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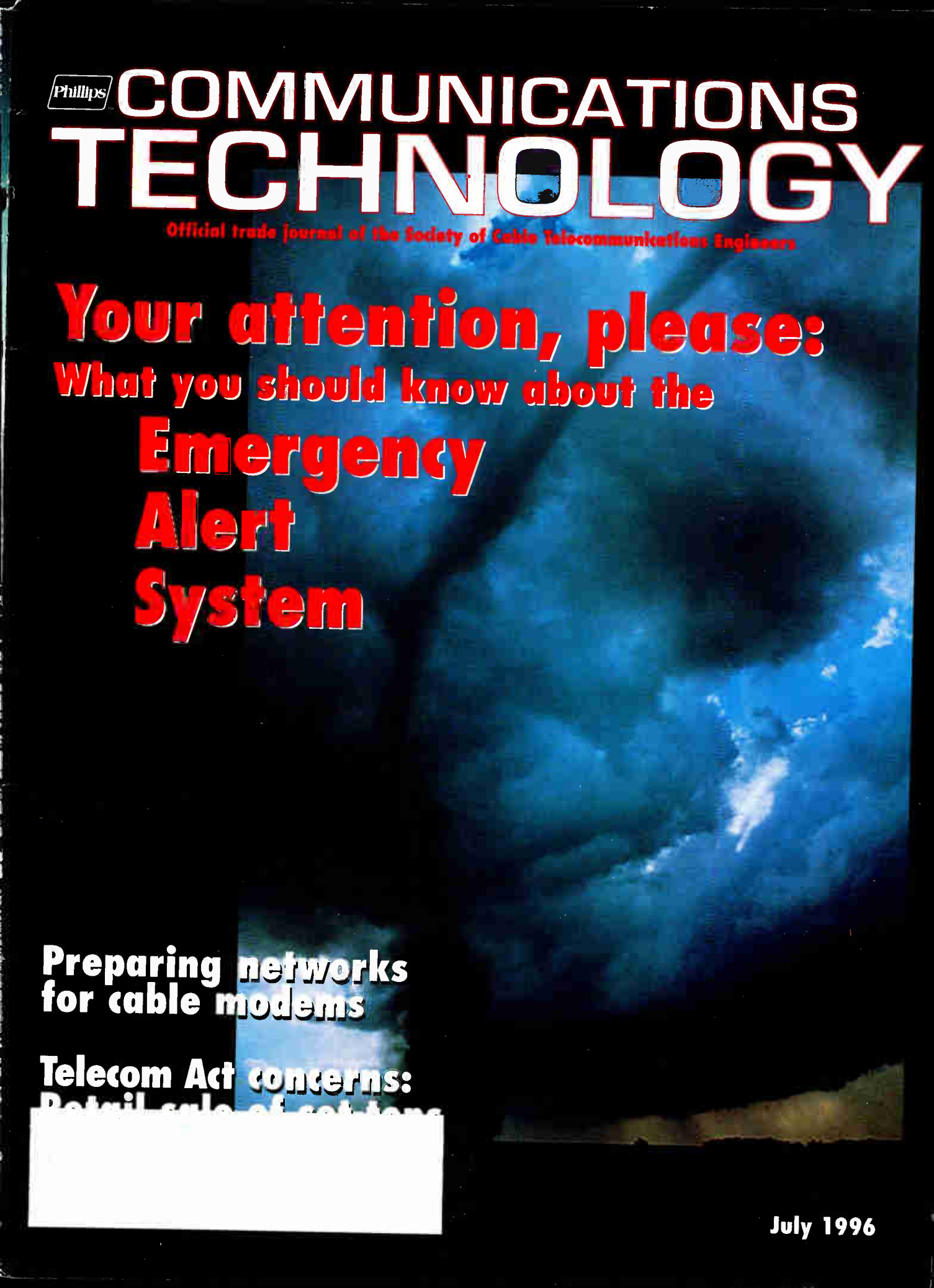
Official trade journal of the Society of Cable Telecommunications Engineers

Your attention, please:

What you should know about the Emergency Alert System



Preparing networks for cable modems

Telecom Act concerns:

July 1996

environment. In his closing remarks at HFC '96, Siller said "HFC networks have an exciting future. Getting there, however, it is not a 'slam dunk,' but it can and will be done."

This was the first time SCTE has collaborated with the IEEE ComSoc in this capacity, and everyone involved was very pleased with the result. Attendance at the conference was exceptional. Seventy five attendees were expected and 135 actually attended the event.

Audio transcripts of the sessions and copies of the proceedings manual are available through the Society by calling (610) 363-6888.

New groups form internationally

Two international SCTE meeting groups have recently formed. One, the Terra Nova Meeting Group, is based in St. John's, New Foundland, Canada. The other, the Central America Meeting Group, hails from Panama City, Panama.

Meeting groups are local organizations in the process of meeting all the requirements necessary for full SCTE chapter status. This marks the first time in the Society's 27-year history that SCTE meeting groups have been formed outside the United States and its territories.

The Terra Nova Meeting Group has been formed by employees of regional cable operator Cable Atlantic, which plans to involve other companies throughout the province of New Foundland. The group's president is Cable Atlantic's David O'Leary.

The Central America Meeting Group also has had cooperation from Costa Rica in forming this organization. Principles of this group are from Cable Onda, a cable operator in Panama City, Panama, and Cable Color in San Jose, Costa Rica. The group's president is Cable Onda's Humberto Garcia.

Anyone interested in participating in the activities of either group should contact the following:

- Terra Nova Meeting Group, P.O. Box 441, Mt. Pearl, NF A1N 2C4, Canada. Contact Alfred Englehardt, vice president, at (709) 753-7583.
- Central America Meeting Group, c/o Cable Onda 90, S.A., P.O. Box 527948; Miami, FL 33152. Contact Humberto Garcia, president, at 011-507-264-7555.

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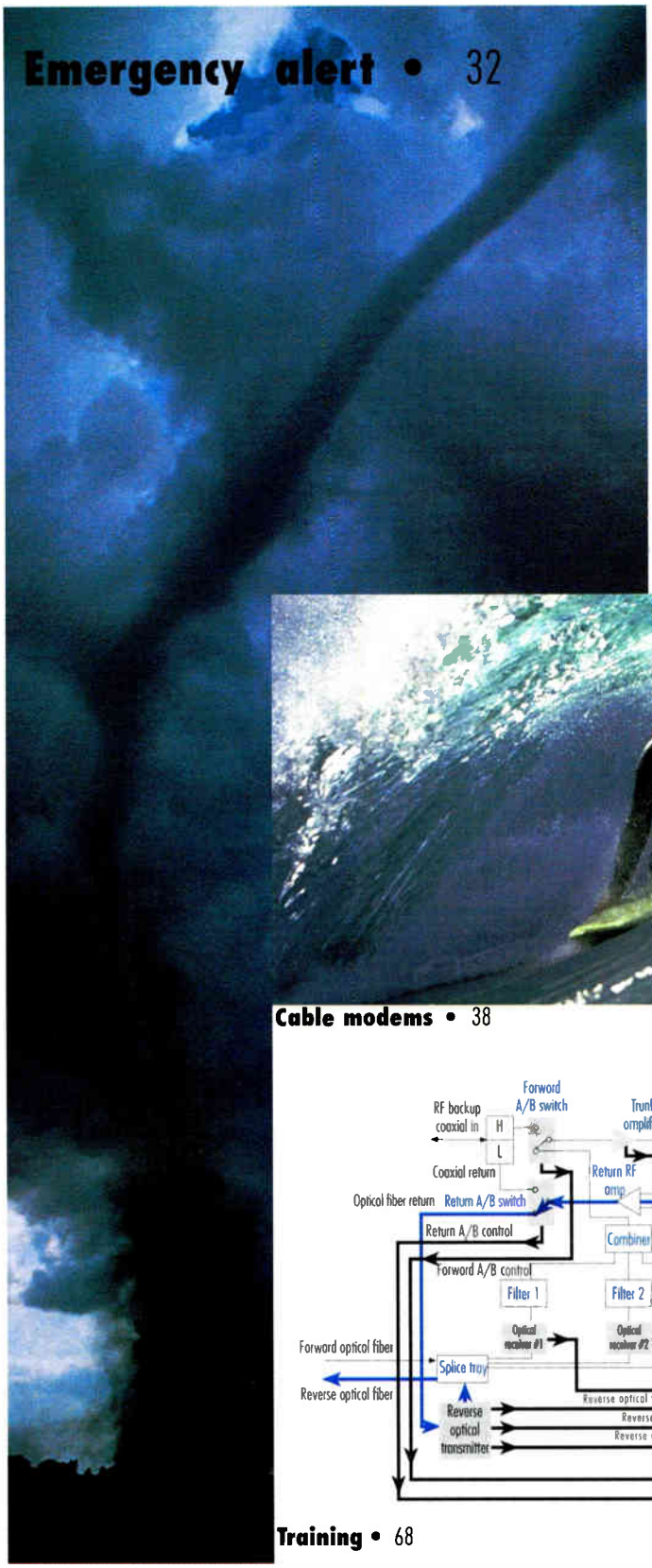

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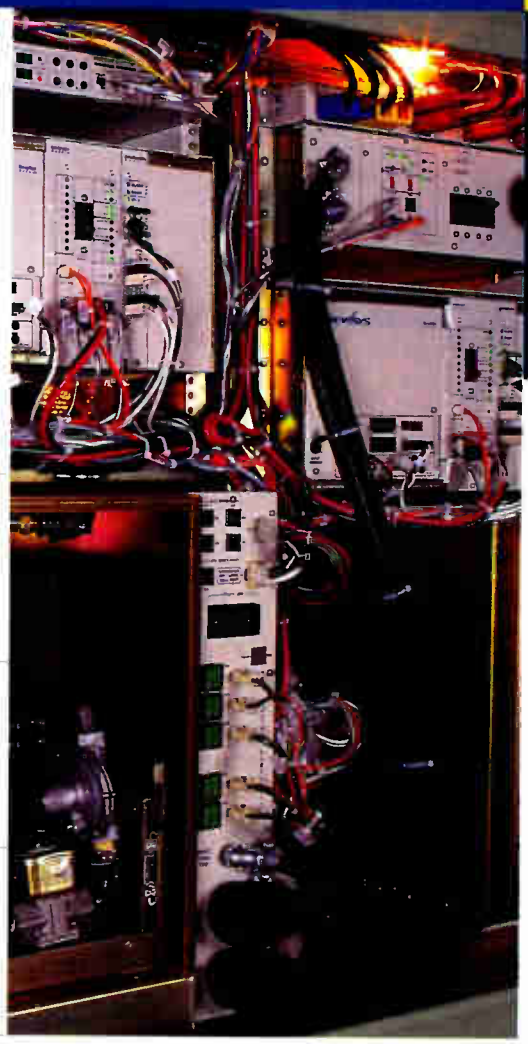

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EDITOR'S LETTER

How "not" to do business

It seems that every morning when I pick up the business section of the local newspaper, I am subjected to another article, "Time Warner sues US West" or "US West sues Time Warner." This legal battle is getting tiresome and it is one that shouldn't consume too much deliberation by a federal judge.

Let's face it. According to the papers, this case over studio ownership seems to be based on hearsay and secret conversations between parties of "two." Time Warner claims to have "told" US West that neither company may own a movie studio except through the Time Warner Entertainment partnership.

"$2.5 billion is a pretty hefty sum to put up on verbal agreements and statements between two people."

"Told?" These are two major U.S. corporations, represented by a plethora of lawyers. And an attorney says, in court, that Oded Aboodi made a remark in 1993 as the company negotiated to sell US West a 25% stake in the cable TV and entertainment partnership for $2.5 billion!

Who recorded the negotiations during these meetings? $2.5 billion is a pretty hefty sum to put up on verbal agreements and statements between two people. And then, Attorney Millson argues, too, that US West knew of a side agreement Time Warner had with Itochu Corp. and Toshiba Corp. The paper reports that Millson offered that knowledge (does he submit any paperwork as knowledge of such "side agreement"?) as proof that US West knew when it was negotiating to become a partner that Time Warner intended to buy Turner and that the partnership agreement provided an exception allowing the purchase.

At one time, I worked with someone who refused to put things in writing. He seemed to feel that if he only agreed on something with another party of one, he could always deny any agreement. On occasion, I saw him use the lack of a written document to his advantage. Strange, but he is no longer in business.

Both of the aforementioned companies have management executives with degrees from some of the elite business universities. I know all of them were taught to protect their businesses in a fiduciary manner. And, where are the lawyers who got rich from the original negotiations? Surely they reminded their clients that every meeting should be recorded and no secret discussions or agreements should occur. Although today's legal system doesn't even approach the wisdom of Solomon, I don't think a federal judge should waste much time before he asks the attorneys to put their proof where their mouth is or make a ruling.

What a poor example for business (and business lawyers) to set for future executives in any industry!

Rex Porter
Editor

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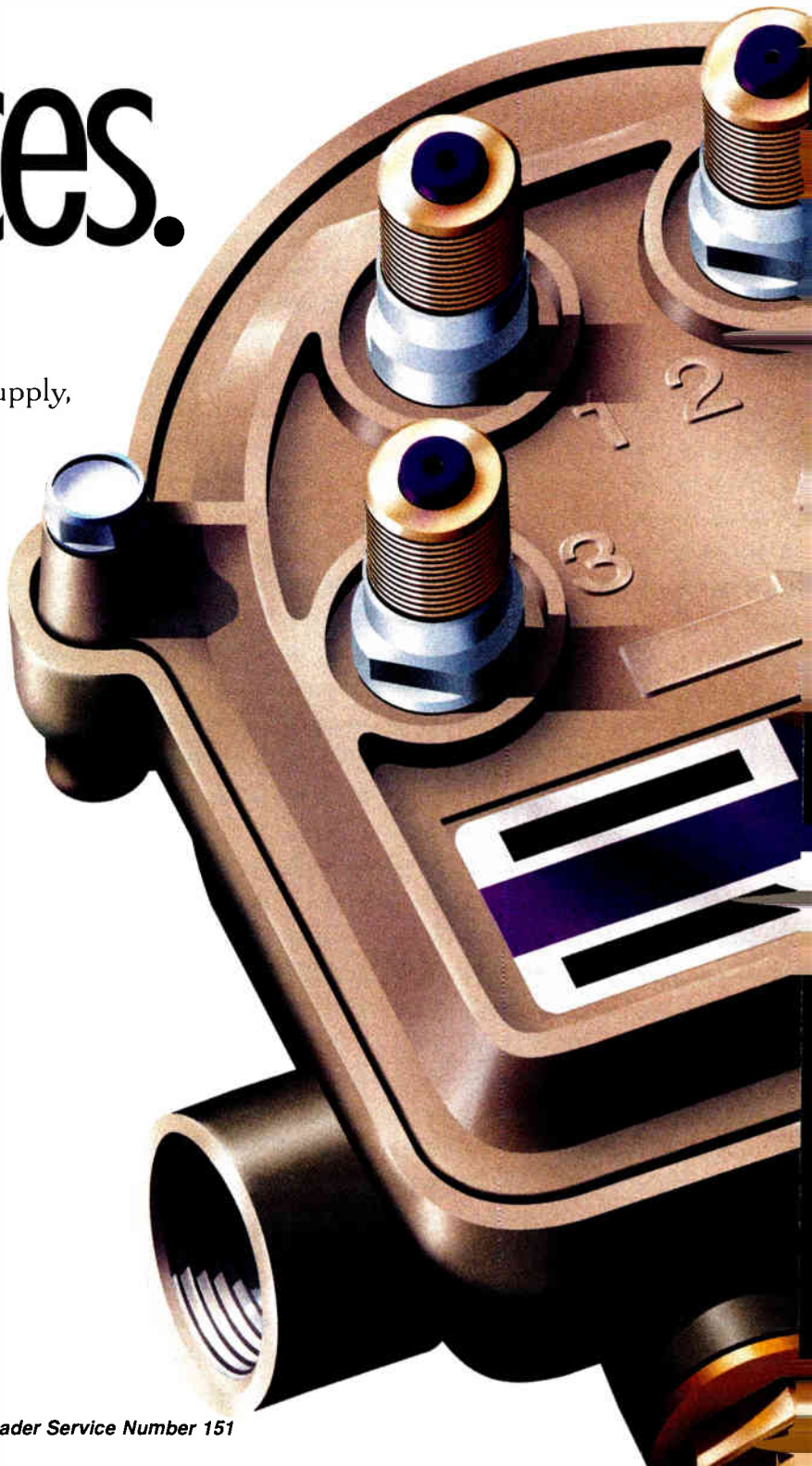

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Continental, Texscan deliver digital NVOD

Near-video-on-demand (NVOD) will be delivered digitally at Continental Cablevision of Chicago upon installation of a 3200DS digital ad insertion system from Texscan MSI, a division of TSX Corp. The system is dedicated solely to extended playback of Continental's infomercials.

"We've been running infomercials for more than a year and with an increase of service to six residential zones, digital insertion equipment is the most efficient way to deliver our product," said Elizabeth Braham Spencer, local ad sales manager for Continental Cablevision.

The Texscan system consists of the server, a control and switch platform and a system control computer. Spot files are accessed, decoded and streamed in real-time from the server to the controller with no restriction in segment length, allowing for playback of infomercials or feature movies.

AMD, Com21 endorse modem standards

AMD announced an agreement with Com21, manufacturer of cable modem communications products, to endorse the development of cable modem technology based upon emerging open asynchronous transfer mode (ATM) over hybrid fiber/coax (HFC) standards. In this partnership, AMD intends to develop integrated circuits (ICs) for communications products based on Com21's broadband ATM cable technology.

AMD, a supplier of Ethernet LAN and other ICs for the communications market, is assisting Com21 in the integration of off-the-shelf components for current products and will co-develop next-generation ICs with Com21. AMD intends to offer these ICs and derivative products to the general market.

CableLabs, Rogers establish test center

Cable Television Laboratories Inc. will assist Rogers Cablesystems Ltd. in establishing a cable TV equipment test laboratory in Toronto, Canada, this summer. The goal of the new laboratory, called the Technical Advisory Committee Test Centre, is to evaluate currently available, off-the-shelf equipment from cable suppliers with an eye to determining if the hardware meets vendor-established specifications.

Brian James, former director of advanced TV testing with CableLabs, will manage the laboratory for Rogers Cablesystems as TAC Test Centre vice president. CableLabs engineers will continue to evaluate and test equipment exclusively in the research-and-development phase.

Testing is voluntary for vendors, who will be given the option to have their equipment included.

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Reader Service Number 19

The Society celebrated another successful Cable-Tec Expo in Nashville, TN, last month. For coverage of the event, see next month's "Communications Technology."

Subcommittees meet at Expo '96

The Society of Cable Telecommunications Engineers is announced the recent formation of two new technical subcommittees organized under SCTE's already established Engineering Committee. These subcommittees each held their first official meetings at SCTE's Cable-Tec Expo '96 on June 9 in Nashville, TN.

The Data Standards Subcommittee, chaired by Continental's David Fellows, will be working to advance the cable industry's interest in and knowledge of medium- and high-speed data delivery and develop standards for hardware interoperability. This group has many important technical issues to discuss, debate and develop. The subcommittee will be coordinating its efforts with the activities of IFF 802.14, DAVIC and CableLabs.

The Digital Video Subcommittee, chaired by General Instrument's

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DX ANTENNA

Reader Service Number 86

Paul Hearty, will explore the need for SCTE involvement in the development of standards for digital video signal delivery through coordination of efforts with NCTA, the FCC and other related organizations.

The Society encourages all interested parties to join these groups to lay the foundation for the future direction of these newly developed subcommittees. For further information on these or any other SCTE engineering subcommittee activities, please contact the Society's director of standards, Ted Woo, at national headquarters by calling (610) 363-6888, ext. 228.

Subcommittees seek working group leaders

SCTE's Maintenance Practices and Procedures Subcommittee is seeking people who want to be involved in creating standards for technical performance that will be necessary to establish superior customer service in this industry. Working groups have been established, but they need leaders to coordinate industry participation in achieving our subcommittee's goals. Working group presently in need of leaders are:

- Preventive Maintenance
- Utility Company Interface

The subcommittee plans meetings for the following trade shows throughout the year:

- SCTE Annual Conference on Emerging Technologies
- Texas Cable Show
- NCTA Show
- SCTE Cable-Tec Expo
- Atlantic Cable Show
- Western Cable Show

Working group leaders may schedule additional meetings for working sessions that can be conducted through teleconferencing or meetings in conjunction with SCTE events.

Interested persons who can attend at least three of the six meetings per year, should call Bruce Weintraub at (301) 294-7607 or fax to (301) 762-7863.

GI scholarship

With General Instrument's recent announcement of its new Milton Jerrold Schapp Memorial Scholarship Program came the news that the Society has been selected by the company to administer the program. The first scholarship to be awarded under this program was announced by SCTE President Bill Riker at Cable-Tec Expo '96 in Nashville, TN.

General Instrument has established this program to honor the founder (in 1948) of Jerrold Electronics, which is now the GI Communications Division. In addition, Schapp is regarded as one of the founding fathers of the cable telecommunications industry.

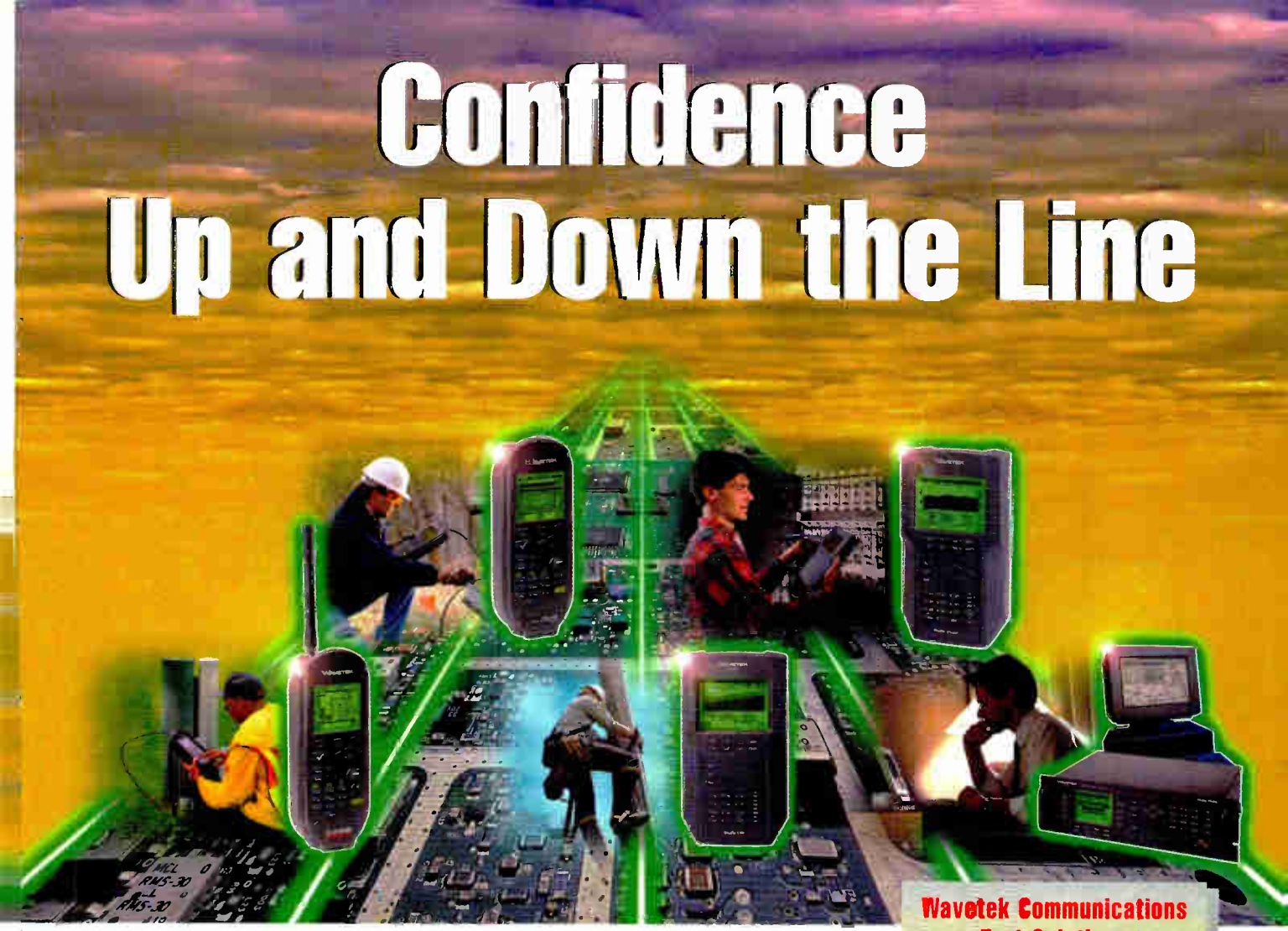
In addition to his distinguished CATV career, Schapp went on to serve as governor of Pennsylvania in the early 1970s. He passed away on Thanksgiving Day 1994.

"We wanted to honor the memory and tradition of Milton Schapp," stated GI Communications Eastern Division President Ed Breen, "and we decided the best way to do that was to establish this program."

According to Riker, "The program will be administered in a manner similar to the way we conduct our Tuition Assistance Program. It will be presented each year to one high school senior whose father or mother has been working in this industry for at least three years. Winners will receive a college scholarship worth $20,000 over a four-year period.

"We're pleased to be able to administer this new and generous scholarship honoring former Pennsylvania Governor Schapp," Riker concluded. "His dedication to helping young people was well known by many in the cable industry."

Confidence Up and Down the Line



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Reader Service Number 55

By Ron Hranac

Impulse noise in two-way systems

I just returned from a two and a half week tour through Asia with one of Hewlett-Packard's top engineers, Francis Edgington. For those of you who don't know him, Francis is the father of much of the technology behind H-P's 8591C cable TV spectrum analyzer. We teamed up during that time to lecture in several countries about CATV system maintenance and two-way operating problems and issues.

At our stop in Tokyo, we met with Mikio Saiki of Hewlett-Packard Japan. Saiki-san coordinated our activities in Japan and also spoke at our Tokyo and Osaka seminars. His presentation dealt with, among other things, impulse noise measurements in the reverse path. One of the demonstrations he used showed an interesting phenomenon: Turning a TV set on and off can generate impulse noise spikes in the 5 to 50 MHz spectrum!

"I have suspected for some time that a large amount of impulse noise makes its way into the reverse spectrum as common-mode interference."

Ron Hranac is senior vice president, engineering, for Denver-based consulting firm Coaxial International. He also is senior technical editor for "Communications Technology."

Setup

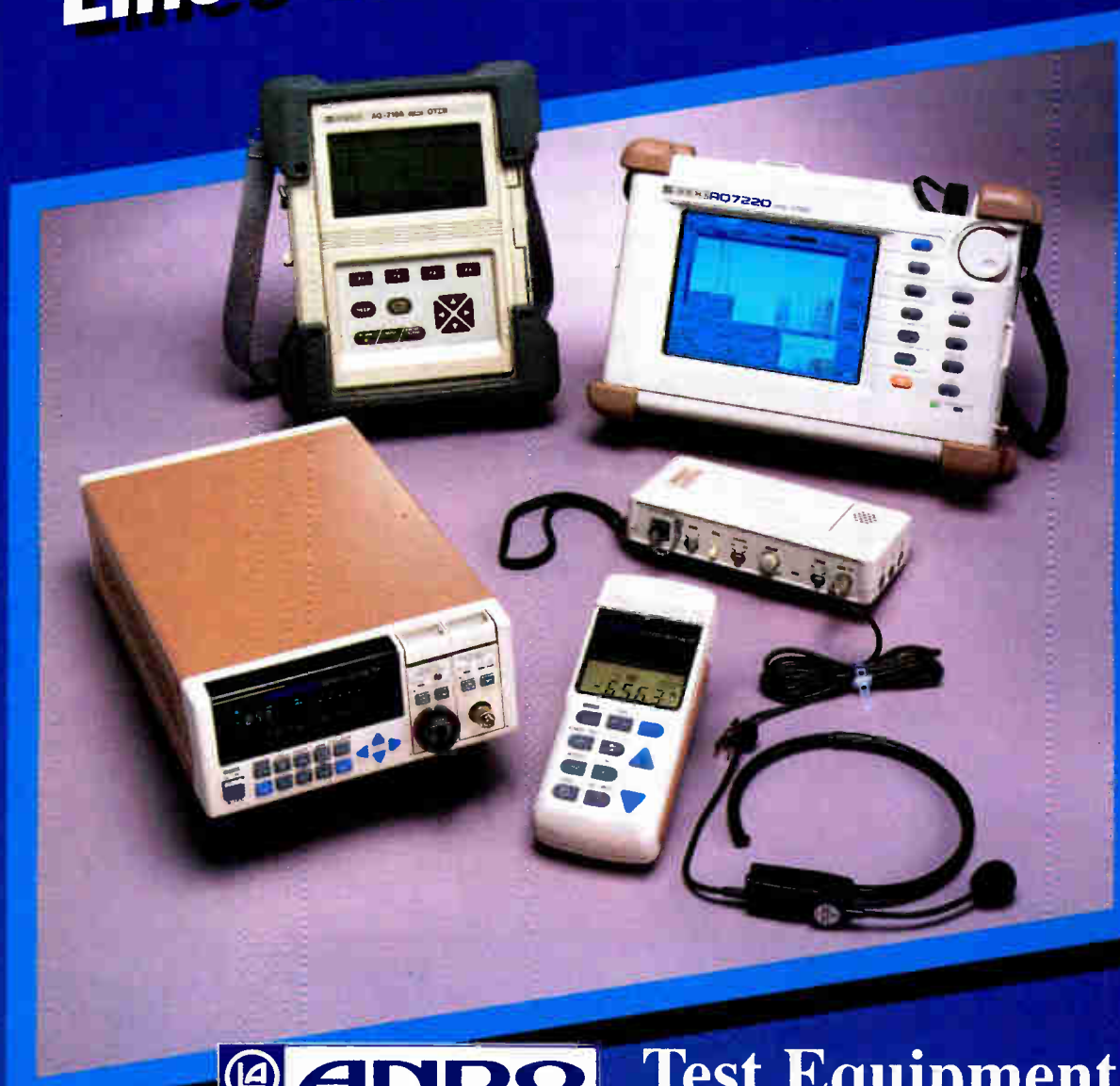
The setup to observe this is fairly straightforward. Connect a cable compatible TV set to a spectrum analyzer using a length of drop cable. Adjust the spectrum analyzer frequency span to cover the desired reverse bandwidth, and then set the analyzer to max hold mode. Next, turn the TV set on and off several times. What you will see on the analyzer display is a buildup of impulse noise caused by the TV set's power switch turning the set on and off. Saiki-san reports that the same thing happens when using a set-top converter to turn the TV set on and off via the converter's switched AC outlet. (A side note: The analyzer's input attenuator, sweep rate and resolution bandwidth settings will affect the amount and amplitude of displayed impulse noise. As such, this method may not always show the true extent of impulse noise. Another way to augment this is to make time domain measurements of the impulse noise rather than the traditional spectrum analyzer frequency domain measurements.)

Naturally, our subscribers won't be sitting at home turning their TV sets on and off repetitively as was done for this demonstration. But imagine thousands of subscribers coming home from work each evening and turning on their TV sets at about the same time to watch the 6 o'clock news! And this is but one of an almost infinite number of possible impulse noise sources.

Playing on a hunch, I suggested to Saiki-san that we repeat his demonstration with a slight modification to the setup.

Using an old ham radio trick, I formed a common-mode choke by coiling up some of the drop cable behind the TV set. This coiled cable technique has been used by hams for years as a way to make an effective current balun for use with dipole and Yagi antennas operating in the 1.8 to 29.7 MHz range, to suppress com-

Keeping the Lines of Communication Open



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mon-mode signals traveling on the outside of the coax shield. It involved nothing more than making an eight to 10 turn coil about 6 or 7 inches in diameter, then taping the coil of cable so it wouldn't come apart. This coil was made in the drop cable as close to the TV set as possible.

When the impulse noise demonstration was repeated, we observed a significant reduction of displayed impulse noise. Suspecting the TV set's AC power cord as another possible common-mode problem point, we installed one of those snap-on ferrite cores used for computer cables (Francis had one in his briefcase) onto the power cord as close to the TV set as possible. This resulted in an additional reduction of the observed impulse noise. What remained likely could have been eliminated with a high pass filter—also known as a differential-mode filter—but we didn't have one with us to confirm this.

I have suspected for some time that a large amount of impulse noise makes its way into the reverse spectrum as common-mode interference. For that matter, I suspect some ingress of shortwave broadcasts, etc., also is via a common-mode mechanism. In any event, this little demonstration confirmed in my mind that a lot of impulse noise problems are probably getting into the network as common-mode signals. Where it is impractical to treat impulse noise as differential-mode signals and filter it out using high-pass filters installed at the feeder tap ports, the use of common-mode suppression techniques may be an effective alternative. (Another side note: Common-mode signals and common path distortion are not the same thing.)

Definitions

I think it's time to digress a bit. I've made several references to common-mode and differential-mode signals, and probably should provide some definitions. By the way, for a good tutorial on this subject, I suggest that you read Chapter Two of *Radio Frequency Interference: How to Find It and Fix It*, an excellent publication from the American Radio Relay League. This book, which sells for about $15, is available directly from ARRL (225 Main Street, Newington, CT 06111, telephone 860-594-0200; ask for publication #3754), most ham radio stores, as well as many book stores. For reference, the ISBN number is 0-87259-375-4.

From *Radio Frequency Interference: How to Find It and Fix It*, here is the first definition: Differential-mode currents occur between two conductors with no ground reference. There is a 180° phase difference between the currents in the two conductors. In a two-wire transmission line, for example, the signal arrives on one line and returns on the other. A good example of differential-mode signals is the TV channels we carry in our coaxial cables.

Also from the same reference: In comparison, common-mode currents are in phase on each conductor of a multiwire cable. Common-mode currents return to their source through some conductor common to both the source and the affected circuit (usually the system or earth ground). In a common-mode situation, all wires of a multiwire system act as if they were a single wire. Since common-

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mode currents flow in the same direction through all conductors in a cable, little field cancellation takes place. The book goes on to say, "The magnitude of common-mode currents induced in each wire of a cable is a function of the cable design ... In an unbalanced system, such as coaxial cable, the induced current magnitude is different in each conductor. The induced current is much greater in the coax shield ... "

Most of the impulse noise that occurs when a TV set is turned on and off is generated by the sparking in the power switch's contacts during the make-break cycle. Each spark contains a lot of high-frequency energy, especially in the CATV reverse frequency spectrum. This energy is induced onto both conductors of the TV set's AC power cord as a common-mode current. It also shows up on the shield of the drop cable, by a combination of conduction (from the TV set chassis directly to the cable shield) and radiation (from the AC power cord and circuits in the TV itself). This common-mode energy then is coupled into the drop cable, probably right inside the TV set.

The multiturn coil I made in the drop cable acted as a high-impedance to common-mode currents on the outside of the cable's shield, while having no effect on the desired differential-mode currents inside the cable. Likewise, the snap-on ferrite core acted as a high-impedance to common-mode currents on the AC power cord, without affecting the desired AC inside the power cord. The combination of these suppressed much of the induced common-mode impulse noise, preventing it from being coupled into the drop cable.

High-pass filters are still a very effective means of dealing with interference, whether impulse noise or other problems, once the interference has been coupled into the cable. Where appropriate, they should be used. But in situations where we can't use high-pass filters—for example, at homes with active reverse—common-mode suppression techniques must be seriously considered as potential remedies for problems we may previously have thought of as differential-mode in nature.

Start with the simple fixes first. Try a coil of cable, with eight to 10 turns over a 6- to 8-inch diameter. Alternatively, commercially manufactured CATV common-mode chokes such as the Ghost Buster can be considered, although this particular design was really optimized for VHF. Common-mode chokes should be located at the inputs to TV sets, converters, VCRs, cable modems, and other devices where common-mode signals may possibly be induced into the cable. We may need to add snap-on ferrite cores to our tool kit as well, to take care of power cord problems (AC and DC). Make sure the ferrite material is suitable for the intended frequency of operation (number 72 or 73 core material is best for frequencies below 30 MHz; number 75 works best below 10 MHz).

Obviously, more work in this area remains, and as the cable industry expands its use of the reverse spectrum, we'll learn a lot more about the problems we face. This includes novel solutions that have been around for similar problems in other fields! **CT**

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By Ron Hranac

Getting on my SCTE soapbox

For more details on one of the topics discussed in this column (the Society of Cable Telecommunications Engineers annual national board election), see "President's Message" by Bill Riker on page 102.

This month I want to get up on my SCTE soapbox, and wear my At-Large Director hat for this particular column. By the time many of you read this, you should have received—or will receive very soon—your annual SCTE election package. That package contains an important ballot, one which gives all Active, Senior, Fellow, Charter and Retired members a voice in the direction and future of the Society. Each of you will have the opportunity to vote for two At-Large Director candidates. About half (specifically, those of you in Regions 1, 2, 6, 9 and 11) also will be able to vote for a director to represent your particular region.

The candidates you elect will be representing you on SCTE's board of directors. This group is responsible for setting and maintaining national policies and procedures. In short, the board is building the future of your Society, and your vote is an important part of the process of running the organization. It's a way for you to have a say in the operation of SCTE. But you forfeit all of that if you don't vote.

Why am I reminding you of this? Simply because most of you didn't bother to vote in 1996. Last year's election had a paltry 17% participation, the lowest in more than 10 years! It wasn't that long ago, '90 or '91 as I recall, that nearly a third of the Society's membership voted in the annual election, but the trend has been downhill ever since. This is strange, because each year our membership count increases a bunch. Yet the percentage of SCTE members who vote in the annual board of directors election is sliding in the opposite direction. What gives?

Why not just open up the election package as soon as you receive it, or dig it out of your in-basket if you've already received it, and vote? It will take only a couple minutes to read the candidate biographies, fill out the ballot (simplified this year to make the voting process even easier) and drop the thing in the mail. Then walk down the hall and remind just one co-worker who also is an SCTE member to do the same thing. Better yet, be a pest about it!

Chapters, meeting groups

While I'm on the soapbox, I'd like to chat about a couple other things. The first is a question related to chapter and meeting group activities. Why are some SCTE chapters and meeting groups successful, and others not? Of particular concern is that some chapters and meeting groups regularly have meetings with standing-room-only attendance, while others struggle to get a dozen folks to show up. I'd like to know your thoughts about this. Drop me an e-mail at rhranac@aol. com or send your comments directly to SCTE headquarters (SCTE, 140 Phillips Road, Exton, PA 19341).

The Society's Planning Committee has discussed this issue at length. A number of possible reasons have been considered, though they may or may not be valid for all situations. Here are a few examples: choice of topic and/or speaker; day of week the meeting is held; location of the meeting (too far away?); cost; lack of support or participation by local cable systems; members too busy to attend; members planned to go, but forgot about the meeting until after it was over.

Let's look at each of these a bit more closely. The choice of topic and/or speaker is certainly one possible factor. A weak meeting topic (for example: "How to pound ground rods without mushrooming the top of the rod,") probably would encourage members to stay home, as could an agenda with an unknown speaker. But I've seen situations where well-known speakers came to chapter meetings to discuss popular subject matter and attendance was poor. Go figure.

The day of the week the meeting is held doesn't seem to be an especially big contributor to meeting attendance, although in some cases it may be. The question here is whether to hold meetings on weekdays or weekends. Some prefer weekends so they don't have to argue with the boss about taking time off work to attend the meeting. Still others prefer weekdays so they don't have to argue with a spouse about using personal time for meetings. What do you think?

How about meeting location? In states with only one chapter or meeting group, meetings often are held in the same city every time. This makes it difficult for members located in other cities or towns to attend, because the meetings are just too far away. In cases like this, it might make sense for chapter officers to consider varying the meeting location

Ron Hranac is senior vice president, engineering, for Denver-based consulting firm Coaxial International. He also is senior technical editor for "Communications Technology."

By Justin J. Junkus

Job description of a telecommunications switch

In many senses, the telecommunications switch is the heart and brains of telephony. When a switch is placed in a headend to provide commercial telephone service, the headend is transformed into a service node in the public telecommunications network. The corresponding telco service node is the central office (CO). No matter where the switch is located, however, it needs to perform three key functions for the service provider's customers: call processing, call routing, and feature delivery.

Justin Junkus has over 25 years experience in the telecommunications industry. Previously the AT&T cable TV market manager for the 5ESS switch, he is currently president of KnowledgeLink Inc., a telecommunications training and consulting firm. He can be contacted for comments or questions via e-mail at JJunkus@aol.com.

Call processing

A novice to telephony would be tempted to view call processing solely from a subscriber's perspective. What the subscriber can observe is that something (the switch) sends dial tone back to the earpiece when the receiver is picked up, receives digits as they are dialed, and rings the destination number. While those actions are part of call processing, they are only a limited subset of what needs to be done. There are, in actuality, three whole categories of functions involved in call processing.

The first category involves meeting some basic circuit needs of the subscriber line. In addition to providing dial tone when the receiver is removed from the switchhook, the switch must deliver the BORSCHT functions. BORSCHT is a telephony acronym for battery, overvoltage protection, ringing, supervision, codec, hybrid, and testing.

Battery refers to the applied telephone line voltage. Typically, this is -48 volts. Overvoltage protection is the set of safety limitations the switch places on possible voltages on the line, to prevent severe damage to both the station equipment and the humans using it. Ringing is self-explanatory. Supervision is the monitoring of call status by the switch, to properly connect, maintain and disconnect the telephone connection. Codec and hybrid are required in digital switches. Codec refers to the function of converting analog information to a digital format while hybrid is the conversion from two-wire to four-wire. Testing is the access to the line to test in either direction: toward the subscriber or back into the switch.

The second category of functions

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in call processing can be called entitlements. This is the part of the call where the switch checks the subscriber's line to see what the sub is allowed to do. The most basic entitlement is the ability to complete outgoing calls. The switch has the ability to restrict the calling privileges of each subscriber line. In certain areas, such as a factory production floor of a large business customer, it may be desirable to allow incoming calls only. In other areas, such as the lobby, it may be acceptable to allow local outgoing calls to be completed, as well as incoming calls. The process can be carried as far as necessary through the call origination hierarchy. In case you are wondering, there are residential applications of call restriction as well as the business applications just mentioned. As an example, consider the family that does not want to complete any 1-900 number calls.

Another type of entitlement is the set of features that the subscriber is allowed to access. We will address features themselves in detail later in this column, but for the time being, consider only the ability to use those features. The switch provides features to the subscriber based on table lookups of features provisioned by switch administration personnel when service is purchased. If you have not purchased call hold, for example, the switch will prevent your use of that feature.

The final category of call processing involves determining when certain actions will occur during the call. The concept of a call trigger is important here. Call triggers are events within the call that cause something else to happen. For example, going off-hook and not dialing any digits within a specified time could be a call trigger. This sequence of events might cause the call to be automatically forwarded to an emergency 911 facility, a service that is vital to any subscriber susceptible to heart attacks. Other examples of call triggers are the dialed digits 1-800 or 1-900. In these cases, the combination of digits might cause the switch to connect itself to an intelligent network service control point, for a data base lookup of the actual telephone number corresponding to the dialed 800 or 900 number.

"The cable telecommunications industry needs to have local switches that provide robust sets of both customer-oriented functions and internal maintenance."

Call routing

In addition to call processing, the switch must route the call to the called telephone line. Call routing is truly a numbers game. For example, the North American Numbering Plan assigns a 10-digit number to every telephone line in North America. The first three digits of the called number are the area code, corresponding to the geographic location of the called line. The next three digits are the office code, which identifies the particular switch serving the called line. The last four digits represent the line itself within the switch. In addition to certain digits within the 10-digit string representing physical entities, there is a restriction on the format of the area code and the office code. In the North American Numbering Plan, the first digit of both the area code and the office code cannot be a 0 or a 1.

An initial 0 or 1 in the call sequence tells the switch the type of call it will be routing. For example, a sole 1 indicates a call to another area code while 011 signifies an international call outside the North American Numbering Plan.

International calls have their own routing scheme. The next two digits after the 011 are the country code. Following the country code is a two-digit city code. Finally, there

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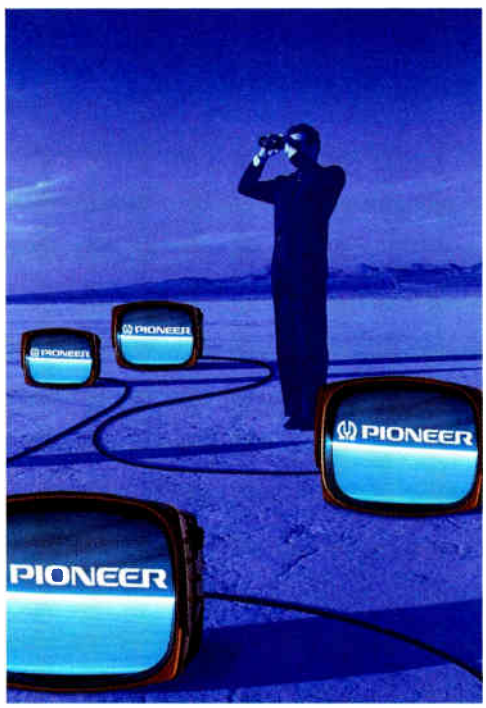

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is the station code, which varies in length by country.

Telecommunications network architecture corresponds to the numbering schemes. For example, seven-digit local calls with the same office code for calling and called party typically complete within one telecommunications switch. When a call is placed to another office code, it may be completed directly over interswitch trunks, or it may be routed through a tandem switch. Until the Telecommunications Reform Act of 1996 passed into law, long distance calls were required to be completed by an interexchange carrier using a separate switch.

Features

The switch is the source of literally hundreds of potential subscriber features. Features are provided by switch software that is invoked during call processing. Switch vendors tend to group features by categories, including POTS, BRCS, LASS, ISDN, mobility, and ACD (Automatic Call Distributor). Many of the feature groups, such as BRCS, are so broad that it would take an entire column to discuss one group alone. (We may do this in later issues!) For the time being, this column will consider the three examples of POTS, BRCS, and LASS.

POTS stands for plain old telephone service. Some examples of POTS features are alternate call routing, permanent signal release, emergency ringback, trunk signaling, call trace, traffic measurements and billing. This group of features is the most basic to switch operation, and typically adds little revenue to the services provider beyond that generated by providing basic telephony. Given increased competition and the rapidly changing technology of telecommunications, features that were billable separately from basic service yesterday often become POTS tomorrow. Perhaps one good indicator of whether a feature has become POTS is whether the switch vendor charges separately for it when the switch is purchased.

Beyond POTS we find features that are billed extra by the switch vendors, and which are capable of generating new revenue for the service provider. BRCS, (pronounced "bricks," but standing for business and residence custom services) is one of the more robust feature sets in this category. While many BRCS features are associated with routing and attendant control, the most consumer-recognizable BRCS features are call waiting, call transfer, call forward and call conferencing. In many cases, the traditional service providers have not capitalized on the full available feature set because of the need for detailed tariff filings prior to an offer. This is changing rapidly, and in some jurisdictions, a group of BRCS features is available on a one-time use, one-time fee basis. The idea, of course, is to get the consumer to try, then buy.

LASS is the acronym for local area signaling services. The consumer will probably recognize calling number identification as the most widely marketed LASS feature. However, many more features are available in this group, such as selective call rejection, selective call forwarding, and rejection of computer access. LASS features are often teamed with common channel signaling capability to extend LASS to interLATA or interswitch applications.

This brings us to another point: not all telephony features are provided by the local switch. Some are network based, such as 800 service, E911, credit card calls, citywide Centrex and number portability. Understanding of these features requires an understanding of the intelligent network, along with signal transfer points (STPs) and Service Control Points (SCPs).

Maintenance is important too

Any discussion of switch functions would be incomplete without acknowledging a set of features known as operations, administration and maintenance (OA&M). Although the service provider's customer is normally unaware of OA&M, these features are critical to the customer-facing functions just discussed. Examples of OA&M features are assigning a feature to a customer's line, identifying faulty circuits, and activating duplicated network components when faults are identified. To provide the service that consumers have grown to expect from the telecommunications network, the cable telecommunications industry needs to have local switches that provide robust sets of both customer-oriented functions and internal maintenance. **CT**

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By Laurence M. Bloom

Will telecom reform delay the "Golden Corridor"?

The present popular belief holds that the Telecom Act of 1996 is a boon for a rapid deployment of a communications superhighway. I suggest that the new legislation is in reality a roadblock to any broadband wired communications system being activated in the near future. The fact that a cable system and a telephone company cannot jointly develop their facilities within the same service area will impede any opportunity for a quick rollout of any reliable high-speed broadband communications system.

The Telecom Act of 1996 in many ways sets the groundwork for the development of the communications superhighway. Basically, the government has moved out of the way of progress. The legislation removed many of the obstacles that kept communications companies from becoming larger and working together for their common good. It opened the door for the possibility of face-to-face competition in traditionally closed communications service areas. Most of the multiple ownership and cross-ownership restrictions that deter development were removed. Most of the rules that foreclosed competition in communications services have been abandoned in the spirit of open competition.

One place the legislation misses the mark, however, is that it delays any early deployment of an advanced broadband wired communications network. The legislation does not take advantage of facilities already in place. Except in rural areas, the new law will not allow a local telephone operating company and a cable system to unite to jointly develop and operate a broadband communications system.

Laurence Bloom is vice president for strategic planning at Cable Resources. He can be contacted at (800) 537-9995.

Throughout most of the country the new legislation restricts a local telephone operating company from purchasing or operating an existing cable TV system within its operating area. The new legislation does not even allow the two local companies from getting together to form a joint venture to develop new services. The new legislation doesn't allow any opportunity for the two local communications providers to commingle their experiences pertaining to the local market. If the government is truly interested in supporting the rapid deployment of a broadband wired communications system it should encourage the local cable TV system and the local telephone systems to work together.

The Golden Corridor

Rapid construction of the telecommunications superhighway would primarily benefit the corridor between Boston, MA and Washington, DC. It should be called the "Golden Corridor."

This traffic route has traditionally carried high volumes of communications. It is also the route along which users are willing to embrace the latest technologies in their desire to have quick and accurate service. More communication takes place between two points along this corridor than between any other geographic area in this country. The brass ring on the merry-go-round of communications competition will be to have a piece of the communications traffic along this Atlantic Coast corridor.

The merger of NYNEX and Bell Atlantic is the first step in acknowledging that the Golden Corridor will be the supermarket for communications services. In announcing the merger, the two companies quickly point out that the first priority for the joint venture is to capitalize on being the long distance provider for its customers within its own territories. This also is a prime area to explore the joint venturing between cable systems and the telephone systems.

The cable systems within the combined territories of these two telephone systems are among the most sophisticated in the nation. Many of the these cable systems are already or are presently being upgraded to 750 MHz. Many of these cable systems already have a fiber backbone with nodes feeding from 250 to 1,000 homes. Some of these cable systems are already providing two way service to their subscribers.

Neither NYNEX nor Bell Atlantic is concentrating on upgrading its systems in residential areas. They have been concentrating their upgrades to fiber-optic service among their commercial accounts. Joining some of the elements of the cable and the telephone systems into one offers the best possibility of developing the superhighway in a reasonable amount of time.

At first, any unification of the cable system and the local telephone company may seem anti-competitive. In my point of view, it could be a very pro-competitive move. The blending of these two existing facilities could result in a jump start for the establishment of the superhighway. In urban areas, where there is a high volume of communications traffic, the marketplace will dictate that there will be more than one communications system developed. The more populated the area, the more demand there will be for additional services. The more the demand for additional service, the quicker there will be a competitive response.

Government involvement

Building a new wire broadband communications system from scratch will take a long time. First, the network would have to be planned. Next,

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the plan would have to be fitted onto a grid of the area to be served street by street.

The next step is to get all of the proper governmental clearances and licenses necessary to construct the system. The process must take into consideration ample opportunity for legitimate governmental concerns. These concerns will of necessity delay or interrupt construction. For example, if there are three candidates who all wish to build separate new wire systems, the government will step in to minimize the disruption to the public. The disruption to the public would be even greater than typical in this case because of the number of construction crews all working in the same rights-of-ways.

The government will want to know if there is enough of a demand for multiple broadband systems. The government also will want to try to control construction so that the same areas will not be disrupted several times. History would suggest that the level of governmental involvement will add years to the deployment of any new wired communications system.

Addressing reliability

On the other hand, retrofitting a cable system to meet the requirements of a reliable communications carrier will take far less time than to erect a new system from the drawing board. There are two major elements that would have to be added to a cable system to make it a serviceable broadband system. The first is that the system would have to become more reliable.

Today's cable systems are at best between 95% to 98% reliable. That is a measure of a system's ability to provide uninterrupted continuous service. Today, cable systems regularly have service interrupted either by weather or mechanical breakdowns. To be an effective communications system the performance standard of the cable system would have to be as close to 100% reliable as the telephone system. To accomplish this the cable system would have to have more reliable system electronics and redundant backup systems that come on-line if the primary system begins to fail.

The second shortcoming of a cable system is that although it is two-way it does not have the capacity to signal when there is an incoming message.

Likely competition to a combined cable TV and telephone wired system would be a wireless communications system. A wireless broadband system could be a network of microwave and cellular technologies. This type of system would not require as much governmental interference or construction time. A wireless communications system could be capable of providing all of the same services that a wired communications system can. It can transmit video, voice and data at high speeds.

The federal government, after reviewing all of its legislative options, selected one that when applied to a specific situation does not quite hit the mark. Along the Golden Corridor the legislation will result in delaying the deployment of a superhighway for at least three years. **CT**

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Courtesy The Weather Channel

By Steve Fox

Are you preparing for EAS?

In one year (by July 1, 1997), the cable industry will be required to participate in the new Federal Communications Commission-mandated Emergency Alert System (EAS).

The purpose described in the new EAS rulemaking is as follows: "The EAS provides the president with the capability to provide immediate communications and information to the general public at the national, state and local area levels during periods of national emergency. The EAS is composed of broadcast networks; cable networks and program suppliers; AM, FM and TV broadcast stations; low power TV (LPTV) stations; cable systems; and other entities and industries operating on an organized basis during emergencies at the national, state or local levels. It requires that at a minimum all participants use a common EAS protocol ... to send and receive emergency alerts ..."

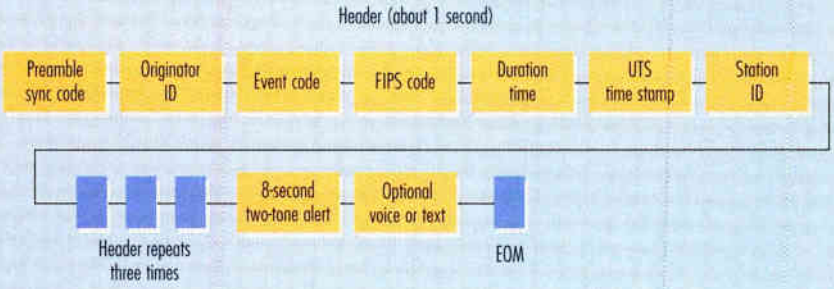
Broadcasters had to have the new EAS operational on or before July 1, 1996. Since cable TV was not required to participate in the old Emergency Broadcast System (EBS), the FCC has granted an additional year for the cable industry to be on-line (July 1, 1997). The EAS equipment installed by that time must be able to automatically interrupt programming whether facilities are manned or unattended to transmit national presidential emergency messages. Some systems will be exempt to EAS requirements, and this will be discussed later.

Cable operators must have the ability to transmit message codes, the attention signal, emergency messages and the end of message code to their subscribers along with weekly and monthly testing. Note that the EAS rules refer to national messages only. State and local messaging is optional according to the federal mandate. However, local franchising rules may require you to provide state and local emergency notification along with the required national emergency notification. Check your local rules to be sure.

The new EAS mandate also requires the creation of new state and local operational plans. According to the rules: "The EAS may be activated at the state or local area levels by broadcast stations and cable systems at their discretion for day-to-day emergency situations posing a threat to life and property. Examples of natural emergencies that may warrant activation are: tornadoes, floods, hurricanes, earthquakes, heavy snows, icing conditions, widespread fires, etc. Man-made emergencies may include: toxic gas leaks or liquid spills, widespread power failures, industrial explosions, and civil disorders."

If you have a superheadend or are co-located with a broadcast station,

Figure 1: The EAS signal



Steve Fox is the eastern regional manager for Mega Hertz in Roswell, GA. He can be reached at (770) 594-8560.

your equipment requirements may be different from an independently located cable headend. The rules state: "Broadcast stations or cable systems that are co-owned and co-located with a combined studio or control facility (such as an AM and FM licensed to the same entity and at the same location or a cable headend serving more than one system) may provide the EAS monitoring requirements ... for the combined station or cable system with one EAS decoder."

Not everyone must implement the new EAS. "Class D FM and low power TV stations are not required to have two-tone or digital encoders. LPTV stations that operate as TV broadcast translator stations are exempt from the requirement to have EAS equipment."

"A broadcast station or cable system may submit a written request to the FCC asking to be a nonparticipating National (NN) source. The FCC may then issue a NN authorization letter. NN sources must go off the air during a national EAS activation. NN sources may voluntarily participate in the state and local area EAS. Participation is at the discretion of broadcast and cable system management and will be in accordance with the provisions of state and local area EAS Plans."

"If the required EAS sources cannot be received, alternate arrangements or a waiver may be obtained by written request to the FCC's EAS office." Keep in mind that, even if you are an NN source, local franchising guidelines may require local and state EAS participation. If you are an NN source and a presidential emergency occurs, you must go off the air for the duration of the emergency. At this time, there are no other exemptions for cable systems. If you aren't an NN source or haven't received a waiver from the FCC, you must implement the EAS.

Local broadcaster interruption is optional. If you have reached agreement with a participating local broadcaster, you do not need to interrupt that channel. All other channels must be interrupted during an alert.

All EAS equipment must have the ability to monitor at least two of the EAS sources assigned by the FCC. This provides a means of redundancy for receiving the EAS signal.

A presidential EAS activation will take priority over any other alert and will preempt any other alert in progress. Other than national alerts, messages should be transmitted with the following priority: local area messages first, state messages second, and national information center (NIC) messages last.

How EAS works

The EAS is a digital signal that can be sent through any audio channel. The transmission is about one second in duration and is repeated three times. Resolution can be as large as national in scope and as small as one-ninth of a county.

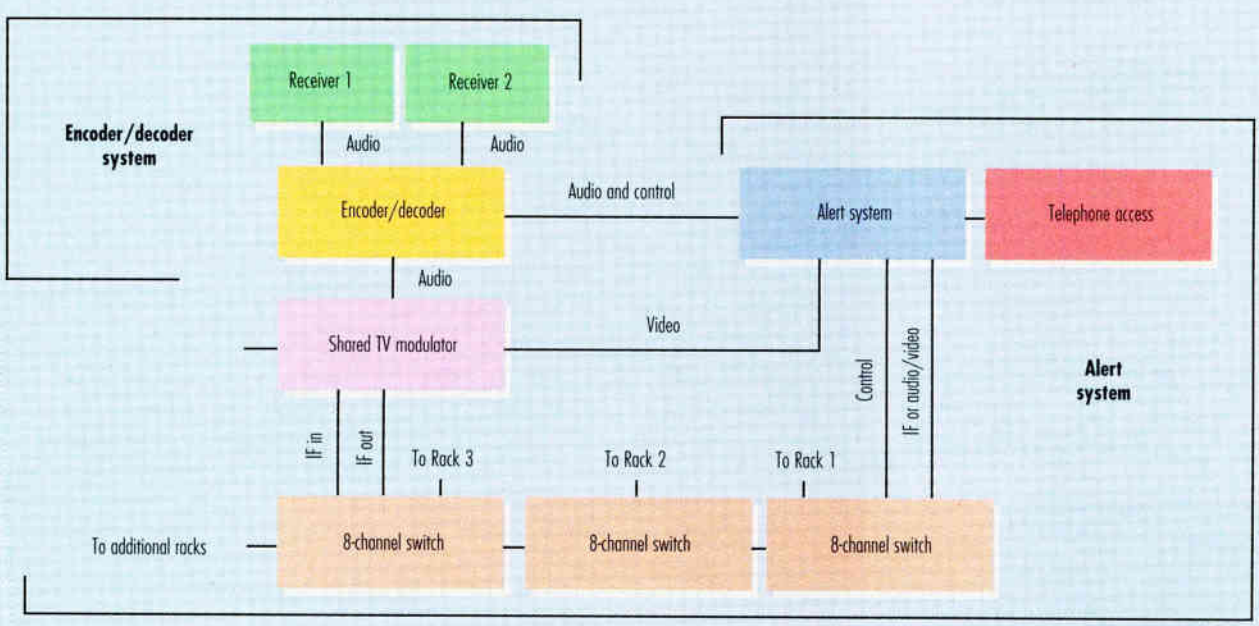
The two-tone signal remains as a part of the protocol for sending EAS messages and will be used to alert the slightly hearing impaired of an emergency.

EAS is compatible with NOAA weather radio and uses a standard, nonproprietary protocol. By July 1, 1996, at least 95% of the country was scheduled to be covered by NOAA transmitters. This is important since NOAA will be a source of many of the local or regional alerts that are generated.

National emergency messages will include information about the originator of the message, the event, location and valid time period. At the headend, this requires digital equipment with a signal encoder/decoder that is used to drive the additional equipment needed to deliver the emergency information over the cable system. This is the equipment which you will be installing.

EAS equipment manufacturers are required to provide some means of protection to prevent unauthorized access to EAS encoders and decoders. Also, the equipment must be capable of issuing alerts and tests in languages other than English. Eventually, the EAS

Figure 2: Basic headend block diagram for EAS



signal will be accessible by pagers, telephones, cellular phones, and other communications devices.

Both an EAS decoder and an EAS encoder are required at each site. This makes every site both a receiving station and a transmitting station to other EAS sites.

Weekly and monthly testing of the system is required. The weekly tests can be performed at any time within the day after the test message has been received. Monthly tests must be transmitted within 15 minutes after receipt. The weekly tests are performed at random days and times and may be on-air or unobtrusive. The monthly must be on-air and must include an attention signal of at least eight seconds, the transmission of the digital codes, test audio, and the end of message code. The monthly test messages will originate from state or local primary sources.

Nationally sourced tests also will be conducted. The rules say: "Closed circuit tests (CCT) of national level EAS shall be conducted on a random or scheduled basis not more than once a month and not less than once every three months. Test times will be selected by the White House in coordination with participating industry personnel, the Federal Emergency Management Agency, and the FCC. "

What you must provide

Each local EAS system must have two signal source inputs to provide redundancy. A data input also is available to monitor other communications sources such as the radio broadcast data system (RBDS), National Weather Radio, satellite, public switched telephone network or any other source that uses the EAS protocol.

Cable operators have the following two options for compliance.

1) You can provide audio and video interrupt on all channels (unless prior arrangements have been made with local broadcasters) with emergency details on one "emergency" channel. Video interruption options include a full screen message or a text crawl. If a genlocked crawl is used, it must be displayed in an area of the TV screen where it will not interfere with other visual messages, such as closed-captioning.

2) You can provide an audio signal on all channels with instructions to tune to a specific video channel for additional information.

This second approach requires the cable operator to provide special "in-home devices" for the certified hearing impaired. Considering that the average disability rate is 3% to 5% of subscribers, this could add up to a significant expense to a cable operator.

The audio-only option arose with the passage of the Americans with Disabilities ACT (ADA), which requires that the disabled be provided with the same emergency information as the nondisabled. ADA is satisfied with audio/video messaging, but not with audio only, hence the requirement for "in-home devices" with audio-only messaging. Keep in mind that the purchase and installation of "in-home devices" is the responsibility of the cable company, not the subscriber.

The EAS signal

The EAS signal is an FSK modulated digital transmission at 520.83 baud. This slow transmission rate is intended to make equipment compatibility easier and to keep costs down. The signal is an open, nonproprietary protocol. All EAS messages are referenced to the universal coordinated time code (UCTC).

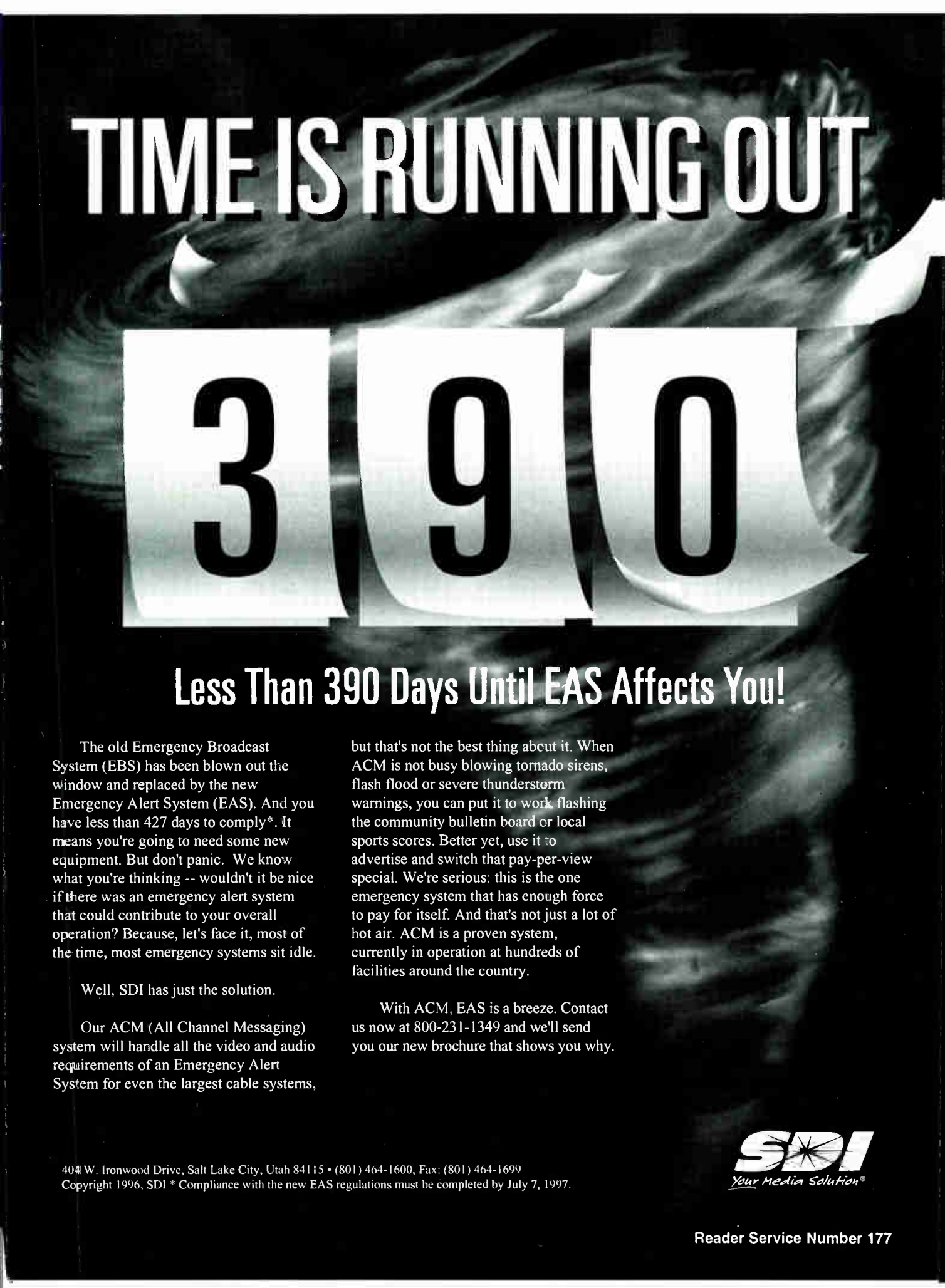
The EAS protocol is based on NOAA Weather Radio's specific area message encoding (SAME) digital signal, which has been used for the past seven years for the automatic distribution of weather related emergencies. The EAS digital burst contains (in this order): Sync. code; ID of the type of emergency and the origination point; event code; geographical areas affected; alert duration; ID of the EAS location transmitting the alert; date and time stamp; two alert tones; voice message; end of message or start of text signal; text message; and end of message signal.

The portion of the burst from the sync. code to the date and time stamp is referred to as the signal "header". (See Figure 1 on page 32.)

Since most activations of the current EBS are weather related, SAME broadcasts from NOAA Weather Radio will become the primary source for activating local EAS signals.

What you need to install

You will need to install one of the following systems: →



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1) *Audio-only interruption.* (Audio messaging on all channels; audio and video EAS messages on the emergency channel generated by a special character generator fed from an EAS encoder/decoder; audio-only override system; EAS encoder and decoder; and "in-home devices" in the homes of subscribers who are certified as hearing impaired or deaf.)

2) Audio and video interruption. (Audio and video messaging on all channels; audio and video EAS messages generated by a special character generator fed from an EAS encoder/decoder; audio and video override system; and EAS encoder and decoder.)

My recommendations

Let's start with the encoder/decoder. This portion of the EAS processes the digital burst. It first looks at the header to see if the message is intended for your cable system. If it is, the signal is processed. If not, it is ignored. Either way, it is automatically retransmitted over your system so other EAS facilities can use you as a potential signal source.

If the signal received is an active signal, a data output is provided to a character generator that feeds the TV modulator on your emergency channel (or on all channels if your system is configured that way). The emergency channel will typically not be a dedicated channel but rather a channel that is shared with another service, such as local origination. If digital audio is included in the burst, it is converted to analog and output to the TV modulator. Up to two minutes of 5 kHz bandwidth audio can be provided in the EAS data burst. Note that the emergency character generator uses a data input to derive its video and is not a "standard" off-the-shelf character generator.

The encoder/decoder includes provisions for processing the weekly and monthly tests and a printer for logging. The FCC has recently type accepted two encoder/decoder manufacturers: Sage and TFT.

As previously noted, you must monitor two EAS signal sources. These can be a combination of AM, FM or NOAA over-the-air broadcasts.

My recommended approach is to use audio and video interrupt on all channels rather than audio only. The use of audio and video negates the requirement for "in-home devices." It also eliminates the cost of truck rolls for device installation and maintenance and removes potential liability problems if an in-home device fails. Note that the cost of a typical audio/video interrupt system is no more than that of an audio-only interrupt system.

An example of a basic EAS system is shown in Figure 2 on page 33. The system can be configured to include composite IF switches, dual IF switches, and/or baseband audio/video switches in any combination. Each switch controls eight cable channels and is designed to control the switching in a single rack, minimizing wiring requirements.

Unless you can arrange an exemption with the FCC, you must have the new EAS operational no later than July 1, 1997. It is a complex system and you should begin your planning soon. **CT**

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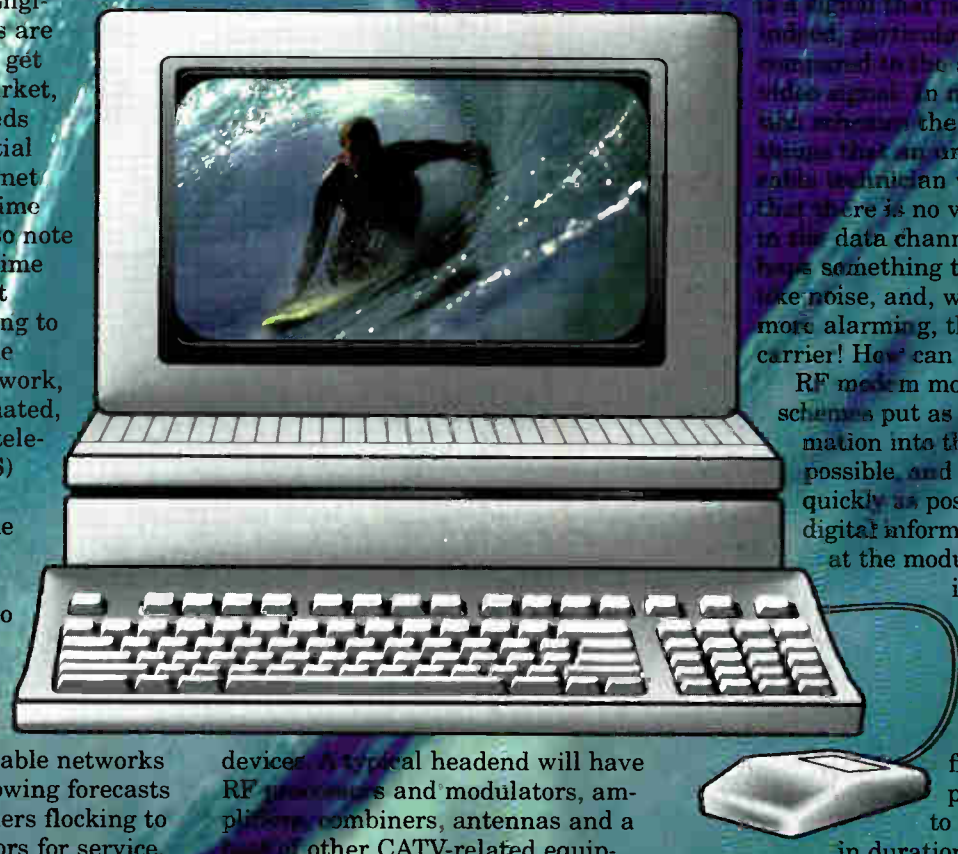
By Dennis Blanchard

Cable modems: Preparing for high-performance surfing

A tsunami of technology is about to crash upon the shores of the data communications village. It will come as high-performance cable modems and will prove to change the face of communications forever. It has not arrived yet, but all the indicators are there. Engineering departments are working overtime to get their products to market, press coverage exceeds that of the presidential primaries, and Internet chatter is at an all-time high. One should also note that at the present time most of that Internet "chatter" is not coming to the customers via the broadband cable network, but by way of antiquated, low-speed plain old telephone service (POTS) modems.

Unfortunately, like an unwary village, this tsunami will overwhelm those who are not ready. Although there has been extensive press coverage of what the data over cable networks will look like and glowing forecasts of millions of customers flocking to the cable owners' doors for service, there remains one serious obstacle to this happening: most CATV networks are just not prepared.

Let us investigate what is necessary to prepare a cable plant for data service. This investigation will focus primarily on the RF side of things, since it is the cable plant operator—an RF-oriented person—who will be doing a great percentage of the installation of these products.



Complex modulation

A typical cable plant operator is equipped to install and troubleshoot video (and the accompanying audio) devices. A typical headend will have RF processors and modulators, amplifiers, combiners, antennas and a host of other CATV-related equipment. Usually a spectrum analyzer is available and hopefully it is portable. The cable plant operator should understand the how and why of the digital-to-RF modulation and what it means.

The digital signals typically come into some form of RF modem or RF bridge (which is in reality a cable modem with some smarts). The digital signals usually have two states that are translated into a related RF signal. Depending on the speeds involved, the resultant RF signal can be a simple frequency shift keying (FSK) signal, a phase shift keying (PSK) signal, quadrature phase shift keying (QPSK) signal, quadrature amplitude modulation (QAM) or other type of modulation.

The end result of the modulation is a signal that is very strange indeed, particularly when compared to the standard video signal. In most modulation schemes the very first thing that an uninitiated cable technician will notice is that there is no visible signal in the data channel, but perhaps something that looks like noise, and, what is even more alarming, there is no carrier! How can this be?

RF modem modulation schemes put as much information into the channel as possible, and do it as quickly as possible. The digital information arrives at the modulating device in short streams of information, known typically as packets or frames. These packets tend to be very short in duration, perhaps a few milliseconds or less. The digital information is then translated into RF by changing the phase (and often the amplitude) of the RF carrier. "But," you argue, "there is no carrier." Actually, there is a carrier, but it is only used to create the modulated signal. This process is similar to that used by single sideband radio, in which there is no carrier present yet the signal is transmitted and the carrier is recreated at the receiving end for demodulation. →

Dennis Blanchard is a cable telecommunications engineer for Digital Equipment Corp. in Littleton, MA.

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Data communications signals on the CATV channels are "bursty" in nature and are of very short duration. The lack of a steady-state carrier can be somewhat difficult for TV trained technicians and engineers to analyze. A spectrum analyzer can be used to observe these signals if one uses a "max hold" or "peak hold" function to capture and store the short bursts of information. Over time, depending on channel activity, a trace will be drawn showing the modulation envelope of the digital signal. Even this method can be deceiving because some of the LCD portable spectrum analyzers do not sample at a high enough rate to capture sufficient signal energy to display anything.

A spectrum analyzer trace of a phase modulated signal cannot be used as a signal reference level for adjusting the system. The energy content in the channel is dispersed over several megahertz and does not easily provide any point that is a known point of reference. To properly set up the channel and get things "data-ready" one must revert back to the tried and true method of "shooting the channel" with a signal generator and measurement meter or accurate spectrum analyzer. Handheld equipment for sweeping the channel also is available.

In-band maintenance carriers can present a problem on a system where data communication is already running, much as it would on a TV service channel. Future generations of data communications products may have the smarts to sample data in the channel and compensate for levels, etc., but this technology is not available yet, and may not be for some time.

Group delay

Thus far in this discussion there has been no mention of a phenomenon called group delay and although not totally correct, it also is known as envelope delay. As an example, assume two RF carriers are simultaneously applied to a CATV reverse channel, going to the headend. Also assume that they are different in frequency. For this example we will assume they are separated by 4 MHz. If we had an extremely fast stopwatch and could clock the two signals as they traverse the cable network from our starting point to the headend, we would observe that the two signals may arrive at the headend at different times. This occurs because the propagation delay of the cable plant (coax cable, filters and amplifiers) over frequency is not consistent. In some ways, this is similar to the amplitude phenomenon known as tilt. However, tilt is far easier to measure than group delay. Remember the stopwatch? The delay times involved can be on the order of a few nanoseconds. This group delay, if it is under a hundred nanoseconds, has little effect on a TV signal, but can devastate a data communication signal that is running upwards of 10 megabits per second.

Previously we mentioned the various forms of RF modulation (QAM, QPSK, etc.). The phase information in the RF signal occurs over very few RF cycles, at 10 million bits per second the information transition time between bits is only 100 nanoseconds. Errors of 100 nanoseconds can completely destroy the information. Conversely, a TV signal that suffers group delay problems will have blurring of the colors, but not a complete loss of the picture.

One of the primary offenders of group delay in the CATV system is the diplex filters used for two-way operation in a single cable plant. Filters inherently have terrible group delay responses near their roll-off frequencies. For example, a sub-split system will have filters that create a notch of attenuation from about 30 to 50 MHz. Operating a data communications system anywhere near this would be futile at best. Higher speed systems (greater than 5 megabits per second) should avoid operation above T-9 (19 MHz video carrier) to stay clear of filter group delay problems. T-8 (center frequency of 14.75 MHz) is a favorite with many existing cable plants that are currently carrying data.

Reverse below 30 MHz

Another problem that requires careful consideration in a cable modem installation is the reverse channel itself. Since most systems

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INSTRUMENTS

from time to time. Here's another idea: If logistics could be worked out, hold an occasional duplicate of the original meeting in another part of the state, say, the following week.

Most chapters and meeting groups seem to be doing a reasonable job of keeping meeting costs in line. Typical fees charged to attend meetings range from about $10 to $25, and sometimes this includes lunch. That's not a bad deal, considering the overall value. Still, fees at the upper end of this range, or those that exceed it, could discourage attendance by members who have to pay their own way. That brings me to one of what is probably the biggest reasons for mixed chapter and meeting group success: support or participation by local cable systems.

This isn't always company-specific. There are some chapters that always receive overwhelming support from a given MSO's local systems, while in other states the same MSO's chapter and meeting group participation is nonexistent. In general, most MSOs are very supportive of SCTE at the corporate level—in some cases having even gone on record with formal endorsement of SCTE's programs— but their individual systems may or may not share this same attitude. I find this mixed support ironic.

Our industry is poised to transform itself into a telecommunications business, and training is of utmost importance to realize this goal. Competition is knocking on our customers' doors, and is just now beginning to erode our subscriber base. Here, too, training can be a valuable tool to protect our turf. Why, then, is it so difficult to get some local system management (both operations and technical) involved with SCTE at the chapter and meeting group level? The Society's board of directors and various committees have wrestled with this question for several years, and we still don't have a simple solution. I see this as one of our biggest opportunities to improve chapter and meeting group participation.

The issue of members being too busy to attend is certainly a valid one. It seems that all of us have much less time than ever before as the workload gets bigger and bigger. I don't see any end in sight, either. We're expected to operate a lean and efficient business, and limited staff resources means that each person has even more to do. One partial solution might be to encourage rotating participation in chapter and meeting group activities. Recognizing that everyone cannot attend every meeting, why not send a couple employees to one meeting, then send a couple different ones to the next meeting, and so on? Naturally, each of these individuals should be encouraged to share what he or she learned at the SCTE meetings with other system staff during regular company training meetings. (You do have regular company training meetings, don't you?) Any helpful ideas?

"The percentage of SCTE members who vote in the annual board of directors election is sliding."

The last example on my list is that of local members planning to attend, but forgetting about the meeting until after it was over. I know I've been guilty of this a number of times. For example, Colorado's Rocky Mountain Chapter is good about sending its meeting notices well in advance of planned meetings. I review the topic and check the meeting date, make a note to attend if there is not an obvious conflict, then—oops—forget to go on the day of the chapter meeting. Sometimes I have a legitimate reason such as meetings, projects or business trips that crop up at the last minute. Other times I simply forget to write the chapter meeting information on my calendar. I can't imagine that I'm the only one who does this. I need to make a mental note to do something about it ...

DigiPoints

And finally, I want to mention one more thing while I'm on my SCTE soapbox. It, too, is a training issue: SCTE's new publication, *DigiPoints*. For years, some of our members have expressed their concern that the Society do more to directly benefit the grassroots membership. Introduced at Cable-Tec Expo '96, *DigiPoints* was intended to be a low-cost monthly subscription-based training tool, covering the basics of digital technology. The first issue was a giveaway to introduce it to the industry. The subscription was very affordable, including a sliding price scale for MSO volume purchases. The content was very high quality, providing an excellent way to learn digital fundamentals. In my opinion, *DigiPoints* is among the best training tools I've seen from SCTE.

The problem? Only a handful of our 15,000 members sent in subscription requests. What the heck happened to those demanding more grassroots benefits? A super idea (one that's training related!), and it's virtually ignored. Fortunately, the Training Committee, board and national staff have taken action to continue supporting *DigiPoints* as a member benefit that will be part of the Society newsletter *Interval* for the remainder of 1997.

One last reminder: Vote! End of soapbox. **CT**

today are sub-split it is reasonable to assume most operators will want to install the cable modem using the 5-30 MHz range for the reverse channel. In addition to the group delay problem, one must consider ingress in this operating range. The HF (high frequency) shortwave bands are alive with high energy signals that will find their way into your reverse channel. Some of the origins for these signals can be very far away but can propagate through the atmosphere and arrive at the cable plant with substantial energy.

A cable modem installation should be preceded by an inspection of the chosen channel. This inspection should include monitoring of the chosen channel for a period of time, preferably 24 hours or more, with a spectrum analyzer monitoring the channel using a maximum hold to store energy peaks. This can be a difficult test because of signal transients that can wipe out several hours of storage. Most cable modems require a minimum carrier-to-noise ratio (C/N) of 30 or 40 dB. Ingress signals that encroach on this requirement are going to cause no end of problems.

Some operators have mid-split systems, where the filter crossover occurs from about 112 to 150 MHz. One advantage of the mid-split systems is that by using a higher reverse channel frequency it avoids the HF ingress problem. However, this can have its own set of gremlins awaiting the unwary. An example is the paging services that exist around 44 MHz in many parts of North America. These systems are usually local to the headend (headends like to be at high locations to receive distant signals, and paging services want to reach distant customers) and can sometimes even share the same tower. A 300 watt paging transmitter is almost impossible to keep out of the cable, even if all is in good repair.

A good installation plan will involve doing a survey of the local RF environment to determine possible sources of ingress. The 27 MHz area is usually loaded with citizens band activity and should be avoided (there are several million CB operators and it is highly likely that the cable will pass several stations on its way to the headend). Other sources of ingress can be amateur radio stations (there are approximately a half million radio amateurs in the U.S.), which can operate legally with up to 1,500 watts of transmitted power on many frequencies throughout the HF spectrum. Shortwave broadcast stations, such as Voice of America, can present substantial energy to the cable system at certain locations in North America. Over-the-horizon radar stations exist that can be a problem as well. Careful research and preparation of the cable plant is absolutely necessary to ensure adequate performance in the channel of choice.

Accumulated noise floor

A typical forward channel system in a cable plant is a broadcast network. The signal originates in the headend and travels down through the network where it is amplified and split as needed until it arrives at the subscriber locations. As the signal travels down through the system it is attenuated by various sys-

tem losses, the coaxial cables being the main culprit, and is amplified sufficiently to overcome these losses. There is only one signal source in this system, so the C/N of the system is dependent on the initial signal as it passes through a limited cascade of amplifiers.

The reverse channel can be a very different situation. In a network where there are many subscribers and various trunks feeding into the headend, each trunk will originate its own noise and the cumulative effect of several trunks feeding into the headend can seriously degrade the C/N of the reverse channel. If the reverse channel is strictly for data communications then one can intercept the RF information and use a cable modem to demodulate the incoming information and remodulate it and send it on its way to the headend. This will re-establish the C/N. However, this is rarely acceptable because other devices must share the reverse frequencies as well, such as telemetry equipment and transponders.

Fiber-optic systems have a decided edge when used for the reverse channel. Ingress problems are diminished and signal integrity can be very good especially with relatively small fiber nodes.

Summary

On several occasions operators have purchased a few cable modems and connected them to their reverse cable plant with little or no preparation (or training) and ultimately the customer failed to succeed with the intended telecommunications. These modems are a new animal and must be cared for properly. The operating parameters are typically published by the manufacturers. It is up to the cable plant operators to assure that the system is ready to meet those requirements.

More often than not a cable technician will call a customer support line to ask for help because the cable modem "is not working." Investigation usually reveals that the cable plant was never prepared and even worse, the technician has never been trained in any way to deal with this new product. To compound the problem, this technician may have received the cable modems on a Tuesday and a big demonstration of the new product is scheduled for the following Thursday. Failure under these conditions is almost always guaranteed. If a cable plant is to be successful with data communications there must be a serious effort put forth long before the first cable modem is ever connected to the system. Long-range planning is paramount to success. Proper alignment of the reverse path is an absolute must and a plan for maintaining that reverse spectrum should be in place to keep it in good working order. Ultimately this attention to the plant and its operating capability can only improve the overall service offered the customer, both for data communications as well as the TV service. Then, and only then, will the cable plant be ready for the surfers of the information superhighway. **CT**

By Walter S. Ciciara

Telecom Act: Retail sale of "navigation devices"

The following is excerpted from the "1996 National Cable Television Association Technical Papers." For a complete copy of the paper, contact the NCTA at (202) 775-3550.

The 1996 Telecommunications Act included Section 629, "Competitive Availability of Navigation Devices," also called the Bliley Amendment. It is important for all involved with in-home equipment (e.g., settops) to become familiar with this section of the law and to participate in the formation of the Federal Communications Commission's rules.

The law

The section of the law reads as follows:

"a) *Commercial consumer availability of equipment used to access services provided by mutichannel video programming distributors.* The Commission shall, in consultation with appropriate industry standard-setting organizations, adopt regulations to assure the commercial availability, to consumers of multichannel video programming and other services offered over multichannel video programming systems, of converter boxes, interactive communications equipment, and other equipment used by consumers to access multichannel video programming and other services offered over multichannel video programming systems, from manufacturers, retailers, and other vendors not affiliated with any multichannel video programming distributor. Such regulations shall not prohibit any multichannel video programming distributor from also offering converter boxes, interactive communications equipment, and other equipment used by consumers to access multichannel video programming and other services offered over multichannel video programming systems to consumers, if the system operator's charges to consumers for such devices and equipment are separately stated and not subsidized by charges for any such service.

b) *Protection of system security.* The Commission shall not prescribe regulations under subsection (a) which would jeopardize security of multichannel video programming and other services offered over multichannel video programming systems, or impede the legal rights of a provider of such services to prevent theft of services.

c) *Waiver.* The Commission shall waive a regulation adopted under subsection (a) for a limited time upon an appropriate showing by a provider of multichannel video programming and other services offered over multichannel video programming systems, or an equipment provider, that such waiver is necessary to assist the development or introduction of a new or improved multichannel video programming or other service offered over multichannel video programming systems, technology, or products. Upon an appropriate showing, the Commission shall grant any such waiver request within

Walt Ciciora, Ph.D., is a technology consultant based in Southport, CT.

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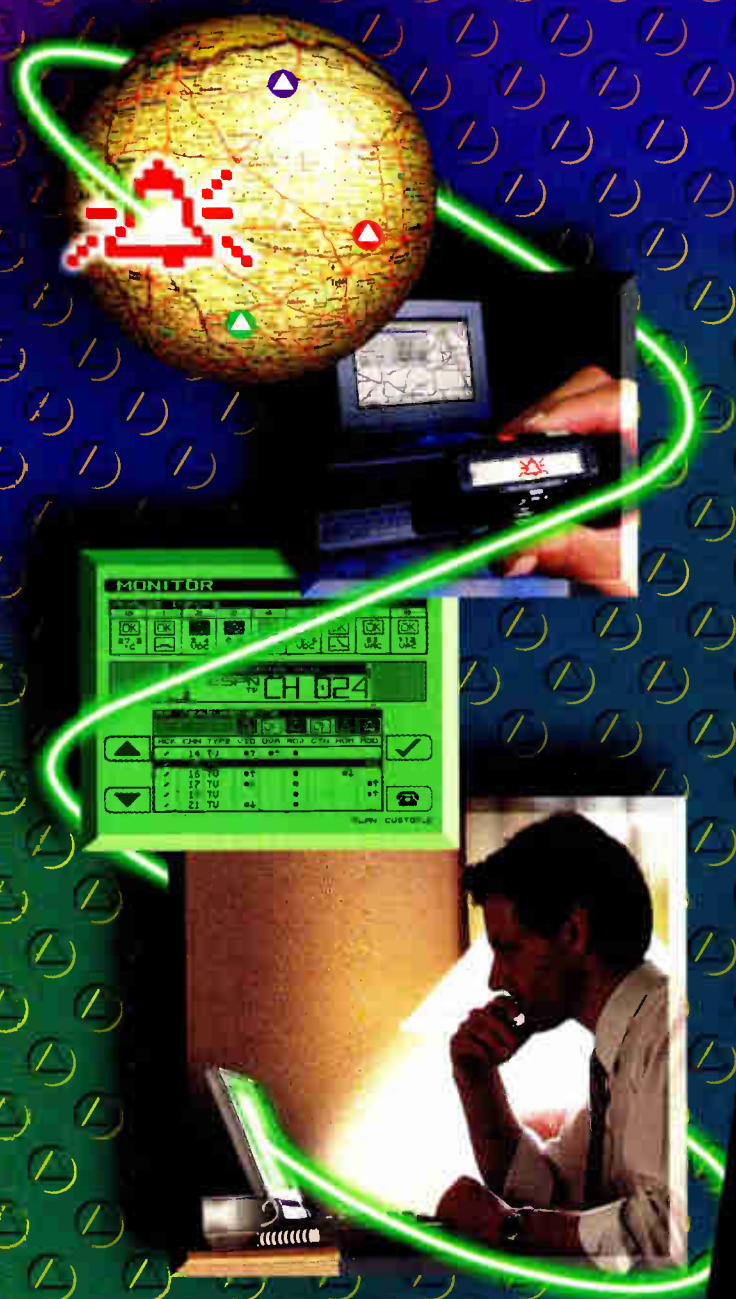

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90 days of any application filed under this subsection, and such waiver shall be effective for all service providers and products in that category and for all providers of services and products."

It is not clear where the term "navigational devices" comes from. The impact of the law is much broader than just electronic program guides, which is the usual meaning of the term. All set-top boxes are included in the scope of this law.

Set-tops vs. consumer electronics

In the past, the consumer electronics industry described set-top boxes as evil things that get in the way of all of those wonderful TV set and VCR features. Sometime in 1995, there was an apparition from heaven that told the consumer electronics industry it was not seeing things clearly. The set-top box is in fact a wonderful thing that can be sold at retail! Rather than trying to kill off set-top boxes, the consumer electronics industry now wants to make and sell them.

Commercial availability

It appears that the FCC is moving directly to a notice of proposed rule making (NPRM), bypassing its usual step of a notice of inquiry (NOI) in its efforts to assure commercial availability of set-tops. Since Congress placed no deadlines for the FCC's completion of this difficult task, this haste seems unwarranted. Congress also did not place a deadline for the commencement of commercial availability.

It isn't obvious how the FCC intends to comply with the requirement to consult with appropriate industry standard-setting organizations. Certainly, the National Cable Television Association Engineering Committee or the Society of Cable Telecommunications Engineers should be involved in any such consultation.

It is clear that the commercial availability of set-top boxes will not limit the cable operator's right to also offer these devices. The important point is that the subscriber must be aware of the fee the cable operator would have to charge and that these charges are not subsidized by any service offerings.

There are still other hazards that arise from subscriber set-top box ownership. Significant extra costs and a loss in convenience can result from direct ownership. There could be problems with servicing the hardware and hurdles to launching new services with subscriber-owned set-tops.

Probably the most important action to be taken by cable operators is subscriber education. It is unfortunate that the cost of advising consumers of their options will fall mostly (or even entirely) on cable operators. This cost eventually raises the price of subscriptions.

Protection of system security

Congress recognized the importance of protecting system security and the rights of service providers. There are only two ways to accomplish this. The first is to create a signal security system that is so secure that it cannot be broken. The second way is to separate out the signal security system and not allow subscribers to own and access it. In the latter case, the service provider is free to replace a breached security system without imposing financial loss on the consumer.

It is impossible to guarantee that a signal security system cannot be breached. There is no way to prove such a claim of invulnerability. The only alternative is for the entity wishing to sell the signal security system to consumers to guarantee the signal security system by placing sufficient funds in escrow to cover the full costs of recovery from a security breach. Since these costs will include the labor to replace the breached hardware as well as replacing the hardware itself, these costs are prohibitive.

Nonetheless, when cable equipment suppliers make large sales of set-top boxes to cable operators, they pledge certain limited signal security guarantees. The cable operator makes a business judgment regarding these guarantees. Then the cable operator takes on the ultimate financial responsibility for fixing a security breach or replacing the defeated equipment without direct financial loss to the consumer.

The retailer wishing to sell signal security directly to the consumer also must protect the consumer against direct financial loss in the event that the security system must be replaced.

The second solution is to separate out the security element and not sell it to the consumer. The service provider retains ownership and control of the security element. In the

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event of a compromise of the security, the service provider replaces the security element. There are problems associated with this. The analog security systems in use at present were not designed for such a partition. Forcing the partition may result in a loss in economics, a reduction of security, and a decrease in user convenience. Adjustments in the way analog security is done will be required.

Waiver

Service providers or equipment manufacturers may request a waiver of the rules for assuring commercial availability of new technology still in its formative stages. For example, while standards are being settled for the hardware required to deploy a new cable service, nonstandardized implementations used for market research or early introduction of the service may be granted a waiver. This is important because the standard-setting process is long and complicated.

"Cable-ready"

The cable and consumer electronics industries have struggled for many years arriving at technical specifications for "cable-ready" TV sets and VCRs. This effort intensified after the 1992 Cable Act and its Leahy Amendment. That law required the FCC to establish a technical definition for cable-ready TV sets and VCRs. The FCC issued a report and order in May 1994 that took the first step in that direction by including partial technical specifications on RF performance of cable-ready TV sets and VCRs. The process will be completed when the FCC incorporates the decoder interface specification in its rules. That, of course, will happen after the Electronic Industries Association's and the NCTA's Cable, Consumer electronics Compatibility Advisory Group (C3AG) makes its recommendation on the decoder interface to the FCC.

When the definition of cable-ready is complete, it must apply to set-top boxes sold at retail. If not, all the work thus far completed could be undone by set-tops that don't meet the FCC's technical definition of cable-ready.

RF requirements

The navigation devices sold at retail require the RF requirements of a set-top box rather than just those of a cable-ready TV set or VCR. Both set-top boxes and navigation devices sold at retail are connected in front of the TV set or VCR. They add another tuner, intermediate frequency amplifier, and remodulator to the chain. If the noise or distortion contribution of the set-top box or navigation device sold at retail is to be transparent, it must be much less than that of the TV or VCR itself.

It is a principle of radio physics that the first tuner dominates the noise performance of the system. If subscriber picture quality is to be maintained, then the navigation devices sold at retail must be held to the same standard as the set-top box provided by the cable operator.

Other concerns with sub-owned set-tops are hazards to broadcast reception and the possibility that the boxes don't comply with FCC cable technical rules.

Decoder interface solution

The cable and consumer electronics industries are reaching completion of the decoder interface specifications. The decoder interface consists of an intermediate frequency (IF) link of modulated signals selected by the TV set's or VCR's tuner and a 26-pin connector. The connector can have up to four bidirectional video twisted-pairs, four bidirectional audio twisted-pairs, a signal reference twisted-pair, a control line twisted-pair, and three bidirectional twisted-pairs satisfying the video specification but reserved for future use. The control line determines the direction of flow of audio and video signal. In its full implementation, the decoder interface complies with the specifications for the audio/video Bus (AVBus) for interconnection of consumer electronics products. In its abbreviated implementation, the decoder interface has just one unidirectional video and audio twisted-pair along with the reference and control twisted-pairs and the IF connection.

The decoder interface and the AVBus connect to a cable that can support up to 10 devices and span a distance of 30 feet. Expansion modules allow these numbers to increase. This system allows the addition of modules that decode subscription signals and provide other features and

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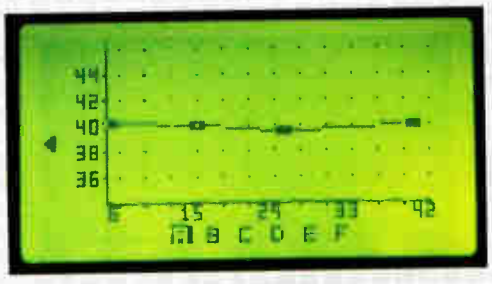

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functions. The signal security modules are intended to be owned and provided by the system operator and the "feature modules" can be either purchased at retail, purchased from the system operator, or leased from the system operator at the consumer's option. Both analog and digital signals are accommodated.

This comprehensive system allows for maximum consumer choice and facilitates competition in the provision of in-home equipment. When subscribers wish to try a new service, they plug in the appropriate enabling module. Their investment in equipment is preserved and they are protected against economic loss. Hurdles to trying new services are reduced or eliminated. Duplication of hardware elements is minimized.

Lame telephony analogy

Consumer ownership of telephone customer premises equipment (CPE) has brought significant benefits and only a few problems. By simple-minded analogy, the same is argued for cable.

Neglected in this are several significant technical facts. The spectrum used for telephony is just a few thousand hertz. If these frequencies leak out into the environment, little harm is caused because these frequencies are not used for other purposes. The same is not true for cable. Cable uses frequencies in its closed environment that are used for many other purposes in the over-the-air situation. Aircraft navigation and communication and emergency services are just a few of the critical applications that must be protected from interference.

The telephone system involves individual circuit paths to the subscriber. If the subscriber's equipment emits interfering signals back into the telephone line, it will have limited impact on other subscribers. Since the cable network is a shared network, any signals put back into the system will cause signal degradation for other subscribers.

In the case of telephony, the individual circuit path makes the theft of service very difficult. The same is not true of cable. The shared structure means that the same signal enters all homes in the neighborhood. Signal security is much more important in this case.

The digital environment

There is a simple-minded assumption that when digital TV arrives, security will be high enough to allow subscriber ownership. This is a naive proposition. There is no reason to believe that digital security will be any better in the long run than analog security.

Signal security is a running battle between the engineers creating the system and those who wish to defeat it. This is not an even match. The designers have a limited budget, a restricted staff, a short time to design the product, and the mature technology of the day to utilize for implementation. Those who would attack the signal security system have unlimited time, arbitrarily large numbers of participants, and an evolving technology. The consumer must not be put in the position of having to abandon an investment in hardware because someone else has breached the signal security system. **CT**

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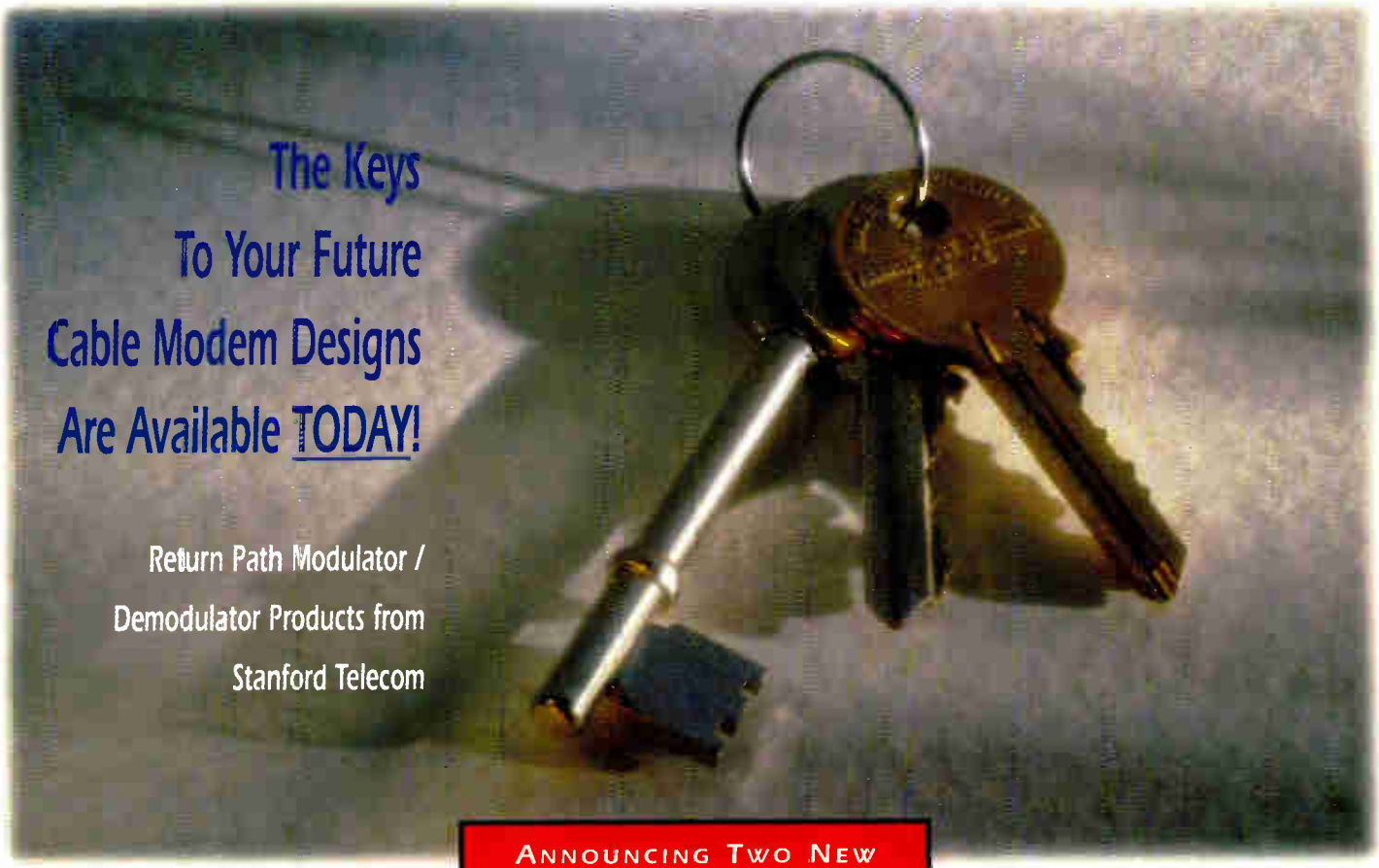

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Reader Service Number 138

By Ray Lehr

Job safety analysis

Sometimes, people seem to think that technical training for the tasks to be performed and safety training are two different pieces of a process. The only way safety can be effective in your organization is to ensure it is totally integrated into the training of the technical tasks. There is not a better method of accomplishing this than through the use of job safety analysis (JSA).

Several years ago while doing some safety consulting for a company in Edmonton, Alberta, Canada, I was duly impressed with the method this company used to integrate safety into the daily tasks of all field workers. This organization did not have a safety manual for publishing safety rules, but the employees knew the rules and followed them.

"What you'll have is a consistent way of training all your employees performing the same task."

What this company did was to develop total job analyses on all tasks that the field employee was expected to perform. This included breaking the task down into a step-by-step procedure with the safety expectations at each step described (i.e., what personal protective equipment to wear). Also described was the equipment needed at each step and even the time each step should take.

I realize that most companies can't go out and develop job analyses for all employee tasks, but one thing you can do is to focus on the ones that have a high injury frequency or potential for serious injury. Let's take mid-span work from a ladder as an example. There is high potential for injury if a person falls or if he or she contacts high voltages. Therefore, this task is a good candidate for a JSA.

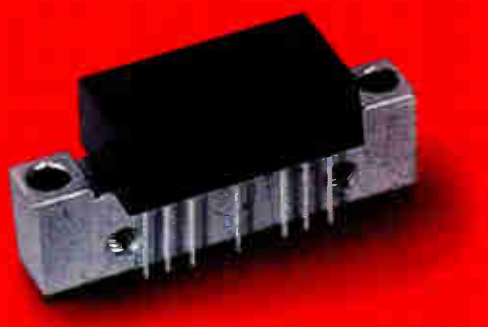
After identifying the task, it is broken into a step-by-step procedure. In each step, the following information is identified and addressed: 1) potential hazards that could injure employees; and 2) a method to eliminate or protect from that hazard.

When finished, you have a written procedure for performing a task that if followed will keep the employees out of harm's way. If you want to get more sophisticated, you can add tools and equipment needed and time frames.

What you'll have is a consistent way of training all your employees performing the same task. You have a tool that enables you to follow-up by observing the task being performed and ensuring each step is done the safe way, which is also the right way.

This approach to safety performance works. If you haven't tried it, I suggest you give it a chance. **CT**

Ray Lehr is the manager of safety at Tele-Communications Inc. in Den-



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PAW588	40-550	33.5	-57	-57	-57	42/60	6.5	+24/340
PAW688	40-650	33.5	-57	-57	-55	40/58	7.0	+24/340
PAW785A	40-750	18.0	-62	-64	-60	36/56	8.0	+24/240
PAW787	40-750	21.0	-59	-59	-58	32/52	8.0	+24/240
PAW788	40-750	33.5	-60	-62	-58	34/56	8.0	+24/340
PAW885	40-860	16.5	-62	-64	-60	36/56	9.0	+24/240
PAW887B	40-860	28.0	-57	-57	-55	35/52	8.5	+24/340
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Waveform monitor

Leader Instrument Corp. announced an improved version of the LV 5100D waveform monitor, which handles two serial inputs and one three-wire analog input, and switches automatically to operate in 525/60 or 625/50 systems.

Features include full EDH facilities with readout of the time of detected errors, and the status of ANC, embedded audio, TRS, EAV, SAV, APCRC, FFCRC and EDH flags. Internal and external alarms may be assigned to any or all of the status readouts. A unique rating of serial data quality is given in terms of equivalent length of coax from an ideal source. Of particular value is a direct readout of signal data in hex form for all 1716 data points of a user-selected raster line. The line also may be selected automatically as triggered by a TRS error.
Reader service #312

Signal level meter

The new KISS drop tester from Toner Cable Equipment is a low-cost installer's meter that reduces service callbacks caused by installation problems and faults in TV distribution systems. The company says this single-channel signal level meter is extremely easy to use and makes a valuable, affordable addition to every installer's tool kit.

Small and lightweight, the KISS is crystal-controlled so no tuning is required. The meter can be supplied for Chs. 3, 4, 7 or 8, in NTSC or PAL format. A single push-to-test button displays a signal strength on a color-coded LED display, with an accuracy of ±1 dB. The instrument is powered by a common 9-volt battery and is covered by a one-year warranty.
Reader service #311

Fiber-optic tester

Fotec says its new hand-held FOtest'R CATV tester for fiber-optic CATV systems cuts the cost of testing and troubleshooting in half, making it cost-effective to have every technician equipped for fiber-optic testing. The instrument costs only a little more than a digital multimeter.

Today's CATV systems use lots of fiber optics, and the optical power levels are high enough to be potentially dangerous, so the need to have CATV technicians test fiber-optic power is critical.

Using a new technique, Fotec has developed a high-power meter that costs significantly less than standard fiber-optic power meters. The new detector technique allows power measurement up to +26 dBm (and down to -26 dBm), providing headroom for the new ultra-high power transmitters becoming available.
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The following is a listing of some of the videotapes currently available by mail order through the Society of Cable Telecommunications Engineers. The prices listed are for SCTE members only. Nonmembers must add 20% when ordering.

☛ *Introduction to Digital Technology*—This program, featuring Kenneth Metz and Randy Reynard, provides an overview of digital technology from both a telephone and video perspective. Topics covered include: analog amplification vs. digital regeneration, analog-to-digital conversion, digital-to-analog conversion, DS-1 structure and operation, digital transmission hierarchy and protocols, digital video vs. analog video, advantages/disadvantages, digital video standards CCIR 601 and 656, ANSI/SMPTE 125M, SMPTE 244M and 259M are referenced. (75 min.) Order #T-1143, $45.

☛ *Fiber–Optic Architectures and Construction Practices*—This presentation, featuring Ted Huff, Joseph Selvage and Les Smith covers fiber-optic design and construction. Topics include: trunk and feeder, backbone fiber, fiber-to-feeder, fiber-to-service area, neutral network, passive network, procedures to initiate fiber construction, fiber-optic placement, aerial/underground, direct bury duct and installation of fiber-optic cable in ducts. (70 min.) Order #T-1144, $45.

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and some are not always so obvious.

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Cable Leakage Technologies has been in the RF leakage detection business for over 5 years and Wavetrackers have patrolled over 4.8 million miles of cable all over the world. Wavetracker boasts positive identification, 2-5 meter positioned accuracy and one step prioritization. And all of that because CLT *invented* the original Wavetracker...it's that simple.

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CALENDAR

July

1-2: Antec FiberWorks training course, compressed video concepts and transmission, Antec training center, Denver. Contact (800) FIBER ME.

8-11: Siecor training course, fiber-optic installation for LANs, Hickory, NC. Contact (800) 743-2671, ext. 5539.

8-12: General Instrument training course, broadband communications network design, Toronto, Ontario. Contact Lisa Nagel, (215) 830-5678.

8-12: General Instrument training course, headend maintenance and performance testing (week one), Toronto, Ontario. Contact Lisa Nagel, (215) 830-5678.

9: SCTE Desert Chapter seminar, safety. Contact Bruce Wedeking, (909) 677-2147.

9: SCTE Mid-South Chapter testing session, BCT/E and Installer exams to be administered, Time Warner Cable office, Memphis, TN. Contact Kathy Andrews, (901) 365-1770, ext. 4110.

9: SCTE Penn-Ohio SCTE Chapter third annual golf outing, Conley Resort Golf Course, Butler, PA. Contact Marianne McClain, (412) 531-5710.

9-11: General Instrument training course, digital network engineering training, Toronto, Ontario. Contact Lisa Nagel, (215) 830-5678.

9-12: Siecor training course, fiber-optic installation for LANs, Pittsburgh. Contact (800) 743-2671, ext. 5539.

10-11: Cable Telephony '96, The Radisson Hotel, Chicago. Contact (312) 787-2900.

10-12: WCA '96, Colorado Convention Center, Denver. Contact Wireless Cable Association, (202) 452-7823.

11: SCTE Satellite Tele-Seminar Program, "Painless Technical Speaking (Part II)," Galaxy 1R, Transponder 14, 2:30-3:30 p.m. ET. Contact SCTE national headquarters, (610) 363-6888.

11: SCTE Great Plains Chapter seminar, personal communications services. Contact Randy Parker, (402) 292-4049.

11: SCTE Rocky Mountain Chapter seminar, telephony, Denver. Contact Mike Phebus, (303) 795-1699.

11-12: Antec FiberWorks training course, broadband cable TV technology, Antec training center, Denver. Contact (800) FIBER ME.

15-16: SCTE regional training seminar, introduction to data communications, Seattle. Contact SCTE national headquarters, (610) 363-6888.

16-19: Antec FiberWorks training course, fiber-optic system training, Antec training center, Denver. Contact (800) FIBER ME.

17: SCTE Chaparral Chapter seminar, BCT/E exam tutorial, TVI, Albuquerque, NM. Contact: Rick Padilla, (505) 761-6290.

17: SCTE Golden Gate Chapter seminar. Contact Mark Harrigan, (510) 927-7060.

17: SCTE Oklahoma Chapter testing session, BCT/E exams to be administered, Norman, OK. Contact Oak Bandy, (405) 364-5763, ext. 249.

17: SCTE Piedmont Chapter seminar, fiber-optic basics, system design, operation and management systems and BCT/E exams to be administered, Raleigh, NC. Contact Mark Eagle, (919) 220-3889.

17-18: SCTE regional training seminar, introduction to telephony, Seattle. Contact SCTE national headquarters, (610) 363-6888.

18: SCTE Gateway Chapter seminar and BCT/E exams to be administered, Overland Community Center, Overland, MO. Contact Chris Kramer, (341) 579-4627

18: SCTE Greater Chicago Chapter seminar, BCT/E tutorial on Category IV: Distribution Systems, Holiday Inn, Willowbrook, IL. Contact Joe Thomas, (815) 356-6105.

22-26: General Instrument training course (week two), headend maintenance and performance testing, Hatboro, PA. Contact Lisa Nagel, (215) 830-5678.

Planning ahead

Oct. 13-15: Atlantic Cable Show, Baltimore, MD. Contact Cable Television Association of Maryland, Delaware, DC, (410) 266-9111.

Dec. 11-13: Western Cable Show, Anaheim, CA. Contact (510) 428-2225.

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By Justin J. Junkus

A step past convergence

With the Telecommunications Act of 1996, everyone in telecommunications added the word "convergence" to their vocabulary. This month, I suggest you go one step beyond convergence and look at integration. When we talk about integration, it's not telecom and cable, but telecom and computers we're discussing. The acronym to know is CTI, which stands for computer telephone integration.

Probably all of this column's readers have used CTI, even if they weren't aware of it. Think of the last time you tried to call an associate and had to leave a message on his or her voice mail. That's CTI!

Justin Junkus has over 25 years experience in the telecommunications industry. Previously the AT&T cable TV market manager for the 5ESS switch, he is currently president of KnowledgeLink Inc., a telecommunications training and consulting firm. If you want to contact him, he may be reached at his e-mail address, JJunkus@aol.com.

Voice messaging is the simplest implementation of a voice processing system. When the called party doesn't answer after a predetermined number of rings, the tele-communications switch automatically transfers the call to an input port of a computer. From that point on, the computer controls the responses given from the called line. Most likely, it will internally route the call to a digitally recorded message from the called party indicating unavailability, and then connect the calling party to a digital storage unit to leave a message.

These messages are stored in the voice messaging system's memory, and can be accessed and erased by the called party, when the called party dials an access code. That access code is actually a phone number, which routes him or her to the section of memory reserved for his or her messages. That's the process. Now let's examine the integration.

Voice messaging

Transferring a call to another number after a predetermined number of rings is a feature of a telecommunications switch. If this voice messaging system were part of telephony service being offered by a cable telecommunications company, the switch would probably be a Class 5 end office digital switch located at the headend. The voice messaging system has its own termination on that digital switch, and that termination is the point to which the call is transferred. The connection at the messaging system is called a port.

The voice messaging system also would probably be located at the headend. It is a networked computer system similar to a local area network. (In fact, most voice messaging architectures actually contain internal local area networks.) Within that computer system, a processor controls the

SEE THE TRAINING COLUMN ON PAGE 68

Optical node status monitoring: Part 2

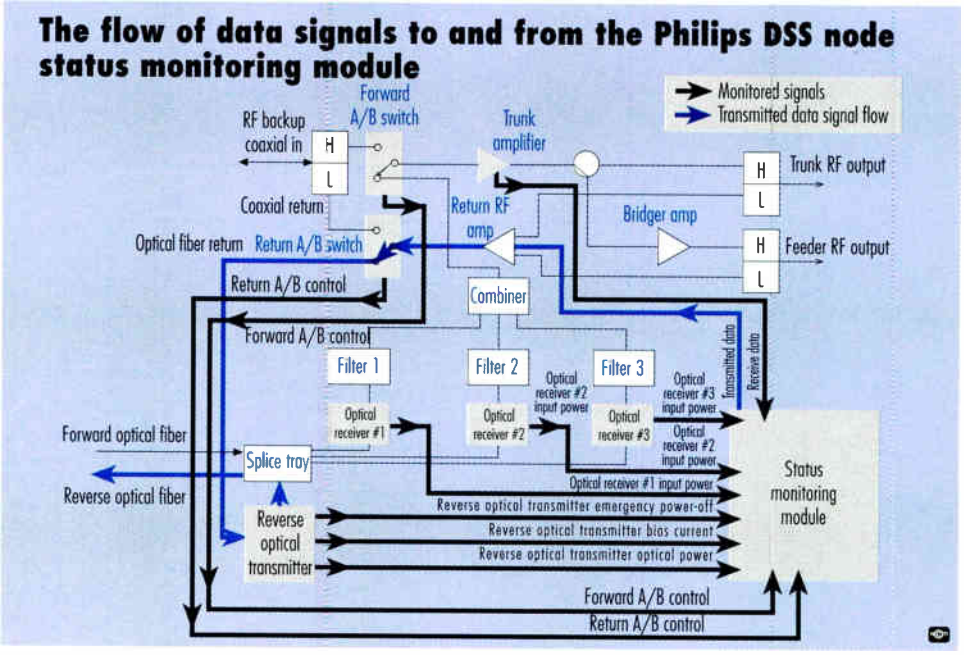
This is the second part of a series on status monitoring in optical nodes. Its purpose is to provide useful information complemented by training suggestions to reinforce the material in a classroom or field setting. The top portion is excerpted from the "Optical Node Return Operations" lesson in NCTI's Fiber Optic Technician Course. The hands-on training suggestions are modeled after NCTI's new facilitator training courses for administering the hands-on labs.

The accompanying figure illustrates the flow of monitored data signals from select modules and switches to the DSS node status monitoring module in the Philips DSS status monitoring system. These monitored data signals typically are analog signals. The monitored data consists of: 1) the three optical receivers' input power levels, measured as DC voltages; 2) the forward and return A/B switch positions; 3) the trunk amplifier receive data, including monitored data on the AGC voltage and the RF communication carrier signal level; and 4) the reverse optical transmitter module's optical output power level, bias current and emergency power-off status.

The status monitoring module converts the monitored data to a digital data signal that is routed to the reverse optical transmitter in the optical node. The figure shows that the transmitted data signal is sent from the node status monitoring module to: 1) the return RF amplifier, where the signal is amplified; 2) the return A/B switch, which directs the return signal to either optical fiber or RF backup coaxial cable; and 3) the reverse optical transmitter, where the digital signal is modulated onto an optical signal and routed to the reverse optical fiber.

Next month's installment deals with monitored parameters/ranges for a node status monitoring system. It also includes review questions/answers for this three-part series.

The flow of data signals to and from the Philips DSS node status monitoring module



Courtesy of Philips Broadband Networks Inc.

Hands-on performance training

Proficiency objective: *Identify major elements on a block diagram showing data signal flow to and from a node status monitoring module and describe their functions.*

Provide each student with a block diagram showing the flow of monitored data signals from modules and switches to the node status monitoring module, and from the status monitoring module to the reverse optical transmitter.

Discuss the major elements in status monitoring signal reception/transmission and describe their functions.

Use the block diagram to identify the major elements sending the following monitored data signals to the node status monitoring module:

- Optical receivers' input power levels
- Forward A/B switch position
- Return A/B switch position
- Reverse optical transmitter module operating data

Use the block diagram to identify the following elements in the path of digital data signals sent from the node status monitoring module:

- Return RF amplifier
- Return A/B switch
- Reverse optical transmitter

Verify that each student can identify the major elements in the node status monitoring reception/transmission process and describe their functions. **CT**

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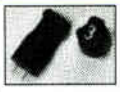

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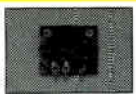

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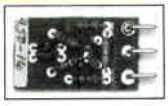

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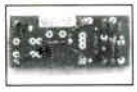

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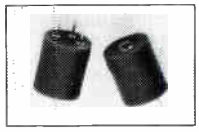

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By Bill Riker, President, SCTE

Inside the SCTE Bookstore

One of the most exciting additions we've made to our annual Cable-Tec Expo over the past few years is the SCTE Bookstore. Since 1994, it has offered Expo attendees the opportunity to browse through and purchase copies of our many technical training publications, videotape productions and SCTE member merchandise. The Bookstore also gives attendees the chance to meet with the authors of some of our publications, (such as legendary Cable Television author Bill Grant), to discuss the texts and have their personal copies autographed.

This year's Bookstore was a noteworthy Expo attraction, as it marked the introduction of several exciting new publications, many of which were developed in response to requests from the membership.

For the first time ever, the Society now offers two publications in Spanish, Manual Para Certificacion Del Instalador (Installer Certification Manual), the comprehensive reference for the Society's Installer Certification program; and Identificacion De Problemas En La Imagen En Sistemas De TV Por Cable (STVC), (Identifying Picture Problems in CATV) by Keneth Simons, a technical manual focusing on the effects of thermal noise, echoes and cross modulation in TV pictures. This classic publication features numerous photographs, illustrations and tables. Both books were painstakingly translated into Spanish with the assistance of SCTE member Antonio Huerta to aid us in expanding our training to Spanish-speaking personnel. We plan to translate even more SCTE publications into different languages as we continue striving to provide the best possible training to the international telecommunications industry.

Another new publication that the Society is pleased to offer is Recommended Practices for Optical Fiber Construction and Testing. This manual consists of 14 sections collected in a custom binder that will inform telecommunications professionals about the management, construction, documentation and restoration of fiber-optic systems.

Another new item is our publications list itself, the SCTE 1996 Training Material Resource, which has undergone numerous changes to become more user-friendly. All materials are now arranged by topic headings that are clearly marked for ease in locating a particular type of resource. An index in the back lists all subject matter, so readers can quickly locate the specific

topic they wish to research. Publications and videotapes are now separated so that readers can more readily find the exact format they wish to purchase. Additionally, titles that are resources for the BCT/E and Installer Certification Programs are noted in the product descriptions. SCTE members should receive their copy of this invaluable training resource in the mail soon.

A resounding success for the Society in recent months has been our Consumer's Guide to In-Home Wiring, which has been purchased in large quantities by cable systems for distribution to their subscribers. This 22-page booklet informs cable subscribers about proper ways to prewire homes and add additional outlets. It also illustrates various types of picture problems, listing possible causes for each. The guide stresses the importance of good planning and using the correct wiring materials to complete the job. Throughout the booklet, cable subscribers are encouraged to contact their local cable companies for further guidance or assistance.

The Society developed this brochure to aid local cable systems in addressing this important issue with their customers. The booklet conveniently fits in a standard letter-sized envelope for easy distribution to customers as a bill stuffer. Systems can purchase copies with a plain cover or have the covers personalized with their company name and logo.

As of this writing, over 50,000 copies are in print, and another 50,000 have been ordered. Cable systems that have purchased the guide have spoken very favorably about this brochure, which serves not only as consumer education, but also as a good public relations piece that gains the attention of the subscriber. Companies interested in purchasing copies of SCTE's Consumer's Guide to In-Home Wiring, or wanting a sample copy, can contact Dorothy at national headquarters at (610) 363-6888.

Of course, no Expo season would be complete without a new proceedings manual, and the Cable-Tec Expo '96 Proceedings Manual, consisting of technical papers presented during the Expo '96 technical sessions and breakout workshops, is now available to the industry. Each registered Expo attendee received a copy, and we are pleased to now make it available to everyone. This year's edition is our largest proceedings manual ever, containing over 700 pages of cutting-edge technical information and useful advice to increase your technical efficiency. Papers of special interest in this book include "Emergency Alert System (EAS) and Cable" by Frank Lucia, Acting Chief of the EAS for the FCC, and "Consumer Electronics Compatibility" by Walt Ciciora, Ph.D., a consultant for the NCTA. **CT**

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flow of information and manages resources, such as memory and available ports. When the call is transferred to a port on this computer, the processor sends a message to the digital switch asking for the telephone number of the called party. This automatic number identification (ANI) information is used to route the call to an appropriate mailbox or area within the computer's memory, dedicated to the called party.

This area of memory contains the digital message from the called party indicating unavailability, and also receives the calling party's message. In addition, most voice messaging systems will provide some indication that a message has arrived, such as lighting a message waiting lamp or directing the switch to provide a stutter dial tone when the caller goes off hook.

When the original called party dials an access code to receive messages, he or she is similarly connected to another port on the voice messaging system. This time, however, the party retrieving messages appears to the switch as a calling party. The voice messaging system sends a message back to the switch requesting the ANI for this calling party.

In the meantime, the caller is connected to a voice response unit (VRU), which steps through a menu of choices for retrieving both current and old messages. The response from the VRU is customized to the caller's particular message history because the ANI information contains the caller's phone number, which the system matched to his or her mailbox location. If messages are retrieved from a phone other than the user's own station, the voice messaging system typically asks for the phone number of the user, since ANI would return the phone number for the telephone used to retrieve the messages, rather than the user's phone number.

In this example, the telecommunications switch provides the ability to transfer the call, the ANI of the called number, and the ANI information identifying the calling party. The voice messaging system provides the memory to store called party's announcement, and the calling party's message. It also provides a directable message retrieval system, using a voice response unit to prompt the user for choices. The two systems are integrated via standard feature software in the switch for call transfer, and via the paths used to request the ANI information and turn on the message waiting indicator. Typical connections between the systems are trunks and/or an interface to provide the message waiting signal.

Call routing

Another application of CTI that uses ANI is an automatic call distributor (ACD). A typical use of an ACD is to route calls to customer service representatives. In this case, the ACD may be part of a digital telecommunications switch located at the headend. Customer service representatives receive incoming calls at the direction of the ACD. As the call rings the representative's phone, the calling party's ANI information is sent via

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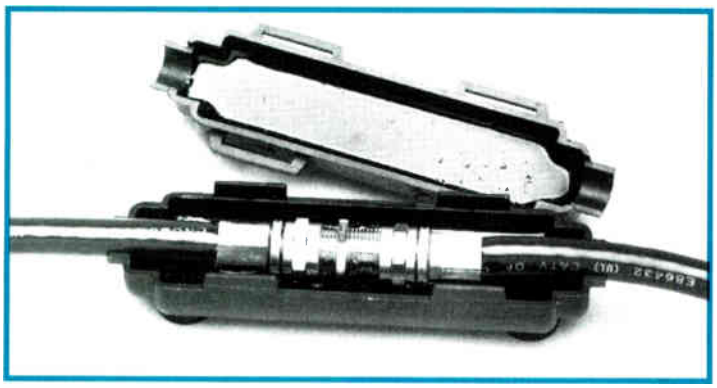
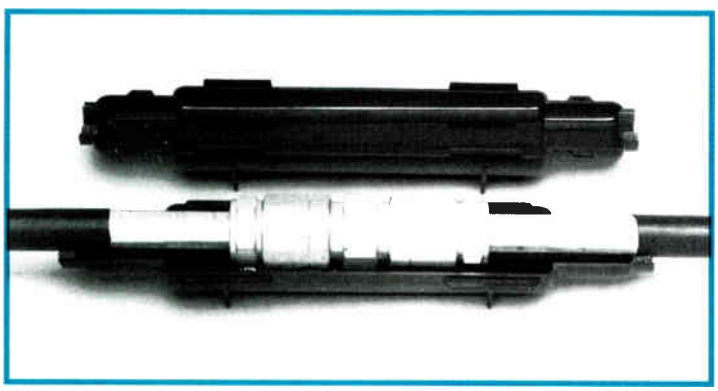


Part No. 3610-GS For RG6/59 Drop Cable Twisted Pair

Part No. 3611-GS For RG11/7 Drop Cable Twisted Pair



Part No. 3612-GS For .412 - .750 Feeder Cable

Mechanical Specifications

Splices protected when direct buried and exposed to temperature ranges of -40° f to 140° f.

Test	Test Conditions
Environmental Cycling	-40° C to 60° C 3 cycles/day 100 cycles
Heat Aging	60° C, 30 days
Water Immersion	Room temperature, for 30 days, 2 foot waterhead
Freeze-Thaw Cycling	-40° C to 60° C, 2 cycles per day, 100 cycles
Salt Fog	per ASTM B-368, 30 days
Soil Chemical Resistance	30 day immersion in: 0.1N Na2SO4 0.1N NaCl 0.1N H2SO4 0.1N NaOH
Fungus Resistance	per ASTM G-21

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