CED

THE MAGAZINE OF BROADBAND TECHNOLOGY / JULY 1990

COMPLIANCE

1 GHz bandwith: Is it necessary?

—page 48

Accurately testing fiber optic systems

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The vertical blanking interval: Stretching television's capabilities

—page 30

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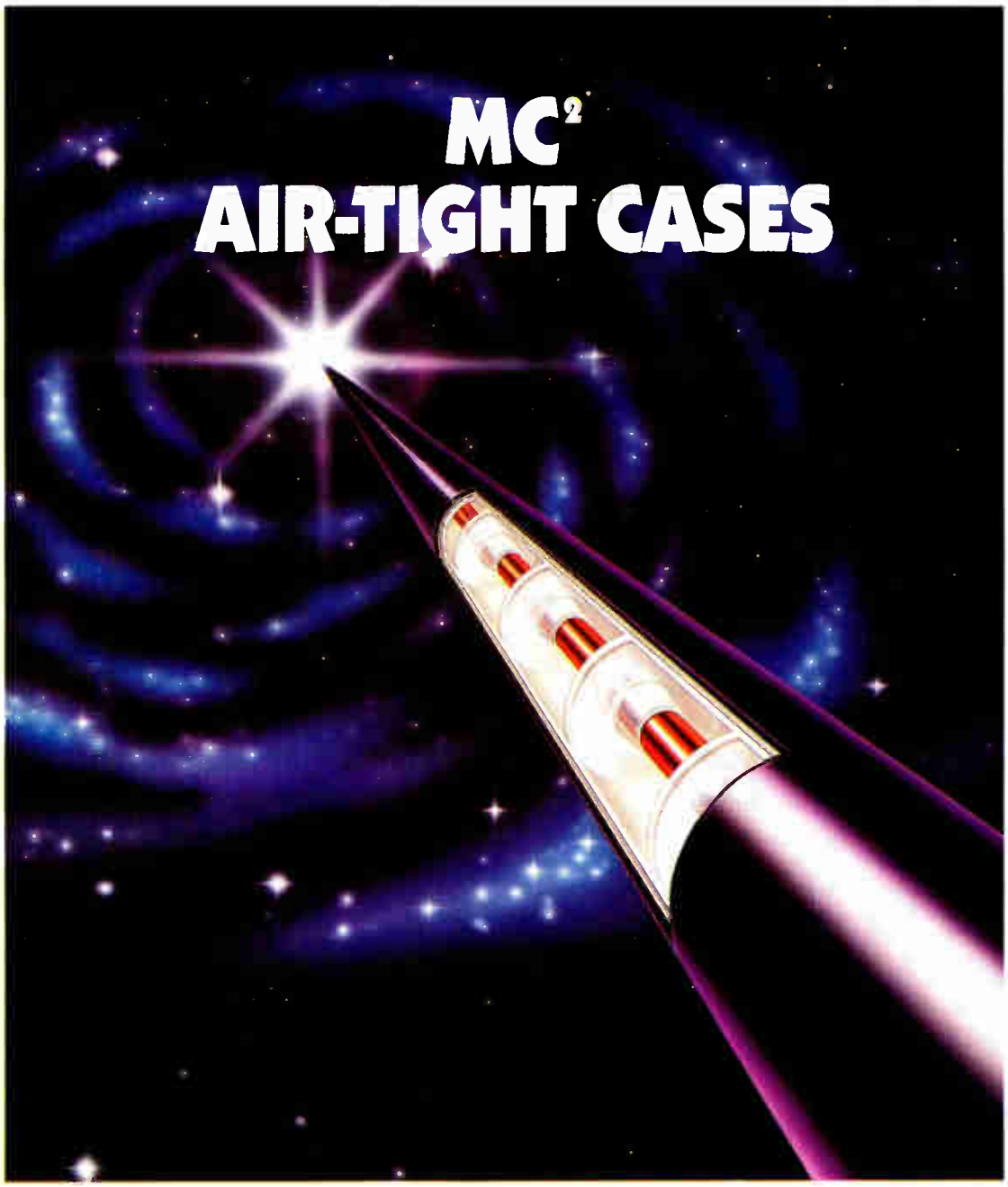

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Services scramble for VBI 30
A tiny portion of the NTSC video signal holds plenty of promise for a variety of services, including program guides, Closed Captioning, and more. This story by Kathy Berlin examines the efforts underway to stretch TV's capabilities and the attempts to do it in an orderly fashion.

Cable-Tec Expo shatters attendance records 39
Three thousand exhibitors and attendees convened in Nashville for the 8th Annual SCTE Cable-Tec Expo, where the attitude was positive, exhibits were jammed with traffic and the industry came to grips with some of its most pressing issues. A recap is given here.

Bandwidth race becomes a marathon 48
Will cable operators ever need a full gigahertz of bandwidth? If so, will it be occupied by 150 6-MHz NTSC channels? What are the hybrid manufacturers up to? These questions and others are examined by *CED*'s Roger Brown and the answers may surprise you.

Improving picture quality with low noise pre-amps 60
Subscribers are getting smarter about picture quality—they recognize and want a better, stronger signal. In this article reprinted from the 1990 NCTA Technical Papers, Dan Maloney of Jerrold Communications takes a close look at converter low noise pre-amplifiers. Future improvements, including fiber optics systems, are also discussed.

Simulated video for fiber optic testing? 66
One of the pitfalls in measuring the electronic performance of fiber optic transmission is simulating actual field conditions in a laboratory atmosphere. Independant fiber consulatant Herzel Laor proposes a new simulated video testing method that tests distortions and carrier-to-noise ratios that provide a better representation of live video signals.

CLI COMPLIANCE

Just when you thought you had it... 74
Now that the CLI compliance deadline is upon us, it seems Murphy's been up to his old tricks again. The FCC made a few little known changes to the paperwork trail and fee structure. *CED*'s Roger Brown explains the changes and how they affect cable operators. An actual Form 155 is included, and can be clipped for duplication and use.

CLI COMPLIANCE

FCC Form 155 changes things just a bit. p. 74

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About the Cover:
The Vertical Blanking Interval can be used to stretch a television's capabilities. Photo by Don Riley.

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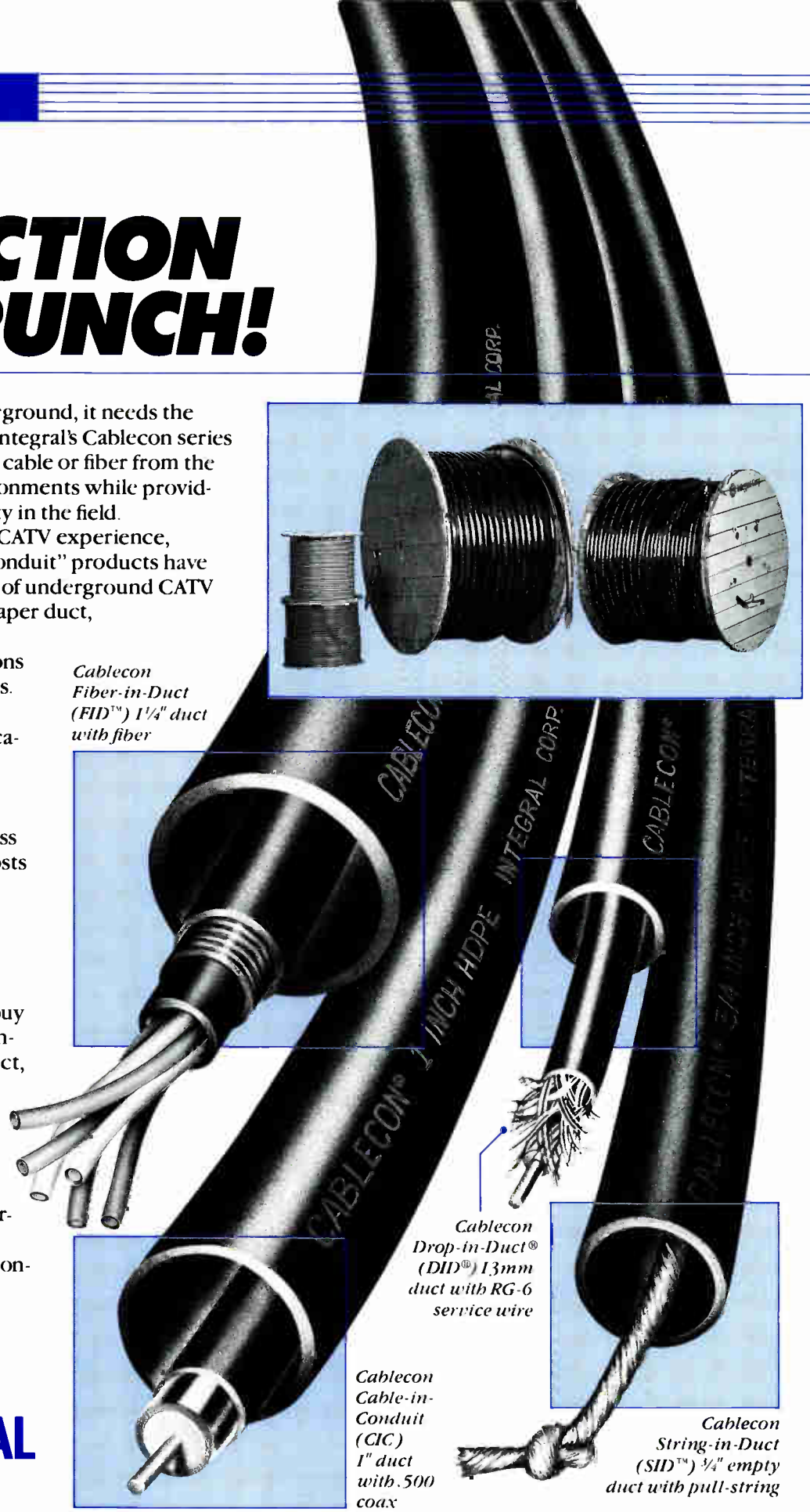

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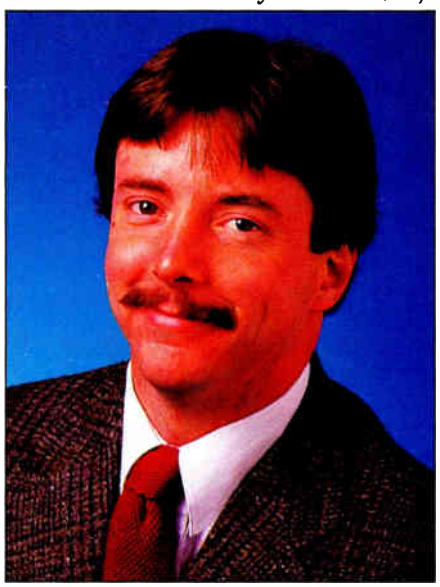
Don't lose sight of today's needs

Two pieces of information—one near the front of this month's issue and another near the back—dramatically show both the potential this industry holds technologically as well as the distance yet to go in subscriber's eyes.

As mentioned in "Color Bursts" on page 10, General Instrument's VideoCipher Division may well have made a technological breakthrough that would allow 1.2 gigabits of video information to be transmitted over a single 6 MHz channel allotment. The breakthrough here is in video compression, which suddenly has become the hottest topic of conversation in television.

In fact, staying abreast of the compression claims made by various labs, organizations and vendors has kept much of the trade press busy interviewing experts about motion artifacts and picture quality and speculating about its ramifications on the development of digital television.



Keeping up with the dizzying pace of research, claims and counterclaims is worthwhile, but as this month's "Cable Poll" indicates, cable operators should dedicate more effort toward improving the product they already have because it's clear they collectively don't expend as much effort or resources toward eliminating subscriber frustration as they should.

If only there was a way to quantify the benefits of being a truly transparent medium that delivers high quality programming on demand, then perhaps more operators would adopt strategies designed to get out of the house and viewers' way. But because cable-TV is a cash flow business and heavily dependent on stockholders, they aren't about to surrender the ready cash represented by additional outlets, converter and remote control rentals and VCR set-ups.

Extrapolating from the respondents contacted for the poll, located on page 88, a large majority of the nation's operators rely on the transmission of scrambled signals, which require decoders placed before the TV. Converter rental fees are often charged, even when viewers have purchased cable-ready receivers. And nearly one-third continue to charge their subscribers to set up VCRs. While many operators express great interest in off-premise technology, which has the potential of removing the entire plant out of the house much the way the telephone industry did after the Consent Decree, a large percentage are scared off by cost and reliability issues that may not be true anymore.

Yes, some new ground is being broken. Major MSOs are beginning to embrace outdoor addressability and numerous vendors plan major product introductions in this area. Other operators are giving up on AOs and remote rental fees as consumers realize they're being milked. But there's a long way yet to go.

It may be an uncomfortable thought, but the industry at large should determine how it can abandon its old methods of operating and substitute new procedures aimed at enhancing the perceived value of cable service. There's no doubt this fundamental shift will take time. But it is probably time well spent, judging from the number of competitors who would love to eat cable's lunch.

While issues like digital television, bandwidth compression and other cutting edge technologies will continue to dominate the news, operators need to realize that more down-to-earth issues should dominate their thinking.

Roger J. Brown

Roger Brown
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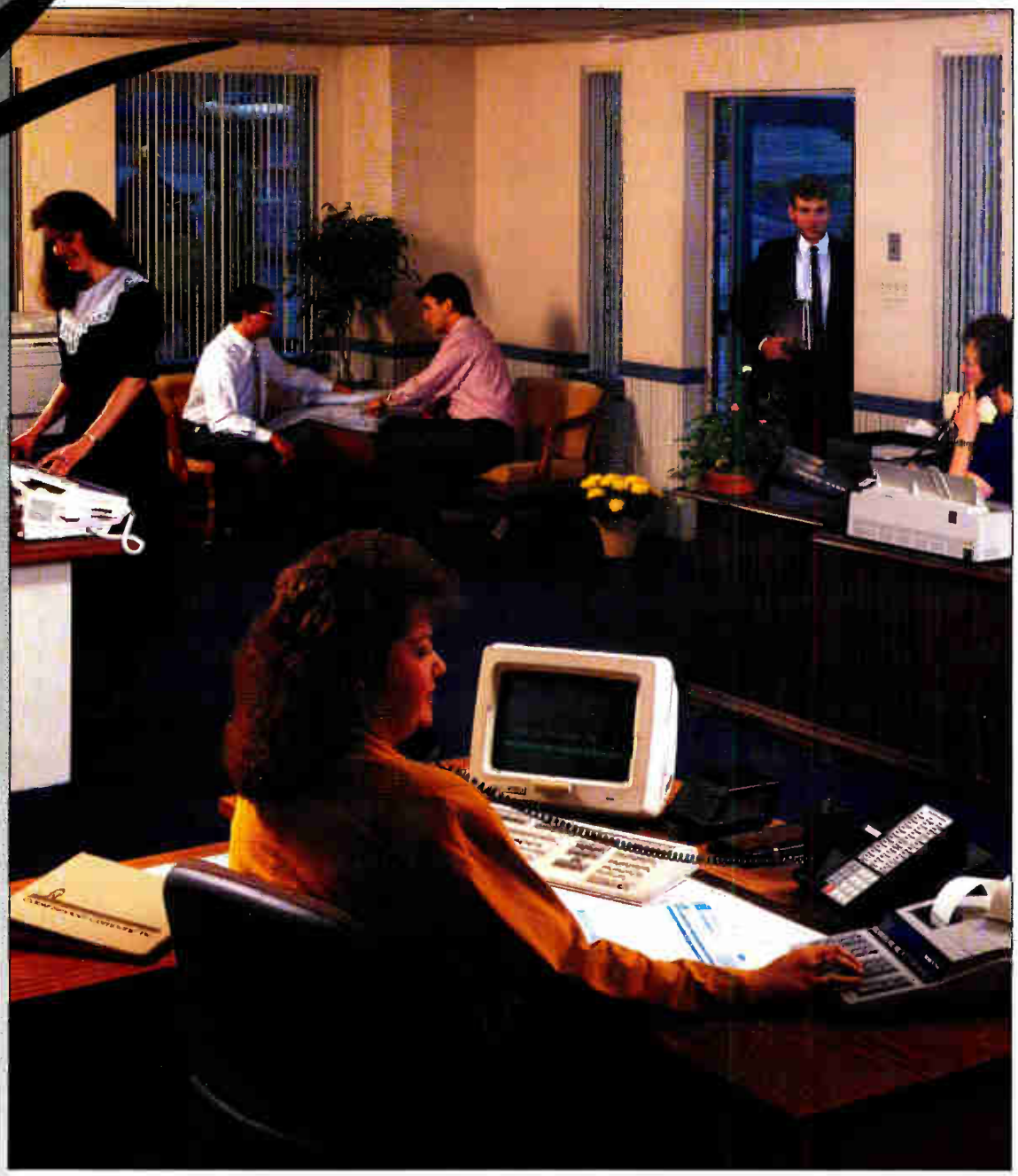

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Reader Service Number 5

VideoCipher surprises industry with HDTV system development

Just when it seemed like the number of HDTV proponents was dwindling, a new, unexpected player has entered the game. Reporters who attended a hastily called press conference in San Diego by General Instrument's VideoCipher Division were given a demonstration of the first all-digital system proposed to deliver high definition signals throughout North America.

GI barely beat the deadline for submissions when it applied to the Federal Communications Commission and paid the necessary testing fees for its technology, presently called DigiCipher. The application was made to Richard Wiley, chairman of the FCC's Advisory Committee on Advanced Television Services. The testing is slated to begin as early as November and is supposed to conclude by the end of 1991.

An all-digital simulcast system, DigiCipher proposes to send a compressed HDTV signal within a 6-MHz channel. NTSC signals would continue to be transmitted on currently assigned channels and the DigiCipher signal would be transmitted on a second channel, viewable only by new HDTV receivers.

According to VideoCipher executives, DigiCipher will work for broadcast, direct broadcast satellite or cable TV systems. It is also dynamically reconfigurable, which means the level of compression can be varied from 2-to-1 to 10-to-1 on satellites and 2-to-1 to 5-to-1 on cable. This feature allows for less compression to be used during video sequences with high levels of motion (such as sporting events) and more compression to be used when less motion is evident (movies, for instance).

DigiCipher is a 1,050-line, interlaced system operating at 59.94 fields per second and displays a picture with 16:9 aspect ratio. Each video channel is accompanied by two to four channels of digital audio. Signal compression is achieved through both intraframe and interframe coding and temporal and spatial compression.

DigiCipher signals will begin to be transmitted by satellite beginning in November, according to VideoCipher officials, with equipment ready for testing by the Advanced Television Testing Center and CableLabs beginning in February of next year. If the system is selected by the FCC as the North American standard, HD television receivers may cost only $100 more than an NTSC color receiver, executives say.

While this technology seems to give American manufacturers an edge over their Japanese and European counterparts, industry experts were quick to point out that DigiCipher must pass critical broadcast testing before it can be hailed as a breakthrough. However, on paper, it appears to give Zenith (whose SC-HDTV system many felt had an inside track on being selected as the standard) a real run for the money.

An all-digital simulcast system, DigiCipher proposes to send a compressed HDTV signal within a 6-MHz channel. NTSC signals would continue to be transmitted on currently assigned channels.

In other news from VideoCipher, consumers who upgrade their satellite-TV systems to VideoCipher II-Plus technology can now add a VideoPal pay-per-view ordering device for just $30 more. That makes the upgrade price for a VC II-Plus module and the VideoPal $159 plus shipping and handling.

VideoCipher has offered consumers the opportunity to upgrade from VC II to VC II-Plus units for $129 plus shipping and handling, since May 1. VC II-Plus is a second-generation security module developed by GI in response to widespread cloning, or pirating, of the original VideoCipher II module, an industry *de facto* standard developed to descramble programmers' scrambled signals.

The VideoPal unit, a modem which connects to the VideoCipher II descramber, carries a suggested retail price of $129. It allows consumers to instantly order movies, regional sporting events and special events from up to 15 different channels at the touch of a button.

TCI embraces S-A interdiction

Industry acceptance of Scientific-Atlanta's outdoor interdiction system took a giant step forward recently when Tele-Communications Inc., the nation's largest multiple system operator, pledged to deploy the single-dwelling unit version of the device in a number of its systems around the country. The announcement closely followed Jones Intercable's decision to install the aerially mounted, four-port device in its Elgin, Ill. rebuild and Warner's successful test of the technology in Williamsburg, Va.

TCI was drawn to interdiction because of its customer friendly features and flexibility, said J.C. Sparkman, TCI executive vice president. Sparkman said that TCI studies unveiled cable-ready devices in 65 percent of thier subscriber's homes. In a test campaign that lowered monthly rates for those subscribers returning converters, 10 to 15 percent returned equipment within the first two weeks. Additionally, Sparkman said, focus group studies conducted throughout the country showed the number-one request from subscribers was choice, combined with ease of use.

These factors, combined with regulatory uncertainties which may force a return to programming tiers, led TCI officials to look at interdiction because of the flexibility it offers, Sparkman said. The single dwelling unit configuration allows for interdiction of about 48 channels individually while leaving channels 2 through 13 available as a basic tier. It also allows the cable system operator to perform all connects, disconnects, upgrades, downgrades and program changes remotely, avoiding costly truck rolls.

TCI will mount the device on the outside of the home. S-A engineers designed the electronics to fit in the

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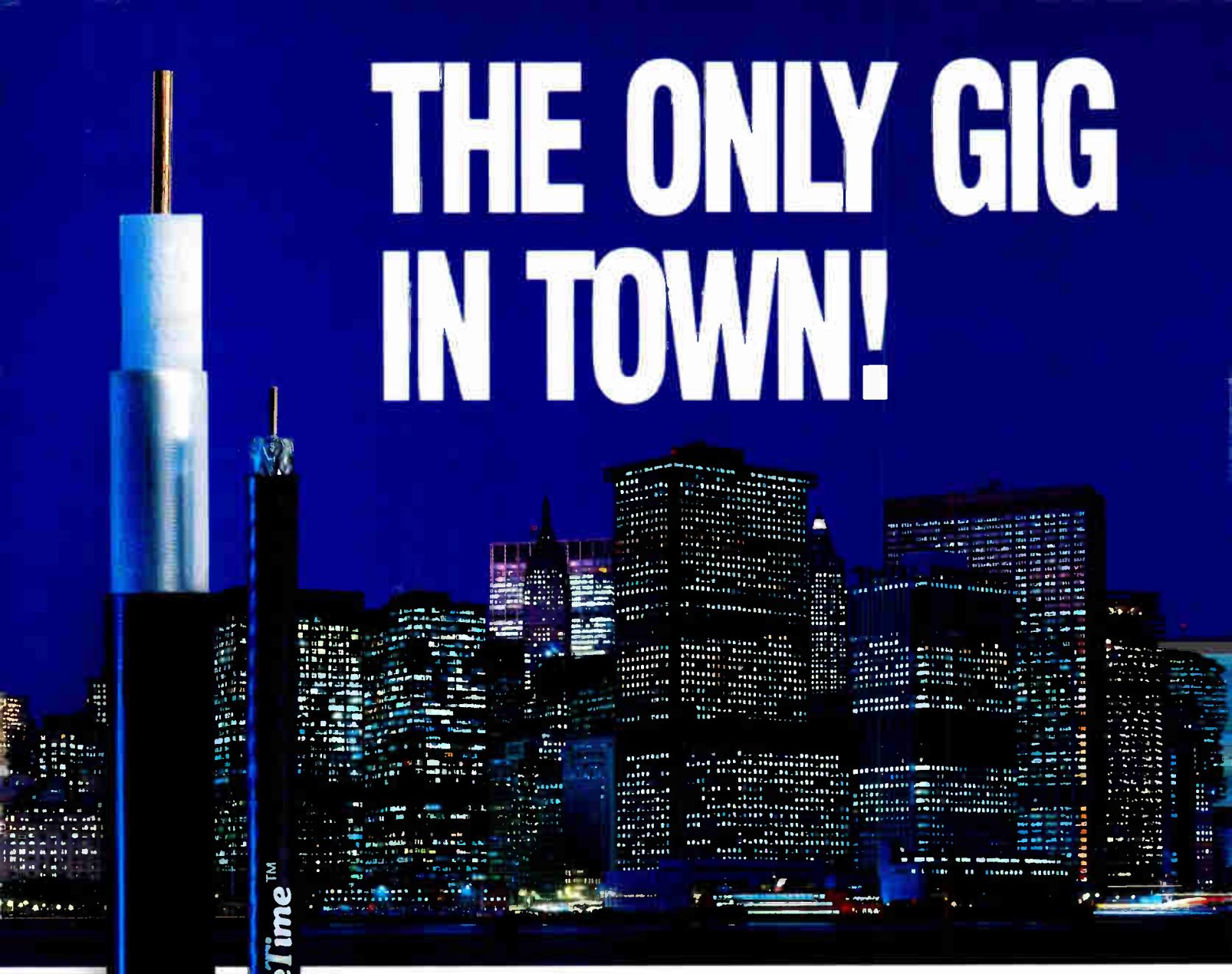

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Reader Service Number 6

Larry Lehman

Giving more than you take

"I think it's important to be active," says Larry Lehman, vice president of technology and planning for Cencom Cable Associates Inc. "You cannot just sit and let things happen." This simple statement is a quiet reflection of a man who believes contributing to cable activities not only benefits the industry but is an excellent learning experience for himself.

Lehman's own experience began in 1973, after graduating from the University of Texas with a degree in mechanical engineering. Through college interviews, Lehman joined Southwestern Bell in the outside plant engineering organization. During the next 10 years, Lehman stayed with the outside plant group in various management and plant engineering positions. In 1983, he moved to the corporate headquarters in St. Louis as part of the Strategic Planning/Business Opportunity Planning Group of Southwestern Bell.

"There's a lot of similarities in the outside plant engineering work I did and the outside plant in the cable industry," says Lehman. "And then, the strategic planning opportunity work was very important. It gave me a feel for how that process should work as well as potential opportunities that do exist."

It was actually the planning job at Southwestern Bell that helped Lehman become involved with the cable industry. One of the areas Lehman was supposed to examine for potential business opportunities was cable television. "At that point," muses Lehman, "we were specifically looking at such things as automatic number identification (ANI) services to offer to cable, the potential of providing transport."

It was while reading *CableVision* magazine that Lehman stumbled upon the job with Cencom Cable. "I saw the advertisement for this position, read it, and thought that whoever wrote the job description knew Larry Lehman," says Lehman. Although he was happy where he was, Lehman told himself this was something he needed to pursue, so he quickly put together a resume.

"Cencom was small, fairly young in their corporate history," remembers Lehman. "They were looking for someone outside of the cable industry and I fit." So, in 1985, Lehman joined Cencom Cable as vice president of engineering. He assumed his present position in October of 1988, a year after he finished his masters degree in business administration.

Looking back on the transition from a large telephone company to the smaller cable company, Lehman sees it as "going from a huge, bureaucratic organization to a company that, at that point, had less than 90,000 subscribers and a corporate office staff of 20 bodies.

'No regrets'

But it was this change that intrigued Lehman about the move and he looks back on it with "absolutely no regrets." His current position as vice president of technology and planning involves technology accessment, basic long range planning, a "what do we need to be preparing ourselves for?" asks Lehman. "What do we need to be doing to be a competitive force in the future?"

In Lehman's eyes, the potential for direct competition is going to become greater as time evolves. "My position is, as long as we're already there—providing multichannel video service—as long as we continue to improve that service, pay attention to our customers and do what they want, and provide them with quality service at a reasonable price, we can meet any competition that comes along."

But in order to provide customers with quality service, Lehman also sees a need industry personnel. To Lehman, the Society of Cable Television Engineers (SCTE), is an excellent means of accomplishing that training. This prompted his involvement in 1986 with getting the St. Louis area MSOs—Cencom, Continental and TCI—together in an effort to start the Gateway Chapter of the SCTE.

Pulling together

"The SCTE at that time was really starting to expand," says Lehman. "It takes an individual or a group of individuals to be willing to put together the effort to get something like that off the ground." Lehman called the appropriate people together, found there was "desire in all parties parts to get this founded and basically just called a meeting." Lehman served as the first president of the Gateway Chapter.

But Lehman's involvement in the cable industry didn't stop there. He is currently a member of the SCTE Planning Policy Committee and the CableTec Expo 1990 Program Committee. Lehman is also an active member of the CableLabs Technical Advisory Committee (TAC) and is chairman of the Technologies for New Business subcommittee as well as a member of the TAC steering committee. He has moderated and spoken on several technical sessions at industry shows.

"These various entities won't exist and can't accomplish anything if people aren't willing to put in the time necessary to make them happen," says Lehman of his committee activities. "People have to be willing to volunteer their time and put in the effort to get things done. Personally, hopefully, what I contribute is some of my experience, experiences from Southwestern Bell and from doing long range and strategic planning."

This strategic planning is an integral part of Lehman's outlook. With fiber continuing to be a key focus, and Cencom deploying one of the largest fiber builds in the country, Lehman has his work cut out for him. "I think there are enough technical challenges out there that will be necessary to continue to evaluate technology potentials—to continue to look at the most efficient means of providing quality service to our customers," says Lehman.

"And I think that there will be enough outside influences, potential competitors, that we'll need to make sure we are looking to the future. We can't just operate in today, we have to continue to make sure we are prepared for the next several years at whatever point in time we are." ■

—Kathy Berlin

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Over the past couple of years, we have been subjected to a virtual avalanche of information about fiber optics. A lot of people want to know what cable's interest is in this technology. While telephone companies have been ballyhooing their interest in fiber for several years now and making disparaging remarks about the cable television industry's lack of expertise or interest in this magical, marvelous medium, the cable industry's engineering community has been quietly beavering away in an effort to meet three specific goals in the fiber optic area. These goals will surely help change the way American television will be delivered in the future.

First and perhaps most important of these goals has been gaining the interest of the leading technical thinkers in the cable industry business and having them understand the potential of this new medium.

The second goal has been to discover exactly what pieces and parts are missing from the mix of technologies and opto-electronic products that would allow us to make more efficient and creative use of fiber in our systems.

The third goal has been learning to do something to address the gap created by the first two goals.

By Wendell Bailey, Vice President Science & Technology, NCTA

Cable's goals

The first goal has been accomplished over a considerable period of time by the combined efforts of cable's technical leaders and thinkers, as well as by the efforts put forth by the many business managers who have worked with the engineers and technicians in trying to understand what this new field could mean to those of us in the cable television business. This was done, of course, without any fanfare and with very little in the way of press or comment. Even so, it seems that the second and third goals were being achieved at virtually the same time.

At the recently concluded NCTA convention, there were literally dozens of interesting new products in the fiber optic area. This fact, coupled with all of the activity and products I have seen at recent fiber optic vendor conferences and meetings on fiber and opto-electronics technology, appears to indicate that the distinct possibility exists for the rapid development of products and technologies which will radically expand the possibilities for architectural creativity in the cable television engineering community. Pieces and parts that will perform a variety of functions will be made available by the scientists and vendors. It also looks like they'll be made available in the way that the cable television industry likes best: designed to solve our problems and in quantities and prices that enable us to use them immediately.

> It now appears likely that American television homes will be served by fiber optics provided by cable television systems.

Vendors are responding

Vendors have been listening to what cable people want to do. They have been making advances in materials and electronics as well as science and in engineering design. They have come to us with proposed products which they believe meet cable's needs, and have listened carefully to our feedback on their efforts. This has resulted in great progress for equipment specially designed for the cable television industry. If someone were to ask any of these any vendors why they, all of a sudden, are working so diligently with so many of the cable people, they would all say the same thing—compared to working with other fiber optic users, the cable people are almost unique in their attitude of "If you'll make it the way we want, we will buy it and use it right now."

Most other industries react differently to this type of opportunity or situation. Studies are called for and carried out as necessary, committee lists are drawn up and members appointed, specifications are debated and general bureaucratic malaise begins to slow down innovation and creativity.

Cooperation breeds success

Cable people, at least on the engineering side, have always been pragmatic and creative. This delightful combination means that if hardware vendors and suppliers will work with us to develop products that give us options and alternatives for solving some of our problems, we will use them—and use them now. It now appears not only possible, but likely, that more American television homes will be served by fiber optics provided by cable television systems than are likely to be served by fiber optics supplied by anyone else.

Perhaps most importantly, this scenario is likely to be realized much, much sooner than anyone ever thought imaginable. The fiber systems which are deployed by cable operators may not go all the way into the home in the short run, but 98 percent of the benefits to be derived from this technology will eventually be delivered to our subscribers. All of this will occur at a price that is very reasonable and in a time frame that will make our business and service goals easier to reach. As an industry, we are truly blessed with having so many creative engineers and so many willing and enthusiastic suppliers. By working together in the future as we have in the past, this will continue to be a healthy and vigorous industry. ■

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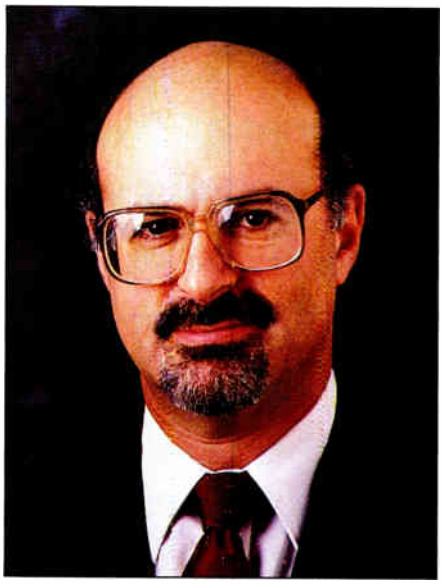

Digital sound broadcasting

You've all heard about high definition television, but have you heard of "high definition radio?" If you are part of the cable industry, then you have. It goes under the brand names Digital Cable Radio, Digital Music Express and Digital Planet (as Dave Barry would say, I am NOT making up this name). These three cable services will soon be delivering digital compact disc quality sound to the home.

In addition, a company has just filed an application at the FCC for satellite delivery of CD-quality sound programming. And satellite sound broadcasting will be one of the major agenda items at a 1992 international conference on radio spectrum allocations.

Digital cable sound services

The three digital cable sound services are similar in concept. The subscriber receives a number of different programming formats—pop hits, country music, soft rock, classical, contemporary jazz, etc. The programming is digitally encoded at a satellite uplink, transmitted by satellite to cable headends, processed at the headends to add subscriber addressing information, and then transmitted—still in digital form—to the home.

By Jeffrey Krauss, Independent Telecommunications Policy Consultant and President of Telecommunications and Technology Policy of Rockville, Md.

These services do not use the same digital coding as compact discs. Compact discs are encoded using a linear pulse code modulation (PCM) algorithm. The sampling rate is 44.1 kilosamples per second. Each sample is encoded into 16 digital bits. The result is a data transfer rate of 700 kbps per channel, or 1.4 Mbps for a stereo pair.

PCM may be fine for a pre-recorded medium, but it is less than optimal for a transmitted signal. First, the data rate is too high, and would require too large a channel capacity on the cable. Cable systems do not have unlimited capacity, and more radio programming channels can be carried if the channel bandwidth requirement is decreased. The answer to this problem is digital compression.

Second, PCM behaves badly in the presence of data bit errors. All transmission channels are imperfect because of noise and interference, which cause bit errors in the transmitted signals. Consequently, two of the three digital cable sound services have chosen an encoding format known as adaptive delta modulation (ADM) that was developed by Dolby Labs.

In PCM systems, a bit error can produce an objectionably loud click or pop. In ADM systems, the bit error produces a sound at very low volume level, so low that it is often masked by the program material. An ADM system can operate acceptably with bit errors up to 10 times the level at which a PCM system would be come unusable.

ADM also provides compression. Like PCM, an ADM system samples the audio, but then compares the sample with the previous sample and only transmits the information that has changed. Since most audio programming changes slowly over time, less information must be sent to fully describe the audio programming. Consequently, a lower data rate is needed for ADM than for PCM.

The Dolby ADM system has the additional advantage of low cost. In this system, the encoder is rather complex and expensive, but the decoders are simple and inexpensive. Only limited precision components are required in the decoders, as compared to the higher precision required in PCM decoders to avoid non-linearities or long term drift.

Although the first digital sound transmission services to enter the market will use cable, the next round will be delivered to subscribers by satellite.

Satellite sound broadcasting

On May 18, 1990, a new company called Satellite CD Radio Inc. filed an application at the FCC to launch and operate a digital satellite sound broadcasting service. This company proposes to transmit up to 66 channels of digital stereo sound programming. Unlike cable sound services, this service will be able to serve car radios as well as radios in the home.

Satellite CD Sound proposes to operate this system in the 1470 MHz to 1530 MHz band. This band is now used for telemetry from the flight testing of new aircraft and missile systems. It is used only around some Air Force bases and around the factories of aircraft manufacturers such as Boeing and Cessna. There is an excellent chance that the FCC will allocate this spectrum for satellite sound broadcasting, particularly if it is allocated internationally for this service.

1992 WARC

Every five to 10 years, the countries of the world get together to review the allocated uses of the radio spectrum and to allocate spectrum for new services. The decisions of these conferences have the force of international treaties. In 1992, the World Administrative Radio Conference (WARC) will consider whether to allocate spectrum for satellite sound broadcasting somewhere in the range between 500 MHz and 3 GHz. The FCC has a proceeding underway to plan a U.S. position on WARC issues.

Prior to the Satellite CD Radio application, it appeared that only the Europeans had an interest in the subject. A research program under the sponsorship of the European Broadcasting Union, known as Eureka 147, was started in 1987 and has devoted enormous resources to the development of digital audio broadcasting technology. Participants in Eureka 147 come from Germany, Netherlands, France and the United Kingdom.

The Europeans have developed a digital sound coding algorithm that they call Musicam. Philips, one of the leading participants, is expected to use this sound coding technology in the HDTV format that it is proposing for U.S. terrestrial TV broadcasting.

The only group that has not been heard from is the U.S. FM radio broadcasters. Not a sound. ■

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An extended fiber plan

More than a year ago, on behalf of our client, Hong King Cable Communications Ltd., I prepared a plan for an extended optical fiber network in Hong Kong. My plan actually preceded by about a year ATC's nearly identical "Fiber Trunk and Feeder" (FTF) architecture. Although my plan was not put down as brutally as was Galileo's insistence in the 16th century that the earth revolves about the sun, it did encounter considerable skepticism.

I sensed that the enormous density of Hong Kong's population might present a unique opportunity to design a major urban cable TV network without any cascaded trunk stations. One of the most astonishing scenes in my recollection is the view from the aircraft on final approach to Hong Kong Airport: High-rise buildings everywhere! Even Manhattan pales beside it.

The average density calculated for the Hong Kong cable plant was nearly 2,000 passings per mile of underground duct route; 6,000 or more in some sections. When completed, the Hong Kong system will pass more than 1.5 million serviceable dwelling units.

The base plan for Hong Kong included optical fiber links from the headend to 17 distribution hubs (i.e. nodes). Four of these, at 16 km to 26 km, would use FM transmission; the other 13, at 2 km to 10 km, would use VSB/AM. Cascades of up to 12 trunk amplifiers would be needed at each hub to serve up to about 140,000 homes each.

By Archer S. Taylor, Senior Vice President Engineering, Malarkey-Taylor Associates

Density supports fiber optic extension

It was found that in many sections, buildings were close enough together to be connected to a fiber node without any trunk amplifiers. Of course, such large buildings would require their own internal distribution amplification, but this would be needed in any case. The cost of the optical receiver node to feed such building clusters would be no more than a few dollars per home passed.

But we needed many more than the 17 nodes in the base plan. To start with, we proposed to change the AM links to FM, with an optical loss budget of 17 dB to 20 dB each. Even with a four-way optical power splitter, each FM link could still be extended up to 20 km or 26 km. This would provide for up to 68 FM nodes, each with headend signal quality. FM nodes are expensive, but because the cost of each one could be allocated to 20,000 to 30,000 homes, the cost per home passed was still quite nominal.

Several VSB/AM lasers installed in each FM node could drive three or four separate, relatively short AM links, each of which could be split two ways. The 6 dB to 8 dB optical loss budget available last year for AM fiber transmission could be split once and the fiber could still be extended from the FM node to a distance of 5 km to 9 km. Thus, if the 68 FM nodes were equipped with four AM optical transmitters, each could feed a total of 272 AM fiber links.

Each of the 272 AM nodes could be split two ways for a total of 544 AM nodes. Even with all of these optical power splits, each of the FM links could be extended to between 20 km and 26 km (12.4 or 16.2 miles); and each AM link, between 5 km to 9 km (3.1 or 5.6 miles). The total reach could be as much as 25 to 35 km (15.5 to 21.8 miles) without AM fiber repeaters.

The EFP/FTF architecture simply divides each backbone fiber with optical power splitters to create two, three or four distribution nodes. It is this "split ends" configuration that led Bob Luff, in his inimitable way, to call it "tree and bush."

A year ago, with only 6 dB to 8 dB AM optical loss budget available, we had to be content with two-way splitters. However, the high density in Hong Kong made it economically feasible to use FM for the fiber backbones in order to provide enough of the lower cost AM nodes to do the job. If 10 dB to 12 dB budgets become available at 54 dB C/N ratio, four-way splitters would be feasible, and the FM links might not be needed. The use of AM optical repeaters, consisting of back-to-back pairs of optical receivers and AM lasers, is a neat way to extend the fiber network, providing care is taken to avoid degrading the C/N ratio.

In the near future, photonic amplifiers may be suitable for this purpose. Until we know more about the transmission characteristics of HDTV signals, however, I think we need to be wary of the as yet unknown extent to which AM repeaters or photonic amplifiers might degrade C/N ratios at customer outlets. We need also to evaluate the effect of connector and splitter return loss on HDTV signals.

Nevertheless, it is clear to me that, whether we call it EFP, FTF, or "tree and bush," the future network architecture for optical fiber distribution of cable TV services is rapidly taking shape. It is already technically sound and economically feasible. Probably the most important future development will be a substantial reduction in the cost of optical receivers.

The next phase of this development is likely to involve some variant of the ring topology for metropolitan networks, such as is presently evolving in Toronto, and digital video transmission. The redundant routing capability of the ring assures greater reliability and maintainability. Moreover, it can be designed with plenty of capacity in each direction and is free from the upstream noise accumulation inherent in two-way tree-and-branch networks.

Developments in optical fiber technology are coming so rapidly that what seems reasonable today is likely to be obsolete long before it is worn out or fully depreciated. But waiting for technology to become fully proven and stabilized for the long haul confronts the even more serious risk of being trampled to death by those who chose not to wait.

The prudent operator will weigh the costs of correcting the mistakes of moving too fast against those of hanging back too long. There is no clear or proper solution to this conundrum. In a sense, it is what this business is all about. ■

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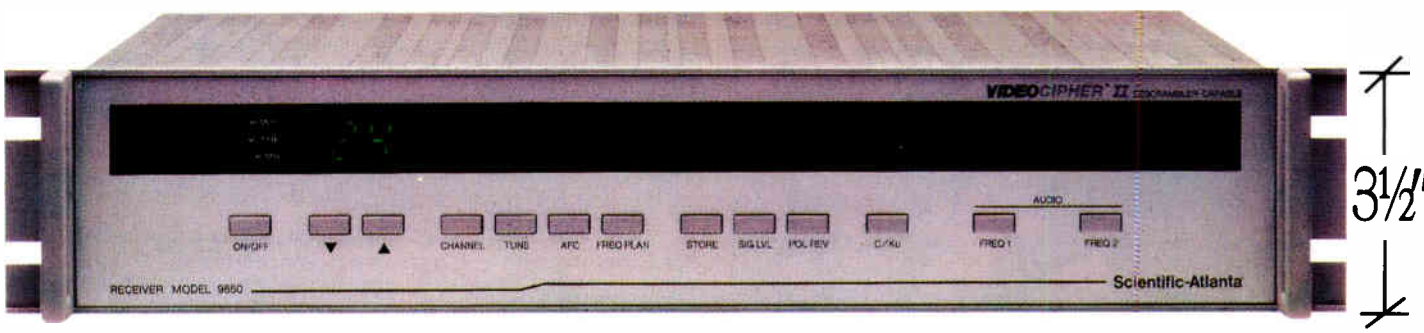

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Inaccurate statement

In George Sell's article, "Outside-premise conversion: Who should power?" (*CED*, May 1990, p. 35) he highlights the important issue of powering and the considerations an operator needs to consider. I was pleased Scientific-Atlanta received coverage. However, I am concerned by an inaccurate statement.

In the second-to-last paragraph in column two, an "unnamed" competitor referred to results of a Scientific-Atlanta/Warner field test. Specifically, the number of subscribers and the number of power supplies were not correct. The field test incorporates 213 subscribers. In addition, Warner installed four *additional* power supplies, but publicly states that two additional power supplies would have been sufficient.

Even though everyone was "unnamed" in the paragraph, most of your readers know who is who. The reference to our field test results should come from the vendor, or even the operator—not our competition.

Angela Bauer
Scientific-Atlanta

The advantages of termination

Recently, a question arose at my company: "Is it really necessary to terminate unused tap ports—not for security, but for system response?" Now we seem to be at a deadlock on the subject. It seems to me that if you did not terminate unused tap ports, system response would be greatly inaccurate compared to a system in which all tap ports were terminated. Remember, this question has nothing to with security; just system response.

I read *CED* monthly and save all issues for future reference. As such, would it be possible for *CED* to print this topic in your excellent magazine? Please answer this major question for use as an industry.

Scott Mann, Dimension Cable
Rancho Palos Verdes, Calif.

We took this question to Tom Jokerst, an engineer working for Continental Cablevision and a member of the CED *Board of Consulting Engineers. He responds:*

I assume when you are referring to "system response" you are concerned about unterminated tap ports creating a situation where the response of the tap is degraded and an accumulation of peak-to-valley response could occur as the signal travels further through the feeder plant.

Let's review a few basics. As I'm sure you know, a distribution system (feeder line) tap is actually an RF directional coupler with its "tap" leg connected to a two-, four- or eight-way splitter (the four- and eight-way splitters are combinations of two-way splitters). This is all accomplished within a single enclosed housing.

Taps vary in value from roughly 35 dB to 4 dB. A 35 dB two-port tap is approximately equal to a 32 dB directional coupler with its tap leg connected to a two-way splitter. On the other hand, an 8 dB two-port tap is effectively a two-way splitter with one leg terminated internally and the other leg connected to another two-way splitter to the output ports.

As you can see, we are dealing with a wide range of directional coupler values used within the taps in cable systems. Directional coupler's peak-to-valley response on the "thru" leg can be affected by the quality of the termination at the "tap" leg. The degree to which the "thru" response is affected varies to a large degree by the value of the directional coupler. For example, a 20 dB or 30 dB directional coupler response would not be greatly affected by the "tap leg" termination, whereas a 3 dB or 6 dB directional coupler's response could be noticeably affected.

Keep in mind that the internal splitter arrangements within the tap present a certain degree of match to the tap leg of the internal directional coupler inside the tap. For example, an unterminated two-way splitter will typically force a 7 dB match (assuming there are no stray parasitic effects, 3.5 dB loss on the incident wave and 3.5 dB loss on the reflected wave). An unterminated four-way splitter will typically force approximately 7 dB x 2, or 14 dB, of match to the internal directional coupler tap leg. This effect helps greatly in presenting a good match to the "tap" leg and therefore has a positive benefit to the "thru" response of the tap overall.

Because taps are directional couplers with two-, four- or eight-way splitters connected to the "tap leg" of the directional coupler, it becomes apparent that the system response could be affected by having unterminated ports. However, this occurs most noticeably with the lower value taps. Keep in mind that all taps are *not* created equal. Taps used in your particular system may be good or poor with regard to the response flatness with unterminated or under-terminated ports.

To find the cutoff value where your taps need to be terminated, you should do some testing. Get out the sweep generator and sweep the different brands and values of your system's taps while varying the terminations on the tap ports. I would suggest using drop cable equal to your average drop length connected to a set-top terminal as a "real life" terminator for half of the tap ports, and 75 ohm F-terminators for the other half.

You should use some feeder cable of approximately 150-foot lengths between the taps to simulate your cable plant. This should allow you to make a more informed decision as to system response effects of unterminated or under-terminated tap ports. (Remember, when making your final determination on whether "to terminate or not to terminate" that a major contribution of system response problems, particularly in older systems, are related to the integrity of the many connections that exist in our systems.)

But wait a minute! Are there any other issues to discuss regarding terminating unused tap ports? How about:

- Drop system response.
- Feeder line reflections.
- Protection of the tap ports from corrosion and the effects of weather.
- Two-way return system ingress.
- RF isolation from drop to drop.
- Security.

Let's touch on each of these briefly.

Drop system response. If unused tap ports are not terminated, the response of the system through that device's tap ports can be *slightly* affected. This is no different than a house drop splitter being unterminated. Is this a problem? Maybe yes, maybe no. Do the peak-to-valley response errors accumulate or do they cancel? It could be either way. In any case, there is generally a "gentle" response discontinuity associated with unterminated splitters (or tap ports). Generally, no deep notches exist such as those that can accumulate on a trunk or feeder line. If you don't want system response errors to accumulate, terminate the ports.

Feeder line reflections. Can unterminated ports on taps cause reflection in the system? Yes, and especially on

"self terminating" taps. Take the case of the 4 dB two-port tap. This is essentially a power blocked two-way splitter connected to the tap ports. If this tap is used on a long feeder line and if neither tap port is terminated, then the tap input does not provide a good match to the feeder line. Reflections can then result, possibly causing ghosts in the picture.

This kind of "ghost," while possibly not being severely noticeable in the pictures, could detrimentally impact high speed vertical blanking interval data used for baseband addressability, etc. (Remember, if the drops are short, they may not be that great of a match to the tap—you may need to "force" a match in this instance.) I personally would prefer to avoid the use of self-terminating taps, especially the two-port variety.

Reflections can also occur when terminators are not used on low value tap ports due to the signal reflecting from the open tap ports back through the splitter and directional coupler to the tap input. This reflection then travels upstream from the tap input back up the feeder line and is reflected each time it sees a discontinuity.

Return system ingress. Is your system using two-way? Do you have problems with ingress? Most system operators I'm familiar with who operate active two-way plant insist on terminating tap ports to prevent the possibility of the tap ports acting as miniature "point sources" and effectively funneling ingress back the upstream path. I can't say how often this occurs, but it would also be more critical with lower value taps. I feel terminating all unused tap ports is a good two-way plant practice.

Tap port protection. Do you have corrosion in your system? Are your tap ports exposed to the elements? If so, terminating or at least capping them is advisable if you want to maintain a good clean electrical contact surface when the tap port is ultimately used.

Drop-to-drop RF isolation. Can we get crosstalk between tap ports? You bet! There may be a situation where a single conversion cable-ready TV/VCR exhibits high levels of local oscillator leakage. This undesired signal "backfeeds" from one subscriber's drop to the next, or others connected to the same tap. To minimize the potential for drop-to-drop interference, terminators can provide a slight improvement in drop-to-drop isolation.

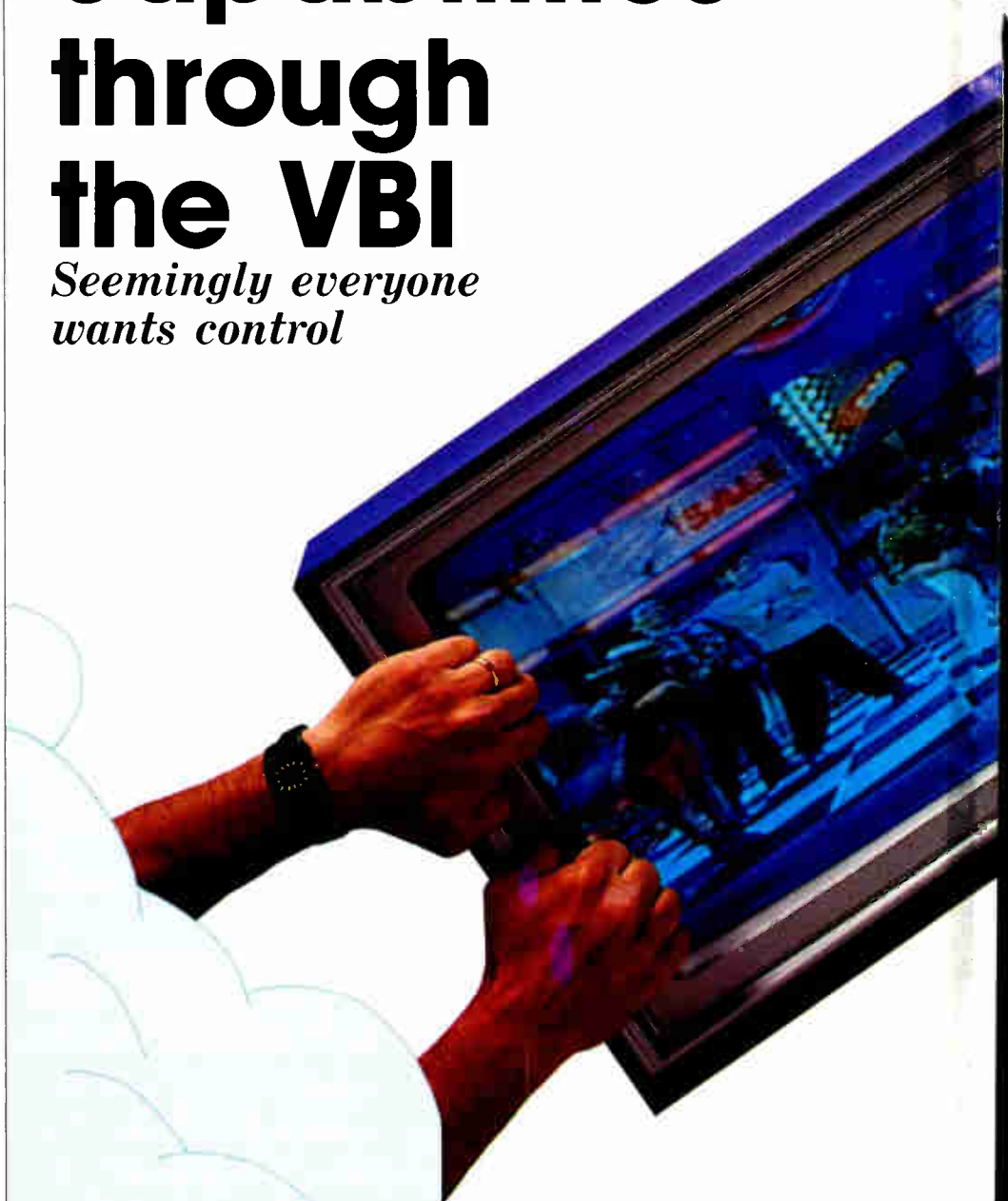
Security. Do you need or want your tap ports to be secured? This certainly varies by locale but it can be another reason on the "plus" side for terminating unused tap ports. If you do this, be sure you select a proven, quality terminator. Many locking terminators have ultimately been the cause of substantial signal leakage and ingress because of corrosion and poor mechanical contact. Test them and talk to other users before you buy.

OK, with all of this said, should we terminate unused tap ports for feeder system response reasons alone? It's probably not mandatory on all taps—just the lower values. However, when considering all of the previous issues mentioned, it is my opinion that terminating unused tap ports is consistent with good engineering practice in a modern cable television system.

Thomas R. Jokerst
Director of Engineering
Continental Cable of Ill., Iowa and Mo.

Stretching the T capabilities through the VBI

Seemingly everyone wants control



Lately, there's been some rumblings and stirring amidst the cable and broadcast industries over a bit of spectrum as old as the National Television Standards Committee (NTSC) itself—the vertical blanking interval (VBI). This prime piece of transmission real estate is piquing the interest of various groups who see this "free" spectrum space as a way to enhance services, embrace new business or simply to secure additional revenue from an existing, and necessary, resource.

This important resource, located on every channel transmitted and containing 10 lines of transmission capacity (for details, see sidebar), has long been used by such players as the cable television industry, the Public Broadcasting Service (PBS), A.C. Nielson and the National Captioning Institute (NCI) to successfully transmit information to millions of television consumers.

However, the success of such companies has also brought a new awareness of the VBI. And with that recognition are more companies who see a way to put that "free" capacity to use, including the broadcast and cable industries. "This is like the Oklahoma land rush," says Claude Baggett, director of systems engineering for Cable Television Laboratories (CableLabs). "Everybody you could possibly think of wants to use the VBI for something."

A few snags

Unfortunately, while many feel there is plenty of capacity to share, there are a few problems when it comes to using and transmitting data via the VBI. First of all, the Federal Communications Commission (FCC) doesn't regulate the VBI except for technical specifications. The Commission allows for certain types of information services and test signals to be transmitted, prohibits the use of Lines 1 through 9 to prevent picture interference and has designated Line 21 for Closed Captioning for the hearing impaired. After that, anyone "can do what they want with it," says Jim McNally, chief of engineering for the Policy Branch of the FCC.

A second problem concerns the right of VBI ownership. According to officials at the FCC, the VBI actually belongs to the licensee of the TV station transmitting it. Yet, because there are no carriage requirements imposed on cable operators at this time (remember, there is no must-carry rule), a cable company is free to strip the VBI if it so desires. It is this possibility of losing information placed in the VBI that has some companies scrambling to share "sacred" lines of the VBI—such as Line 21 or even going beyond the VBI into the actual video picture.

The cable industry itself is one of the first to admit Line 21 looks promising. Through the EIA/NCTA Joint Engi-

"S

neering Committee, a subcommittee has been formed to look at the logistics of using the VBI to set a VCR timer for recording as well as using the VBI for a program guide. "Line 21, the Closed Captioning interval, is one of the prime candidates," says Bob Burroughs, manager of cable products for Panasonic and chairman of the Program Identification subcommittee. "The reason for the possibility of using Line 21 is it seems to be the only line that is used for one purpose and people cannot fool with it." Because Line 21, field one, is designated for Closed Captioning, the committee would have to use Line 21, field two, and work in concert with the NCI.

Although the Program Identification subcommittee is currently active, no final decisions have been made to date. Some of the suggested applications, besides an electronic program guide (EPG) and VCR timer setting (to use the information in the EPG to program the VCR) would be to use the in-band approach for a "Mood Guide" for subcategories such as sports, westerns and drama; an in-home program router for identifying programs which are routed through a CE-Bus type environment when there are a multiplicity of sources; and cataloging and editing of recorded programs with "Program Identification" codes stored in the VBI.[1]

"Our conclusion (at this time)," says Burroughs, "is the program needs to be standardized in order to be viable. We're just looking to make a standard on how you will send information and how it will be used. By making such a standard, the various applications...can be guaranteed by using the standard, the hardware manufacturers will build hardware for it and the programmers will supply information."

Don't want to share

However, for others, the answer to VBI stripping is not in sharing the single "safe" vertical line. Airtrax, a company specializing in ad verification, has taken a different approach to avoid being stripped off the signal. It strips the video in Line 22 and puts in its place a non-return-to-zero code. The code gives information about the commercial (whether it ran, how long it was) and is picked up by a receiver that looks to make sure everything that's supposed to be happening, did indeed happen.

"Line 22 is considered part of the active picture," says Dick Burden, consulting engineer for AirTrax. "And stations never cut part of the active picture." AirTrax was able to do this because "you don't normally see Line 22 because it's at the top of the picture and the overscan causes you to miss the first five or six lines," says Burden.

Unfortunately for AirTrax, A.C. Nielson also decided Line 22 was safe and started using the line for station identification codes. This prompted AirTrax to commission the FCC for rulemaking so that "if we're going to share the line, we have a way of sharing it," says Burden. "It's like having a party line; that's essentially what you've got."

But going to active video lines is seen as unnecessary to others. "There are a lot of VBIs," says Mike Garr, vice president of marketing and operations for PBS' National Datacast Service. "The VBI is part of the 525 lines so it's always there." Stripping is another aspect that is not a deterrent to Garr. "From a practical perspective, it takes a lot of effort to be able to blank out some portions of the TV picture, reinsert them and make sure you don't muck up the rest of the picture."

For Garr, using the VBI is simply tradition. PBS has been using the VBI since 1985 to download information to computers and printers. Two years ago, the National Datacast Service was developed to provide an open pipeline for nationwide coverage of other company's applications. "We take applications that others have developed and provided the transportation medium," says Garr. "Our service uses 10 lines of the VBI, each a unique data channel.

"We also provide the data insertion here," continues Garr, "we provide monitoring of the performance both on

the network level and the local station level." In addition to providing multiplexing, addressing and forward error correction, National Datacast reaches all PBS stations, or approximately 78 million households.

One company taking advantage of National Datacasts' VBI service is the Interactive Network (IN). "Right now, we are sending our data to PBS in Washington," says Bob Brown, vice president of engineering for IN. "They put it on satellite and at the various, individual stations they receive it and use what's called a data bridge which takes it off a national feed and puts in on what they broadcast."

Interactive Network was founded in 1988 with financing from NBC, United Artists, General Electronics, Paul Kagan and Le Group Videotron and allows users to interact with sports and game shows. "The thing to remember about this," says Ann Doremus, assistant product manager for IN, "is it is compatible with existing television shows. We do not develop our own programming." If the interaction is with a football game, users call the play before the ball is snapped, (a logout signal is sent once the ball is snapped to prevent registration of a late call) and the interactive control tells the user how many points he's scored as well as the total score. At the end of the game, a user can see how he fared against others playing at the same time by using the telephone and terminal.

Although currently in beta tests, "the interactive ratings are two to three times what the Nielson ratings are for these programs aired at that time," says Doremus.

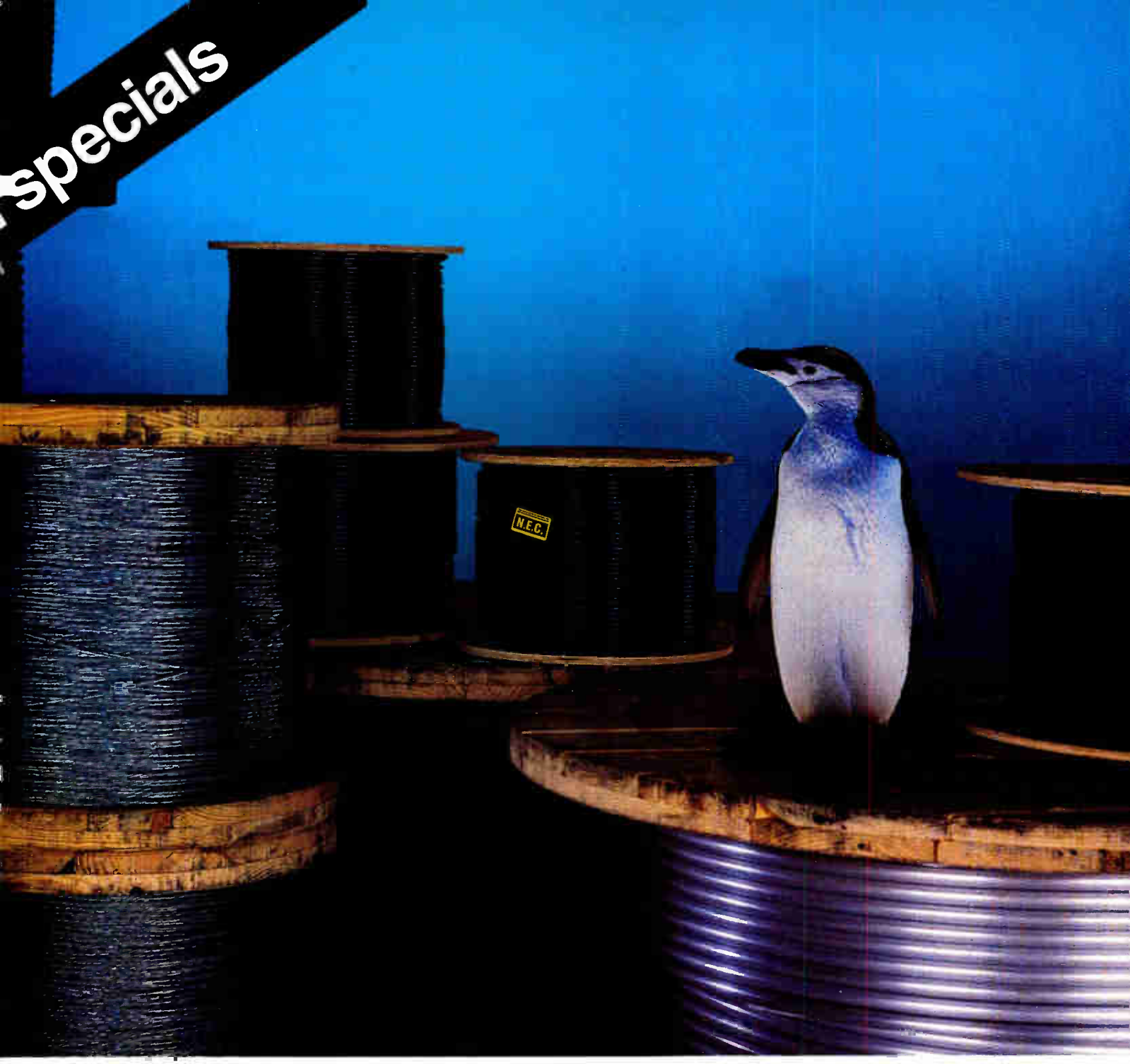
Potential players

Another potential user who sees no problems with using the VBI is the National Association of Broadcasters (NAB). "Right now, broadcasters, by and large, don't deliver anything to the home in the VBI," says Lynn Claudy, staff engineer for the NAB. "But there are a lot of potential uses for the VBI in the future. One we're particularly interested in is a ghost canceling training signal for a receiver that would look like a standard pulse receiver over the air and knowing what that is supposed to look like and what it does look like after its been corrupted by transmission.

"It would benefit the cable industry," says Dan Wells, vice president of business development for Comsat and chairman of the technology group on distribution for the advanced television systems committee (ATSC), when asked about the training signal. "It would be a picture free of ghosts. But the TV set manufacturers have a legitimate question of how expensive the circuitry would be and whether or not the public would pay an additional amount for it," adds Wells.

Another system being proposed that would also use more than a single line of the VBI is by Sitec, a company that works with FaxScans, a process that allows facsimiles to be read directly into a computer. Sitec's primary intent for using the VBI is for distant learning applications. The prototype system, which is now functional, uses six VBI lines, two for data and four for audio.

Yet, because of the many uses of the VBI, Sitec had a conflict with line usage. While doing a demonstration, an uplink truck came in from the University of Alabama that was putting a vertical interval test signal (VITS) on the VBI. Sitec's audio wound up on the same line as the truck's identifier, which caused significant problems. The solution during the demonstration was to turn the identifier off, but "that's the reason we're going to be delayed (with the product) for 60 to 90 days," says Pete Aumann, director of engineering for Sitec. "We need to redesign such that we can control which lines the downlink units will receive the proper signals from on our software



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What is the VBI?

The vertical blanking interval (VBI) of a television channel gets its name because of the physics of the electronics of a television set. The TV receiver is essentially a picture that is painted on the back of a glass tube by a moving electron beam that moves right to left. The beam paints 262 1/2 lines in the first field before returning to the top to paint a second field of 262 1/2 lines. The result is 525 lines for each picture frame.

The VBI is the time alloted for the picture-tracing electron beam to return to the top of the screen. This time interval corresponds to the time required to trace approximately 20 lines of a new frame. The electronic beam must be turned off for this amount of time in order to prevent leaving a stripe across the screen from top to bottom. During this interval, no useful information about the television picture is sent and the time can be used to send data or other information.

VBI allocation

Because the VBI is used to synchronize the picture, the first nine lines of the VBI are the vertical sync itself and cannot be used for transmission purposes. Lines 10 through 20 are open for ancillary services, while Line 21 was reserved in 1976 by the Federal Communications Commission (FCC) for Closed Captioning services.

In 1983, the FCC authorized the use of the VBI for teletext, with none of the rules and regulations, such as "fairness" and equal time requirements, imposed on television broadcasting. It was in 1985 that the FCC opened the VBI for broader classes of ancillary communication services.[1]

The FCC Rules and Regulations, which addresses the use of the VBI, specifically states "(a) Telecommunications services permitted on the VBI service include the transmission of data, processed information, or any other communication in either a digital or analog mode. (b) Telecommunications service on the VBI is of an elective, subsidiary activity. No service guidelines, limitations, or performance standards are applied to it.

The kinds of service that may be provided include but are not limited to teletext, paging, computer software and bulk data distribution, and aural messages. (d) Television licensees are authorized to lease their VBI facilities to outside parties."[2]

The regulations also state that "the use of such signals shall not result in significant degradation of the program transmission of the television broadcast station, nor produce emission outside of the frequency band occupied for normal program transmissions."[3]

Ancillary and test signals can be transmitted on "Lines 10 through 18 and 20, all of Field 1 and Field 2. Use of specific lines to be in accordance with Schedule 1." (See Figure 1.)

Figure 1

	1983	1984	1985	1986	1987	1988	1989	1990	1991
10	X	X	X	X	X	50 IRE ⟷ 70 IRE			
11	X	X	X	X	X	50 IRE ⟷ 70 IRE			
12	X	X	X	X	X	50 IRE ⟷ 70 IRE			
13	X	X	X	X	X	70 IRE	80 IRE	80 IRE	80 IRE
14	40 IRE ⟷ 70 IRE						80 IRE	80 IRE	80 IRE
15	80 IRE ⟷								
16	80 IRE ⟷								
17	80 IRE */** ⟷								
18	80 IRE */** ⟷								
19	***								
20	80 IRE ** ⟷								

* Also authorized for Vertical Interval Test Signals (VITS) that are used with remote controlled transmitters
** Also authorized for SID signals (Source Identification Signals)
*** Presently reserved to the Vertical Interval Reference (VIR) signal

References

1. Stephen B. Weinstein, *Getting the Picture*, The Institute of Electrical and Electronics Engineers Inc., New York, N.Y., p. 238.
2. *Federal Communications Commission, Rules and Regulations*, Volume I-V, Part 73, Section 73.646, Teletext Service, pp. 137, 138.
3. *Federal Communications Commission, Rules and Regulations*, Volume I-V, Part 73, Section 73.658, 21 (ii), p. 148.
4. *Federal Communications Commission, Rules and Regulations*, Volume I-V, Part 73, Section 73.658, 22 (i), p. 149, Schedule 1, p. 150.

Upbeat Cable-Tec Expo shatters records

The CATV re-regulation drumbeat coming from Washington was reduced to faint rumblings at a primarily upbeat annual Cable-Tec Expo and engineering conference hosted by the Society of Cable Television Engineers in Nashville late last month.

With a few notable exceptions, vendors and operators remained highly optimistic about cable television's future (both short- and long-term) and focused on the primary technical issues facing the broadband video industry.

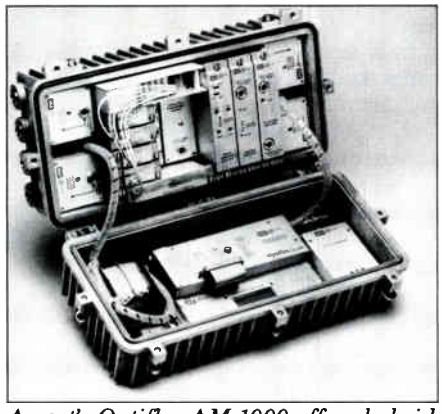
The Expo continued its rise in popularity by setting new attendance figures. According to SCTE staffers, 3,000 participants, including 1,400 exhibiting personnel and 1,600 registrants, attended the three-day conference and Expo at the Nashville Convention Center.

Unlike the National Show held a month earlier, there was less discussion of industry re-regulation, although the uncertainty surrounding that subject remained a stubborn thought in many people's minds. Vendors, however, seemed to concede that some form of re-regulation is inevitable, but have begun to look to overseas markets to offset losses incurred stateside.

One gauge of the Expo's growing importance is the number of new products which were announced and displayed during the proceedings. Hardware vendors, wishing to avoid being overshadowed at the huge NCTA confab are, in many cases, now focusing their product introductions for the SCTE gathering. What follows are highlights from the 1990 event:

Augat/LRC

Augat/LRC made two announcements at this year's SCTE. The first was the official introduction of the new Push-N-Lock indoor premise F-connector. Designed with ease of use and dependability in mind, the Push-N-Lock uses a standard 1/4 inch to 1/4 inch prep, offers universal fit to any port and compatibility with RG-59 and RG-6 cables. The Push-N-Lock features one piece construction, which simplifies installation. One push locks the indoor drop connector in place, and provides a positive RF seal. Augat/LRC has units in beta test now, with full production



Augat's Optiflex AM 1000 offers hybrid coax/fiber-trunking

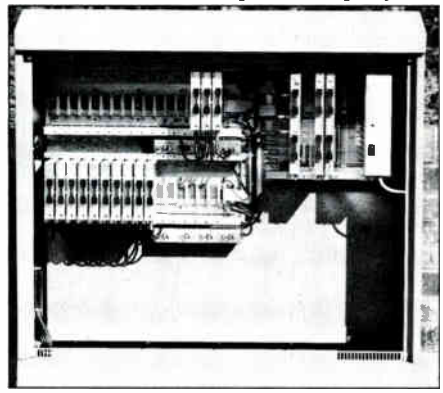
expected this September.

Also introduced was the Optiflex AM 1000 Fiber Trunking System, which offers operators the capability of a hybrid coax/fiber trunk architecture. Optiflex can accommodate standard coax and offers modular upgradability to fiber trunking with the addition of up to four plug-in optical receivers.

Other features include a 1 GHz platform, dual trunk output ports and a redundant coaxial trunk input. Additionally, Optiflex can accommodate push-pull, power doubling or feedforward trunk amplifiers. Local and remote status monitoring enables technicians to monitor AC current, voltage and temperature. According to Augat/LRC officials, the Optiflex is projected to be available in the first quarter of 1990. For more info, call (607) 739-3603.

Cabletime

Cabletime, a European company exhibiting at this year's SCTE, unveiled its new switched star system. Dubbed Cablestar, the switch is in use in various European sites and is said to deliver cable TV, data and telecommunications services into the home. The system offers channel capacity of up to 550 MHz per trunk, with a standard dual trunk capability—giving operators up to 1 GHz of spectrum. Services offered with Cablestar include channel tiering, impulse PPV, audience analysis, telephony, interactive television and data.



Cabletime's new switchstar interactive cable TV system, CABLESTAR

Exhibited at the show was an electronic mail system that enables subscribers in a cable network to send messages over the network with an alphanumeric keypad in the home. Also demonstrated was the Cablephone service, where telephony is integrated onto the drop cable of the network so that one cable delivers TV, telephony and fax into the home. For more info, contact Cabletime at (0635)35111 in Berkshire, England.

Cable Prep

Cable Prep, a division of **Ben Hughes Communication Products Co.**, has introduced a new drop cable stripping tool for RG-6 and RG-59 cable. Called the CPT 6590, the new tool features a lifetime warranty, safety yellow color, industry standard stripping dimensions, non-adjustable steel blades and replaceable snap-in blade cartridges. According to Cable Prep officials, the new tool removes the cable jacket, cuts the foil and braid, and exposes the center conductor in one step. For more information, call (203) 526-4337.

Channell Commercial Corp.

Two announcements have been made by Channell Commercial—the introduction of the Signature Pedestal Housing line and Integral Corp.'s enhanced Cablecon line. The Signature Pedestal Housings represent an investment of $2.8 million in research, design and tooling, and offer several new features such as optional flame retardant materials, removable snow reflectors, three types of security measures, and unconditionally guaranteed ABS plastic ma-

University and has served the cable industry for 14 years. Krone will be responsible for the distribution of all products, with particular emphasis on the Matrix on-premise addressable system.

In product news, Midwest CATV announced an expansion of the SyncTruck program, which will service the East Coast and Dallas regions. The Sync program is a "warehouse on wheels" approach that offers operators materials management and just-in-time inventory control. Also, Midwest announced it will begin distributing Preformed Line Product's Fiberlign micro fusion splicer. Priced at under $5,000, the fusion splicer offers ease of use and low splice loss, according to Midwest officials.

Finally, Midwest CATV announced several new features to the Matrix on-premise addressable equipment. Specifically, enhancements include tone-controlled security measures, billing interfaces and an interface with an ARU (automatic response unit) for pay-per-view. An ANI (automatic number identification) system to handle impulse pay-per-view is in development now, according to Krone. Also, a new engineering facility is under construction in Ocala, Fla. to service Matrix clients and provide engineering and technical support. For more info, call (304) 343-8874.

RMT Engineering

RMT Engineering Inc. signed a $1 million contract with Jerrold Communications to distribute headend, line and distribution equipment. Additionally, RMT announced plans to expand its repair service business to nationwide status with a two-day turnaround on coast-to-coast business, thanks to a new contract with Emory Air Express. A warehouse expansion will accommodate the Jerrold inventory. The combined effect will enable RMT to offer quicker service and lower prices to a larger customer base, says Chuck Blanchard, corporate sales director. For more info, call (408) 733-4830.

Telecommunication Products Corp.

Headend automation was the focus of an announcement made by Telecommunicaton Products Corp. (TPC). In a joint development and marketing agreement with Tim Black Engineering, TPC introduced the Queue Master headend control system. According to Rick Montgomery, applications engineer, Queue Master is timed-event software loaded on a rack-mounted, industrial 386 PC. The equipment is capable of controlling routing switches, modems, tape deck controllers, satellite receivers, tuners, character generators or any equipment controllable by serial or parallel port.

The remotely controllable Queue Master software operates on a series of single line instructions entered as text on a free-form log. Queue Master controls up to eight ports, and each port can control up to 100 devices. Applications include commercial insertion, local origination automation, routing switch automation and tape delayed switching. For more info, call TPC, (717) 267-3939.

—Roger Brown and Leslie Miller

Will the '90s signal 'boom' or 'bust' for CATV?

As cable television, satellite, telephone and other interests proceed to converge, speculation grows as to who will be left standing as video signal deliverers and what form their networks will take. Generally, (and perhaps not surprisingly) the conclusion of a panel discussion convened at the SCTE annual engineering conference was that CATV holds a majority of the trump cards.

The panel, moderated by TransMedia Partners' Paul Maxwell and consisting of Jim Chiddix of ATC, Tom Elliot and Craig Tanner of CableLabs and Gary Kim of Multichannel News, explored whether cable TV in the '90s will continue to be a force or go the way of the dinosaur.

Kim led off the discussion by comparing and contrasting telco architectures with those being embraced by cable operators. He pointed to several cases—most notably ATC's "backbone" and Rogers' ring configuration—where the networks have begun to resemble each other. The outgrowth of building "ring" networks give cable an opportunity to deliver voice and data with video.

In 1987, there were three "alternative access" providers (companies which provide a local loop bypass to long distance carriers) in three different cities, Kim said. Today, there are 38 providers in 25 cities. Next year, there will be 41 providers in 28 cities and one of those will be Jones Lightwave, a subsidiary of Jones International, he said.

Generally, Kim noted that the necessary technology (switching networks or cellular radio) exists today should cable operators be allowed to deliver voice and data. "Telcos agree that ring or mesh networks operating on a non-switched basis and based on single-mode fiber are ideal," wrote Kim in his technical paper. "CATV could be a player in this market (business use for voice and data transmission) without undue difficulty, especially if it specializes in transmission services only and does not provide network termination gear or network integration services."

Although the revenue potential for residential voice provision is characterized as "less clear" by Kim, Bell Operating Companies have historically gained $25 per month per residence for this service. So, Kim concludes, "If an operator's average revenue per month from a video customer is $30, then the value of a $25 per month customer looms as a significant contributor to earnings."

Chiddix followed by making an analogy between the cable industry of today and the railroad industry of 1900. "Are we now in the 1890s or in the 1950s? It's up to us," he said.

To avoid stifling future options, cable operators should look to perform system upgrades that provide a lot of flexibility and invest the money in the area of the plant which makes the most sense. For example, upgrades with fiber that make use of coaxial cable wherever possible is a smart move. However, when it comes time to do newbuilds, ATC now believes it makes the most sense to take fiber all the way to the bridger location and discard trunk amplifiers altogether.

The elimination of expensive trunk electronics and cable allows cable operators to instead invest that money in fiber—a wide bandwidth medium. "The rules have changed," said Chiddix. "Trunk is going to be obsolete."

Through fiber, channel capacity is increased. It will allow state-of-the-art to move from 550 MHz upward to 1 GHz or beyond. And while that probably won't mean 150 channels of 6 MHz, VSB/AM video, it could allow for 70 NTSC channels and a single, 400-MHz wide carrier centered at 800 MHz that could carry a variety of digitized,

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formance specifications cable operators need.

In fact, according to Pfizenmayer at Motorola, CableLabs officials have told him they would like to see improvement at the 450 MHz level considered the first priority. Pfizenmayer was told CableLabs would like to see performance improved by 10 dB within the next four years because digital compression and in-home digital storage devices (which can download programs during off-hours, thereby reducing the need for additional channels) will make 150 channels unnecessary.

"I almost fell out of my chair" upon hearing this, says Pfizenmayer. "That was a real surprise to us."

CableLabs officials confirmed that a study focusing on picture quality is underway, but chose not to make further comment until the study is completed sometime later this summer.

"CableLabs believes the best counter to telco entry into cable is the improvement of CATV system performance—and I think they're dead right," says Pfizenmayer.

Regardless, Pfizenmayer believes that the improvements sought by CableLabs can be made through power doubling and feedforward devices, but

Lindsay, among others, has developed passives that will handle 1 GHz.

at a price penalty. If the achievement is being sought through better standard devices, Pfizenmayer says he can provide at least some improvement as die advancements are made in the lab.

Even if the hybrid manufacturers could develop 1 GHz products, they'd have to come back to the CATV industry for proper specs. Hendrix from Philips says it would be easy to extrapolate today's distortion parameters and relate them to 1 GHz actives, but wonders if that makes the most sense.

Some reassessment needed?

"Someone has to realistically assess what the limiting factors are in a cable

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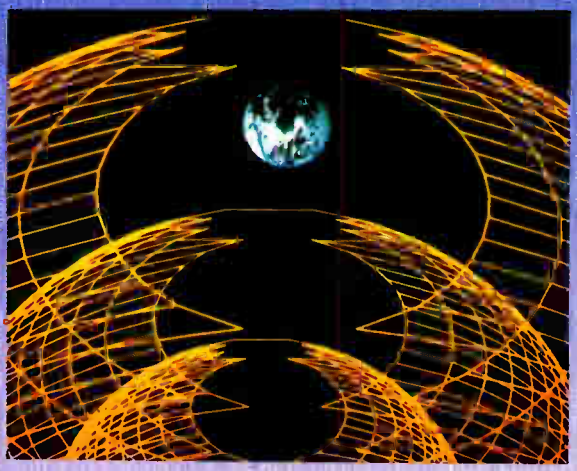

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system," he says. "Maybe some of the (specifications for composite triple beat, composite second order and cross-modulation) are more stringent than they need to be. We must gauge which are the most important parameters.

"CATV module research is somewhat of a black art," continues Hendrix, "because the performance can't be modeled. It takes scratching around on the substrate or trying some new things. It has to be done on the bench, not on a CAD machine."

Realistically, component vendors believe the need for 1 GHz is probably three years away, coinciding with the time that a North American transmission standard for advanced television is due to be chosen and the proposed start-up of direct broadcast services that promise to deliver more than 100 channels of video.

But complicating factors include fiber optics and compression. If the former is built deep into the system and the latter is implemented even in simple 2:1 ratios, wouldn't 550 MHz equipment be plenty? Perhaps, but many note those are two very significant "ifs."

Regardless, amplifier vendors continue to apply relentless pressure to move hybrid manufacturers up the ladder toward high bandwidth capabilities. They've already introduced chassis, motherboards and housings which are capable of accommodating 1 GHz components when they become available. Cable operators tell them they don't want to purchase equipment today only to have it be obsoleted in a few years. In the meantime, these suppliers will find customers for extended gear, if not here in the U.S., then overseas.

The 860 MHz equipment is already being sold by C-Cor Electronics, Jerrold Communications, Magnavox CATV, Scientific-Atlanta, Texscan and others to British and European operators who need to operate in the UHF band and avoid placing converters on subscribers' TV sets. (Televisions in Europe are built to receive UHF channels on-channel, without conversion.)

Those 860 MHz devices are currently good enough to load 30 to 40 channels, says Bob Young, director of product marketing for Jerrold's Distribution Systems Division. Because television tuners are not of sufficient isolation quality, channels cannot be arranged immediately adjacent to one another. Therefore, signals come into the home starting at about 470 MHz and are arranged so that none are adjacent, says Young.

Lone voice

But what about domestic applications of extended bandwidth? Perhaps the sole voice in the woods with any real intention of using 1 GHz equipment soon is Rogers Cablesystems, presently actively rebuilding all its Canadian systems with fiber and 550 MHz actives. Rogers, which is working actively with C-Cor (who, in turn is working with Motorola) to develop active product, but doesn't really expect much for about three years, says Nick Hamilton-Piercy, VP of engineering and technical services at Rogers.

When 1 GHz gear is built, Hamilton-Piercy doesn't believe operators will load it with 150 channels of video. "Probably not," he says, because not all channels will be 6 MHz wide. And by that time, Rogers will have installed fiber all the way to the feeders.

One thing Hamilton-Piercy is not convinced of is the viability of digital compression, especially if it forces operators to place a decoder in the home. "Doesn't that ruin the customer friendliness? Isn't it undoing what we've been trying to do for the last few years? I don't want to trade off bandwidth for customer friendliness."

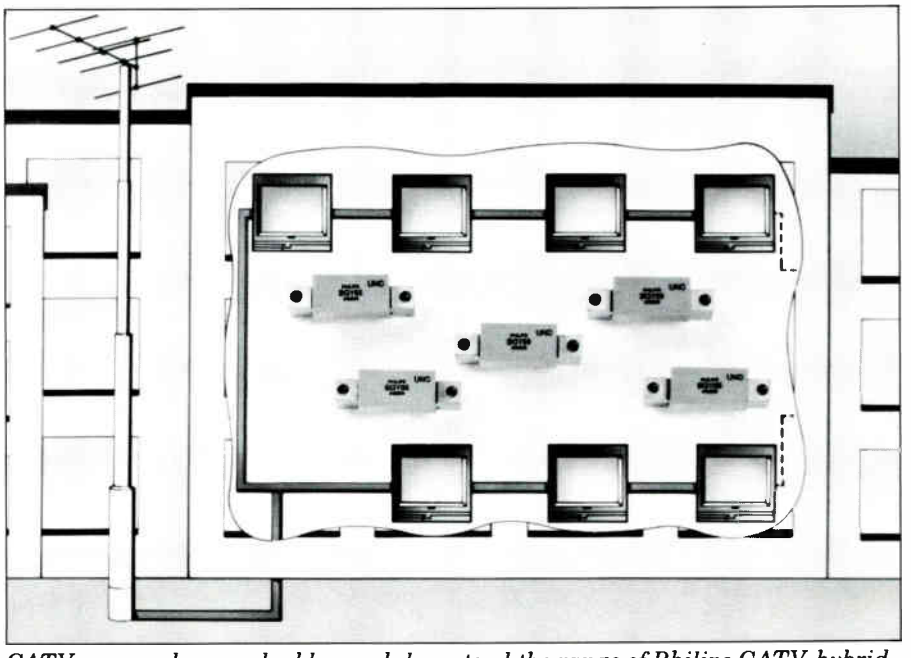
Real demand for additional channel capacity beyond the 78 channels presently being offered will come when a competitor can deliver more than that number, says David Fellows, president of Scientific-Atlanta's Transmission Systems Division. If that happens, how quickly can cable respond? I think we're capable of delivering 100 channels, uncompressed and unaltered," says Fellows.

That number would naturally increase if compression schemes are factored in. For example, if DBS plans to fill 27 transponders at 4:1 compression ratios to deliver 108 channels, CATV could use the same algorithm and end up with the equivalent of 2,200 MHz, or 2.2 GHz.

Additionally, cable networks have the luxury of converting from digital to analog anywhere along the network—not just at the end.

Right now, when cable operators plan rebuilds, the main questions are "How much fiber do I need?" and "Can I eventually get to 100 channels with this equipment?" Fellows says. Present development of 1 GHz equipment, as Fellows sees it, is plagued by the chicken-and-egg problem: He can't sell it because the product isn't available, but until it's available no one will buy it.

Although Texscan, which was among the first to mention 1 GHz as a goal, hasn't changed its strategy, George Fletcher, senior VP of corporate marketing, concedes that right now it's "probably overkill," because the combination of its new optical bridger and 860 MHz ICs gives it a good product line-up that provides all the channel capacity operators need.



CATV amp and power doubler modules extend the range of Philips CATV hybrid amp module product line. Someday these will be 1 GHz-capable.

Peaceful coexistence

Fletcher is even more bearish about 1 GHz than most others. He says it could be five years before adequate ICs are developed, perhaps longer if fiber to the bridger is embraced by the industry. But he doesn't see compression as any threat to 1 GHz; in fact, he feels cable operators could actually operate their plants that high by delivering both digital and analog signals.

For example, Fletcher wonders why traditional analog signals couldn't continue to occupy the 54 MHz to 550 MHz spectrum, with the digital bitstream taking up the area from 550 MHz to 1 GHz or beyond. That way, subscribers with analog TVs would only need digital-to-analog converters for, perhaps, premium services and digital TVs would get everything.

Although the domestic market is sending mixed signals, the international operators are beginning to move toward higher bandwidth equipment, says John Caezza of Magnavox CATV. With the luxury of being a sister company to Philips Components, Magnavox can work closely to assure design and performance specs of advanced hybrids meet CATV needs. However, Caezza and Keith Weil, VP of marketing, agree that U.S. demand is latent.

However, that hasn't stopped Magnavox from introducing a new 600-MHz amplifier that is plug compatible with old 300 MHz hybrids. "Today's product could take operators to 750 MHz" in some cases, says Weil.

And what is unclear is whether a 1 GHz hybrid could physically be packaged in the same size module as 550 MHz ICs. According to Robert Beaury, director of marketing at C-Cor, component manufacturers have expressed some doubt as to whether they can squeeze the circuitry into today's module package. If not, that has huge ramifications for the housings and chassis that have been built today and tout themselves as 1 GHz platforms.

Serious research

Nevertheless, work at C-Cor continues. "We're very serious about this research," says Beaury. "We're not just waiting for the hybrid manufacturer to do all the work. One of the lessons we've learned is to use some of our own resources to make sure R&D moves along" in the direction they need, he adds.

All of this uncertainty hasn't slowed down the pace of preparation—especially by manufacturers of passive equipment. Lindsay Specialty Products is among those who have extended the bandwidth handling capability of their hardware from 5 MHz to 1,000 MHz.

"With the passives, bandwidth is no longer an issue for the foreseeable future," say Lindsay officials. Even when used in systems with less capacity, the passives contribute lower losses and greater flatness than before, according to Lindsay spokesmen.

As the natural progression of technology leads component manufacturers to try different things, performance of ICs designed for cable amplifiers will only get better. But it seems clear those improvements will take time—probably at least two generations of product. But by the time 1 GHz is possible, CATV networks and needs may have changed—through the installation of fiber optics and compression technologies—to the point where it's no longer necessary.

And it's that uncertainty which has to be sorted out before anyone will know. ■

—Roger Brown

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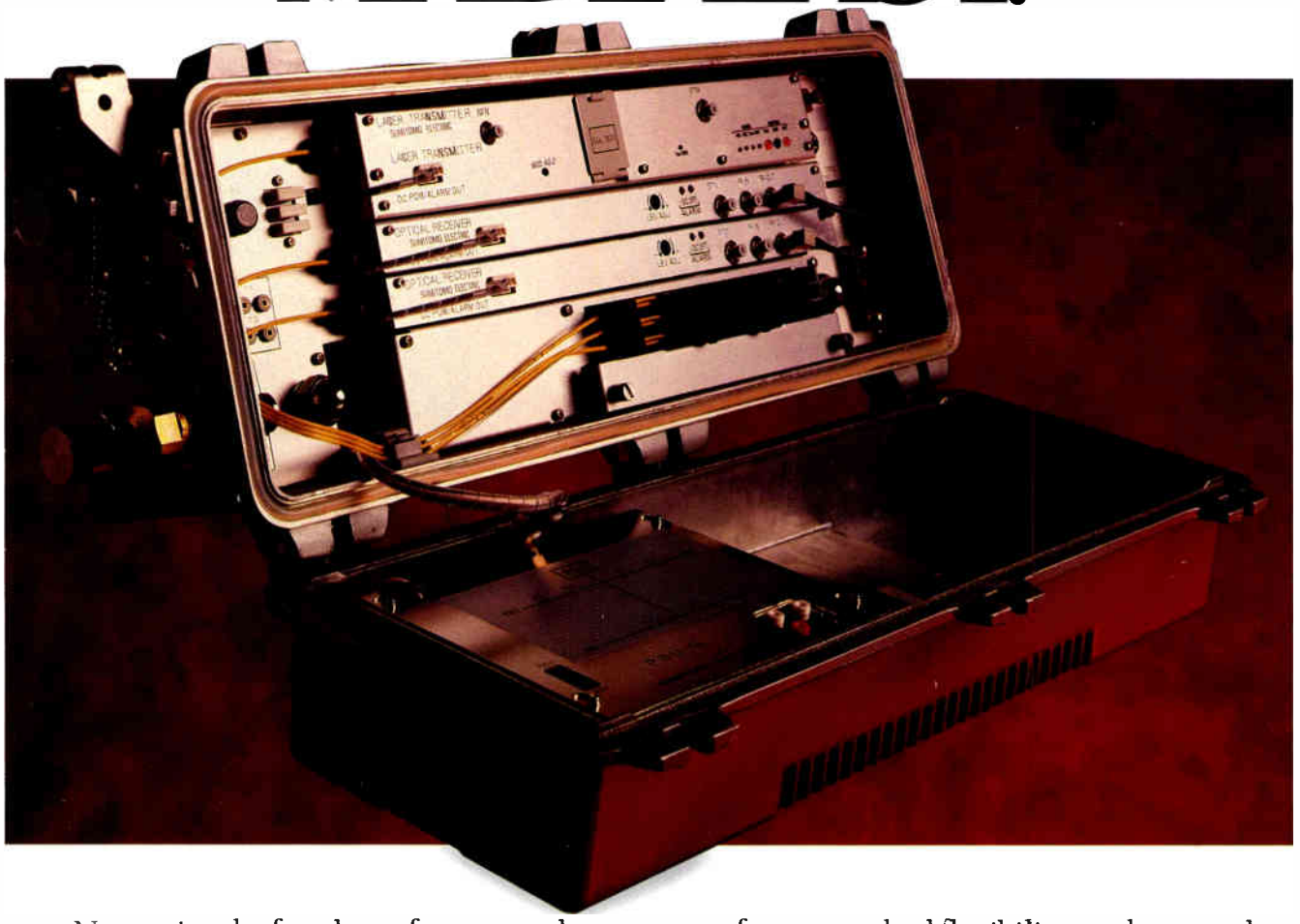

Now enjoy the freedom of a true outdoor repeater, for unmatched flexibility on the strand.

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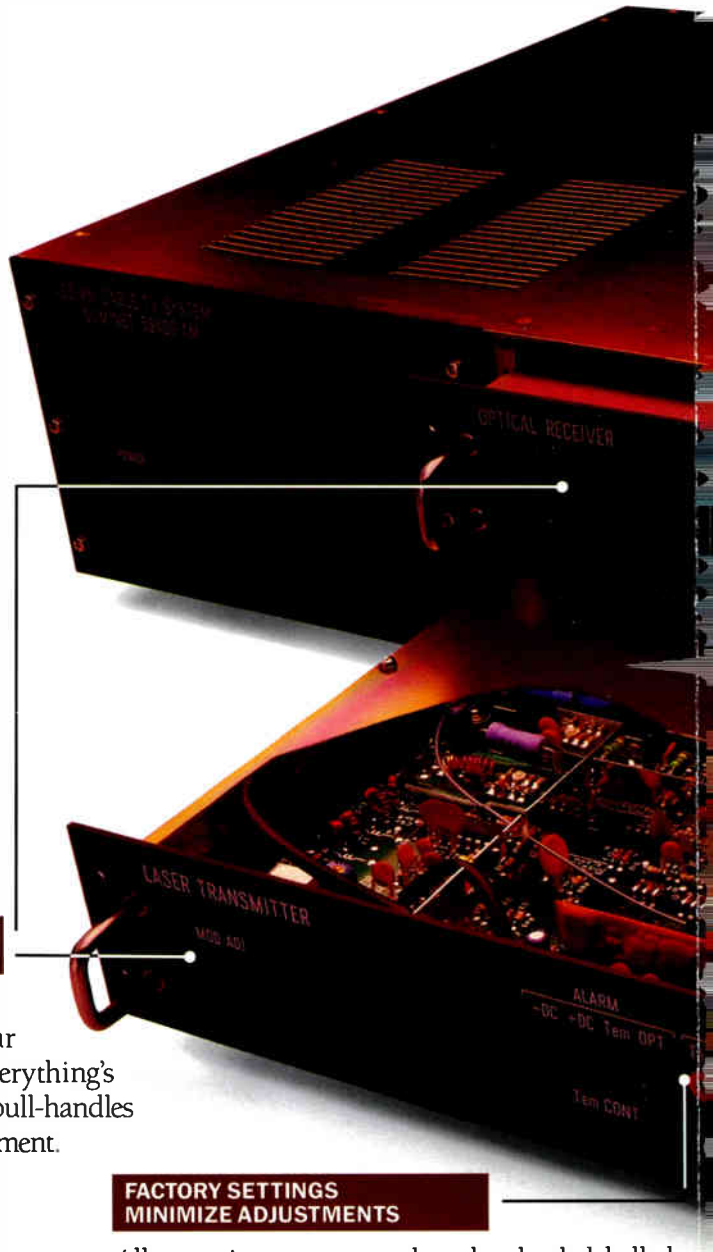

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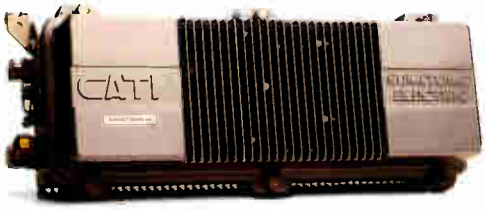

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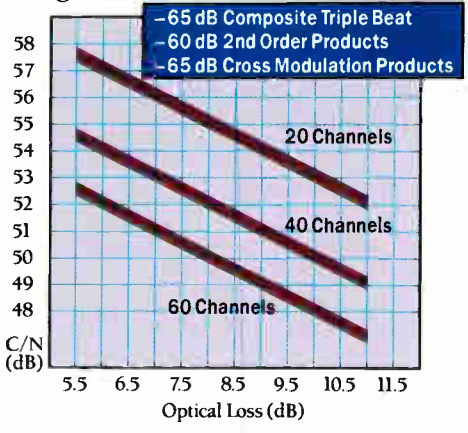
POLE MOUNT. Rugged pole mount for optical transmitters and receivers.

Design Performance vs. Attenuation



SPECIFICATIONS — SUMINET 5840 SERIES II

RACK UNIT

	COAX RF	OPTICAL
Transmitter	**IN**	**OUT**
	Bandwidth . . 50-550 MHz	Source . . . . DFB-LD
	Level . . . . . 25 ± 5 dBmV	Wavelength . 1310 nm
	Impedence . . . 75 ohms	Isolator . . . . Yes
	Return Loss . . 14 dB Min	Avg Power . 4 mW (set)
	Connector . . . F-Female	Output . . . . Pigtail (5 m)
Receiver	**OUT**	**IN**
	Bandwidth . . 50-550 MHz	Detector . . . PIN-PD
	Level . . . . . 25 ± 5 dBmV	Wavelength . 1310 nm
	Impedence . . . 75 ohms	Performance SEE GRAPH
	Return Loss . . 14 dB Min	Input . . . . . Pigtail (5m)
	Connector . . . F-Female	

NOTE: Rack Mount Chassis Accommodates Two Units — Either Transmitters or Receivers or one of each.

STRAND UNIT

	COAX RF	OPTICAL
Transmitter Forward	**IN**	**OUT**
	Bandwidth . . 50-550 MHz	Source . . . . DFB-LD
	Level . . . . . 30 ± 5 dBmV	Wavelength . 1310 nm
	Impedence . . . 75 ohms	Isolator . . . . Yes
	Return Loss . . 14 dB Min	Avg Power . 4 mW (set)
	Connector . . . Standard ⅝ x 24	Output . . . . Pigtail (2 m)
Receiver Forward	**OUT**	**IN**
	Bandwidth . . 50-550 MHz	Detector . . . PIN-PD
	Level . . . . . 25 ± 5 dBmV	Wavelength . 1310 nm
	Impedence . . . 75 ohms	Performance SEE GRAPH
	Return Loss . . 14 dB Min	Input . . . . . Pigtail (2 m)
	Connector . . . Standard ⅝ x 24	
Transmitter Return	**IN**	**OUT**
	Bandwidth . . 5-30 MHz	Source . . . . DFB-LD or FP
	Level . . . . . 30 ± 5 dBmV	Wavelength . 1310 nm
	Impedence . . . 75 ohms	Isolator . . . . Yes
	Return Loss . . 14 dB Min	Avg Power . 4 mW (set)
	Connector . . . Standard ⅝ x 24	Output . . . . Pigtail (2 m)
Receiver Return	**OUT**	**IN**
	Bandwidth . . 5-30 MHz	Detector . . . PIN-PD
	Level . . . . . 25 ± 5 dBmV	Wavelength . 1310 nm
	Impedence . . . 75 ohms	Performance SEE GRAPH
	Return Loss . . 14 dB Min	Input . . . . . Pigtail (2 m)
	Connector . . . Standard ⅝ x 24	

NOTE: Strand Housing accommodations: Up to 4 receivers or one transmitter (Forward or Return) and two receivers or two transmitters. Also, it can be configured as a repeater with one receiver and transmitter.

GENERAL	RACK UNIT	STRAND UNIT
Power	110/220 VAC 50/60 Hz 30 W/unit	30/60 VAC 50/60 Hz 30 W/unit
Operating Temperature	0° C to 40° C	–20° C to 50° C
Operating Humidity	Max 85% RH	Max 100% RH
Dimensions	EIA 19″ Rack Mount 3⅜″ High (2 RU)	18¾″ L x 8″ H x 7″ D
Weight	25 lbs Max	25 lbs Max
Splice Ctr	—	3 Tray (12 Fibers)

Specifications are subject to change without notice.

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Augat Comm. Group . . . . . .(206) 932-8428
FAX . . . . . .(206) 938-8850
2414 S.W. Andover St.
P.O. Box 1110
Seattle, WA 98111
PERSONNEL: Sherwood Hawley, Cindy Thormahlen
DESCRIPTION: Augat Broadband manufactures replacement electronics as well as its own comprehensive line of trunk, line, drop and multiple-dwelling amplifiers. All of which utilize the latest hybrid technology for superior performance. The most recent addition to the Augat Broadband line is the revolutionary new Multi-Port Channel Controller (MPCC), an off-premise addressable security system for MDU applications.

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Old Bridge, NJ 08857
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DESCRIPTION: Full line of low noise amplifiers, broadband amplifiers, preamplifiers, prefabricated headends, antennas, downconverters, earth station receivers, channel converters, modulators, demodulators, power supplies, off-premise systems, scramblers, encoders, audio processors, signal processors, and passives.

C-COR® ELECTRONICS INC

C-COR Electronics, Inc. . . . . .(814) 238-2461
WATS (National) . . . . . .(800) 233-2267
WATS (In PA) . . . . . .(800) 356-5090
FAX . . . . . .(814) 238-4065
60 Decibel Rd.
State College, PA 16801
PERSONNEL: John Hastings, Director of Sales—CATV; Dick Taylor, National Sales Manager—CATV
DESCRIPTION: C-COR, a leader in distribution electronics for the CATV industry features a full line of amplifiers from 330 to 550 MHz; many are upgradable to 1 GHz and available with status monitoring. C-COR has also expanded its horizons with a line of innovative amplifiers designed specifically to meet European market requirements.

California Amplifier

California Amplifier Inc. . . . . .(805) 987-9000
FAX . . . . . .(805) 987-8359
TELEX 469193
460 Calle San Pablo
Camarillo, CA 93012
PERSONNEL: Dennis Schwab, Vice President, Marketing; John Ramsey, Director of Sales
DESCRIPTION: Manufacturer of high performance low noise microwave amplifiers and downconverters. Products include C-Band and Ku-Band LNB's, C-Band and C/Ku Feedhorns, SMATV amplifiers, phase locked LNBs and VSAT equipment. For MMDS wireless cable, products include preamplifiers, downconverters and the "Beambender"™ a new microwave signal repeater which allows wireless operators to bend microwaves around obstacles to service customers.

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FAX . . . . . .(215) 672-5130
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Hatboro, PA 19040
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DESCRIPTION: Jerrold Communications pioneered the Cable TV industry over 40 years ago, and in line with the philosophy of technological leadership, the company designs and manufacturers a full line of STARLINE distribution equipment. The line features the new SX trunk amplifier, fully backward compatible with Jerrold's SJ amplifier chassis, and accommodates Cableoptics modules.

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FAX . . . . . .(705) 324-5474
50 Mary St. W.
Lindsay ONT, Canada K9V 4S7
PERSONNEL: John Bielby, Vice President & General Mgr.; David T. Atman, Director of Marketing
DESCRIPTION: Lindsay is a quality manufacturer of CATV equipment and has been established for over 30 years. We specialize in system requirements for small, medium and large builds and rebuilds. Systems benefit from our wide range of trunk amplifiers, line extenders, apartment amplifiers, system passives, directional multi-taps and bandwidths to 1 GHz. Full headend surveys and commercial antennas of superior quality, complete our line.

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DESCRIPTION: Scientific-Atlanta offers a complete line of 450 and 550 MHz trunk stations in either push-pull, parallel hybrid, feedforward, or distortion improved FT configurations. Dual Pilot ACM's, Status Monitoring, and Reverse can be added to any station. Fully loaded feedforward upgrades are possible in any Scientific-Atlanta trunk housing ever shipped.

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FAX . . . . . .(416) 629-1115
4560 Fieldgate Dr.
Mississauga, Ontario, Canada L4W 3W6
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DESCRIPTION: The Equipment Service Center offers prompt customer service; quick turnaround on your repair (within 48-hours if it is an emergency); and a full range of engineering services. All equipment is repaired to its original specifications, and copies of test results are furnished with the repair unit. The Equipment Service Center will fix C-COR and all other manuacturer's equipment.

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Realize The Promise Of The Future Without Sacrificing Your Investment Of The Past

Jerrold Communications has teamed with Cable Television's leading engineers to bring you the best of all worlds with the **SX Amplifier**. You can now expand and upgrade your system without sacrificing your SJ amplifier investment or missing out on the latest technology.

Jerrold's SX Amplifier fully supports over two decades of our SJ technology. At the same time, it is so advanced that our X Series and Cableoptics™ technology is supported as well.

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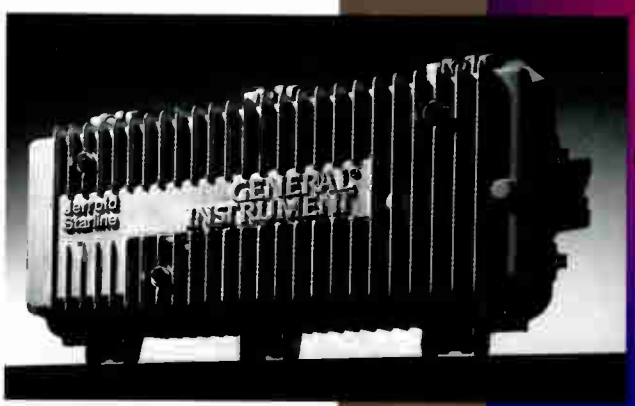
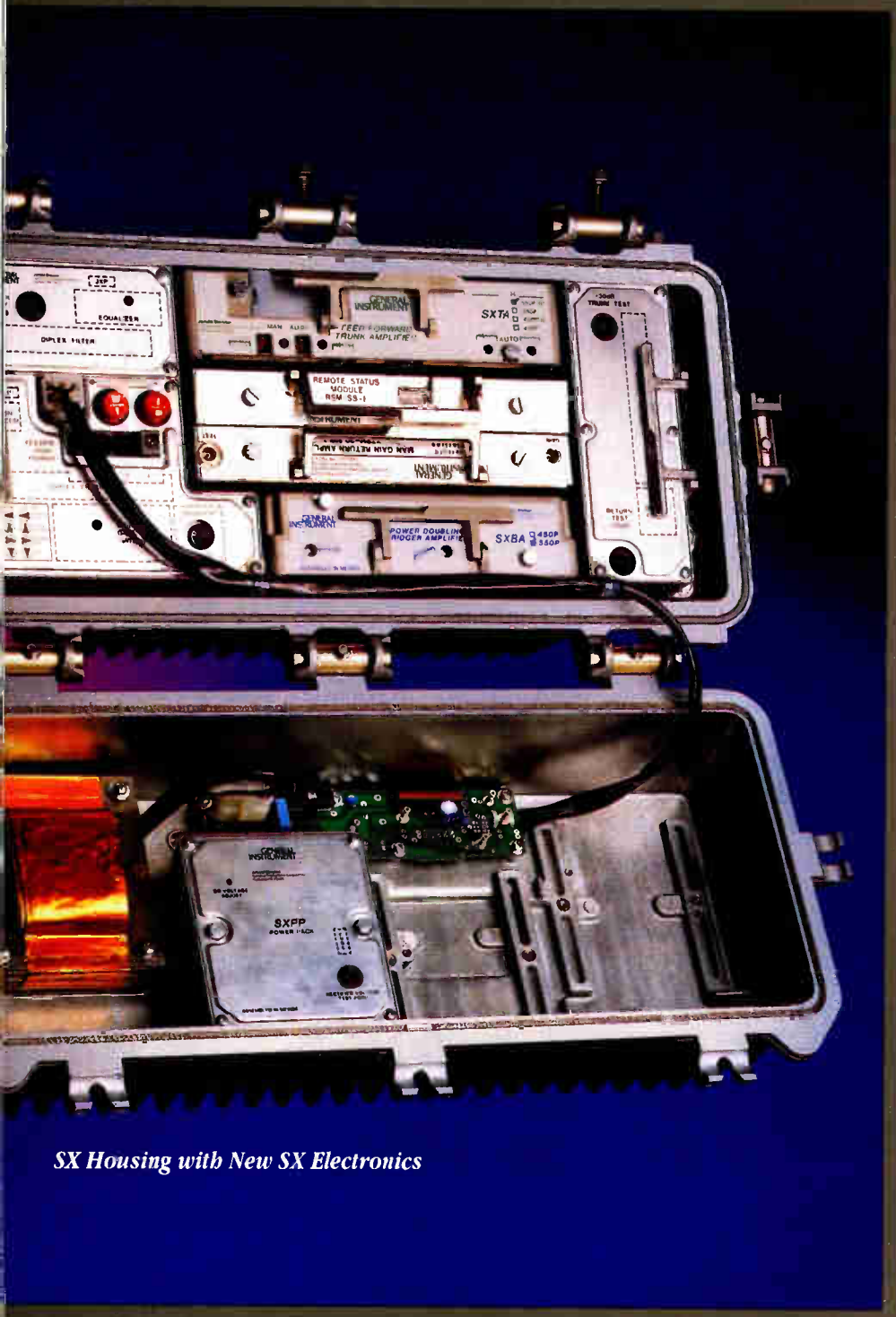
Future SX channel capacity to 750 MHz has been designed into the passive features. Currently, a full 550 MHz active design combines with improved noise figure and distortion performance to supply whatever services your customers need. Depending on your system requirements, you can choose among FeedForward, Power Doubling or Quadrapower® technologies. All SX test points are easily accessible, plus only three tools are needed for set-up, cutting SX installation time to a minimum. A superior heat dissipation capability translates into long-life and long-term SX reliability.



All of this underscores Jerrold's continuing commitment to cable television through the research and development of technology that supports the dependable Jerrold equipment that is in service today.

To find out how the new SX Amplifier can move your system forward, get in touch with your Jerrold Communications account representative or contact us at 2200 Byberry Road, Hatboro, PA 19040, 215/674-4800.

JERROLD COMMUNICATIONS



SX Housing with New SX Electronics

SX Modular Design Offers You:

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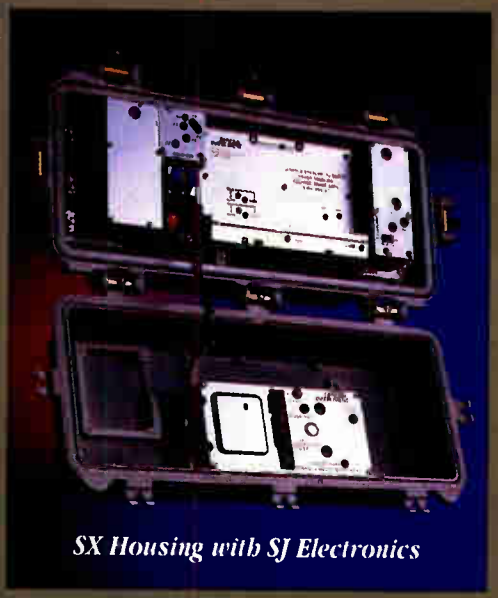
- SJ Chassis Backward Compatibility
- X Electronics Compatibility
- Cableoptics™ Adaptability
- Simple Routine Maintenance
- Easy Test Point Access



SX Housing with SJ Electronics

SX

GENERAL INSTRUMENT

Tests have shown that a modulation level of 50 percent most closely approximates live video results. Each carrier is zero percent modulated for 8 μsec, and 50 percent modulated for 56 μsec, for a total of 64 μsec. This is not precisely the horizontal timing interval, but it is sufficiently close to yield acceptable results.

This pattern continues for a total of 15.36 msec, followed by a 1.02 microsecond interval of zero percent modulation, which simulates the vertical sync interval. Each test signal modulator has its own crystal oscillator, so there is no correlation of timing among the modulated carriers.

Test results

The results of this simulated video signal generator were made by Louis Williamson at the American Television and Communications laboratories[2]. An optical transmission set with a laser source, a length of fiber and a detector was tested, using simulated video signals. The same equipment was then tested with CW carriers from a common test signal generator, and with live video carriers generated at a typical headend. In each test, the transmitter was driven with various RF power inputs, ranging from 10 dBmV to 16 dBmV. The performance of the system under each test is given as a function of the input drive power.

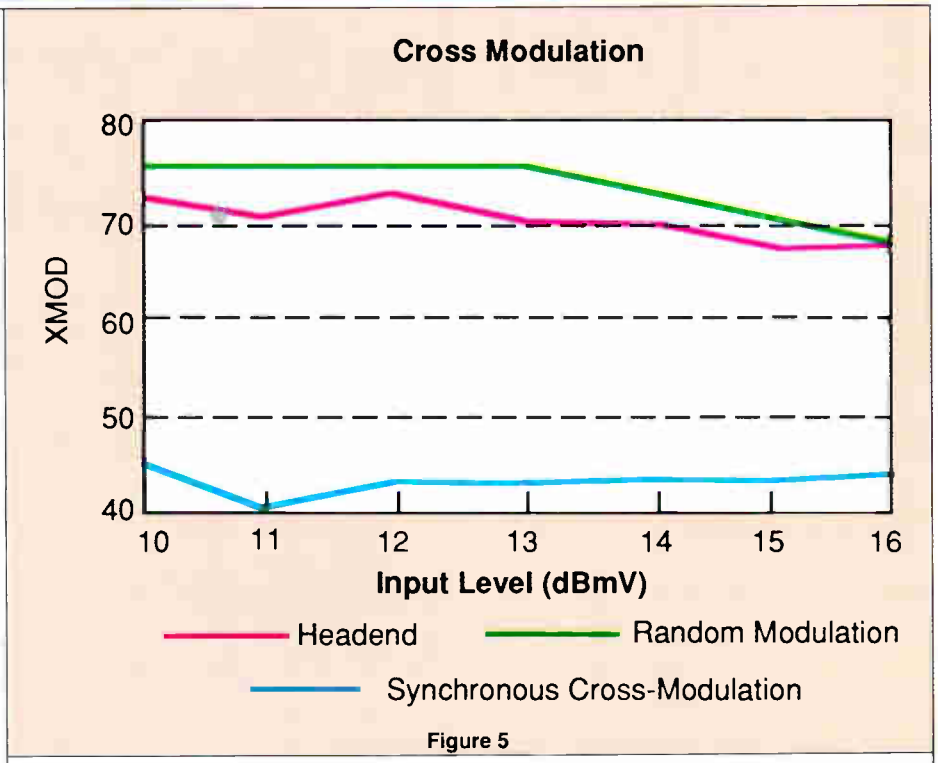


Figure 5

Carrier-to-noise test. As predicted, there is little variation in the carrier-to-noise (C/N) performance of the tested

optical link when the testing methods are changed, because carrier measurements are made during the sync intervals in each case (see Figure 2). The C/N ratio increases almost linearly with the increased drive power, because the noise is essentially independent of drive power.

Composite second order tests. Test results for CSO showed a close correlation between the live video tests and the simulated video signal tests (see Figure 3). The results obtained with CW carriers are 6 dB lower across the drive power range. CSO figures decrease uniformly with increases in drive power, demonstrating that the laser and detector were not saturated.

Composite triple beat tests. Once again, the results obtained with the live video signals and the simulated video signals are very nearly equal. The tests performed with CW carriers show a variation of 11 dB in performance as compared to the other test methods (See Figure 4).

Cross-modulation tests: The tests performed with CW carriers present some problems in this parameter, in that the results did not decrease monotonously with increases in drive power. In any case, the results obtained were 20 dB to 30 dB lower than the results obtained with live video signals. We believe that the erratic behavior of the system is caused by the laser being heated and cooled at the 15 kHz modulation rate, when all carriers are in phase. The cross-modulation tests performed with the simulated video signals demonstrate a 3 dB to 5 dB better performance than the live video signals (See Figure 5).

Conclusions

The test results confirmed our understanding of the system behavior. The results obtained with simulated video signals provide the best approximation of results obtained with live video signals, with the necessary characteristic of being repeatable form one optical system to another. We believe that this modulation scheme will be useful in comparing laboratory tests and field tests.

The use of simulated video signals for performing C/N, CSO and CTB tests and for establishing equipment specifications is proposed as a standard. This will ease the communication difficulties which currently exist between manufacturers and users of optical electronics components. The reader must be cautious not to use measurements made with simulated video signals in conjunction with performance requirements based on CW carrier tests. ■

Acknowledgements

I am thankful to ATC Inc., James A. Chiddix, David M. Pangrac, Louis D. Williamson and Ronald W. Wolfe for ordering the simulated video modulation equipment built and assembled in ATC's laboratory, and for their assistance in conducting the tests and compiling and publishing the results.

References

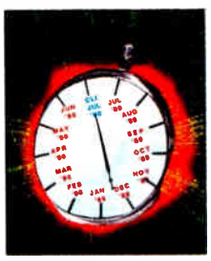
1. James Chiddix, "How to Lie With Specifications"; *CED* Magazine, September 1989.

2. Louis Williamson, "Laboratory versus Field Measurements of AM Optical Links—Reconciling the Differences." SCTE Conference, Fiber Optics, 1990, Monterey, Calif. March 21-23, 1990.

Don't forget

CLI COMPLIANCE

COMPLIANCE



dismissal of the filing and/or application.

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Part of a new order

The new procedure is the result of a FCC order which, in essence, allows the Commission to charge fees to help recover administrative costs associated with the filings as well as speed the fee processing procedure.

The new fee schedule is expected to result in the collection of an additional $20 million per year by the Treasury, which effectively doubles the amount taken in through the previous fee structure. However, the number of applications to be processed by the Commission will triple, from approximately 268,000 to nearly 750,000.

But in these days of tight federal budgets and scarce personnel, the Commission has chosen to utilize a lockbox banking service to handle the extra load. This lockbox bank acts as the filing and processing agent for the Commission, working 24 hours a day. The lockbox opens mail, processes funds, records the data and returns a receipt, usually within 24 hours of receiving the funds.

The bank which will be used is the Mellon Bank in Pittsburgh. All CATV related filings should be sent to the following address:

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Pittsburgh, Pa. 15251-5205

So, if you're about to file an aeronautical frequency usage notification (and you might, because it's a very important issue to the FCC as it begins to inspect systems for signal leakage), make sure you utilize the new Form 155 and attach a check for $35 per system notification.

Regarding frequency offsets, remember the FCC requires that: 1) cable operators be on the correct offset and 2) it be properly notified of what offset you're using. Why? Because if leakage were to occur from your system, it won't be directly on top of a frequency used by an aeronautical service.

Staying in compliance

According to Ted Hartson, vice president of engineering at Post-Newsweek Cable, there are two ways to get on the wrong frequency: 1) by not changing equipment to a ±12.5 kHz or ±25 kHz offset (any old offset or the original nominal frequency like channel A, 121.2500 MHz are no longer correct); and 2) temperature variation, mechanical shock or substitution of modules can cause frequency drift away from you it belongs. (For more information on this subject, see "What's your frequency," *CED* May 1990, p. 102.)

Anyone with questions related to the new Form and/or fee structure should call the nearest field office or the Commission's fees hotline, (202) 632-FEES.

—Roger Brown

Approved by OMB
3060-0440
Expires 12/31/90

FEDERAL COMMUNICATIONS COMMISSION

FEE PROCESSING FORM

FOR FCC USE ONLY

Please read instructions on back of this form before completing it. Section I MUST be completed. If you are applying for concurrent actions which require you to list more than one Fee Type Code, you must also complete Section II. This form must accompany all payments. Only one Fee Processing Form may be submitted per application or filing. Please type or print legibly. All required blocks must be completed or application/filing will be returned without action.

SECTION I

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MAILING ADDRESS (Line 1) (Maximum 35 characters - refer to Instruction (2) on reverse of form)

MAILING ADDRESS (Line 2) (if required) (Maximum 35 characters)

CITY

STATE OR COUNTRY (if foreign address)	ZIP CODE	CALL SIGN OR OTHER FCC IDENTIFIER (If applicable)

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in FCC Fee Filing Guides. Enter in Column (B) the Fee Multiple, if applicable. Enter in Column (C) the result obtained from multiplying the value of the Fee Type Code in Column (A) by the number entered in Column (B), if any.

	(A) FEE TYPE CODE	(B) FEE MULTIPLE (if required)	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
(1)			$	

SECTION II — To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

	(A) FEE TYPE CODE	(B) FEE MULTIPLE (if required)	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
(2)			$	
(3)			$	
(4)			$	
(5)			$	

ADD ALL AMOUNTS SHOWN IN COLUMN C, LINES (1) THROUGH (5), AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE. →

TOTAL AMOUNT REMITTED WITH THIS APPLICATION OR FILING	FOR FCC USE ONLY
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FCC Form 155
May 1990

INSTRUCTIONS FOR COMPLETING FEE PROCESSING FORM, FCC FORM 155, May 1990

(1) **"Applicant Name"** - Enter the name (last, first, middle initial) of the applicant as it appears on the original application or filing being submitted with this Fee Processing Form. If company, enter name which is used commercially.

(2) **"Mailing Address (Line 1)"** - Enter the street address or post office box number to which the applicant wishes correspondence sent.

(3) **"Mailing Address (Line 2)"** - This line may be used for further identification of the address if additional space is required.

(4) **"City"** - Enter the name of the city associated with the given street address.

(5) **"State or Country"** - Enter the appropriate two-digit state abbreviation as prescribed by the U.S. Postal Service. If address is foreign, enter the appropriate country name here.

(6) **"ZIP Code"** - Enter the appropriate five or nine-digit ZIP code prescribed by the U.S. Postal Service.

(7) **"Call Sign or Other FCC Identifier"** - Enter an applicable call sign or unique FCC identifier, if any, as shown on your attached application or filing. If applying for a service affecting more than one call sign, enter one call sign only.

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(9) **Column (B), "Fee Multiple"** - Certain applications and filings may request action with respect to more than one station, license, frequency, or party and can be submitted together with one check if they meet specific conditions. This column is used only if a multiple, i.e., two or more, is being applied for. Examples of when this would be used are renewing more than one call sign, frequency, station, or the transfer of control of more than one station. Refer to the appropriate Fee Filing Guide for additional information.

(10) **Column (C), "Fee Due For Fee Type Code in Column (A)"** - Enter in this block the amount of the fee associated with the Fee Type Code shown in Column (A) (times (x) the fee multiple, if required).

(11) **"Total Amount Remitted With This Application or Filing"** - Enter the total of lines (1) through (5) of Column (C). This amount should equal the amount of your check or money order. We will not accept multiple checks.

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o Each application or filing should be assembled with the Fee Processing Form stapled to the top of the application with the check placed on top of the Fee Processing Form. DO NOT STAPLE THE CHECK TO THE APPLICATION OR FEE PROCESSING FORM. Required copies of applications should be clearly identified as "duplicate copy" and placed behind the original package. A copy of an application or filing submitted for receipt purposes only should be placed at the bottom of the submission. Extraneous material and extra copies should be avoided at all times. Failure to abide by these instructions will delay the processing of your submission.

o Completed applications or filings should be mailed to the proper address shown in the Fee Filing Guide for the particular service for which you are applying or making a filing. Applications and filings which are properly addressed to the appropriate P.O. box number may also be hand delivered to the following address. Applications received before midnight on a normal business day will receive that day's date as the receipt date. Deliveries made after midnight on Fridays will not be "officially" receipted until the next Monday. Applications received on weekends and government holidays are dated the next regular business day.

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(Attention: Wholesale Lockbox Shift Supervisor)

o A single check, bank draft or money order made payable to the Federal Communications Commission and denominated in U.S. dollars and drawn upon a U.S. financial institution must be included with each application or filing requiring a fee. No postdated, altered or third-party checks will be accepted. Do not send cash.

o Parties hand delivering applications or filings may receive dated receipt copies by presenting copies of the applications or filings to the acceptance clerk at the time of delivery. Receipts will be provided for mail-in applications or filings if an extra copy of the application or filing is provided along with a self-addressed stamped envelope. Only one piece of paper per application or filing will be stamped for receipt purposes.

REMEMBER

o A separate completed Fee Processing Form is required with each application or filing except in certain circumstances. Please refer to the appropriate Fee Filing Guide for additional information.

o A wrong Fee Type Code or incorrect remittance may result in your application or filing being returned without processing, or result in the dismissal of your application or filing. Please ensure that FEE TYPE CODES are correct and that your check or money order equals the amount shown in the TOTAL AMOUNT REMITTED WITH THIS APPLICATION OR FILING block before submitting your application or filing.

o If you have any questions completing this form, please call the Fees Hotline, 202/632-FEES.

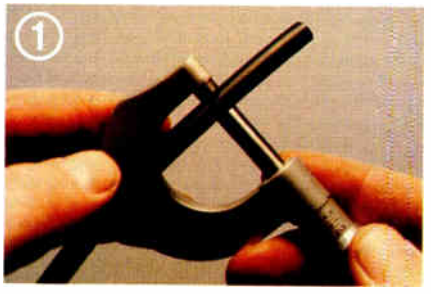
FCC NOTICE FOR INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

Part 1, Subpart G of the Commission's rules authorize the FCC to request the information on this form. The information requested is required in order to obtain a license or authorization from the Commission. The purpose of the information is to provide a means to link a fee payment to a specific invoice, application or filing. The information will be used by the Commission to maintain data concerning fees paid to the Commission, for internal financial control, audit, and reporting purposes. Information requested on this form will be available to the public. Your response is required to obtain a license or other authorization from the Commission.

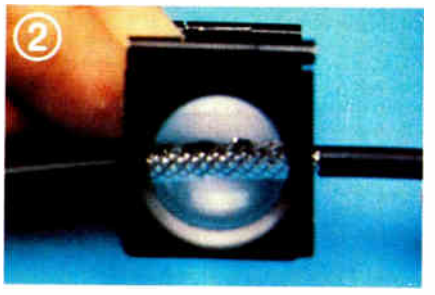
Public reporting burden for this collection of information is estimated to average 10 minutes per response, including the time for reviewing instructions, searching data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Federal Communications Commission, Office of Managing Director, Washington, DC 20554, and to the Office of Management and Budget, Paperwork Reduction Project (3060-0440), Washington, DC 20503.

Caveat Emptor*

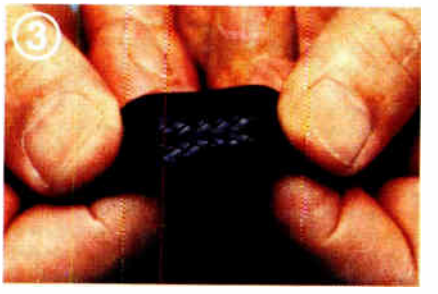
If you buy RG-6 or RG-59 drop cable, try this little test.



Measure the overall outside cable diameter with a micrometer. If it is not .242" (RG-59), or .275" (RG-6), connectors may not fit properly and performance might be affected.

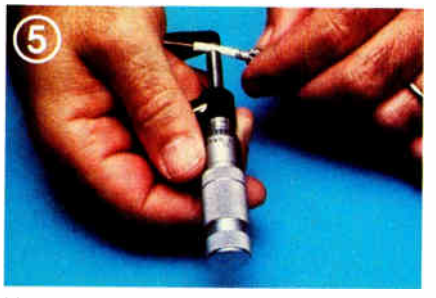


Carefully strip jacket off one inch of cable. If you ordered 67% braid (RG-59) or 61% braid (RG-6), make sure ⅔ of the foil is covered by braid—not ½ or less.

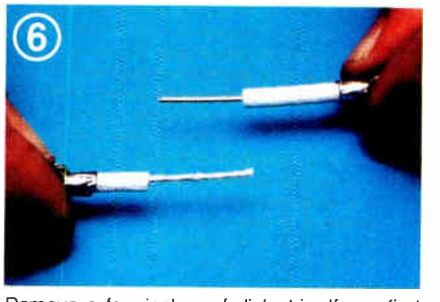


Check the braid impression on the underside of the removed jacket. A deep impression indicates a jacket which is too tight. This may cause difficult "F" connector installation. An extremely shallow impression indicates a jacket which is too loose.

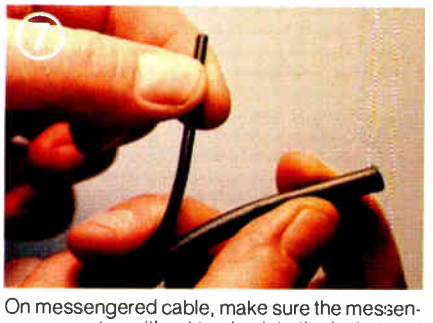
Now, strip off some jacket and braid, and expose the foil. If the aluminum/mylar shield peels off easily, it is not bonded. Belden® Duobond® II provides a strong bond to prevent the foil from pushing back during termination.



Measure the core (over tape) in several places to make sure it is .147" (RG-59) or .184" (RG-6). If out of tolerance, the connectors may not fit properly.

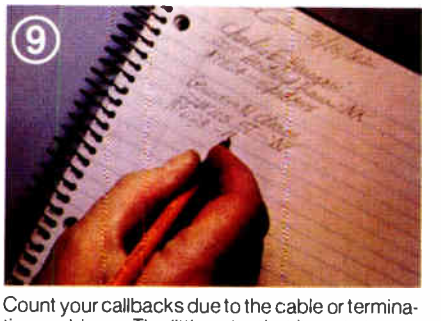


Remove a few inches of dielectric. If you find "fuzz" on the center conductor, intermittent contact may result. If the installer scrapes off the fuzz with a knife, he runs the risk of damaging the copper cladding. Belden® cable stays smooth and clean every time.



On messengered cable, make sure the messenger separates without tearing into the jacket and exposing the shield.

Is every reel of cable 100% sweep tested? All Belden drop cable is 23dB, from 5–550MHz for RG-59 and 5–750MHz for RG-6. You don't have to accept anything less.



Count your callbacks due to the cable or termination problems. The little extra that it costs to use Belden gives you a big extra in performance reliability and value.

Don't believe everything you hear—or read. Even this. Test it for yourself. For more information, contact:

Belden Wire and Cable,
P.O. Box 1980, Richmond, IN 47375
Phone: **1-317-983-5200.**

* Let the buyer beware—especially when it comes to drop cable.

Take a New Look at Belden—Greater Reliability, Better Value.

Reader Service Number 41

COOPER INDUSTRIES **BELDEN**

Off-air signal maintenance

While graybeards sit around the wood stove on occasion and contemplate the origins of Community Antenna Television, regardless of who was first to build a CATV system there was but a single purpose for the beginnings of our industry: to provide quantity, if not quality, television signals.

The infatuation with television began in the late 1940s with the introduction of television sets and that proliferation continues to this day. Television viewers (translate that to CATV subscribers) were willing to accept and pay for most any quality of signal offering a watchable picture. Tall towers grew across America adorned with the splendor of large, multi-bay antenna arrays seeking television signals from 125 miles or more away, although those signals were sometimes as nocturnal and fleeting as a cheetah.

The age of satellite-delivered television signals dawned in the 1970s and the picture changed, literally, overnight. When the CATV subscriber had a look at the new technology, no longer acceptable was the interference ridden, noisy, weak signal. There simply was no comparison between off-air and satellite-delivered pictures. Except for the more geographically remote towns, gone now are many of those elaborate antenna systems, replaced by one or more dish antennas at every headend.

Off-air antenna systems today are more likely retrieving Grade-A or Grade-B signals, but the picture does not equal the quality of the satellite-delivered signal. The result is a dissatisfied customer and a costly, time-consuming service call. A further result will be a customer relations problem (just what this industry does not need!) because the service technician will not be able to cure a problem which originates in the antenna system. The causes and remedies are suggested here.

Gradual degradation

When the off-air antenna system is originally installed, any problem is usually immediately apparent, such as no or low signal, noise, and ghosting. What occurs over a period of time is much less apparent, gradual degradation of the signal quality. Fortunately, the cause may be located in one of three locations, or perhaps a combination of the three locations: the antenna itself, the pre-amplifier (if one is used), or the coaxial cable downlead.

Antenna systems do wear out. The environment to which they are subjected is the number-one factor determining the lifespan, given of course the initial quality of the product. An antenna system in the Arizona desert will far outlast one in a salt-laden, high moisture coastal environment.

Corrosion may be the cause of lowered signal level, or more graphically, picture flashing—especially with any wind velocity. Damage may also be the cause of noise introduction, either caused by the corrosion itself or from an external source such as electrical interference that now can override the received signal level. The power line may not be the culprit. The cure for an element-to-boom problem is to remove the element(s), if the antenna has this feature, and clean the joint(s). You may just as well do them all (undoubtedly Murphy is watching) or replace the antenna.

Look for electrolysis

Hardware corrosion occurs where the antenna attaches to a stacking frame or the tower. Still another source could be tower grounding or guying hardware; be particularly wary of electrolysis at dissimilar metal bonds and check with an ohm meter.

Antennas which use tubing for the boom or elements may sustain water ingress which may freeze-fracture the tubing, causing a noise source. And most assuredly make certain all hardware is snugged tight.

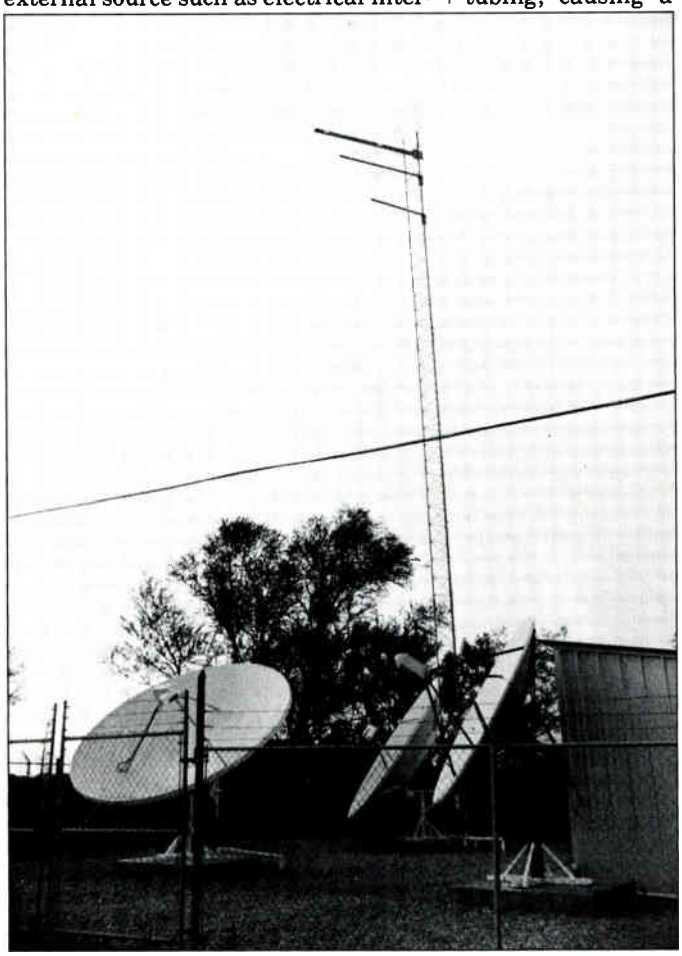
The antenna feed point should be carefully examined. If the antenna is one that requires any type of an impedance-matching balun, that balun should certainly be suspect after any period of time and be replaced.

Coax fittings are particularly susceptible to poor initial installation, cold flow or water ingress. If suspect, replace and waterproof with heatshrink.

Heatshrink deteriorates with time, hiding problems. So-called electrical tape has no place in any outdoor installation, not even securing downleads to a mast or tower leg.

Position the

By Bill Smith, Vice President of Marketing, Cadco



Typical small system headend

downlead so water or condensation travelling on the outside of the coax has no path into the connector or feed point: make a drip loop.

Preamplifiers

Installations requiring a preamplifier need special attention to the connectors at the actual preamplifier input and output considering all previous precautions. Preamplifier manufacturers take precautions to make housings waterproof, but gaskets do dry out and shrink if even ever-so-much allowing possible moisture ingress. Use a waterproofing grease around all edges where the housing fits together, and be liberal.

Drip-loop the input and output cables, heat shrink the connectors, and ascertain all hardware which closes the housing and attaches the preamplifier to the tower is snugged tight.

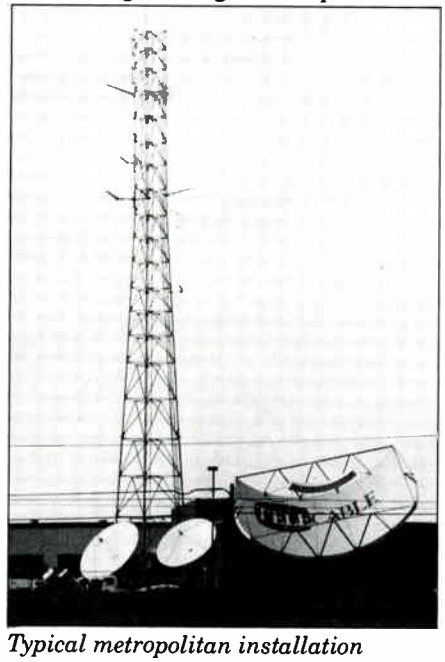
On the ground, similar installation and maintenance precautions apply. It is good engineering practice to enter the headend building through a bulkhead as opposed to directly running the downleaad into the building onto the off-air signal processor input.

Usually this bulkhead is metal and permits additional ground of the downlead by bonding the bulkhead to a minimum of an eight-foot electrician's copper groundrod taking into account metal-to-metal bonding techniques.

Connectors are required at the bulkhead and it may be argued, introduce the possibility of further connector problems. Properly installed, using drip-loop and connector waterproofing techniques, the bulkhead arrangement is acceptable and certainly eases the situations associated with running hardline directly into the equipment headend racks.

Make some measurements

When the initial installation or maintenance is completed, it is highly recommended that an immediate record of each channel's signal level off the downlead in the headend be made. These signal levels and any other appropriate notations should be posted in the headend and a copy made part of the engineering staff's permanent



Typical metropolitan installation

records. As part of the entire system's routine preventive maintenance program, these records may be used for performance verification.

There can be no doubt our industry's collective feet are to the fire with assaults seemingly coming from all sides. Some of those assaults we have no control over, some we do. Delivering the best technically qualified product to the paying subscriber we can control. ■

Guy strand for CATV line construction

Guy strand is a critical structural component in CATV line construction, with significant safety, quality, and economic ramifications to the CATV system operator.

Properly manufactured and packaged strand makes for greater line service life, efficient construction costs, and reduction of field safety hazards. The use of sub-standard guy strand can lead to costly line repairs, reduced plant life, higher installation/construction costs, and most significantly, great safety risks to both linemen in the field and the general public.

Because of the inherent risks in using guy strand of improper quality, one should take great care in the choice of strand manufacturer.

Manufacturers vary in production techniques, diversification of products and markets, quality assurance procedures and product warranty. Variance in manufacturing techniques and raw material uniformity can result in line construction problems. Therefore, certain quality aspects of guy strand should always be considered.

Tensile strength. Quarter-inch E.H.S. strand has a minimum breaking strength of 6,650 pounds. Strand which breaks at lower strength levels could very well lead to failure during installation or under severe service loads.

Ductility. Strand is tested for ductility via wrap, bend, torsion and ultimate elongation measurements. Brittle strand can mean single or multiple wire failures during tensioning. A complete seven wire failure during tensioning is a great safety hazard to construction crews and possibly the public.

Uniformity. The outer wires of the strand should be evenly and concentrically wound about the center wire, and there should not be openings in the lay of the outer wires which expose a significant area of the center wire. The strand should maintain its helix when cut. Excessive "fraying" or unwinding of the outer wires can make termination of the strand very difficult, and cause problems with gripping the strand for tensioning.

Many manufacturers tie a knot in individual wires during the galvanizing process. Undetected knots which can pass through wire guides in stranding equipment may result in knots showing up in the strand. This can be an extreme safety hazard to the line crew during stringing or tensioning, because the knot will most likely catch in the keeper of the strand clamp.

Weld burrs on individual wires and lumps of zinc from galvanizing pose the same threats as the aforementioned knots. Continuous inspection for strand uniformity during the stringing process is recommended, and deviations from surface quality should be reported to the product vendor.

Straightness. When unwound from the reel, any length of strand should lie relatively flat and straight. Excessively bowed, kinked or cambered strand can be difficult to manage on the roadside, causing a safety hazard to autos and line crews. Undetected kinks which get tensioned in the span are almost sure to cause a seven wire failure, a most serious hazard in the field.

Galvanizing. The galvanized coating of the strand should be smooth, free of lumps and flaking, and without excessive oxidation. Minimum weight of coating for Class "A" 1/4 inch E.H.S. strand is .60 oz./ft^2. The hot dip method for galvanizing is clearly superior to that of electroplating or mechanically depositing zinc. This is because of the formation of the iron/zinc alloy layer during hot dipping. This tough iron/zinc alloy acts as a second layer of corrosion protection long after the sacrifice of the free zinc layer is complete.

Packaging. Properly packaged reels of strand are essential for efficiencies in the field. Strand which tangles on the reel during unwinding makes for frustrating field installation delays.

The strand should be evenly distributed across the drum of the reel, with two to three inches of "free board" remaining on the reel flanges to prevent the strand from slipping off the side of the reel when unwinding. Well-built, sturdy, hardwood reels should be used to prevent breakdown in the field or in warehouse handling.

The major issue when considering the possibilities of defective strand and choice of manufacturer is traceability and warranty. Some questions one should ask when purchasing strand: Does the manufacturer of your choice have full control over the quality of its product from raw material to the finished product? Given the identification tag from a reel of strand, can the manufacturer provide test results from a sample lot representative of the reel of strand? Does the manufacturer stand behind the product and warrant that its product meets the specifications to which it is certified? Does the warranty have time constraints? What is the manufacturer's record of providing field support on product complaints, and the replacement of defective materials? If a responsive and dedicated manufacturer has been selected, these questions are quickly and easily answered.

Because of its application in CATV line construction, the guy strand to which your service line is lashed is a very critical component in plant installation and quality. Careful attention should be paid when making decisions on its source. ■

By Richard T. Wagner, Division Manager, FWC Supply Division of Florida Wire and Cable Co.

WHAT'S AHEAD

SCTE

Following is a list of SCTE technical seminars with contact name. If known, location and seminar topic are listed.

July 11 *Palmetto Chapter* Contact Rick Barnett, (803) 747-1403.

July 11 *Hudson Valley Chapter* at Capital Cablevision offices, Albany, N.Y. "Video Waveform Interpretation, Character Generators and Video Switching Usages." Contact Bob Price, (518) 382-8000.

July 11 *Mount Rainier Chapter* "First Aid Certification and CPR." Contact Sally Kinsman, (206) 821-7233.

July 11-14 *Rocky Mountain Chapter* Technical sessions at the Colorado Cable Television Association convention on "Management and Professionalism," "People Skills" and "Safety." The second annual Cable Games will be held. The convention is located in Breckenridge, Colo. Contact Steve Johnson, (303) 799-1200.

July 12 *Big Country Meeting Group* in Brownwood, Texas. Contact Albert Scarborough, (915) 698-3585.

July 14 *Chaparral Chapter* "Data Networking," Amfrac Hotel, Albuquerque, New Mexico. Contact Brian Throop, (505) 761-6289.

July 18 *Dixie Chapter* in Montgomery, Ala. Contact Rickey Luke, (205) 277-4455.

July 18 *Razorback Chapter* Topic to be announced. To be held in Little Rock, Arkansas. Contact Jim Dickerson, (501) 777-4684

July 18 *Great Plains Meeting Group* To be held in Omaha, Nebraska. Contact Jennifer Hays, (402) 333-6484.

July 18 *Greater Chicago Chapter* "BCT/E Category II - Video and Audio Systems and Signals." Contact Jim Grothendick, (312) 438-4200.

July 18 *Big Sky Chapter* "BCT/E Review: Categories IV and VII." Contact Marla DeShaw, (406) 632-4300.

July 19 *Southeast Chapter* at Warner Cable, Houston, Texas. Contact Tom Rowan, (713) 560-7360.

July 25 *Appalachian Mid-Atlantic Chapter* Annual pig roast and golf outing. Contact Richard Ginter, (814) 672-5393.

July 25 *Great Lake Chapter* BCT/E testing in Categories II, IV, V, and VI. Location to be announced. Contact Dan Leith, (313) 549-8288.

July 25 *Piedmont Chapter* "Rebuild and Upgrade Engineering," location to be announced. Contact Rick Hollowell, (919) 968-4631.

WHAT'S AHEAD

C-COR Electronics "state of the art" seminars are three-day events designed to instruct relatively new technicians in basic theory, installation and maintenance of cable TV systems. Attendance is limited to a maximum of three persons from one system. The fee is $245. Call Kelly Jo Kerstetter, (800) 233-2267, ext. 422 to register or for additional info on any of the following 1990 seminars.

September 18-20
Dallas, Texas
October 16-18
Los Angeles, Calif.
November 13-15
Orlando, Fla.

Hughes Aircraft Company's microwave communications products has announced its 1990 schedule of technical training seminars on its AML microwave equipment for local signal distribution. The Broadband seminar focuses on the new family of AML broadband transmitters, amplifiers and repeaters, while the Channelized seminar emphasizes the traditional AML STX-141 and MTX-132 channelized transmitters. For more info call, (213) 517-5629 or (800) 227-7359, ext. 5629 outside Calif. and Alaska.
July 23-26 Broadband
September 10-14 Channelized
November 5-8 Broadband

Anixter Cable TV has announced the date of the next fiber optic group meeting. The keynote speaker will be Jim Chiddix, senior VP of engineering and technology, American Television and Communications. The meeting will be held **August 15 and 16** at the AT&T Merrimack Works in Merrimack Valley, Mass. For more info, contact Carole LeCompte at (800) 342-3763.

Fiberoptic Communications Corp., is offering 5-day fiber optic splicing and termination workshops at its Sturbridge, Mass. facility. The course is available on **July 23-27, August 20-24,** and **September 17-21** Also available from FC² is a two-week Certified Competency Program developed for installation and field service technicians and engineers. The program is held in Sturbridge, Mass. from **July 30-August 10** and **Oct. 29-Nov. 9.**

For further details on either seminar, call (800) 776-0518.

'Pro-sumer' and 'HDTV-ready'?

The Electronic Industries Association Consumer Electronics Show was held in Chicago in early June. This show gives cable operators a peek at what our subscribers will be trying to hook up to cable over the next few years. A glimpse three to seven years into the future is then provided at the International Conference in Consumer Electronics (ICCE) sponsored by the Institute of Electrical and Electronic Engineers (IEEE) Consumer Electronics Society (CES). The ICCE was also held in Chicago, immediately following the CES. I have the privilege of being the current president of the IEEE CES. I am proud of what this group does to bring technical information to the attention of the engineering community.

The good news is that America's love affair with consumer electronics continues. This is closely related to the attraction cable's programmming has for the consumer. The bad news is that all the new features and the emphasis on video and audio quality will present us with challenges, headaches and more charges of being "consumer surly."

'Pro-sumer' and 'HDTV-ready'

Fosgate audio and Barco video combined forces to sponsor a home theater demonstration room. During that demonstration, I heard two new terms: "Pro-sumer" and "HDTV-ready." The first term was used to denote products with technical specifications between "professional" and "consumer." It was specifically applied to the Fosgate audio system. But it could also be applied to many of the TV receivers on the show floor. Many of these "monitor" receivers claim horizontal lines of resolution in the range of 400 to more than 500. Since NTSC is capable of only 330 horizontal lines of resolution and ordinary VHS tape is limited to about 250, these products go beyond what consumers can get off-air or, at present, off-cable.

Why do these manufacturers do this? Primarily, because it is possible! Consumer electronics technology has progressed to the point where it can produce better pictures and sound than NTSC can technically support. These monitor receivers have baseband inputs which can take the baseband outputs of extended bandwidth VCRs and videodisc machines. Super VHS and ED-Beta are the current products providing these kinds of signals.

However, even more is promised. Across town, at the IEEE ICCE confab, techniques for consumer digital rcording were being explored in technical papers. These technologies are in fact so good, many independent TV stations are starting to use high-end consumer electronics products for production purposes. This gives solid meaning to that strange new term: pro-sumer.

The HDTV-ready product demonstrated was the Barco monitor, an extended bandwidth, adjustable aspect ratio projection system which accommodates various scan rates. The claim was made that with the Barco monitor, the consumer can have the best which NTSC has to offer now, enjoy even better performance from pre-recorded discs and tapes, and be ready for HDTV when it becomes available. Implied but not stated was the promise of an HDTV tuner and decoder for use with the projector.

While the Barco projector is a remarkable machine, it is very expensive. We can expect, however, more HDTV-ready devices in the future at more affordable prices. These will provide the subscriber with a crystal clear window through which to watch our signals. We will be challenged to do better and better.

A couple of HDTV displays were on the main floor displaying the kind of pictures possible with baseband recording.

Of particular note was the increased brightness of the displays. In previous years, an HDTV monitor would only be shown in a darkened room or with an overhanging light shield. Panasonic had a large HDTV projector which was out in the open. While it wasn't as bright as a NTSC projector, its performance was quite acceptable. The Sarnoff argument that HDTV displays are not bright enough to be saleable has been put to rest. These displays do not require the room lights to be dimmed. This brings the day of practical HDTV a little closer.

SuperGuide

The Uniden booth demonstrated the UST4800 model satellite Integrated Receiver/Decoder (IRD) with built-in SuperGuide. SuperGuide is an impressive electronic program guide which eases the use of the programming available on the satellite. Multiple screens of information allow the subscriber to tailor his presentation in a manner that is comfortable for him.

SuperGuide was also described in a paper at the IEEE International Conference on Consumer Electronics. It was stated that plans call for the production of 50,000 units in 1990. The projected cost increment if SuperGuide was added to cable converters was $40. In 1993, this is expected to fall to $14 because of increased integration of the circuitry. Memory capacity is 128 kBytes in the standard model. To store information for eight days and 120 channels, 256 kBytes are required. SuperGuide's 6808 processor can handle up to 500 kBytes of memory.

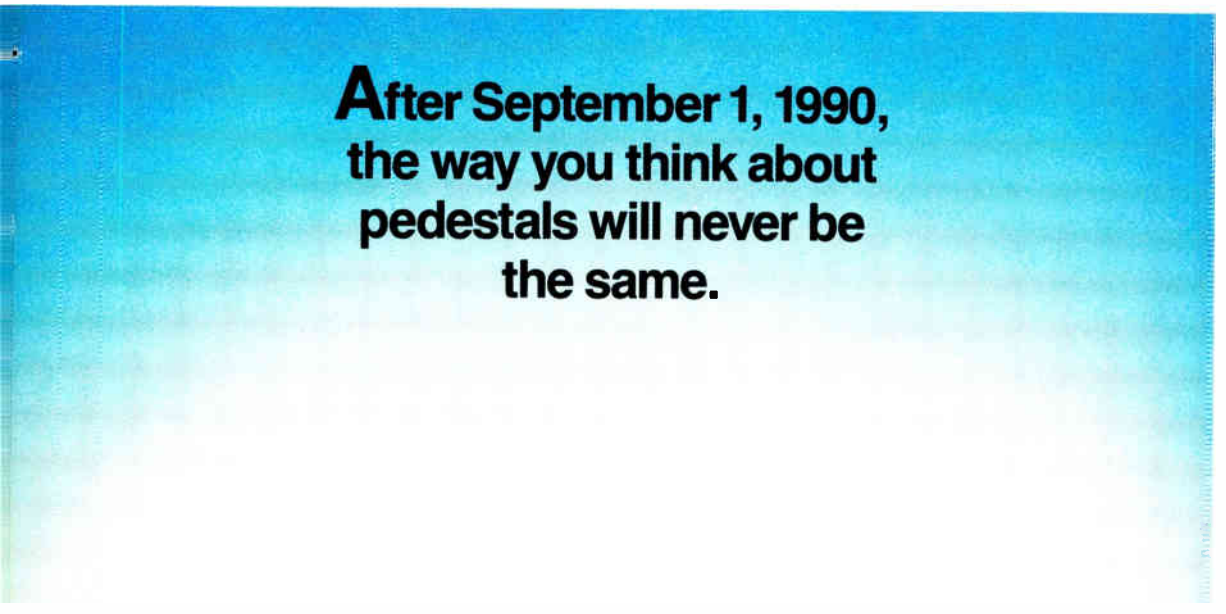
SuperGuide sells the information for the guide for $48 per year. The first year is included in the cost of the purchase. The signal is encrypted and addressable. The IRD causes the antenna to turn to the correct satellite during the night and retrieve the next day's data. Several days' worth of information is updated daily.

Conclusion

So get ready for pro-sumer and HDTV-ready. Products following in these trends will make our lives more interesting and challenging. Our subscribers will demand even more of us. ■

By Walter Ciciora, Vice President of Technology, American Television and Communications

U T I L I T Y P R O D U C T S



On September 1, 1990, Utility Products, the leading manufacturer of closures for the CATV industry, is introducing a new line of products that will revolutionize the way you think about pedestals.

Our new Access 360° Pedestals will outperform all other pedestals currently on the market.

PLASTIC OR METAL

360° ACCESS

GREATER STABILITY

GREATER VOLUME

Find out how Access 360° Pedestals can enhance your system. Call Reliance Comm/Tec's Utility Products group at 708-455-8010 or call or write Anixter today for more information.

RELIANCE COMM/TEC + ANIXTER CABLE TV

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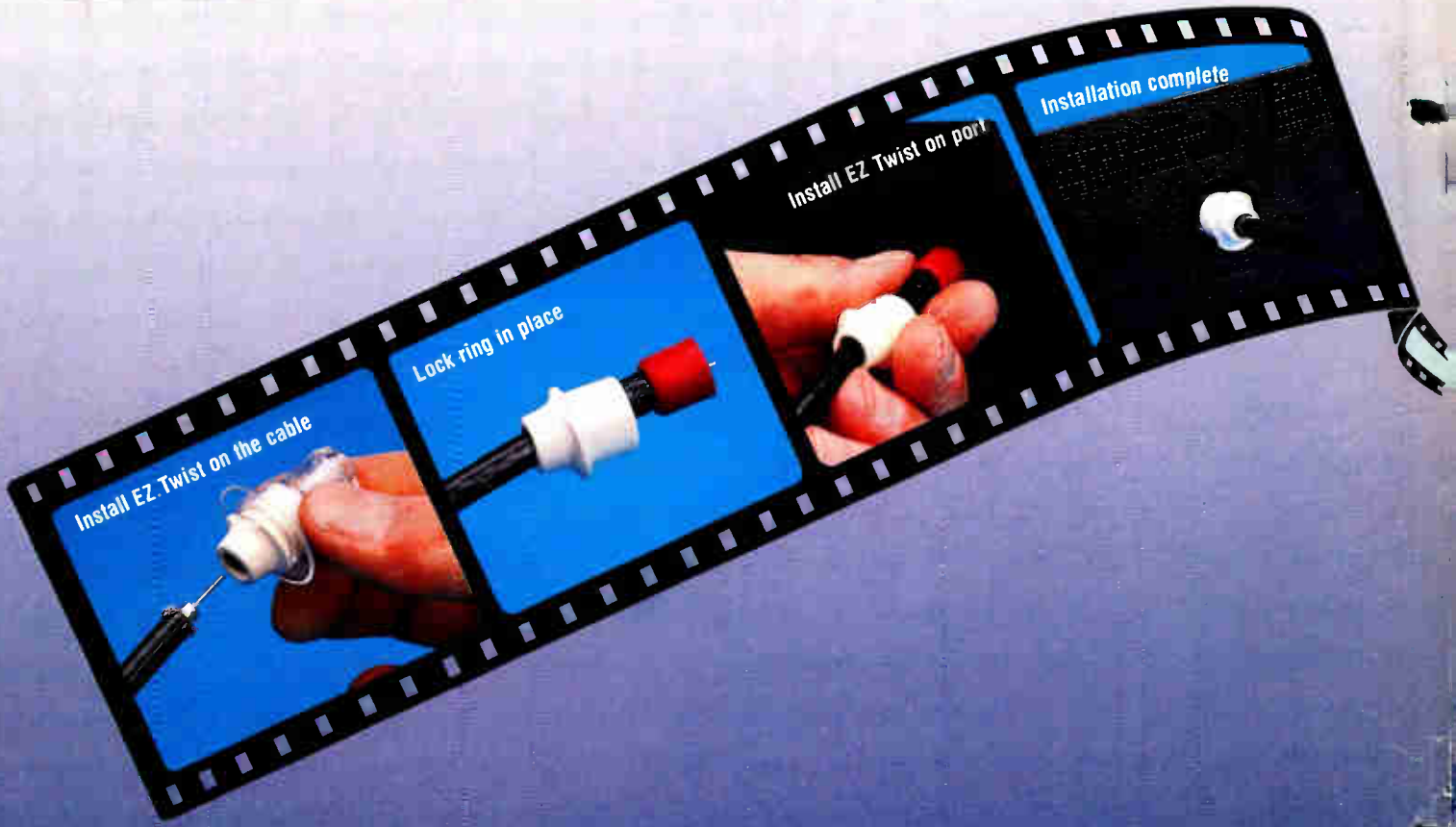
Reader Service Number 60

In an emergency, weekends and holidays or after 5 P.M. call toll free 1 (800) 323-8166.
CORPORATE OFFICES, ANIXTER CABLE TV, 4711 Golf Road, Skokie, IL 60076, (708) 677-2600

Introducing EZ Twist™...



A new concept in F-connectors

Recent studies show that the most common F-connector problems are indoors. Raychem's EZ Twist connector with its unique, push-on-and-lock design, avoids the problems of poor RF shielding caused by loose connections and swivel fittings.

It can be installed quickly in tight places with limited access. And it's truly a universal connector:

- fits all RG-59 and RG-6 cables.
- fits all ports.
- fits tightly spaced ports — no wrench needed.

The EZ Twist indoor connector was built with the subscriber in mind. Its ivory color makes it easy to locate, and its one-hand, one-step process makes it easy to install.

Raychem's new EZ Twist indoor connectors are available *now* through Anixter Cable TV. To order, or for more information, call the Anixter Cable TV location nearest you.

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