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October 1993

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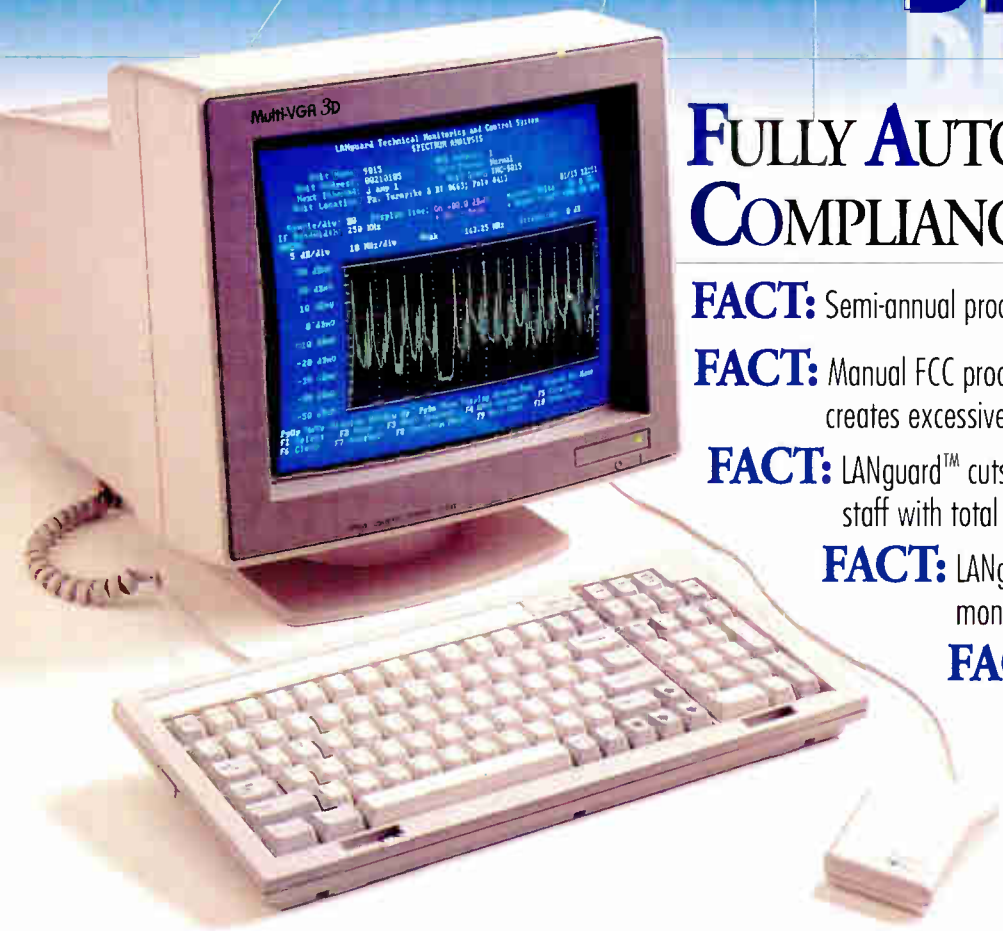

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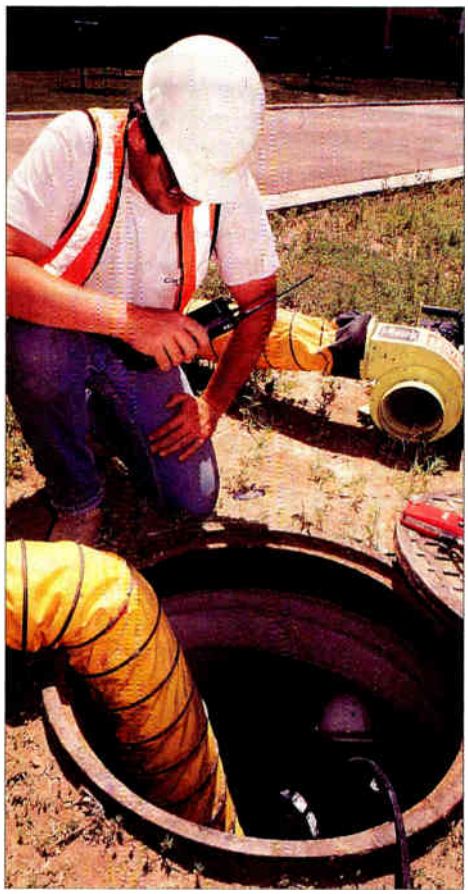

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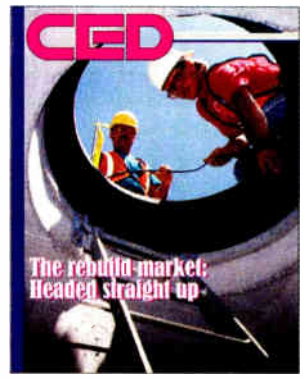

About the Cover

The construction future is bright. Photo by Don Riley.

Departments

CED (USPS 330-510) (ISSN 1044-2871) is published monthly except twice in May by Chilton Publications, A Capital Cities/ABC Publishing Group, 825 7th Ave., New York, NY 10019. ©October 1993, Volume 19, Number 11. U.S. domestic subscriptions are $48. Outside USA, subscriptions are $69 for surface delivery or $96 for air speed delivery, prepaid in U.S. funds drawn on a U.S. branch bank. Second-class postage paid at New York, NY 10019 and additional mailing offices. CED is published on behalf of the cable television and broadband communications industries. POSTMASTER: Please send address changes to CED Circulation, P.O. Box 7699, Riverton, NJ 08077-7699. MEMBERS OF THE BPA. Printed in U.S.A.

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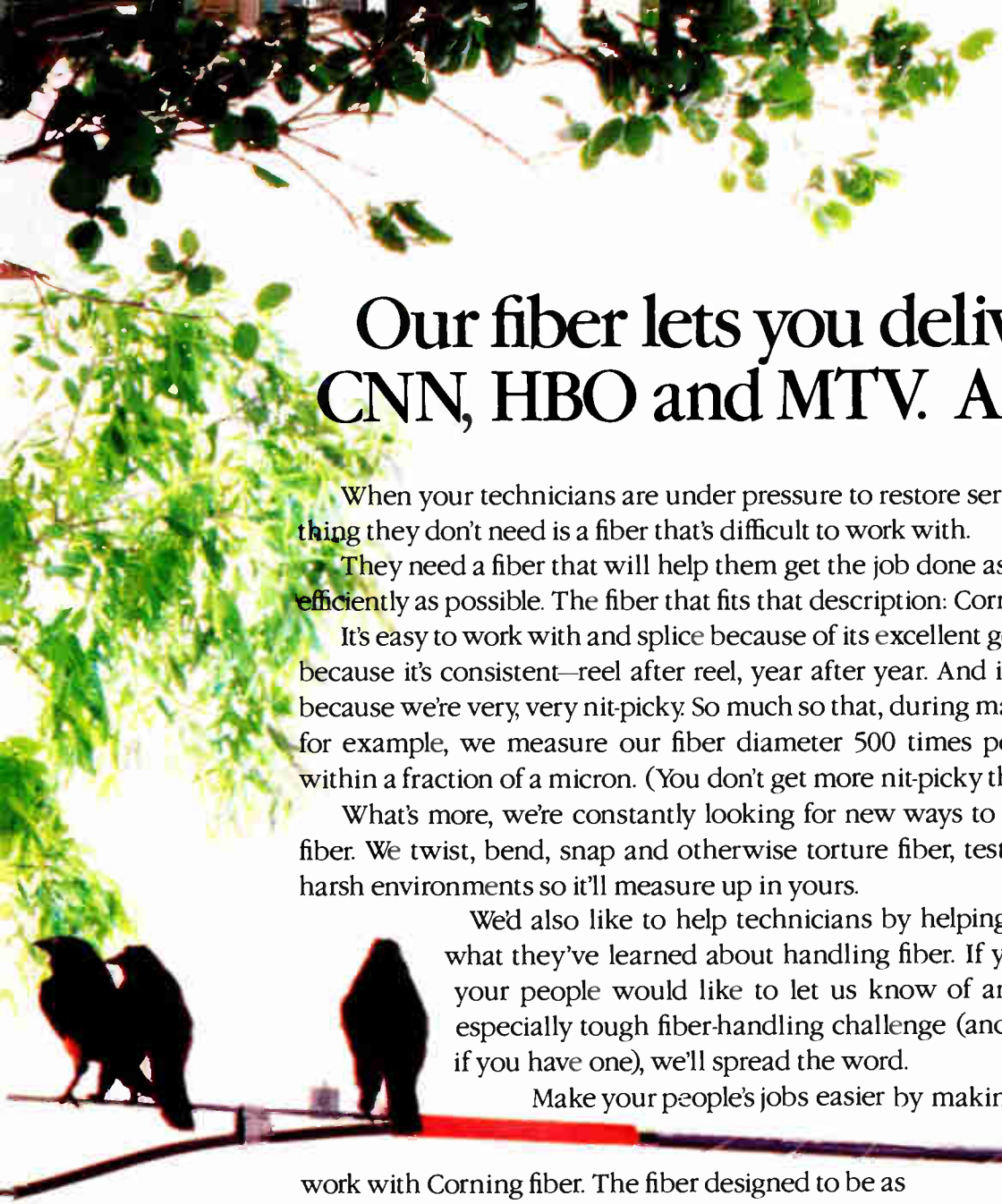

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On taking a metaphor way too far...

Oh, how I'd like to get my hands on whoever coined that now-overused phrase: "digital superhighway" (sometimes preceded with the words "national" or "information.") It's slowly driving me batty. Is anyone as weary of this phrase as me?

Actually, it isn't just the highway analogy that bothers me–it's all the ancillary phrases that have been conjured up that make me crazy. For example, a few weeks ago *CED* received a press release touting a "license plate" for the "vehicles" traveling the future "superhighway." Others have publicly discussed their desire to provide the "on- and off-ramps" and "toll booths" to the "superhighway." More recently, the word "engine" has cropped up in discussions relating to the "superhighway."

These are clear cases of taking what was a fairly useful analogy and taking it way too far. It's one thing to talk about the digital superhighway and compare it to the government's '50s-era interstate highway construction program. It's another to completely abuse the analogy.

I must admit (with shame, now) to having used the analogy myself in things I've written for *CED* over the past year. As a magazine, we even used the concept for a recent cover. The simple fact is that every writer looks for catchy ways to describe the sometimes dry facts associated with electrical engineering.

But what I really fear are the next adjectives in this silly chain of analogies. I dread the day, for example, when *CED*'s fax machine spits out more catchy products for future communications transport. I can see it now: Digital *mufflers*. Superhighway *traffic cones*. What about *road maps*? Where will the *filling stations* be located? And I can't even begin to imagine the fun someone could have with digital *traffic signals*, not to mention those gas pedals which drive the digital engines of the digital vehicles traveling the digital superhighway! Please–I think you get the idea, so spare me.

Using analogy and metaphor is admittedly a useful tool in writing. But at some point, analogy becomes cliché. In my opinion, hitching a ride on the "superhighway" is now cliché.

And how about this whole 500 channel business? The way it's bandied about during industry forums, it appears as though the "average Joe" subscriber (exit 17 off the digital superhighway–sorry, couldn't help it) will be sitting in his La-Z-Boy actually flipping through 500 channels worth of stuff. Will somebody please help get the message across that future cable systems won't offer 500 *channels* per se, but will be loaded with a comparable amount of *bandwidth?* Big difference.

It's our responsibility, as representatives of the technical community, to educate and lead our non-technical colleagues down the true path of technology. Let's give them a hand. I suggest openly screaming every time you hear the word "superhighway." Or, call me with an alternative metaphor....I'm flexible.

Leslie Ellis
Managing Editor

CED MAGAZINE

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Address
600 S. Cherry St., Suite 400
Denver, CO 80222
303/393-7449

Circulation Manager
Rebecca Young

Fulfillment Manager
Mary Keane

Subscriber services
CED
P.O. Box 7699
Riverton, NJ 08077-7699
Telephone: 609/786-0501
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Continental pursues data market with plans to offer Internet services

Cable operators have long talked of linking their video networks to high-speed data networks to link computer users to their plants, but Continental Cablevision will be one of the first to actually do it.

Continental has joined with Performance Systems International to create regional networks that will, in turn, allow PC users in cabled households to connect with Internet, a global "network of networks." Initial roll-out of Internet is slated to take place in Continental's eastern Massachusetts systems, said David Fellows, senior vice president of engineering and technology at Continental.

Continental's data services are targeted at the high-end computer user.

Continental will dedicate a 6 MHz channel slot for the service, which will run at speeds of up to 10 megabits per second. Eventually, Continental will upgrade that network to higher speeds to accommodate asynchronous transfer mode (ATM) switching.

Continental and PSI will deploy data servers and routers/switchers in Continental headends. RF-to-digital converters and data modems will be deployed in users' homes and businesses when the service rolls out early next year. From there, the service will be expanded to other Continental systems.

Although Continental plans to attach a relatively high subscription price to the service (between $70 and $100 per month) because he has targeted the high-end computer user, Fellows said there is no shortage of interest. "We've logged 100 phone inquiries and PSI has taken 400," said Fellows. "There are a lot of people with computers in their basements and a lot of content providers out there."

Fellows personally has taken calls from consumers who heard about Continental's plans to offer the service from radio newscasts or by reading about it in the newspaper.

Although nothing new is needed technically to carry the service over Continental cable plant, Fellows said it would be advantageous for a cable operator to have functioning two-way plant and a fiber-to-the-serving-area topology so that telephone lines aren't tied up by the users.

Fellows said business users should be attracted to Continental's plan to offer a flat-rate subscription to the service, instead of having to pay for each minute the phone is off hook. Cable's wide bandwidth will also allow users to access the network and its information at much faster speeds.

Continental chose eastern Massachusetts as the location for initial roll-out because the area has a large university population that is highly Internet-literate and because the MSO has a lot of fiber installed there. "We'll head toward the lower end of the market when Internet is ready to go prime time," said Fellows.

Internet is actually a global collection of interconnected networks, including NSFNET (the National Science Foundation's network), NSI (NASA Science Internet), TWBnet (DARPA's Terrestrial Wideband Network) and ESnet (Energy Sciences Network). Regional computer networks, including NEARnet in New England, SURAnet in the Southeast and WESTnet in the western U.S. are also part of the mix.

Internet has grown from a scant four sites in 1969 to include 8,000 interconnected networks with a million computers. It is growing at nearly 10 percent per month, according to the Network Information Systems Center at SRI International. Between January 1992 and January 1993, the number of networks connected to Internet grew 25 percent while the number of computers connected grew 80 percent.

Association formed to develop data standard

Several computer-related companies have joined together in an effort to define a data interconnect standard. The Fibre Channel Association was formed to promote technology that can transmit large data files bi-directionally at one gigabit per second.

The Fibre Channel Association plans to increase awareness of the benefits new technology brings to high-speed data transfer. Recognition of performance improvements in processors and peripherals and the move toward distributed architectures, such as client-server, will be a high priority of the organization.

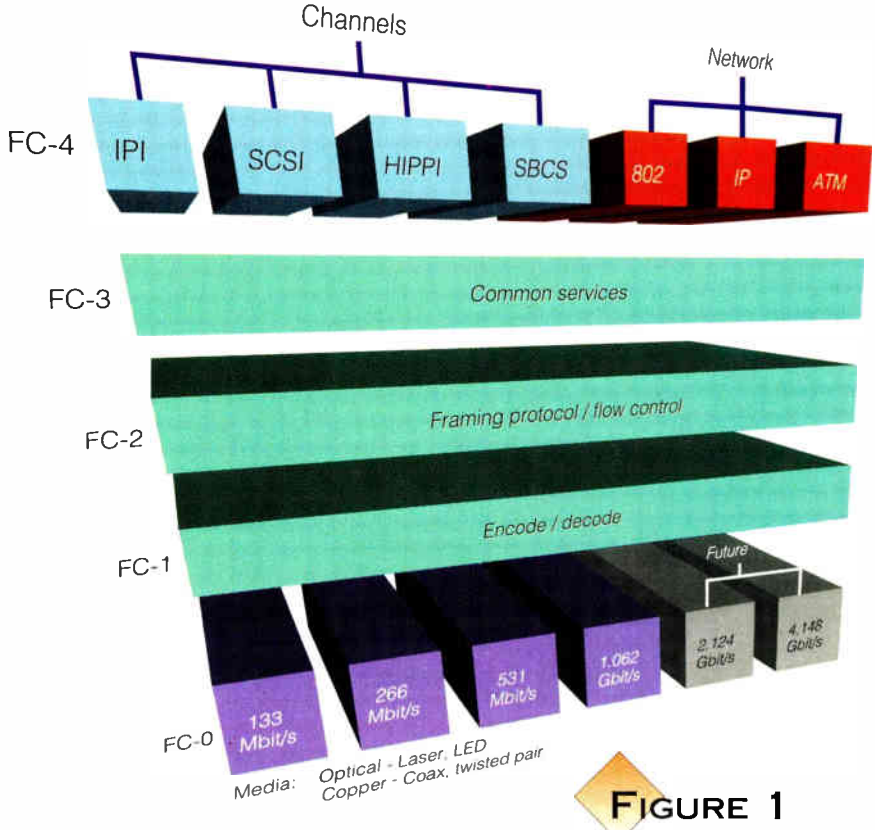

FIGURE 1
Fibre channel structure

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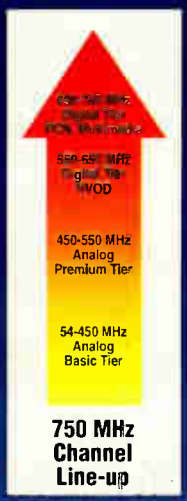

750 MHz Channel Line-up

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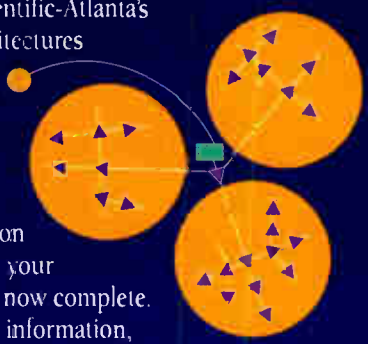

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More than 20 organizations are members of the group, including AT&T Microelectronics, Hewlett-Packard, IBM, Sun Microsystems, Tandem Computers, Siemens and others.

The association will also focus on accelerating the use of Fibre Channel technology in future products and services. With members representing a wide spectrum of system and component manufacturers, the organization hopes to foster a Fibre Channel infrastructure to help insure interoperability. The Fibre Channel standard was initially endorsed by a joint effort of HP, IBM and Sun, and has been under development for more than four years.

"When links within and between companies, schools, hospitals, governments and other organizations are created, Fibre Channel will provide standards-based, high-speed on-ramps necessary for the digital information highways of the future," said Jeff Silva, FCA board member.

The Fibre Channel standard was developed to be complementary to asynchronous transfer mode (ATM) and other interconnect technologies. While ATM was developed to connect wide area networks and facilitywide local area networks for traffic that comes in short bursts, Fibre Channel was designed for mass storage interconnect and workstation clustering.

Uses include the transfer of large amounts of information between systems and between systems and peripherals for database transaction processing. In the future, it is expected to be used to transmit real-time full-motion video, multimedia and imaging.

For information, call the FCA at 800/272-4618.

Viacom orders DigiCipher gear for satellite services

When digital video compression rolls out in cable systems next year, will the video adhere to MPEG-2 standards or a proprietary system like General Instrument's DigiCipher?

The answer to that question depends upon whom you ask, but if Viacom International has it's way, it will go with the emerging MPEG-2 standard.

Viacom made that preference known last year when it announced it would purchase equipment from Scientific-Atlanta to serve the lodging and SMATV markets. Since then, General Instrument has agreed to offer a "dual-mode" version of DigiCipher that could incorporate both its own compression system and the MPEG-2 standard.

By agreeing to do that, Viacom agreed to purchase DigiCipher technology for the roll-out of Viacom's multiplexed satellite services, including Showtime 2, Flix and MTV Latino, over GE Americom's Satcom C3.

"We are very pleased that GI has agreed to accommodate the MPEG-2 video standard and that it is willing to license the DigiCipher product line," said Paul Heimbach, senior vice president of Viacom Networks.

"These are major steps toward widescale adoption of an open standard-based signal compression system by the cable industry."

Viacom will initially use DigiCipher I equipment to uplink those digital signals to a single transponder beginning later this year. Viacom will then upgrade to DigiCipher II–the version that will accommodate MPEG-2–in the middle of 1994, or when the hardware becomes available. Viacom will use that platform to evolve into a MPEG-2 video and audio provider.

The deal is yet another victory for General Instrument, which now has purchase commitments from Request TV, Viewer's Choice and Primestar Partners in addition to five MSOs that have promised to buy almost 2 million DigiCipher set-top terminals.

Technology allows TV self-editing

VideoFreedom of San Diego, Calif. has come up with a novel approach to self-censoring provocative television programs. The company has announced technology that blurs out potentially objectionable material, including graphic violence and/or sex, language or nudity.

Local broadcasters would use the technology to broadcast sensitive material with various degrees of blurring–from none to a lot. Likewise, a set-top box will be developed that allows viewers to select the amount of blurring they want to see. Only that section of the picture which contains the objectionable material would be blurred while the remainder of the picture frame would be transmitted without alteration.

This process is carried out by the company's technology that codes each individual frame with information prior to it being broadcast to viewers. The information is passed on the the decoder via the vertical blanking interval. Company officials say the information takes up little space and will not interfere with closed captioning and other VBI services.

Initially, VideoFreedom expects to sell the home decoder separately for about $60, with volume production resulting in a signficant price reduction. VideoFreedom officials hope to have the circutry built into future televisions.

Jottings

Cox Cable San Diego will test **Qualcomm**'s code division multiple access (CDMA) radio technology for use in its cable TV-based personal communications services. The tests will include a series of telephone calls which will transmit CDMA radio signals to portable telephones using the testbed in San Diego. The test calls will start at the base station located in the headend and travel over both fiber and coax to a microcell site, where they'll be delivered over the air to the wireless portable phones . . . **Cablevision Lightpath** (division of Cablevision Systems Corp.) and **AT&T** are teaming up to wire four Long Island University campuses with fiber optics to provide a fully integrated multipurpose communications system. Students will have access to a computer hookup, free intra-campus telephone service, cable TV and local- and long-distance telephone, teleconferencing and a direct link to WPBX, the university's public FM radio station. The long-term vision is to give every Long Island cable customer access to interactive education . . . The long-dreamed-of flat panel display for applications like HDTV may be a bit closer thanks to a $1.9-million cooperative research agreement between **Lawrence Livermore National Laboratory, Commonwealth Scientific** and **SI Diamond Technology.** SI Diamond intends to develop a flat panel display using a thin diamond film as a key component. The diamond film produces light directly without need for a backlight source, has resolution high enough for HDTV and can be viewed from wide angles . . . **Sony** has developed a color video printer that will take video images from any source and make a full-color print in just one minute . . . Interactive television should now be available to residents of Chicago, now that **Interactive Network** has rolled out there. The technology, which can operate both with or without cable support, had been available exclusively in San Francisco and Sacramento . . . **Stanford Telecom** has been tapped by **AT&T Network Systems** to develop production-ready headend and subscriber equipment for the Cable Loop Carrier 500 system that integrates telephony service over a cable TV network. Stanford Telecom will provide the modems needed in both locations. Tests of the CLC-500 are expected to occur in the United Kingdom later this year; the product should be available late in 1994. CED

Compiled by Roger Brown

We're not just talking about tomorrow. We're developing the platform, today.

There are those who believe "interactive technology" is a fascinating concept that exists only in the imagination. But at Jerrold/GI, we're not only designing this technology, we're building the platform that will serve as the foundation for the future of cable TV.

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Circle Reader Service No. 7

Adventures with ghost canceling

By Leslie Ellis

For Uwe (pronounced *oo-vah*) Trode, life as an adventure started in 1967, when his parents announced their intentions to move from a small, West German town on the Baltic coast to the United States. A youngster at the time, Trode was ecstatic–after all, his rosy perception of the United States came from dubbed versions of *My Three Sons*. "Through television, I had three preconceived ideas about America: it was always sunny (the series was filmed in California), books were carried in bags that were strapped to your back, and everybody rode minibikes," Trode laughs.

Even the six-day trip across the Atlantic was an adventure, Trode says, because the cruise ship proffered two swimming pools, movie theaters, and food and games galore. For a wide-eyed 12-year-old, it was a colorized and personalized travelogue with a most spectacular finale. "Coming into New York Harbor and seeing the Statue of Liberty was just like the movies," Trode recalls.

Now, some 25 years after the transatlantic trip, Trode says the only preconception that didn't hold true is the sunny weather. The Trodes settled in the Syracuse, N.Y. area, which is known by meteorologists as the second-rainiest city in the U.S., next to Seattle.

However, the rain and snow don't seem to have dampened the spirits of this pleasant, humorous engineer. A phone call to Trode's voice mail during blustery weather, for example, is evidence enough. "Hello, you've reached Uwe Trode....It's wintertime in Syracuse, so any number of things could explain why I'm not available to take your call. I could be buried in a snowdrift somewhere, or perhaps my car won't start...." the message explains. Indeed, Trode is a living definition of the word "engaging."

An early vision

Trode's path toward electronics and, ultimately, his career at Philips Broadband Networks, however, didn't come without some experimentation and heartache. Although he says he's been drawn to technology and communications since childhood, he admittedly took a roundabout road. After high school, Trode joined the Navy with every intention of being trained in electronics. A few weeks into boot camp, though, he was told it wouldn't happen because he wasn't yet a U.S. citizen. Instead, the Navy shipped him off to a spy station located, ironically, within a short drive of his childhood home in West Germany.

After he was discharged, Trode headed back to Syracuse. There, he worked for a while as a partner in his father's ceramic tile business, and D.J.'d for a German-speaking radio program. "After a while, I said `this is nuts,' " Trode recalls, and stepped directly back onto the trail to his life's dream: electronics. He studied at Onondaga Community College, where he completed his associates degree in engineering in 1981. Shortly thereafter, Magnavox CATV hired him as a systems designer. He's been there ever since, working as a technician, then a test engineer.

Sometime around 1988, Trode starting putting out the feelers at Magnavox for a more people-oriented position. Ironically, three departments simultaneously handed him offers. Ultimately, he chose the marketing department. "It was pretty clear to me that that's what I wanted to do," Trode says of the transition.

The ghost canceling guy

These days, most people who know Trode link him with Philips's award-winning "Vector" ghost canceling system. Although he humbly insists it was a team effort which brought the Vector program to completion, it is his business card that reads "Product Manager, Vector Ghost Canceler."

As the Vector story goes, a group of Philips Broadband employees were touring a sister division (Philips Laboratories) one day. In the basement, they came across a big rack of interesting-looking equipment. Upon inquiry, they were told it was something that might someday be shrunk down to put inside television sets to eliminate multipath ghosts. The broadband group immediately embraced the equipment as a potential solution for cable operators, and placed Trode in charge.

Trode says the Vector experience has been his greatest challenge, to date. "We went through some very stressful times to make it happen," Trode explains.

And while he agrees with the current information overload on converging technologies, Trode takes a more cautious approach. "There are technological stumbling blocks to the idea of having a sort of porthole through which we'll fulfill all our communication needs," Trode says of a one-box answer to telephony, entertainment and computing. "For example, if you picture a huge, hang-on-the-wall HDTV screen, where does the telephone plug in? How do you activate the computer function? Where is the keyboard? We have to come up with something that works seamlessly with all of those services."

Data storage is also a big consideration, Trode says, for service downloading on demand. "We need to be measuring storage capacities in the googols, instead of the megas or gigas, " Trode says. (A googol is a number followed by 100 zeros; six zeros follow a mega, and nine zeros folow a giga).

New arrival

When Trode isn't carving out new product adventures for Philips, he's at home with his opera-singer wife, Gloria, and their new daughter. Both musicians, Uwe and Gloria named their new arrival "Cecilia"–and later discovered (with great pleasure) the moniker is shared with the patron saint of music. Gloria is also "of German extraction," Trode says, and they're hoping a houseful of fluent German and English sounds will make Cecilia bilingual at an early age.

Trode is also a baker and does some "pretty mean Chinese cooking," he says. Between bands currently, Trode plays guitar and sings with local rock groups. "Most of the time, though, I'm enjoying the fatherhood thing. Cecilia learned to walk recently–now she's *really* dangerous." CED

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It's a virtual reality we should consider

By Wendell Bailey, VP of Science and Technology, NCTA

Some things in the cable television industry today seem like they've been around forever. We take our technology very much for granted as we try to grapple with the ramifications of digital compression, interactivity, and new cable regluations such as compatibility with consumer electronics equipment.

It's habitually a human thing to forget that the things we work with today and that we have come to trust as immutable forces in our universe were not always available to us. In fact, if we pause to reflect, we can recall those moments in time when these everyday tools just weren't around.

I was reminded of this flaw in human nature recently when I was reading a story in a computer magazine about desktop personal computers. I found it shocking to be reminded that, in fact, personal computers as a regular thing in our daily lives are less than 15 years old. Think about it: just 15 short years ago, there not only was no such thing as a desktop computer, but the very idea of that amount of computational power being at everyone's fingertips in a desktop PC was preposterous.

Strange waters ahead

Lately, in my travels to cable events around the country, I have noticed a new type of technology; a new effort at specialized services quite different from anything we have considered before. I first saw an example of this technology at an NCTA Show four years ago. At the time, I thought it was interesting, but it didn't impact me as something that would someday be part of our consciousness.

Lately I've been seeing more and more evidence that there is in fact a technology fermenting and beginning to bubble up such that we're all going to realize in the not-too-distant future that there is something here we should pay attention to.

I'm talking about virtual reality.

So far, we have only seen this demonstrated at computer shows and occasionally some other venues, where our colleagues donn odd-looking headgear while wobbling around a podium.

It's clear that virtual reality takes a lot of equipment as well as a lot of effort and expense to make what is essentially a cartoon-like scene come alive with us as a potential player in the story. But recently, I saw two things that made me stop and think more carefully about what's really going on here.

First, I saw a helmet I understand will be available shortly in stores. The helmet can be connected to home-based video games, enabling the player to experience the game in virtual reality. I am told that this visor, rather than costing thousands of dollars, will cost less than $100.

Secondly, even though I have experienced virtual reality demonstrations myself on three or four occasions, I recently saw for the first time a virtual reality program running on a notebook computer. The computer was fairly normal, with a modest-size hard disk as well as a small but reasonable amount of RAM. And, it was fully loaded with Windows, word processing packages and spreadsheet packages in addition to the program which ran the virtual reality presentation. In the same presentation , I heard about applications of virtual reality to several industries and disciplines I had not yet thought about.

Virtual business reality

Several things about the two events interest me. First, I was struck by the easy availability and cost-effectivness of a demonstration in virtual reality that I had never seen before. Secondly, I had not realized that there were people using virtual reality in actual business situations.

The use of a technology like this is quite staggering, if you think about it. It impacts our industry as well as the daily lives of a lot of people. An example was given by the lecturer of a company that makes large airplanes using a virtual reality display. In so doing, the company enables its workers to put the wiring system into airplane by looking through a heads-up type visor where they could see the place where wire harnesses were supposed to be attached, superimposed on the correct color points in the wiring area.

By simply matching up the correct color in their hand with what they were seeing with their eyes, they got perfectly accurate and repeatable connections to the correct points.

The same manufacturer used a similar system for people who had to troubleshoot the airplane from the outside. They would walk along while looking at the skin, and by looking through their virtual reality display, they found themselves looking at the underside of the aircraft. When they saw the subsystem they wanted, the were at the spot where they needed to remove the screws and an access panel to get at the area needing repair.

While this is just an example of how this technology can be used, it magnifies the importance of the other issue that came up at this meeting: the simple fact that these virtual reality proponents had come to a small cable industry gathering to give a lecture.

When I talked with them later about why they had come to this particular event, they said virtual reality encomassed many areas in training as well as in entertainment and diagnostic applications. But, in order to get the data flow needed for certain applications into homes or offices, either a large amount of computational power must be available or transportation, or the output of such computation power must be available for distriubting the programs in a real-time basis.

Their analysis of the situation indicated that the cable television industry had the necessary bandwidth and the necessary connections to the homes to facilitate this type of service. Their question was whether or not the cable industry has an interest in playing a part in these types of virtual reality service offerings.

The strongest point that we have in our favor vis-a-vis competition is the intertia that incumbency gives us. The surest way to diminish that power is to rest on our laurels and not embrace new concepts.

I told the speaker that he had indeed come to the right place. Am I right? CED

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Resonant circuits, filters and traps, Part 4

By Chris Bowick, Group Vice President/ Technology, Jones Intercable

So far in this series, we have come a long way toward an understanding of the basics surrounding the design and performance of filters and traps. We've covered the basic terminology in part 1, discovered the concept of resonance in part 2 to give us a fundamental understanding of how various components can be brought togther to create a tuned circuit, and studied the effects of load and source impedance on the performance of a simple resonant circuit and discovered that the performance of a filter or resonant circuit can be greatly affected by the impedance characteristics of the system within which the filter is inserted. This month we'll take the study a step further and examine another very important parameter that can greatly affect the performance of any filter–the concept of *Component Q*. As with Parts 1 through 3 of this series, this column will be adapted from my book *RF Circuit Design*[1] and various data supplied by the trap vendor community.

Thus far in our study, we have assumed that the components used in the resonant circuits are perfect, or lossless and produce no degradation to the overall circuit's loaded Q. In reality, however, such is not the case, and the performance of the individual components within the filter must be considered in the design of any filter network—-especially in those filter applications requiring very narrow (high Q) or very sharp response skirts. In a lossless parallel circuit at resonance, for example, the impedance seen across the circuit's terminals, if it could be measured, would appear infinite. In a practical parallel resonant circuit, however, because of component losses, there exists some finite equivalent parallel resistance. It is this equivalent parallel resistance of the individual components that creates the insertion loss with which we have become so familiar. In very high-Q filter requirements, individual component Q will often be the limiting factor in the design of the network. In fact, for applications requiring extremely low insertion loss, very deep and narrow notches, and/or very steep skirts, the filter's design criteria will dictate the minimum Q required of each component, and the manufacturers must therefore specify these less-lossy (high-Q) and typically more expensive components for their designs.

Limiting factor

In order to simplify the analysis, let's examine the Q of an inductor in a little more detail. A similar analysis could be performed for a capacitor, but because of the basic structure of the two types of component designs, it is usually the inductor that has the lower-Q at the operating frequencies we are typically interested in, and thus it typically becomes the limiting factor in the design of any high-Q network.

Intuitively we can understand the loss associated with an inductor by simply considering how one is made. After all, an inductor, in its simplest form is a finite length of wire, wound into a coil. The number of turns wound, along with the thickness of the wire and the geometry of the coil (diameter, number of turns per given length, core material, etc.) will dictate the value of the inductance. When you consider the fact that any finite length of wire must have some amount of resistance associated with it, and that the smaller the diameter of the wire the higher will be its resistance per unit length, you can begin to see that higher values of inductance created by many turns of very fine wire can create very low-Q or very lossy inductors.

In order to understand how the resistance of the inductor can affect the loaded Q and the insertion loss of the network, it is best to transform this series circuit model into an equivalent parallel circuit. This can be done by the following transformation equations:

$R_p = (Q^2 + 1)R_s$

where,

R_p = the equivalent parallel resistance

R_s = the actual series resistance of the component

$Q = Q_s$ which equals Q_p which equals the Q of the component.

and,

$X_p = R_p/Q_p$ = the component's inductive or capacitive reactance

If the Q of the component is greater than 10, then R_p is approximately equal to Q^2R_s and X_p will be approximately equal to X_s.

Note, however, that these transformations are valid only at one frequency because they involve the component's reactance which, as we have seen in previous columns, is frequency dependent.

Increased insertion loss

Once you perform these calculations for a given component, you will find that the result of a low-Q component is to effectively place a low value of shunt resistor directly across the circuit. As we saw in last month's column, any low-value resistance that shunts a resonant circuit drastically reduces its loaded Q, thereby increasing its bandwidth. It also increases the insertion loss of the circuit.

The above discussion was certainly not meant to provide you with the necessary tools to design circuits. It should, however, give you a better understanding of the inner workings of the filters and traps that you use on a daily basis. The tier traps, low-pass filters, high-pass filters, and positive and negative traps that are so pervasive in the industry are typically reasonably high-Q designs with very narrow high-Q notches or steep response skirts in order to minimize picture degradation of either the given channel, or the adjacent channels. The higher you go in frequency, the more difficult this task becomes because the circuits and components will require much higher Q in order to provide the same performance as its lower-frequency counterpart. As an example, given the equivalent passband or stopband requirements (in MHz), a filter at channel 36 (295.25 MHz) will require a loaded Q of over 5 times that of a filter designed for channel 2 (55.25 MHz). CED

References

1. Bowick, Chris, *RF Circuit Design*, SAMS, (a division of Macmillan Computer Publishing,) Indiana, 1982-1991.

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What am I bid for this spectrum?

By Jeffrey Krauss, independent telecommunications policy consultant and President of Telecommunications and Technology Policy of Rockville, Md.

While most cable industry managers continue to focus on the 1992 Cable Act, the Congress has recently passed additional communications legislation, this time dealing with radio spectrum issues. In fact, this may be the most important spectrum legislation since the Radio Act of 1927, the predecessor to the Communications Act of 1934.

The 1993 legislation gives the FCC authority to auction the radio spectrum. It also forces the federal government to give up 200 MHz of spectrum for commercial use. And it tries to equalize the regulatory burden between cellular mobile radio carriers and other commercial mobile radio carriers.

Auctioning the spectrum

Up until about 10 years ago, the FCC gave away spectrum on a first-come, first-served basis. You applied for a radio license, and if nobody else applied, you got it. If somebody else did apply for the channel you wanted, in the place you wanted it, then the FCC held a "comparative hearing."

In a comparative hearing, the FCC would establish a list of qualifying factors, and then hold a hearing before a judge to decide which of the competing applicants was best qualified. This approach was manageable when the only contested applications were for radio and TV broadcast stations.

But when cellular mobile radio came along, and wireless cable, the FCC found that it had too many hearings, and not enough judges. So Congress enacted authority for the FCC to use lotteries. While lotteries do not take the time and expense of a hearing, they have other drawbacks. Speculation and fraud has been widespread, for example.

For the last 15 years, maybe longer, economists have argued with lawyers about the virtues of auctioning the spectrum. The federal government auctions mineral rights and grazing rights; why not wireless transmission rights?

But it took the current budget deficit crisis to convince politicians that auctioning the spectrum would be good policy. Billions of dollars in revenues would flow into the U.S. Treasury, according to some studies, if the FCC were to auction off the PCS spectrum instead of giving it away in lotteries. So the 1993 Budget Reconciliation Act gives the FCC authority to use competitive bidding when competing applications are submitted for new radio services, such as PCS. The FCC must first hold a rulemaking proceeding to adopt the auction procedures, but you can expect to see the first spectrum auctions within a year.

Equalizing the regulatory burden

This same legislation includes a section that will result in all commercial mobile radio services being regulated equally. It applies to cellular radio, "private carrier" commercial radio services, and future PCS services. It allows the FCC to preempt state regulation. And it requires local telephone companies to provide the same quality and type of interconnection for all of these mobile radio services.

This section was enacted because of the growth of Specialized Mobile Radio (SMR) services, which were established by the FCC to operate as "private carriers" rather than "common carriers." It was supported by the cellular telephone industry, because SMRs are not subject to rate regulation by state public utilities commissions. (Never mind that very few states actually regulate cellular rates).

But this tactic may have backfired on the cellular industry. The legislation requires telephone companies to interconnect with SMRs. In the past, SMR services were sold primarily to industrial fleets, such as the cable company, for dispatching trucks. Interconnection with the public switched telephone network was of secondary importance, and was usually possible only when the mobile radio initiated the call. Reflecting the industrial nature of this service, the largest SMR operator (after Motorola) was named Fleet-Call.

But with the new legislation, SMRs can now serve the general public. They plan to use digital mobile radio technology similar to that used by cellular carriers. Interconnection to the telephone network will be just like cellular, so SMR customers will have telephone numbers and they will be able to receive calls placed by wireline telephones. And Fleet-Call has changed its name to Nextel. Get it? The NEXT telephone company.

When PCS finally gets underway, this legislation makes it likely that there will be one or two SMRs in each major city, using the same technology as cellular and competing with cellular and PCS for the same customers. This section may be the "sleeper" of the year in communications legislation.

Government spectrum

The FCC and the U.S. Department of Commerce have the authority to divide up the radio spectrum so that the federal government gets what it needs (mainly for the military, law enforcement agencies such as FBI and Customs, and aeronautical safety administered by the FAA) and the rest is available for commercial and local government use. This new law forces the federal government to give up some of its spectrum, so the FCC can auction it off for PCS or other uses.

The federal government must give up 100 MHz of spectrum below 3 GHz and another 100 MHz of spectrum between 3 GHz and 5 GHz. Congress took this initiative because of a feeling that the federal government does not use its spectrum as efficiently as commercial users.

Indeed, there is plenty of government spectrum between 3 GHz and 5 GHz that is not being used and could easily be made available. Some of it, for example, is held in reserve for old troposcatter communications systems. But below 3 GHz, the government's spectrum is heavily used. We'll have to wait and see what frequencies they give up.

These legislative changes will be good for the public–more spectrum for PCS and more money for the U.S. Treasury. And maybe the FCC, in addition to hiring hundreds of economists, engineers and lawyers to regulate cable rates, will have to hire auctioneers. What am I bid for this prime, slightly-used chunk of spectrum? CED

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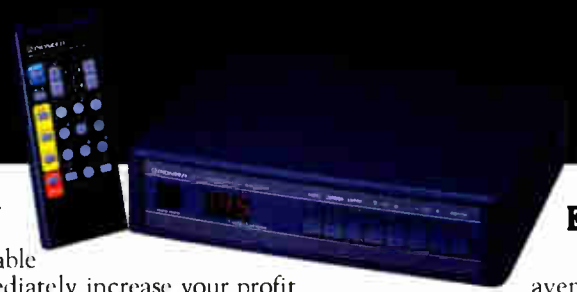

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More on that pesky PMD snafu

To the Editor:

Leslie Ellis' fine article, "PMD: Answering the questions," (*CED*, July 1993, p.55) and Bill Gardner's article, "PMD testing: Wavelength scanning method," (same issue, p.58) show that the phenomenon of polarization mode dispersion remains obscure, if not mysterious.

Ellis' article is a comprehensive compilation of what has been published on the subject to date.

Perhaps the reason her article seems weighted with information from AT&T rather than Corning is because AT&T has published far more articles and white papers on PMD than Corning.

Such a flurry of papers on PMD coming from highly credentialized engineers at AT&T's Bell Laboratories makes me suspect that AT&T has something to obscure. There was a time when us laymen could trust what eminent engineers told us, wasn't there?

It is comforting to hear that "distinguished" engineers at AT&T can assure us that the world is not perfect (nor perfectly round) but, also, that their fiber is not perfect (nor perfectly round). And it is good to know how "quick" they are to explain (or use to obscure) that there are other causal factors that stimulate time varying second order (CSO) distortions besides PMD alone.

According to Ellis and AT&T, there are intrinsic and extrinsic causes of PMD. The intrinsic causes of birefringence are the result of manufacturing factors. AT&T and Corning each use different methods for making fiber. AT&T starts with an essentially asymmetrical process and, according to AT&T's Jim Refi, "relies on an elliptical cladding to induce the internal stresses needed to change the index of refraction along each axis," whereas Corning's glass ingots are unitary and circular from the start.

There was a time when us laymen could trust what eminent engineers told us, wasn't there?

Does this not provide a prediction for PMD?

But what does implicitly emerge from Ellis' article is that there is a "statistical" method for predicting whether your system will experience PMD-related time-varying CSO.

Since AT&T fiber has experienced PMD in the field and Corning fiber has yet to discover any field issues with their fiber, I therefore have this to offer regarding intrinsic causes:

✔ Deploy AT&T-manufactured fiber and you *might* have PMD

✔ Deploy Corning-manufactured fiber and you *will not* have PMD.

The same kind of statistical method can be used for predicting whether a cable system will experience PMD-related CSO caused by "extrinsic" factors "such as radial pressure, bending and torsion."

In other words, then, to eliminate extrinsic causes:

✔ All future fiber installations should specify Tight Wrap™ fiber optic cable

✔ Request Corning as the glass of choice.

So, to sum up:

✔ To eliminate intrinsic causes of PMD, buy Corning fiber

✔ And, to eliminate extrinsic causes of PMD, buy Tight Wrap fiber optic cable with Corning glass cabled inside.

Cordially,

George C. Sell
Market Research and
Product Development
Channell Commercial Corp.

Editor's Note: Optical Cable Corp.'s Tight Wrap fiber cable is marketed to the cable industry exclusively by Channell Commercial Corp.

Heads up to management

To the Editor:

I found that the recent cover story, "Operators say: Hands tied by red tape" by Leslie Ellis (August *CED*, p.30) which summarized the salary and job satisfaction survey, while informative and interesting, also provided me with a sense of deja vu. The attitude of management toward the technical people is as old as the industry.

In my opinion, it stems from managers' lack of technical knowledge along with confusion as to the function and purpose of the manager's position. What group should the manager try to please? Is it the accounting department, the subscriber, the stockholders, the local politicians and their influential friends, the customer service reps, the technical personnel–or all of the above?

Because so many managers now have training in business management, and little or no understanding of the concerns of an entrepreneur, the tendency is to focus on the "bottom line"–at times to the detriment of those who do the most to sustain or improve that line.

Engineering managers and supervisors are buried in a redundancy of paper, the sole function of which is to inform someone at the next level that work is being done. Because of the emphasis on paperwork, technical personnel have no time to go into the field and see the problems first-hand.

Our industry could benefit from the advice of the CEO of one of the country's most successful manufacturing businesses: Maytag. It's philosophy is to take care of your customers, your product and your personnel, and the bottom line will take care of itself.

The technical staff–those that create the product that the CATV system offers–needs to be recognized as an equal partner in the successful operation of the business. Technical staffing should be based on the age, design, and size of the system, as well as the overall level of training–not solely on the number of subscribers served.

Further, training and upgradding should continue for the working life of the individual. A goal to staff the technical group wity multi-skilled technicians capable of handling any tasks that arise should be paramount.

Consider the subscriber subjected to this scenario:

The installer arrives, completes the wiring, but finds that there are poor pictures. He tells the subscriber that he must now call for a service tech to determine what is wrong with the picture quality.

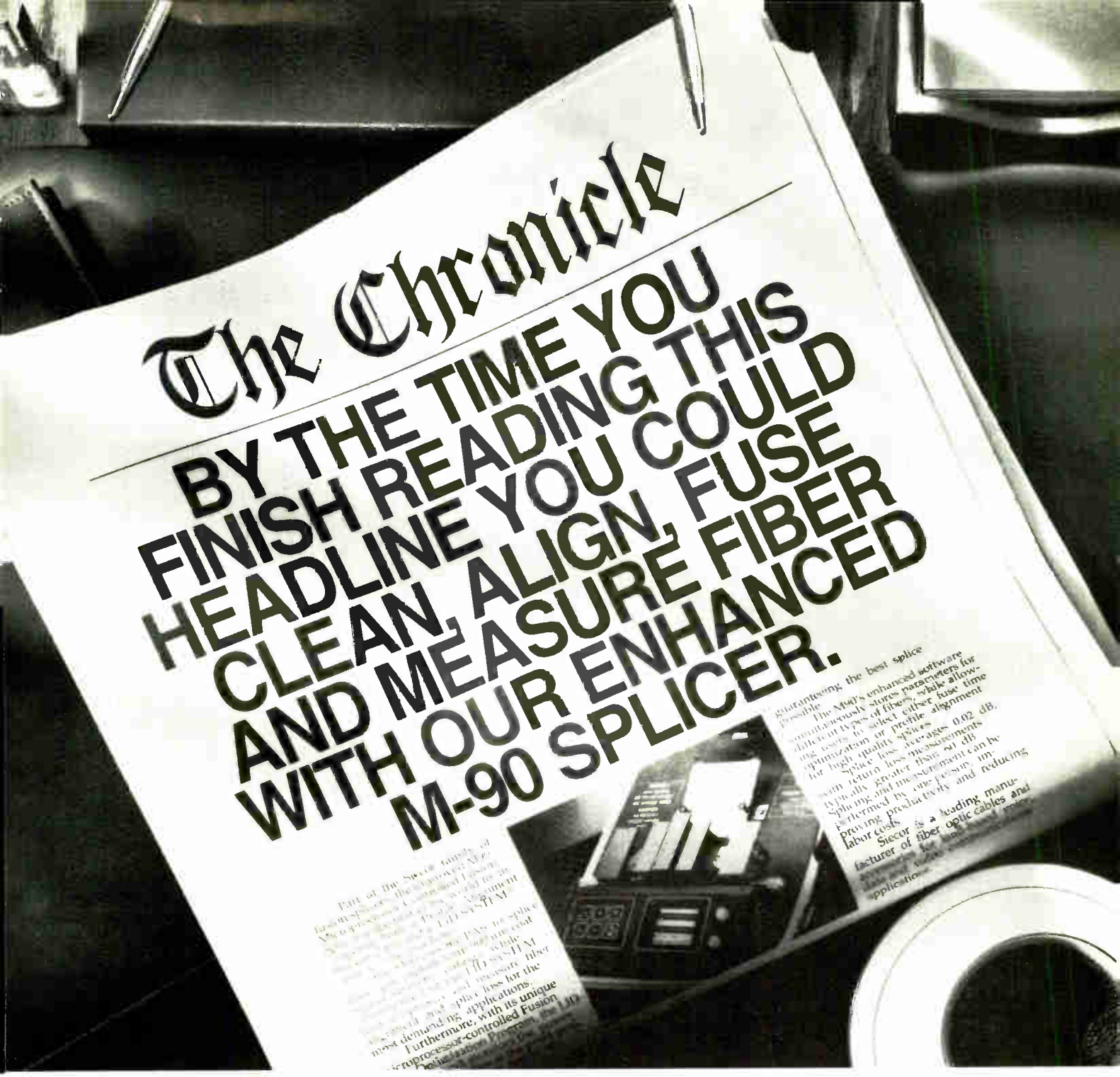
The service tech arrives, one or two days later, and determines that the problem is actually in the trunk. He now tells the subscriber that a line tech will have to run down the trunk to find and fix the problem.

A day or two later, the problem is fixed. How well did this subscriber think of his cable service? What will the reaction be to an outage?

Most of all, what will the be the opinion of the technical expertise of the system personnel, when it took three men and as much as a week to provide the services he was willing to purchase?

Conscientious management should consider the benefits a well-trained, adequately staffed technical group can provide.

What am I doing to help? Presently, not much. There is an age-related attitude in the industry that results in the loss of a



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FEEDBACK

great deal of experience.

For example, a representative of a leading "head hunter" firm recently stated: "We have been told, 'don't send me a resume of anyone over 45 years of age.' " The result, in my case, is 37 years of training and experience which is being underutilized.

Further, the chairman of a top 50 MSO once told me, "If you are over 40, you're not wanted. The industry wants to consider employing (those they can employ) for 20 years."

This is what I can recommend to management:

The attitude of management toward the technical people is as old as the cable industry.

✔ Employ the "older technical worker," because in doing so you will obtain the benefit of experience. "If youth but knew what age could tell..."

✔ Commit to training. Set time aside for that purpose alone.

✔ Hire a training manager to develop and present a curriculum that meets the needs of the company and the staff.

✔ Examine policies and attitudes that engendered the gripes of "no recognition/respect," "gripes with management" and "no support" cited in the article.

✔ Treat a technical person as both an equal and a co-manager, not a subordinate.

This is what I recommend to the top technical person:

✔ Train your subordinates to handle their own problems. You can't and shouldn't be all things to all people.

✔ Take your time off. Both you and your company will benefit. You'll probably learn that the staff can carry on without you.

✔ Learn all you can that will help you with your job. Knowledge is the one thing you get to keep as you change jobs or otherwise advance.

✔ Work with management to prepare a budget that reflects the needs for adequate staff, equipment and training.

So many of the gripes mentioned in the article echo through the years that I feel compelled to speak up, if it is only to say that your research unearthed nothing particularly new.

Thanks for accepting this and keep on publishing an excellent magazine.

Sincerely yours,

Richard A. Hood
Ballwin, Mo.

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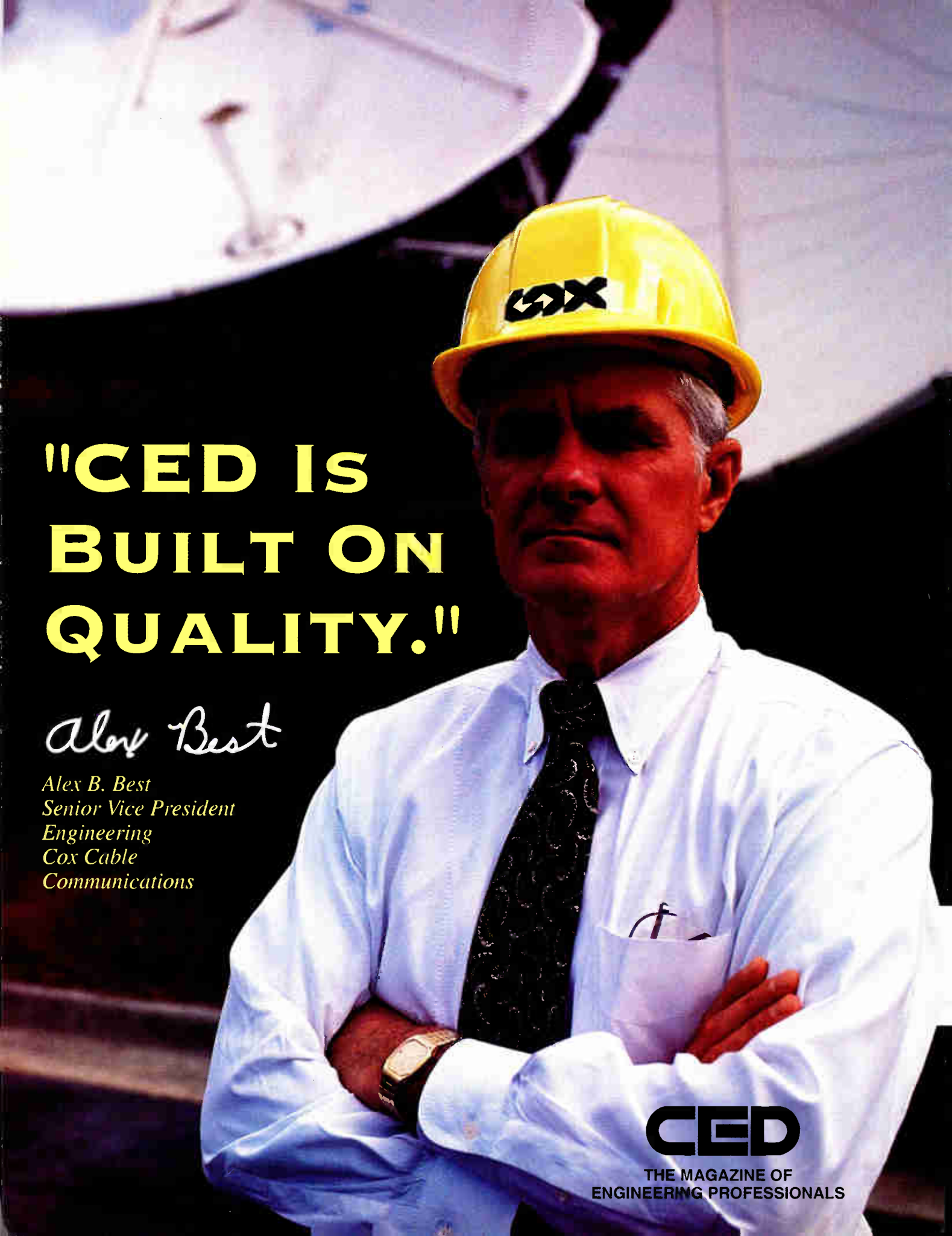
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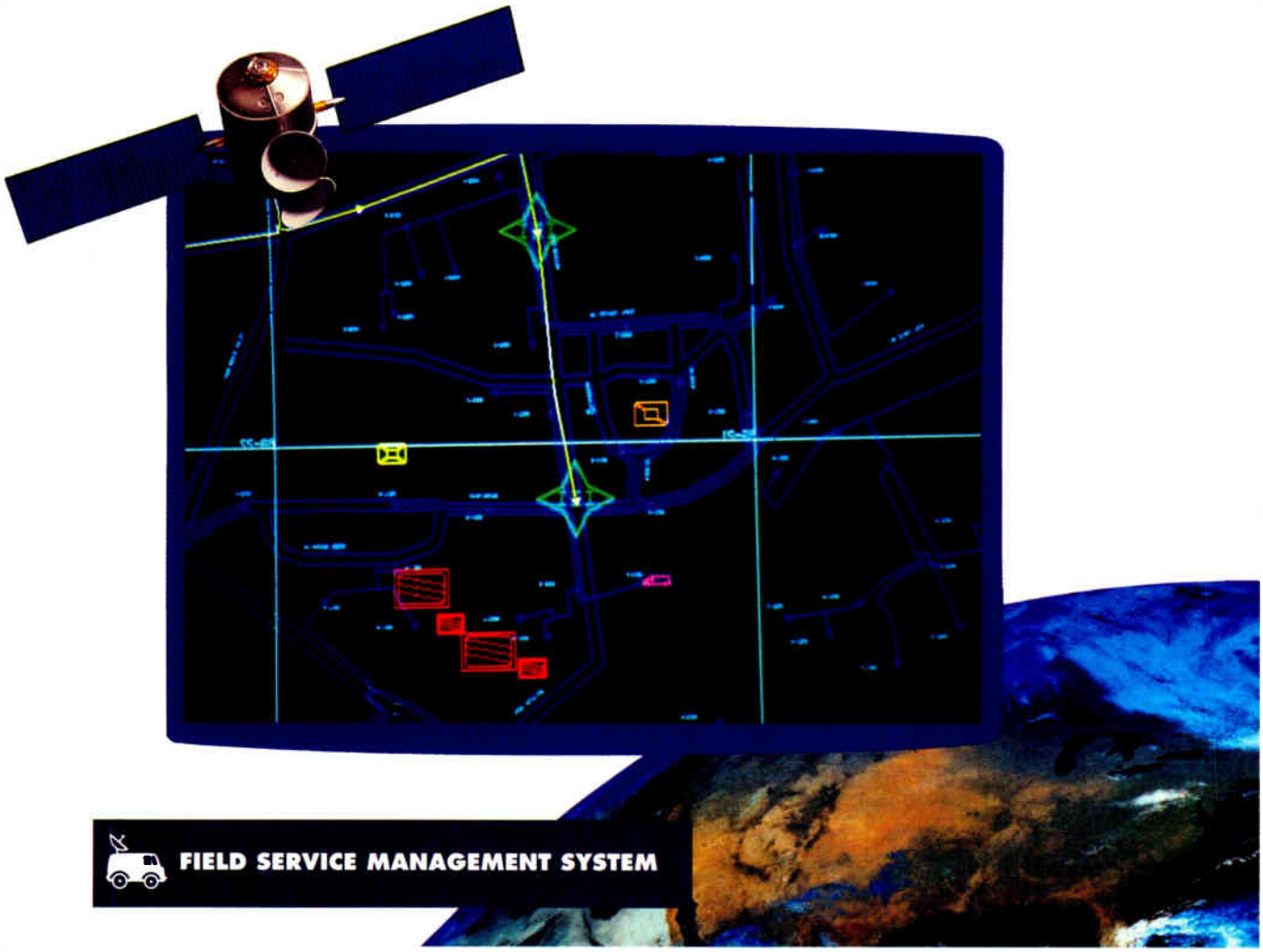

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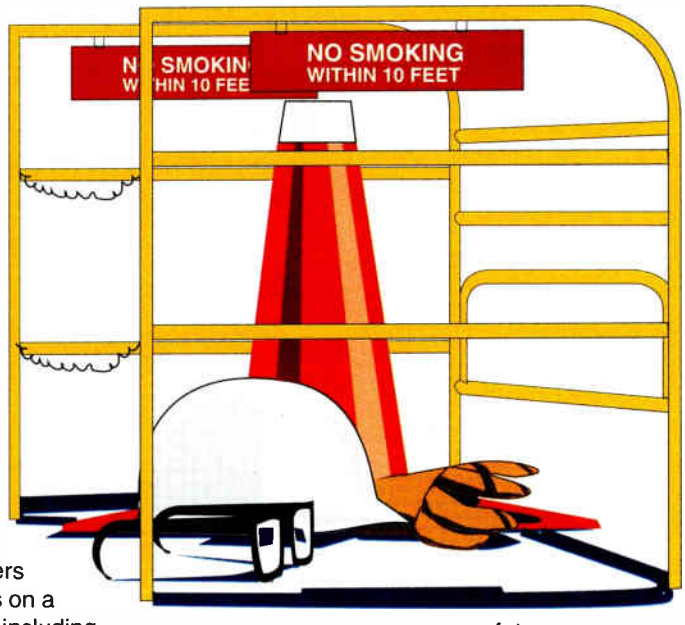
Safety issues: A tough sell to management types

By Roger Brown, CED



If you think selling a rate increase to your local city council is tough duty, try selling a safety program to your general manager–it might be the toughest sell of all. That was the message that emerged from Safety '93, a two-day conference held in suburban Washington, D.C. last month and hosted by MultiChannel CommPerspectives.

About 50 safety managers from cable systems and headquarters locations were given tips on a wide variety of subjects, including starting a program from scratch, improving existing programs, new OSHA regulations and how to get better participation. But heavy emphasis was placed on determining the value of a safety program and methods to "sell" a program to system employees and managers. The conclusion was that the effectiveness of a safety program is directly related to the level of support a program is given from top-level management.

A case in point is Delmarva Power & Light Co., provider of gas and electric service to Delaware, Maryland and Virginia, and a company with an enviable safety record.

Things weren't always that way, according to Olan Mills, DP&L's safety supervisor. Prior to the arrival of DP&L's present CEO, "we were seriously injuring or killing someone at the rate of about one every two years," admitted Mills. The new CEO brought a new philosophy–that every accident is preventable–and instilled that attitude from the top down.

After instituting a new program, one that strived for zero accidents, DP&L saw almost immediate results. In 1980, the company suffered 200 reportable accidents, 25 lost time accidents and one fatality among its 2,800 employees. In 1983, those numbers were slashed in half.

The key ingredients of a successful safety program, according to Mills, include management commitment, a written mission statement, safety philosophy, employee/team involvement and specific rules and procedures.

As an incentive, DP&L tied monetary bonuses to its safety record. Mills said this led to some initial revolt as some employees complained they couldn't be responsible for the safety of someone nowhere near them. But over time, the employees have indeed bought into the program.

In fact, to have the most effect, a company should develop the employee and a safety attitude. This is most effectively done by groups, said Mills. But a good safety program needs a "Safety champion"–someone who sets an example, trains the employees and performs periodic reviews.

Some cable companies are apparently getting the safety message. Tele-Communications Inc., the largest MSO, hired a corporate safety manager about a year ago. Although the program is really just getting underway, the company tapped a seasoned pro in Ray Lehr, a certified safety professional with more than 20 years of safety administration experience in a number of industries.

Lehr emphasized that the cable industry's struggles with safety are no different than those experienced by other industries. But it takes time and effort to develop a successful program.–perhaps as many as seven years before all aspects of the program pay off, he said.

Proper management of a safety program is important, said Lehr. His five-step process includes:

✔ Identification of key activities that must be included in such a program (management commitment, worksite analysis, hazard prevention and control, and safety training)

✔ Setting standards for the above activities

✔ Measuring the standards ("what is not measured cannot be evaluated," said Lehr)

✔ Evaluating the success or failure of the standards

✔ Commendation when goals are met, correction when they're not.

Proposing a safety program to system or corporate managers "is a sales job," said Jim Hurley, manager of safety and training at TKR Cable. As such, the person responsible for developing an effective safety program must understand that the program must be "sold" to managers just as anything else is–with heavy emphasis on the amount of money that can be saved over time via a safe workforce.

Mike O'Connell and Gena Fowler of Despot Nelson & Company Insurance Brokers joined Hurley in a presentation of methods to sell a safety program to managers and colleagues.

Managers want to know how a program can save money. Access to information about the cost of insurance and hidden productivity costs (the hidden costs associated with every accident usually result in a cost 400 percent higher than the apparent cost) are often provided by insurers.

You'll need a different plan to get colleagues to buy in, however. Fowler and O'Connell said supervisors and front-line employees are motivated by different factors, including health and well-being, pride and self-esteem, productivity (which often translates to money) and job security. They typically have a "what's in it for me" attitude–until one of them doesn't get home that night because of an accident.

One MSO recently developed a plan and presented it to the company's chief financial officer, took his input and combined it with input from regional and divisional managers and combined it to re-write the safety program and goals. In 18 months, accident rates fell 51 percent. The company is now auditing and adjusting the program to maximize its effectiveness, said Fowler. CED

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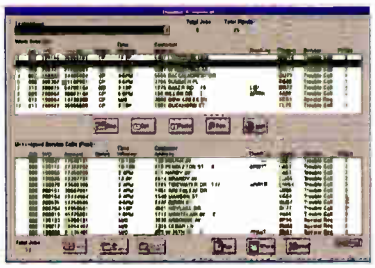

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Continued from page 31

interconnected networks that cover entire regions–not just a portion of town. Although the company is mum about it, TCI is known to be testing telecommuting, high-speed data transfer, medical imaging and other new services, in addition to its well-publicized trails of video on demand and cellular telephony over cable.

Time Warner's plans

Time Warner Cable is also spending heavily, primarily on installing fiber. The company plans to upgrade between 80 percent and 90 percent of its systems over the next three to four years, said Mike Hayashi, vice president of advanced engineering. The upgrades consist of fiber-rich topologies that bring fiber to nodes serving 500 homes, on average.

Time Warner is focused now on upgrading its Orlando, Fla. network to what it calls the Full Service Network, a real-time interactive switched network capable of delivering video-on-demand, picture phone and virtually any type of multimedia entertainment and information service.

Although Orlando is presently the only location where the complete FSN architecture will be deployed, Time Warner Cable executives expect to eventually have several FSN locations.

Jones Intercable

In spite of the new regulations, Jones Intercable plans to proceed with several "major rebuilds" it has in the works, including Alexandria, Va., Independence, Mo., Albuquerque, N.M. and others that haven't yet been disclosed, said Chris Bowick, group vice president of technology.

"We're trying our best to swallow hard and go ahead with our projects," said Bowick. "Glenn (Jones) is not shying away from spending the money. We'll get it done."

In fact, Jones is gearing up for what could be its largest capital expenditures next year, said Bowick. In Alexandria and Independence, among other locations, Jones is constructing 750 MHz platforms with fiber optic nodes serving 2,000 homes (with enough fiber installed to migrate to 500-home nodes). A ring infrastructure will be included in Alexandria, allowing Jones to compete with Bell Atlantic for telephony customers "right in its own backyard," said Bowick.

In addition, Jones is preparing to start construction of its franchise in Leeds in the United Kingdom. According to Bowick, that build will easily be the largest ever undertaken by Jones.

In Chicago, Jones will offer its subscribers a connection to Internet. The MSO is also eyeing the Windy City for deployment of multimedia services and video servers to deploy a "regional hub-like scenario" for video on demand, Bowick added. Telephony trials, including residential telephony, may also be part of the mix. That would put Jones in competition with Ameritech in its backyard.

Continental is equally determined to spend the money that's necessary to upgrade its network to fiber-rich topologies designed to service pockets of 2,000 homes passed. Even though "re-regulation makes it hard to invest in the cable plant" because the reduction in revenue affects borrowing power, "we are determined not to let it get int he way of the spending we need to do, especially in face of competition" like DBS, MMDS and the like, said David Fellows, senior vice president of engineering and technology at Continental.

Continental recently finished a two-year process of restructuring its debt that now gives the MSO more leverage. "We are now in a position to spend money on our infrastructure," Fellows said.

Specifically, Continental plans to boost the amount of bandwidth available through plant upgrades and fiber deployment that allows frequency re-use. Right

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now, 70 percent of all Continental subscribers are fed 54 channels or more and 52 percent live in addressable systems. Within 5 years, Continental will boost the bandwidth to at least 550 MHz. In metropolitan areas, 750 MHz deployment is being "seriously considered," said Fellows.

The little guys

But other operators–especially the smaller ones–may not be so fortunate. According to a story that appeared in the July 12 issue of *Multichannel News*, executives from such operators as Falcon Cable TV, Bresnan Communications, Coaxial Communications and others noted that re-regulation was at least causing a pause in their construction plans. Although those operators stopped short of saying they were halting spending, clearly the trend was toward a delay.

This development couldn't come at a worse time, many believe. The next few years could be critical as competition in the form of DBS, MMDS, telcos and others begin to take shape.

Corning and Scientific-Atlanta filed a petition with the Federal Communications Commission requesting reconsideration of the benchmark/price cap requirement because it makes no provision for operators to recoup capital costs related to network upgrades to advanced technology.

"It's possible that cable TV operators may have little alternative but to cut back dramatically on what had been a rapidly growing investment in fiber optics and other advanced technologies," wrote Kathy Rauch, Corning's cable TV market manager, in a letter to *CED*. "Although the cable TV industry has only been deploying optical fiber in volume for approximately four years, it sets the pace in U.S. fiber deployment."

Operators have rebuilt their balance sheets to afford network changes

To determine how the regulations might affect a "typical" cable system, Corning and S-A commissioned a financial impact study by Deloitte & Touche. The study examined three operators and the effects it would have had if the regulations went into effect in 1990. The model showed a generation of a negative $10 million in funds available for network upgrades.

Apparently, the larger MSOs, at least, are willing to trade the financial hit for a chance to garner new revenues from new services–as well as be a national player in data, voice and video delivery. "Our astute customers see a quantum change coming in the marketplace caused by the introduction of DBS, MMDS and video dialtone services," said Any Devereaux, vice president of strategic planning at General Instrument-Jerrold. "These (competitive) forces have our customers energized."

Has re-regulation affected those plans? In some cases, yes, but other operators have "rebuilt their balance sheets" so they can afford to make the necessary changes to their infrastructures, said Devereaux. Others remain too leveraged financially to make that commitment.

For those able to make the investment, the first step toward competing with telcos and Hughes is to improve the network, he said. "Many (systems) are going to 500-home nodes from 2,500-home nodes in order to provide on-demand services and telephony."

The pace of construction is so high, Devereaux said it may be difficult to find a designer or turnkey construction company that can carry out the system rebuild. If that is true (and indeed, it seems to be–see sidebar story for more detail) it could push the operators' construction plans out even longer.

Devereaux said Jerrold has already experienced a significant increase in orders for its new on-screen and impulse ordering set-tops, a trend which should remain even when digital boxes are rolled out beginning next year. In response, GI has increased its production of set-tops by 15 percent to 20 percent per month for the past few months, he said.

Jerrold should also enjoy large orders for fiber optic systems for at least the next two years as operators rebuild those systems, said Dave Robinson, director of new media business at Jerrold. "The industry is harnessing the full capability of those networks cost-effectively," he said.

General Instrument's announced sales figures certainly back up those statements. GI's second quarter sales were up 20 percent over 1992 levels, to $312 million, according to the company's latest financial statement. "The underlying strength of our core business continues to provide a strong platform for GI's participation in the coming cable TV industry transition from analog to digital technology, and from entertainment video to interactive multimedia," said Donald Rumsfeld, GI's former CEO.

Scientific-Atlanta's sales jumped 9 percent to $188 million, during its fourth

Continued on page 40

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Construction companies facing a major boom

By Leslie Ellis

Executives with construction turnkey companies across the nation are whistling a happy tune these days. Unanimously, business is up–way up–in exponential proportions.

"There's more work to be done than we can handle," says Dale Lutz, president of Engineering Technologies Group, a Denver-based design firm.

"How do you handle it when the phone rings and within seconds, your staffing needs double–literally?" agrees Bernie Czarnecki, president of Cablemasters Corp., a design and construction firm in Erie, Pa.

"I've not seen a construction explosion like this during my time here, which is 10 years now,"Czarnecki continues.

What's more is, construction vendors agree that there's no end in sight–or at least not through the decade.

"We're backed up until at least December, and will be busy well into '94," ETG's Lutz says.

This marks a sharp contrast from the late 1980s, Lutz says. "In 1989, things were slow–*real* slow." It wasn't until the middle of 1991 when things started to pick up again, Lutz says. "Now, everybody's in a hurry to get things designed."

Jesse Hill, president of Rocky Mountain Fiber Plus, agrees. "We're approaching the last quarter crunch and there's no light at the end of the tunnel, in terms of any kind of slowdown," Hill says. "For the first time in 14 years, we're in a position of actually turning business away. I never thought I'd see it happen, because usually there's a lull around the last two months of the year and the first two months of the next year."

ETG's Lutz says he is also in a position to turn business away–reluctantly.

When will the craziness end? Not anytime soon, according to the construction folks. Hill says indications from his design and engineering

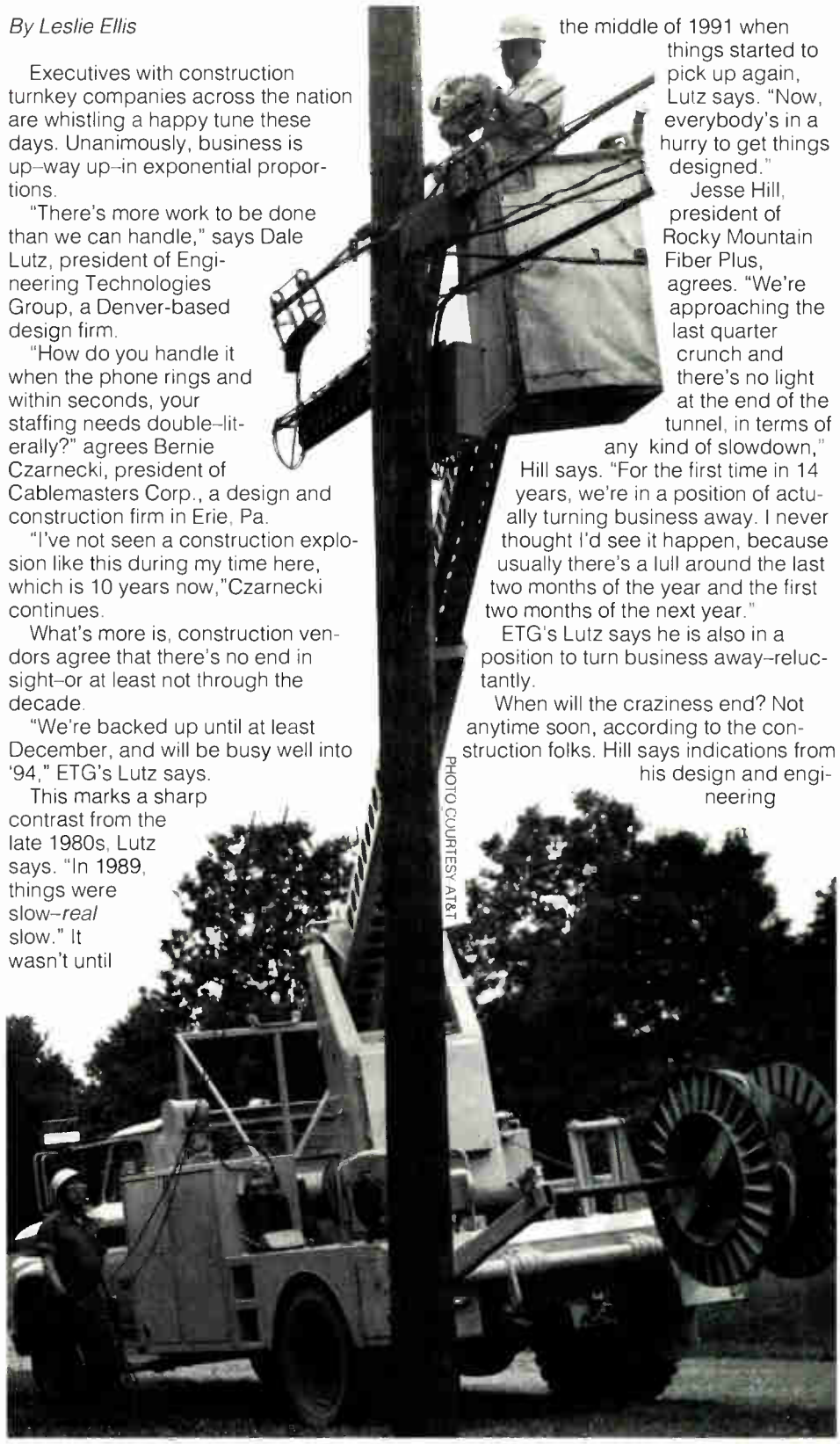


PHOTO COURTESY AT&T

departments point to a frenetic pace throughout 1994. "We don't see any lull in sight. It's my guess that we'll roll right through the next year."

Czarnecki also predicts continued strong trends through the mid-1990s. "I just don't see it letting up," Czarnecki says. "It kind of makes one wonder what's feeding the beast. Obviously, competition plays a role. But what are the other factors?"

What's causing the boom?

One may be TCI's announcement earlier this year to implement a $2 billion upgrade program over the next four years. While most construction firms are wary to discuss what percentage of their windfalls come from the cable giant, TCI's plans alone have to be a major contributor. The company will spend in the neighborhood of $750 million for completion of its 7,000 (strand) mile, 250 city upgrade to its "infostructure" topology–and that's just the 1993 plan.

Telco projects are also edging onto the construction plate, although at a slower pace, most construction company officials agree. "We're doing some U.K. jobs for (a telco), but not much else," Lutz says.

Staffing is currently the major logjam for construction turnkey companies.

Most construction company executives agree that there are no regional "hot spots" for design, rebuild and construction activity. Instead, the entire U.S. is ripe with design and construction opportunities. "It's exploding all over the nation," Lutz says, adding that solicitations are also coming in from South America and the Pacific Rim: "I've fielded more international calls just this week than I have during this whole year."

Not surprisingly, requests for system upgrades and rebuilds vary widely, but Czarnecki says he's seeing more and more of an appetite for 110-channel capacity. "Operators seem to be building to 550 MHz and 750 MHz, mostly. I've also seen some building to 550 MHz and spacing it all out to 750 MHz," Czarnecki explains.

The bad news

That's the up side. The down side is, cable operators are finding themselves hogtied on short-order rebuild or construction projects. "I just had to turn down a 300-mile project outside Pittsburgh," Lutz laments. "They needed it done in 30 days. I had to tell them there was just no way."

Lutz says ETG's current project load indicates an end-of-year leadtime, noting that some jobs will conclude in December. "In some instances, we can squeeze in 200 to 300 mile projects, but the big ones of 1,000 or more miles have to be planned early," Lutz explains.

"Lead time is so critical right now," Czarnecki says. "I'd say we're at least 90 days out. But, with pre-planning, it would be much easier to ramp-up for staff increases in anticipation of an upcoming project."

Unquestionably, staffing is currently the major bottleneck for construction contractor expansion. In the construction business, labor is the name of the game–and the pool is getting smaller and smaller. "It's a designer's market. If you're a designer, chances are you're not looking for a job right now," Lutz says.

Cablemasters' Czarnecki agrees. "Labor is getting increasingly hard to find–especially lineman, splicers and foremen."

Hill notes that he's implemented an in-house training program to keep his staffers knowledgeable. "System operators don't want their systems used as training grounds, and that's completely understandable," Hill says. "However, with the labor market the way it is now–tight–we're committed to heavy in-house training. It's absolutely key to this crazy pace."

Plan now

So what is a cable operator to do when pinched for time on a necessary rebuild or upgrade? Either continue smiling and dialing and waiting to hear a "yes, we can do it," or wait seems to be the resounding answer from today's tapped-out construction firms.

Lead time is critical in project planning; most firms foresee a 90-day minimum.

Going forward, though, Czarnecki believes a briefing with preferred construction companies about upcoming plans–both short- and long-range–may work best. "The whole process would work a whole lot more efficiently that way, " Czarnecki says. CED

Continued from page 36

quarter, while bookings jumped 33 percent. For the entire 1993 fiscal year, sales at S-A surged 26 percent over 1992., even though the company is reporting some spending reticence by operators concerned about the effects of re-regulation.

And C-COR Electronics announced a sales increase of nearly 7 percent over 1992 levels, which was lower than the company forecast because of lower than anticipated international sales as well as domestic re-regulation and architecture changes. "Looking ahead, we see a dynamic cable television industry for upgrades and rebuilds in the U.S.," said CEO Richard Perry. "We anticipate . . . record revenues for C-COR in fiscal year 1994."

That thought is borne out by others as well. "The top 5 MSOs will be spending record amounts on fiber and coaxial cable next year," said Chris Huffman, marketing research manager at Comm/Scope. "It's amazing."

Although the amount of trunk cable sold falls each year, it is more than supported by increases in drop and feeder plant. Operators are buying more feeder for their rebuilds because of tougher FCC technical standards, the need for more bandwidth and the provision of more services.

"Outside the top 20 MSOs, no one is spending anything. The big players are the ones holding the vendors afloat," said Huffman.

A fast game

Does that mean we're headed for a future where only the large, urban systems will be able to afford to purchase and implement the technology that opens the door to new technology? Maybe.

"I believes the have-nots will merge into to the haves," said Devereaux. "I've already heard merger rumors." He added that he thinks merger mania will come about quickly, perhaps beginning in the next six months. "This has become a very fast game."

Others aren't so sure. Both Hayashi of Time Warner and Bob Luff of Scientific-Atlanta remember similar comments during the advent of satellite communications and fiber optics. Instead of smaller operators dying off, they either grew or simply caught up later.

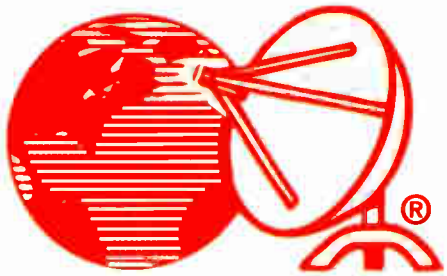
"Look back to 1980," said Hayashi. Several MSOs that were among the top 10 no longer exist, while some that were smaller players have since grown into large operators with sub counts in the millions. S-A's Luff agrees: "If it's an economically valuable technology, it hardly matters (who's first). You move to maximize your revenues," he said.

Luff said S-A is experiencing some reticence about spending from some operators, but noted that fiber optic gear and set-top sales continue to be strong. In addition, he said S-A's digital storage and retrieval system for ad insertion is gaining a lot of attention because that's one revenue stream that is unregulated–and it's enjoying double-digit growth.

S-A is also being buoyed by US West Communications, which selected S-A to provide digital video compression equipment and interdiction gear for its service area-wide upgrade to a broadband network capable of delivering voice, data and video. The initial system is slated for testing in Omaha beginning next year.

Perhaps C-COR's Perry summed it up best in a recent statement. "The activity level at C-COR is high," he said. "We are quoting more jobs than ever. However, many buying decisions are being delayed due primarily to two industry factors: FCC re-regulation and changes in network architectures."

But that may not be enough. Operators who cannot afford network upgrades may hinder a regional effort to roll out new services like Internet. "Small operators *have* to figure out a way to do it," Fellows said. "Otherwise, Bell Atlantic will put 'em out of business." CED



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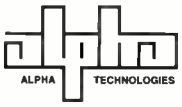

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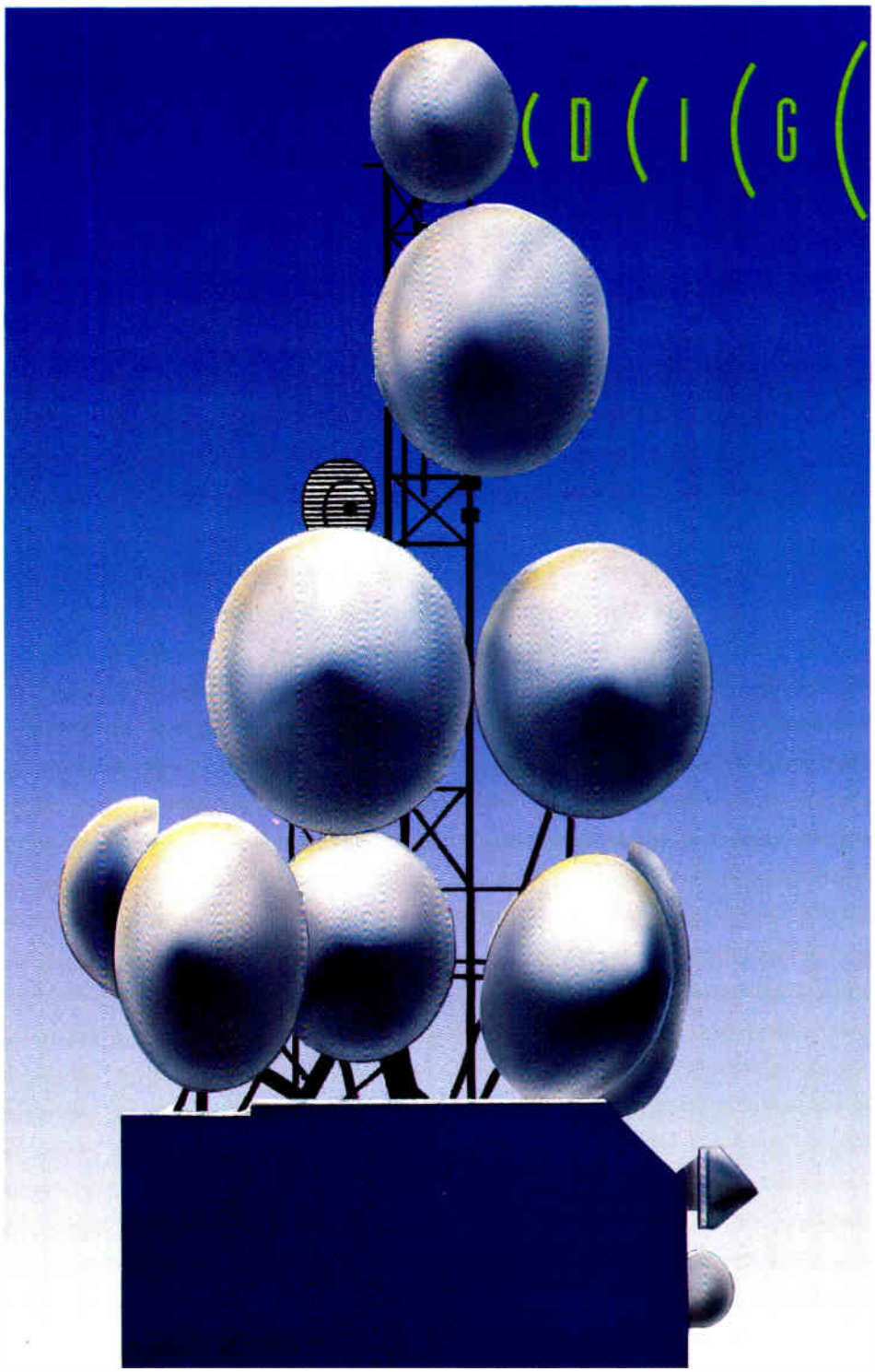

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Cashing in on video-conferencing

How to get in and win

By Douglas M. Robertson, VP/sales and marketing and J. Rowan Carroll, VP/operations, VideoBooth Inc.

Until recently the cable television industry has experienced double-digit annual growth, but cable companies will be hard pressed to maintain similar growth rates in the future. (See Figure 1) Recent re-regulation has curtailed growth potential in basic services.

As a result, cable companies must raise market penetration, which certainly has its limits, or pursue non-regulated markets such as pay-per-view or develop new services. Additional factors including cash or payments-in-kind for TV transmission have saddled cable companies with other cost pressures.

With 60 million of the nation's 100 million homes subscribing to cable, cable television (CATV) providers have a captive audience and ready infrastructure for future services. Furthermore, the existing cable infrastructures are in place at a competitive price and present an opportunity for immediate revenue from digital voice, data, video and other application-type services.

Cable companies will be hard-pressed to maintain double digit growth in the future.

Cable companies eager to offer new services can now go head-to-head with phone companies in the emerging interactive and multimedia markets.

What are these other , emerging services, and how much are they worth? VideoBooth and other analysts project a $100+ billion market for interactive video technologies such as home shopping, home video-on-demand, telecommuting/telecomputing, and videoconferencing.

Grabbing market share will not be easy for the cable TV companies as competitors emerge from the telephone, computer, software, broadcast TV, publishing, entertainment and information services industries.

In addition to these customer opportunities, demand for alternative local access is heating up. Long distance carriers (IXCs), who spend more than $25 billion on call completion to Bell Operating Companies (BOCs) and other local exchange carriers (LECs), are looking for lower access costs and more reliable networks. Cable companies, competitive access providers (CAPs), and wireless providers are jockeying for position in the $80 billion local exchange telephone market.

CATV/telco mergers

To capture these new opportunities, cable companies are spending billions to ally with BOCs

FIGURE 1
Annual revenue growth

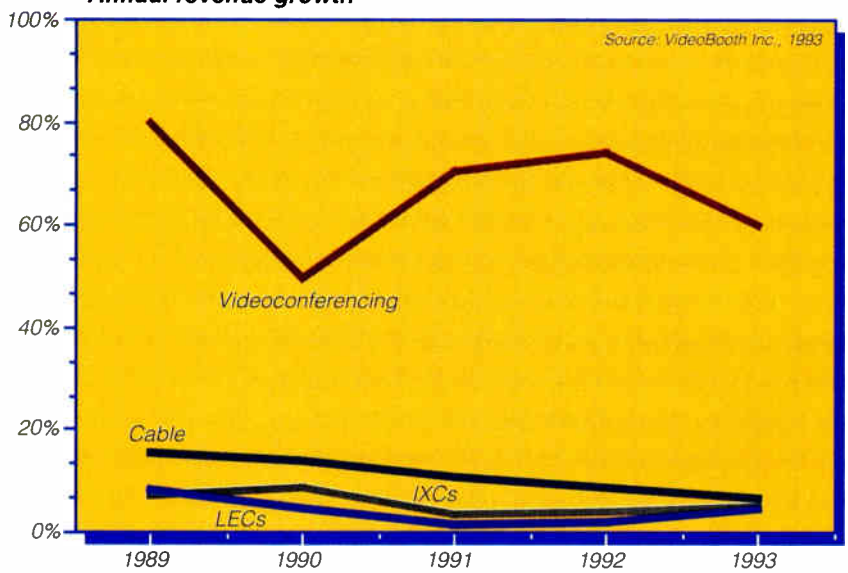
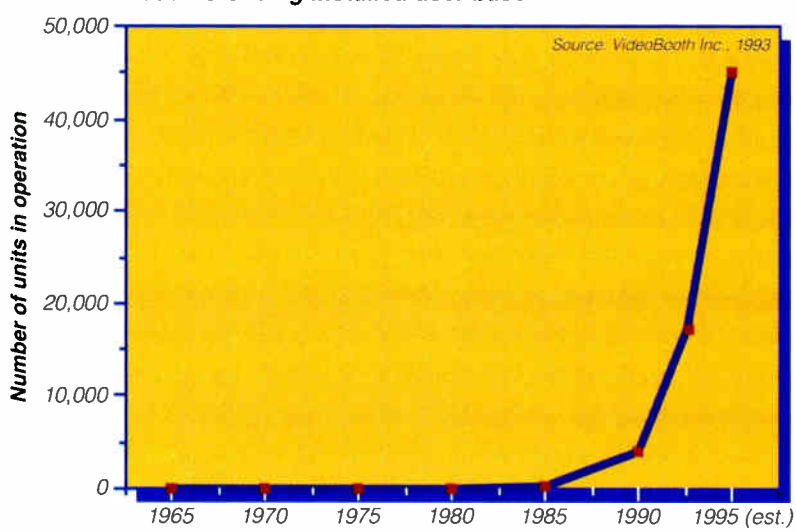


FIGURE 2
Videoconferencing installed user base



and other LECs, to upgrade their networks with fiber, and to invest in digital technology in order to reconfigure their networks for broadband offerings.

To attract customers, cable and telephony carriers must offer applications or total solutions by combining software or services with their hardware capabilities.

Mergers underway

Cable-telco mergers have already started. Four leading cable companies acquired Teleport Communications Group (TCG) in order to deliver telephony and data services over a state-of-the-art network.

Further, TCI and US West made headlines when they announced a $2.5 billion joint venture to build a super information highway. Most of these alliances involve the 50 largest cable operators , who account for almost 90 percent of the subscriber base.

Alliances with local exchange carriers and interexchange carriers will allow cable companies to leverage existing telephony skills at these carriers.

To attract customers, cable and telephony carriers must offer applications.

Currently, CATV operators cannot capitalize on their developing broadband networks unless they:

✔ change networks from one-way coaxial pipes to dependable, two-way switches with, obviously, return data capabilities

✔ enhance and improve their billing processes

✔ improve their network monitoring, telemetry and control and provisioning capabilities

✔ gain better control of their costs

✔ improve their responsiveness to customers.

Carriers can help them meet these challenges and offer them excellent market penetration in downtown business areas. Likewise, competitive access providers and other carriers can leverage existing cable infrastructure to capture lucrative access services in suburban business centers, which might not justify fiber optic buildouts.

The holy grail

The holy grail for interexchange carriers, local exchange carriers, competitive access providers and CATV companies is a completely fiber optic network, and most carriers and many cable providers are working toward this long-term goal.

Until that future date, carriers intend to provide services over existing copper, coaxial, fiber or hybrid networks. New technologies, such as Asymmetric Digital Subscriber Line (ADSL), high-bit-rate digital subscriber line (HDSL) and Integrated Services Digital Network (ISDN), use ordinary copper wires to transmit video-on-demand programs, which previously required coaxial cable at a minimum. These technologies, coupled with advances in digital compression, will increase channel capacity so more than 500 channels can be accessed by cable subscribers.

However, copper wires lose signal power easily and require expensive amplifiers; thus, optical fiber will provide clearer signals and fewer outages in addition to offering higher bandwidth.

As fiber is being added to existing coaxial plant, hybrid fiber/coax networks are emerging which allow for cost-efficient delivery of reliable advanced services. Carriers can now use synchronous optical network transmission (SONET), asynchronous transfer mode (ATM), and other advances in switching technology to

deliver new services at flexible bandwidths. In addition, intelligent convertor boxes and software-based cable programming boxes will stimulate interactive video.

As this technology becomes readily available and users understand its power, cable-delivered services to home residents, such as home shopping and video-on-demand, will generate significant network traffic.

Carriers will receive additional revenue from businesses, who will use LAN interconnects, image transfer, and videoconferencing services.

Other vendors in the computer industry will use the high-speed digital network to tap the huge market potential of software and data services.

The shifting political climate is accelerating infrastructure changes. Regulatory relaxation of the cable and telecommunications industry will allow cable-telco cross-ownership that will offer better services to the customer.

Highly visible support from the White House has advanced the development of an information superhighway to the top of the national agenda, paving the way for private development.

Video dial tone tests

Cable companies are already testing these new video services on existing cable networks. In Orlando, Florida, for example, Time-Warner will initiate video-on-demand to about 4,000 cable subscribers.

Utilizing a new, digital AT&T switch, Time-Warner can deliver information at speeds up to 20 gigabits per second. To support this fiber-to-the-serving-area strategy, information flow is fed to a node by optical fiber and then carried via coaxial cable to cells which deliver signals to between 500 and 2,500 homes and businesses. (See Figure 2.)

Joint venture: Liberty and Nynex

A joint venture between Liberty Cable of Manhattan and Nynex was among the first to propose video dialtone service, which began in June. In addition to 160-channel access, subscribers can access video-on-demand services such as movies, special programming, videoconferencing and information services.

Cable companies are already testing new video services on existing cable systems.

More recently, Time-Warner Inc. announced its plan to offer telecommunications services in San Diego.

In the project, an optical fiber network will be built to connect local business customers to long distance carriers and link local customers together. Additional services, including high-speed data and image transfer, and videoconferencing will also be offered.

These initial trials are technology driven, but user acceptance of these new offerings will be the litmus test. Moreover, certain technologies such as videoconferencing, virtual reality, and interactive video games will need to achieve critical mass before usage becomes widespread.

Cable telephony in the UK

Telephony services combining optical fiber and cable networks are already beginning in the UK.

For example, companies such as General Cable, Cable London and Videotron Corporation are now providing voice services and other switched services to residential and business users

who in the past could only choose British Telecom.

Although BT still controls more than 90 percent of the total UK market for telephony services, its management has expressed concern regarding the capabilities of UK cable companies.

Clearly, significant joint ventures and backing from U. S. companies, including Cox Cable, TCI and US West in UK cable franchises has raised this uneasiness–and rightfully so.

U.K. market growing fast

Cable subscribers in the United Kingdom number only 500,000 homes today, but leading analysts forecast this market will grow more than 50 percent annually to reach 6 million homes by the year 2000. According to the UK's Cable Television Association (CTA), the number of cable telephony exchange lines has grown from 2,224 in 1991 to more than 150,000 lines in May 1993. Businesses and residential customers have cut their telephone costs by 10 percent to 25 percent by using cable telephony.

Telephony services combining optical fiber and cable networks are already underway in the U.K.

In addition, customers value itemized billing and responsiveness of these local telephony providers.

According to the U.K's Cable Television Association, for example, between 20 percent and 40 percent of all current cable subscribers are changing from British Telecom services to cable-provided telephony services.

The further installation of advanced cable networks could generate more than $1 billion British Sterling in telephony revenue by the year 2000.

User desire for alternative providers, technological advances, and the CATV provider's need to increase revenue are accelerating the development of these telephony services. By 1994, U.S. subscribers will have access to cable telephony services similar to those in the United Kingdom.

To date, more than 98 percent of local access telephony services in the U.S. are handled by the local exchange carriers, while less than 2 percent of the market goes to the alternate access providers.

With this $80 billion local exchange market growing at less than 2 percent a year, most of the revenue growth for new entrants, like competitive access providers and cable companies, will come at the expense of the local exchange carriers. Imagine the revenue impact of cable telephony in the United States if the capture rate was similar to that in the UK.

Cable's next market: Videoconferencing

With the merging of cable and telephony, cable companies are poised to participate in the spectacular growth of videoconferencing, the next wave in telecommunications.

Videoconferencing systems combine television monitors and cameras, special coder/decoders called codecs, and digital transmission services from telephony providers to provide fully interactive video and audio meetings for users. The dominant users of this new technology are businesses, but the prospect for interactive video in the home to date looks promising.

The introduction of lower-cost tabletop and desktop units promises to accelerate acceptance in the business and residential markets. More than 2,000 companies turn to videoconferencing to improve

communication, lower travel costs (while simultaneously providing environmental benefits via a reduction in travel-related smog), increase productivity, enhance customer-vendor relations and eliminate the time delay in critical decision-making.

According to VideoBooth studies, the industry revenues for equipment, transmission and services are growing at more than 60 percent per year and the market for transmission revenue will exceed $1 billion by 1995. The introduction of videoconferencing to 30 million video-ready PCs in use could increase this projection significantly.

Study: User growth strong

In early 1993, for example, VideoBooth Inc. conducted a survey of 140 current videoconferencing users. These primarily U.S.-based companies have nearly 1,500 sites, representing about 10 percent of the worldwide installed base. This study addressed equipment choice, usage patterns, call patterns, network choice and highlights key market trends and critical success factors in the videoconference market.

Of particular interest to carriers, competitive access providers and cable companies are the usage levels which for the heavy users exceed more than 60 hours per month per system and represent significant opportunities for transmission revenue.

The implications are also of importance to those companies offering and installing services including LAN interconnect, Metropolitan Area Networks (MAN), and Wide Area Networks (WAN).

Videoconferencing has already proved in for a national distribution company.

One user example involves a multi-billion dollar national distribution company, which turned to videoconferencing in the summer of 1992 to link one its divisional headquarters to its corporate Management Information Systems group 20 miles away. Two single monitor PictureTel 4000, model 400 systems were configured for the both company's private network at 384 kbps and for the public switched network with 112 kbps access. The company uses videoconferencing to make time-critical decisions about a systems development effort and to conduct internal training to divisional MIS personnel.

In previous system development efforts, corporate MIS professionals found themselves spending too much time traveling between sites and turned to videoconferencing to speed information sharing on an as-needed basis to meet aggressive project deadlines and make key executive decisions.

Awareness breeds new users

As awareness of videoconferencing's capabilities and benefits grew, new users from other divisions began to use the system to link company employees through a public room network with company distribution centers and with the company's suppliers.

The company's usage of more than 30 hours per site per month is split equally between speeds of 112 kbps and 384 kbps. With the planned addition of 10 more systems and a multi-point bridge in 1993, monthly usage is expected to grow systemwide to more than 350 hours per month.

Advances in video compression technology, increases in the availability of digital networks, and the adoption of an international standard, combined with business pressures, have spurred videoconferencing growth, but obstacles still remain.

Obstacles still remain in videoconferencing, including equipment interoperability.

Equipment from leading vendors still does not interoperate at the highest performance levels. Users want dial-up capabilities from network providers and seamless communications for on- and off-net traffic.

Inter-organizational applications (company-to-company calling), improved equipment performance and more flexibility in network services (i.e., bridging and ISDN) are accelerating a movement toward public networks.

No clear leaders

While some network vendors already have entered the race, no one has emerged as a clear leader in videoconferencing services. Interexchange carriers will transport the bulk of long-distance traffic, but they cannot provide the local access portion.

Local exchange companies have the inside track for local access revenue, but they have become a bottleneck in terms of delivering flexible, timely and trouble-free services to customers. Opportunities thus exist for lower cost alternate access providers such as CAPs and CATVs, as long as they meet customers' service expectations.

In addition to rapid broadband optical fiber deployment and a growing knowledge of telephony, many CATV providers have videoconferencing systems in place. Several cable companies utilize videoconferencing regularly to review operating results with regional offices and subsidiaries.

Cable involvement

One major cable company with an expensive multi-point control unit soon will provide multi-point bridging services to its customers at a much lower cost than its major competitors. Although a key focus for cable companies is improving their networks, they will leverage existing networks in creative ways to generate additional revenues.

To manage these new service and product offerings effectively, cable entrants will have to establish clear customer-focused policies. In addition, sales and support staff must be trained in solution and application selling, instead of the much different subscription sales approach. Fortunately for the CATV provider, the adjustment should be faster than for BOC LEC staffs, many of whom are struggling with the concept of competition.

New service providers must overcome network integration and coordination issues in offering interactive services like videoconferencing. They also must cope with the harsh realities of increased competition, as overcapacity in the local access market results from the rollout of more powerful networks. Those who succeed must be nimble and quick as they re-engineer their corporation for the 1990s.

One result seems clear; this challenge and the perceived urgency in getting to market will drive CATV providers into alliances with interexchange carriers, local exchange carriers and competitive access providers. CED

Preparing for not-carried local TV stations

Sifting through A/B switches

Television set antenna terminals	Off-air antenna lead-in type			
	Outside antenna			Indoor antenna
	Separate flat twinleads	Combined single flat twinlead	Combined round (coaxial) lead	
Single coaxial connector	7	6	5	15
Coaxial VHF, screw terminal UHF connectors	8	2	3	16
Separate screw terminal connectors for VHF and UHF	13	1	4	14

TABLE 1
When not-carried stations are either VHF or both VHF and UHF

Television set antenna terminals	Off-air antenna lead-in type		
	Outside antenna		Indoor antenna
	flat twinleads	round (coaxial) lead	
Single coaxial connector	6	5	19
Coaxial VHF, screw terminal UHF connectors	9	11	17
Separate screw terminal connectors for VHF and UHF	12	10	18

TABLE 2
When not-carried stations are only UHF

By David J. Large, Director of Engineering, InterMedia Partners

Your general manager has just informed you that the system is dropping one of the local network affiliate stations. What now?

The 1992 Cable Act created a new right for television stations: retransmission consent. Under the Act, all stations (except superstations) have the right to deny cable operators permission to use their signals and/or to negotiate a payment for their use. Stations meeting certain signal level requirements may elect must-carry as an alternative, in which case they lose the right to negotiate a fee for carriage. On the other hand, making room for must-carry stations may force operators to drop other non-must-carry broadcasters that are popular with subscribers.

Some major players in both the cable and broadcast industries have taken relatively hard positions with regard to retransmission payments. Under this new scenario, it seems probable that some systems will fail to reach an agreement with all the stations demanding a fee for carriage and, therefore, will drop some stations they previously carried. Operators need to prepare to assist customers with receiving those signals using antennas and selector switches. Keep in mind that our customers did not do this to us and it is essential to be as customer-friendly as possible under what will be difficult circumstances.

Adding a selector switch is not as simple as it sounds. Consider that:

✔ Customers may have a variety of leads from existing antennas (combined or separate VHF and UHF leads, coaxial or twinlead).

✔ Television sets may have a variety of antenna terminals (one combined coaxial terminal, coaxial VHF and screw terminals for UHF, or separate screw terminals for VHF and UHF).

✔ The station(s) not carried might be VHF, UHF or both.

✔ Customers may or may not have a VCR and/or convertor.

✔ VCRs have another whole variety of VHF and UHF terminals.

The possible permutations are many!

Collected on the following pages are diagrams of hookups for some of the more common situations and a selection guide to use in choosing the best one. The diagrams include Radio Shack part numbers for the required hardware, although they are not identified as such. These can be deleted if systems wish to furnish the hardware themselves, or included if they want to trust customers to buy their own accessories. The selected A/B switch does meet the FCC Part 15 isolation requirements for an antenna selector switch.

A suggestion: **Unless you want your customers to go screaming out of the lobby, never to be heard from again, don't just hand them the selection guide and a book of diagrams.**

A more customer-friendly approach is as follows:

✔ Train your technicians and CSRs on the enclosed materials.

✔ Help the customer select the proper diagram.

✔ Supply only the selected diagram and an enclosed note.

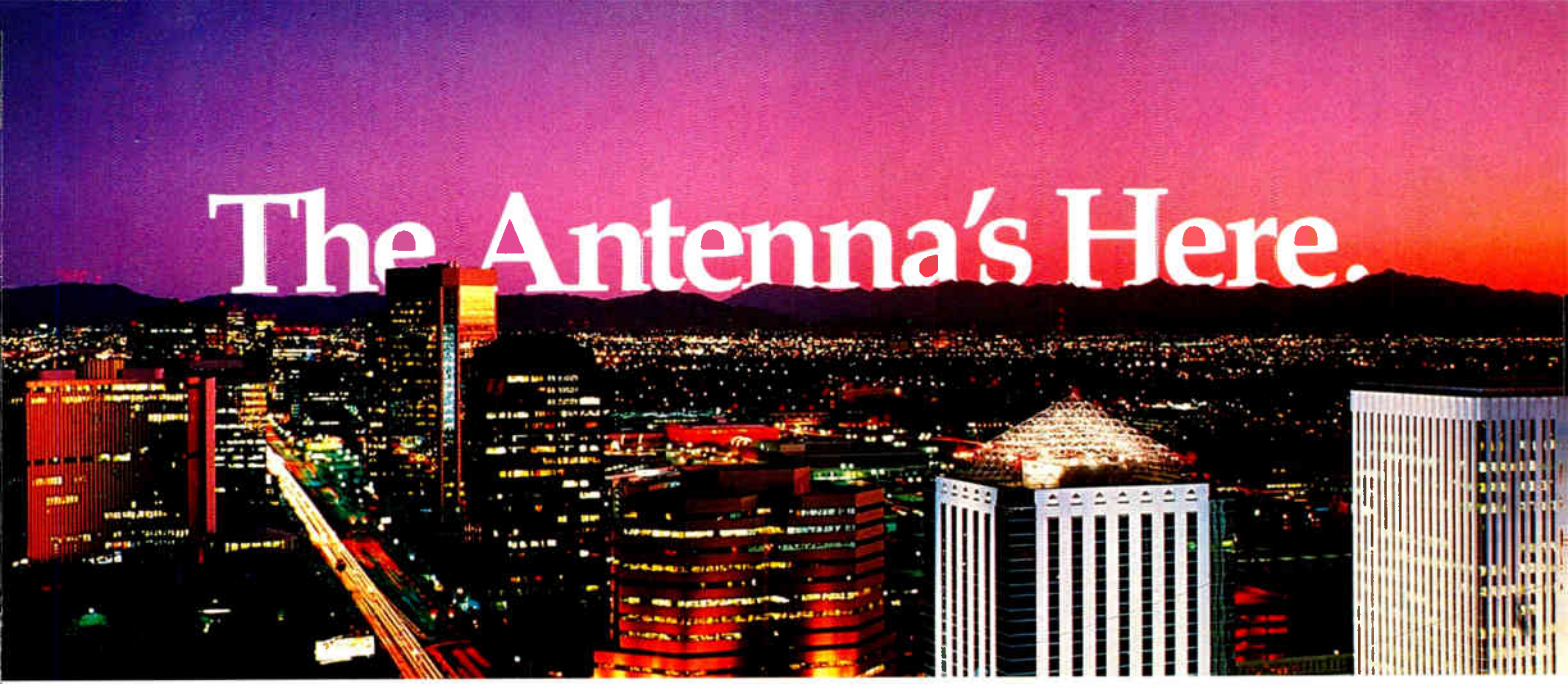
✔ Either supply the components or direct the customer on how to get his own.

In any case, give the customers the jumpers they need, as good jumpers and connectors are difficult to find in the retail customer electronics stores. If customers choose to buy their own equipment, caution them about the selector switch. Only one marked "This device is verified to comply with FCC Rules Part 15 for use with cable television service" will have adequate isolation to avoid interference between cable signals and off-air signals.

Few in the cable industry are happy about having to do this at all, but unless retransmission consent is successfully challenged in the courts, the situation will arise and systems had better be ready.

Selection guide

Tables 1 and 2 will help you select the proper connection diagram and equipment for connecting either an outside antenna or an indoor set-top antenna ("rabbit ears") for direct reception of television broadcast signals that are not carried on the cable system.



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To our customers

In 1992, Congress passed new legislation covering many aspects of cable television. One of its provisions creates a new property right for broadcast television stations. Starting this year, these stations may deny our right to deliver their signals to you unless we agree to their terms for payment. Since these payments (which are new costs to us, created by the 1992 Act) will in the future be passed along to subscribers, we have tried to be diligent in bargaining on your behalf. If we are unable to come to an acceptable agreement with some station, we will be unable to carry it.

A second provision allows stations that supply an adequately strong signal to our reception point the right to demand carriage. If we were not formerly carrying the station, that might mean that we were forced to drop some other channel to make space for it.

Due to one or both of these situations, we regret that we are unable to carry some local broadcast stations on our cable system.

The interconnection diagrams

In order that you might have independent access to these channels through use of your own antenna, we have prepared diagrams showing how to best interconnect your antenna and the cable system equipment. We have also researched proper components to use for the interconnection, and will attempt to keep some of them on hand which we will supply at our cost, if you desire. Alternately, you may acquire them yourself. In either case, we will be happy to provide you with the jumper cables required at no cost.

Should you wish to provide your own components, be aware that the quality of many such components is not sufficient to provide interference-free reception. In particular, the selector switch must have a factory-provided label that states: **"This device is verified to comply with FCC Rules Part 15 for use with cable television service."**

If it is not so labeled, you may experience interference between broadcast signals and those received from the cable system. For the same reason, it is critical that coaxial cable connections among the set-top components be adequately tightened. It is recommended that connections be made hand-tight plus about 1/4 additional turn of the nut.

If you have an existing outside antenna or install a new one in order to receive non-carried television stations, make sure that it is properly installed and grounded.

Caution: External antennas must be properly grounded to reduce the possibility of injury, fire or equipment damage in the case of lightning or inadvertent contact with power lines.

If you wish to have us to install the set-top components, please contact our service department to arrange for an on-site appointment with one of our service technicians. We cannot, however, work on outside antennas.

Selecting between cable and off-air

When you desire to view one of the non-carried broadcast stations, push the "B" button on your selector switch (if your set-up requires a selector switch) and use your television receiver to tune to the desired channel. If the non-carried channel is a UHF station (channel number greater than 13), you will need to switch the television receiver tuning mode switch from "cable" to "TV." Depending on the model of television, this control is located on either the remote control, on the front of the set, or on the rear of the set near the antenna terminals.

When you desire to view cable programming, push the "A" button on your selector switch and use your equipment as you always have, tuning with either the convertor or receiver as appropriate. Make sure that the tuning mode switch is back in the "cable" mode.

If you have questions about the selection or installation of components or operation of the antenna selector switch please call our customer service representatives during normal business hours and we will be glad to help.

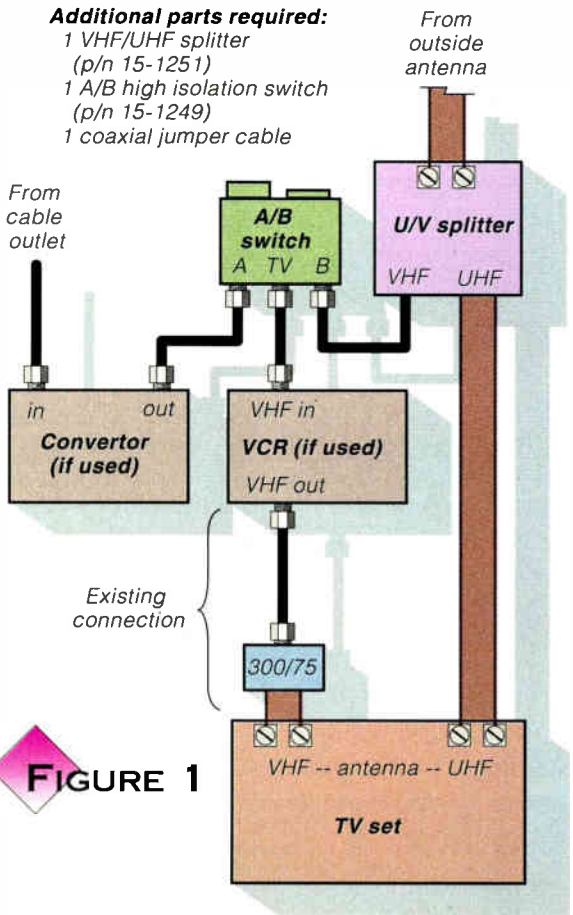
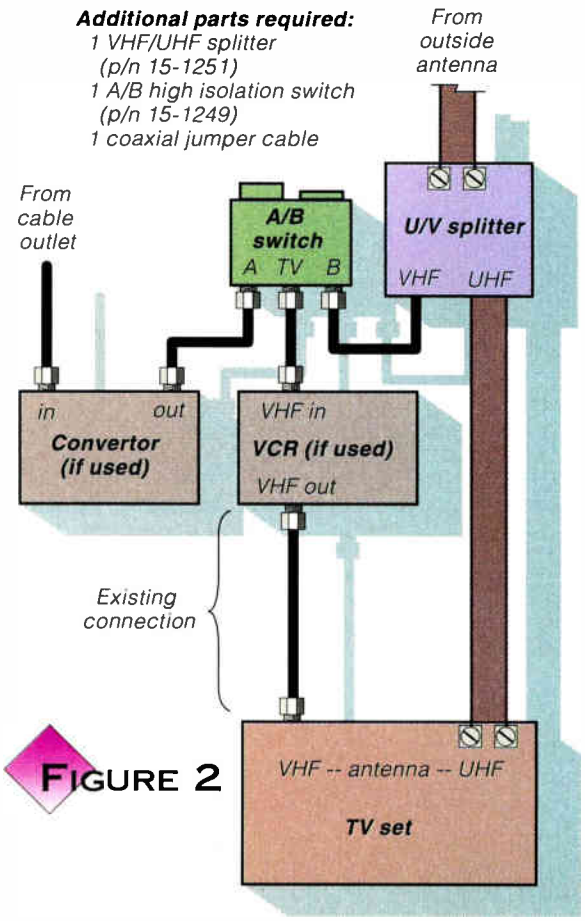


FIGURE 1



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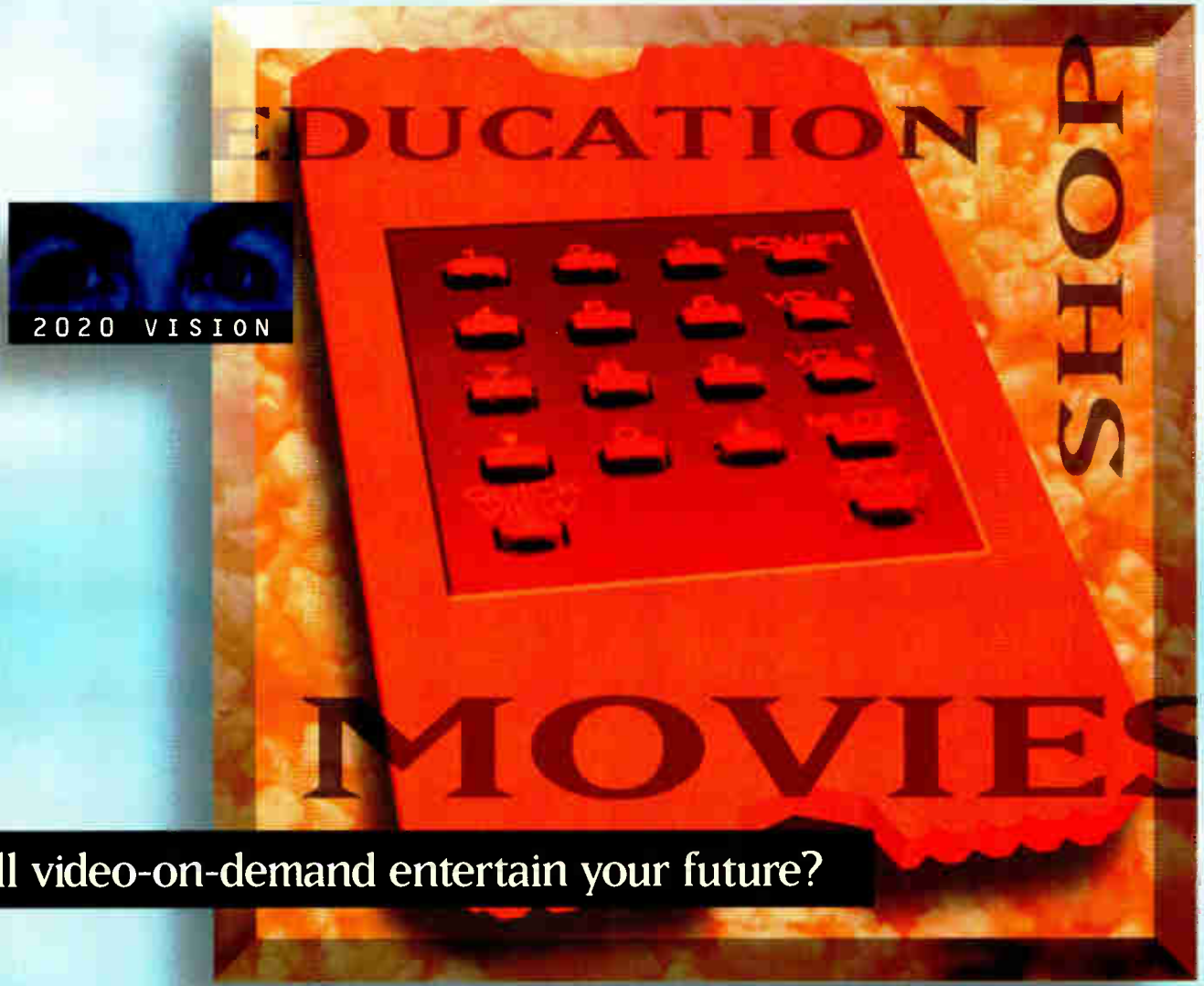

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*Our Cable Integrated Services Network is a plan for building a fiber network that accommodates video compression, analog and digital transmission in a 1 GHz spectrum.

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A/B Switches

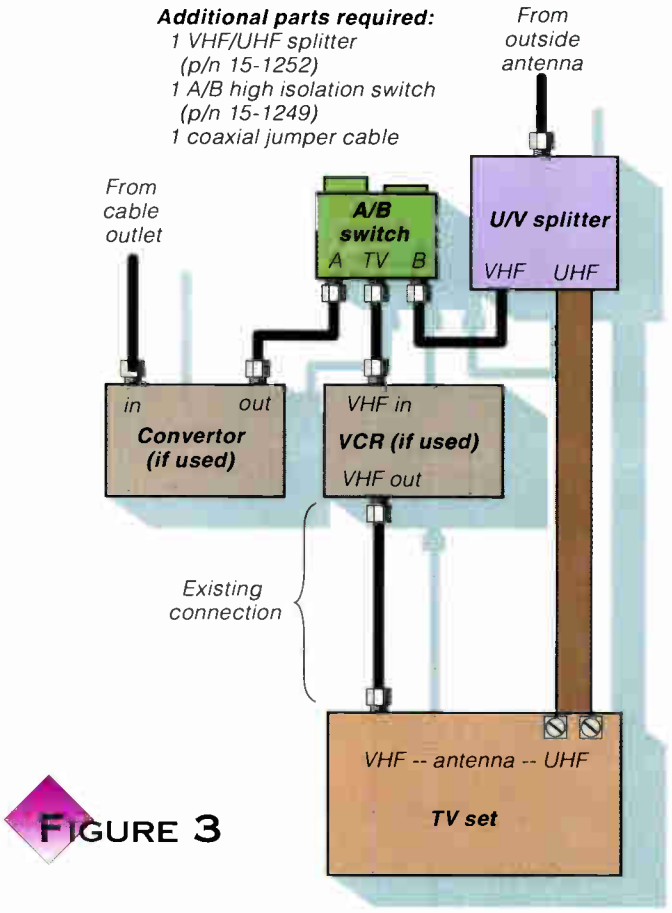
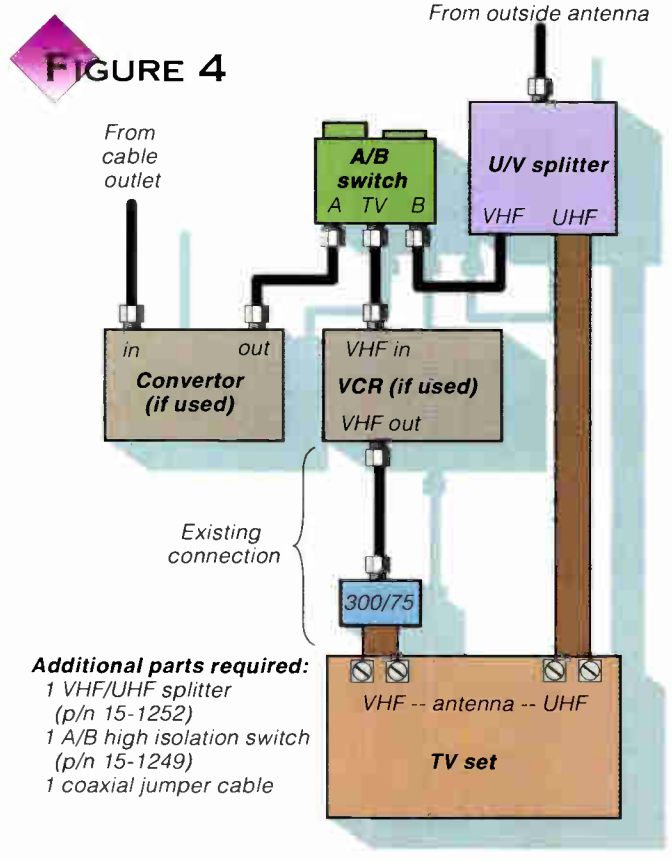


FIGURE 3



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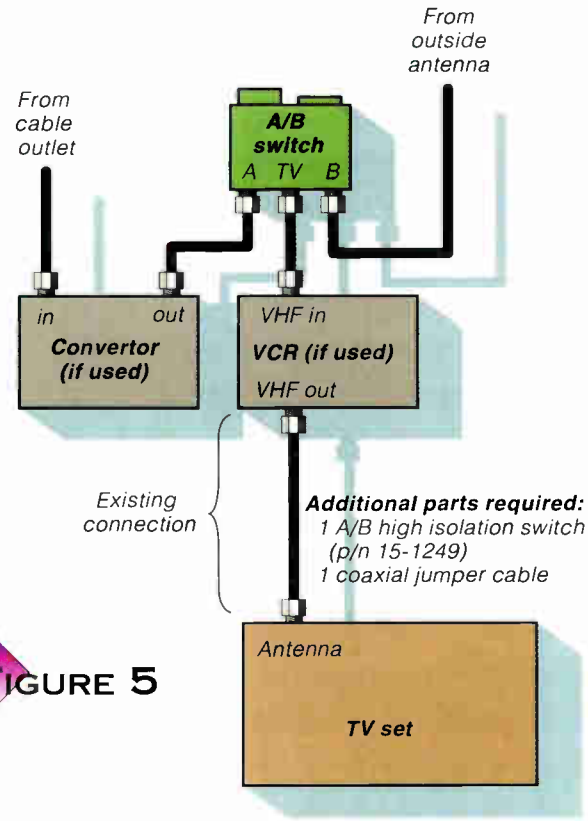

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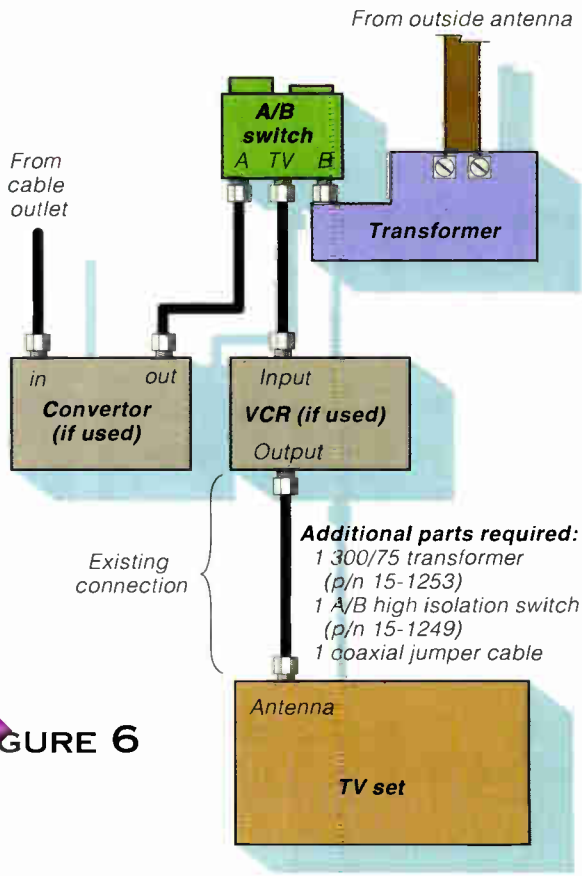

FIGURE 6

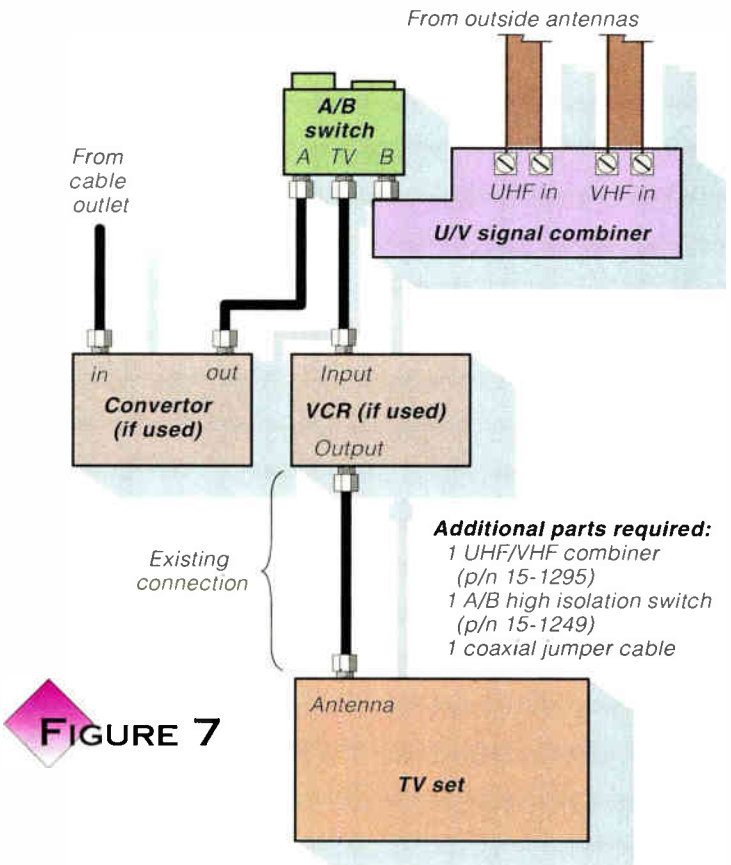

FIGURE 7

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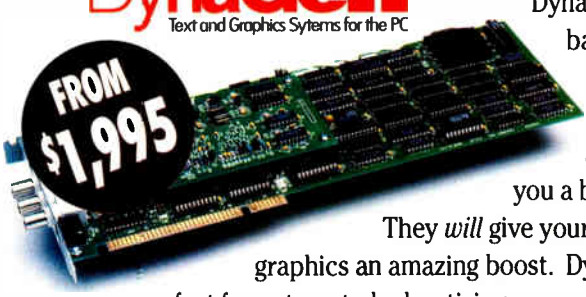

The new DynaGen PC-based character generators *won't* cost you a bundle. They *will* give your text and graphics an amazing boost. DynaGen 400 is perfect for automated advertising, promotional channels, and bulletin boards at a fraction of the cost of traditional units. DynaGen 300 is an excellent low-cost titler and display system with Instant Sizing, Free-Form Text, and amazing color spreads.

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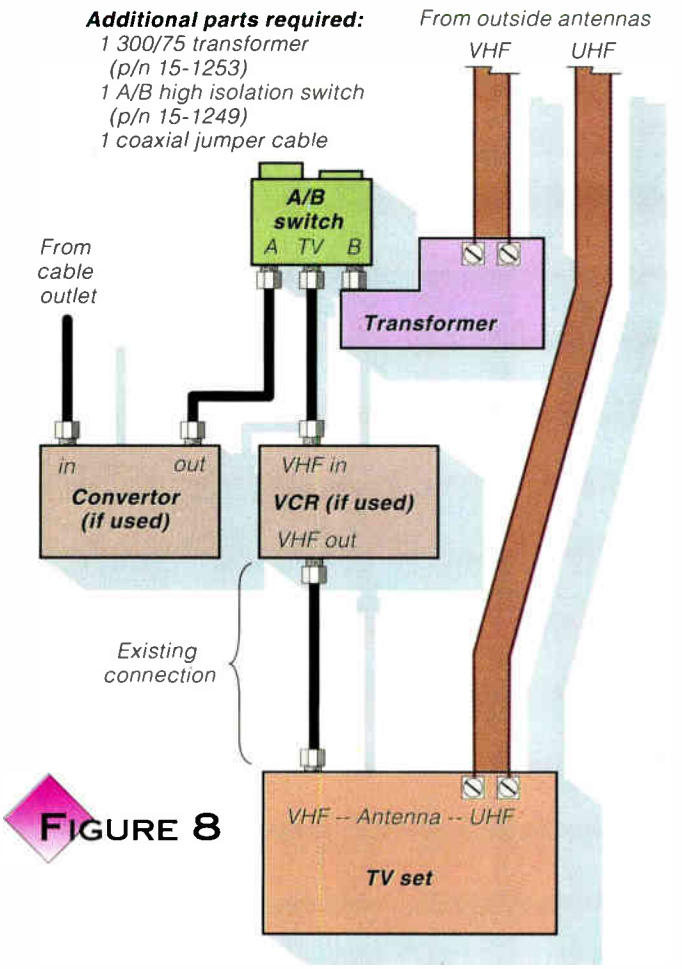

FIGURE 8

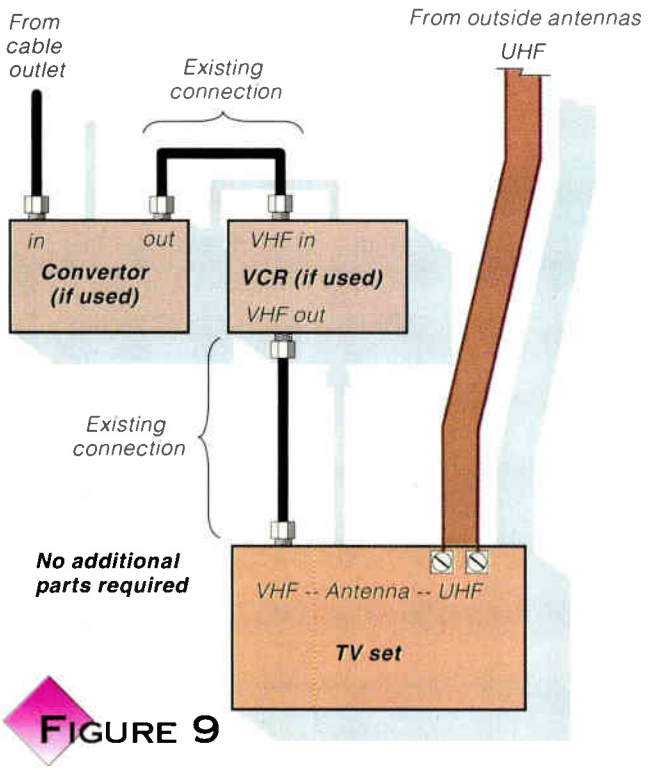

FIGURE 9

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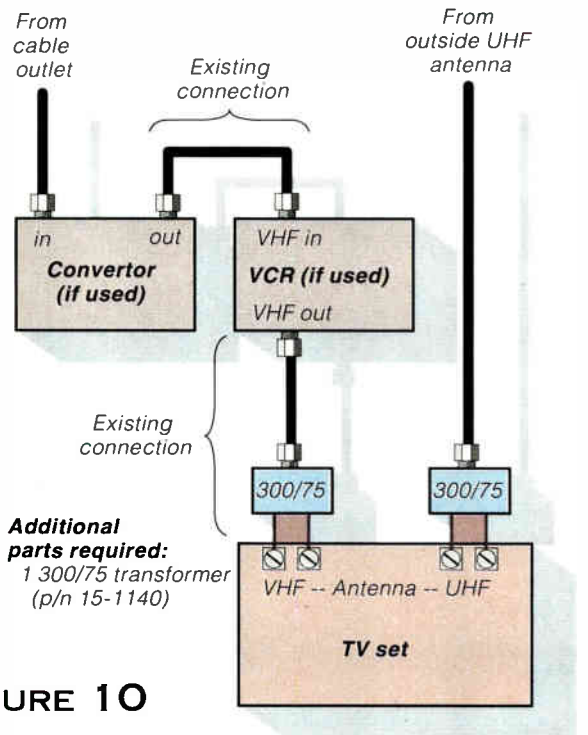


FIGURE 10

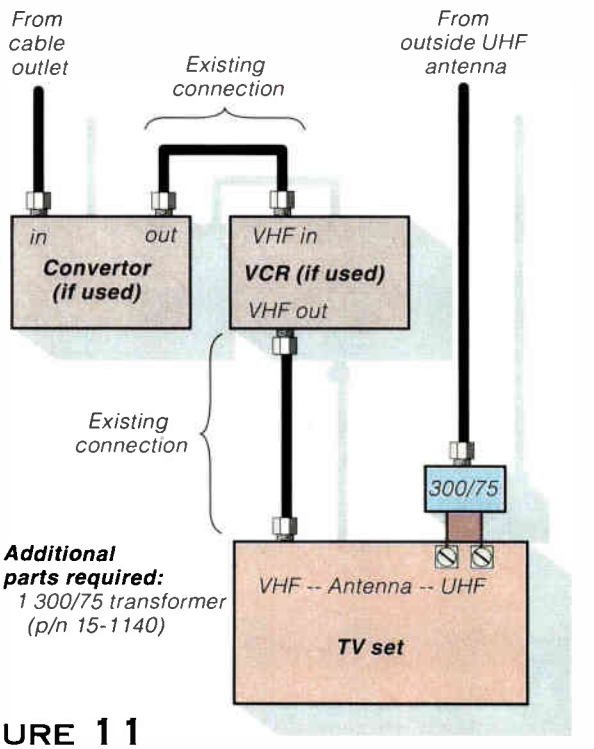


FIGURE 11

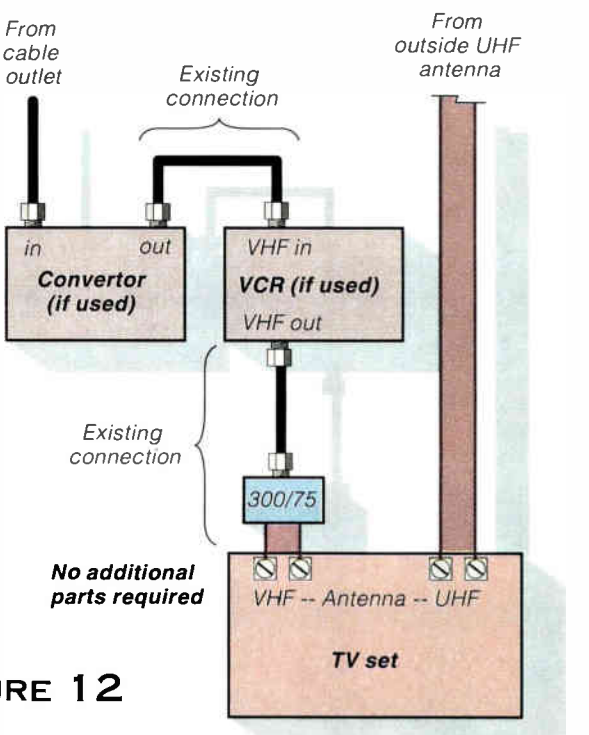
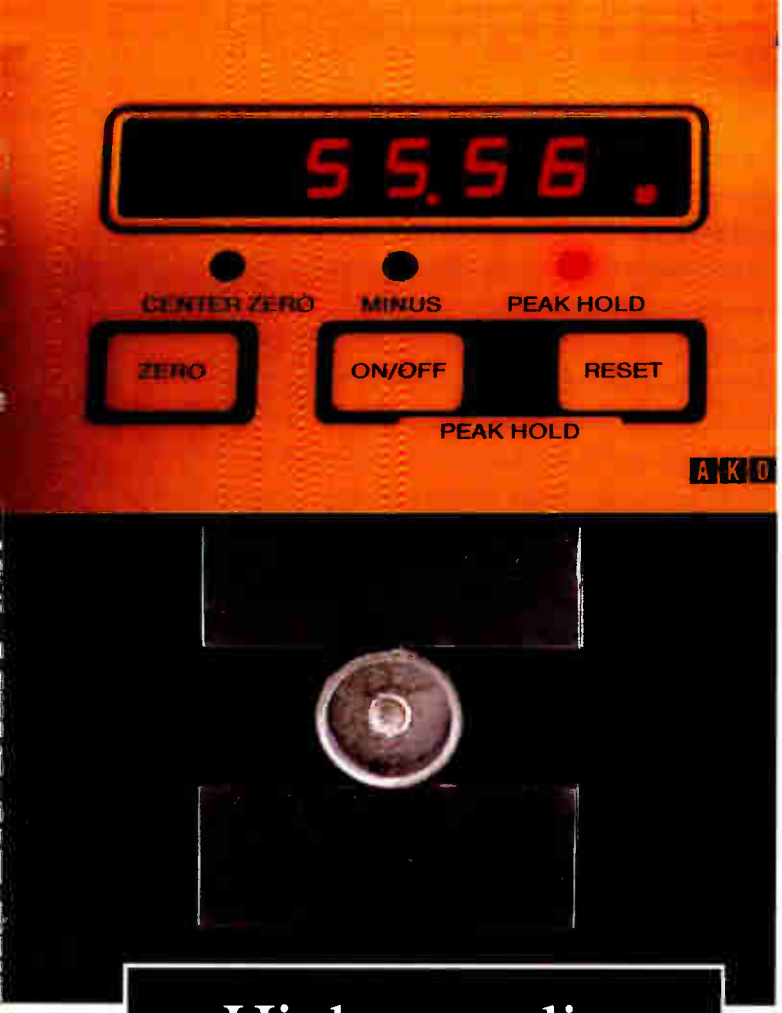
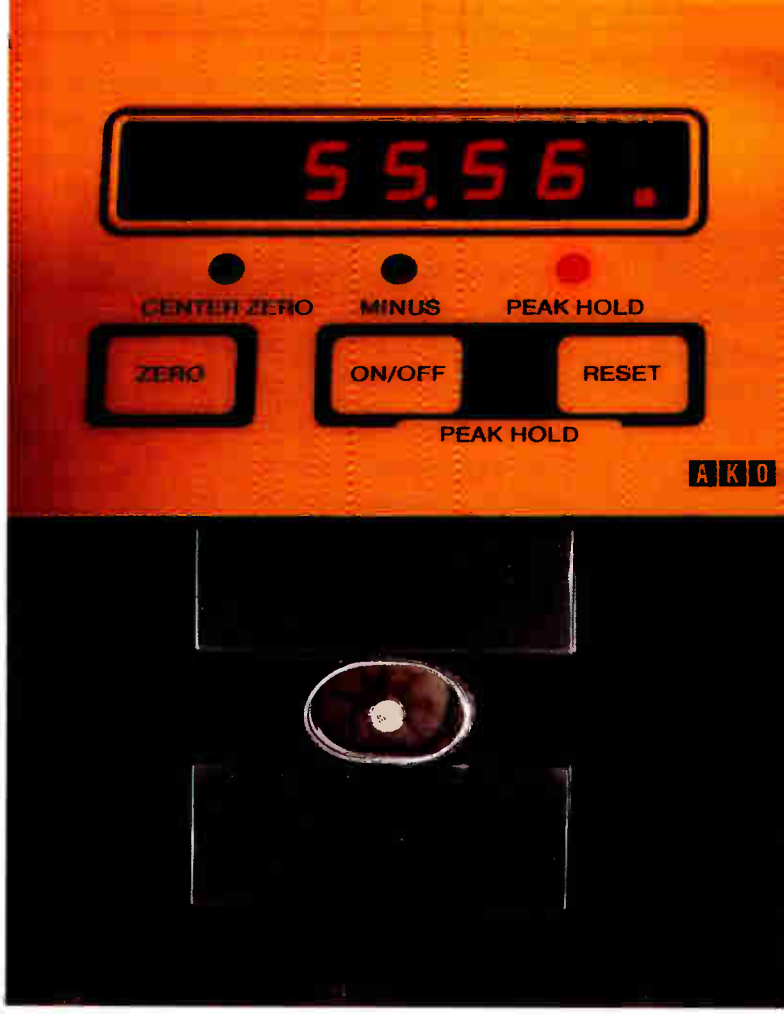


FIGURE 12





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A simple compression test dramatically demonstrates Times Fiber TX cable's (left) superiority over a leading competitor

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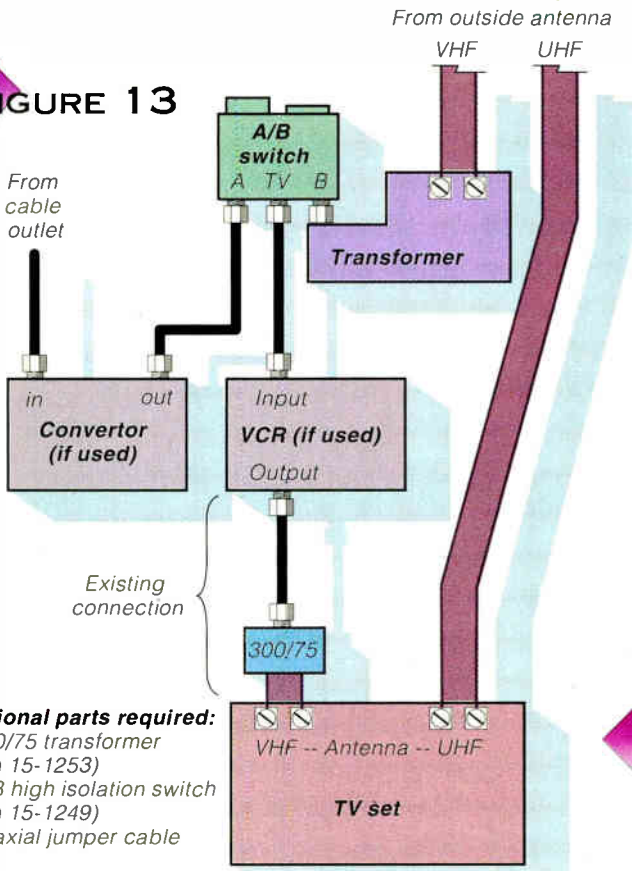
FIGURE 13



Additional parts required:
1 300/75 transformer (p/n 15-1253)
1 A/B high isolation switch (p/n 15-1249)
1 coaxial jumper cable

Additional parts required:
1 300/75 transformer (p/n 15-1253)
1 A/B high isolation switch (p/n 15-1249)
1 coaxial jumper cable
1 indoor antenna (p/n 15-1806)

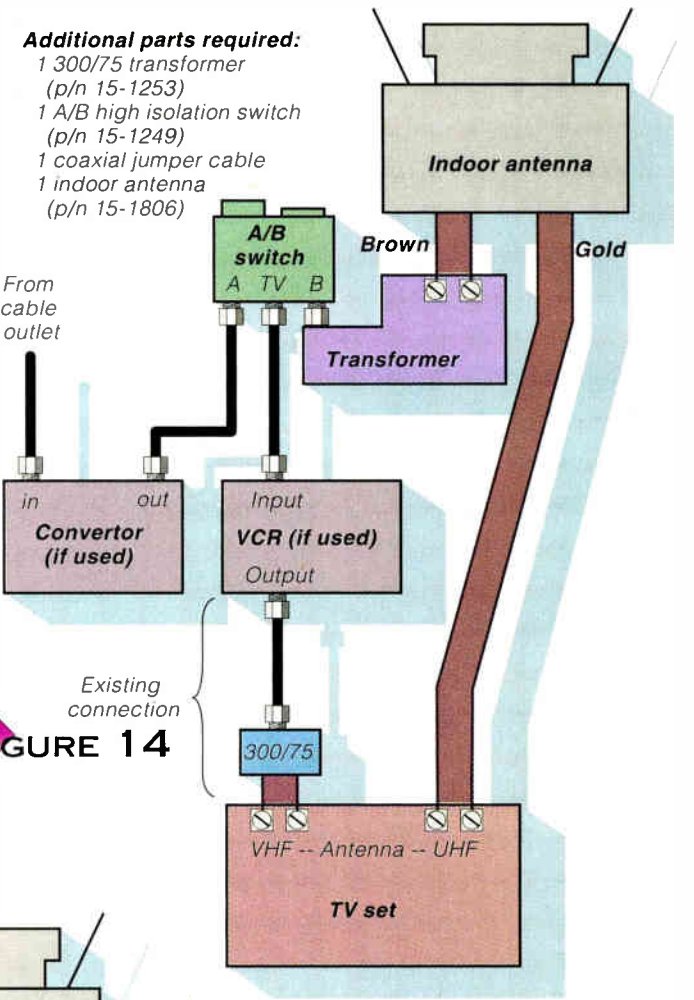
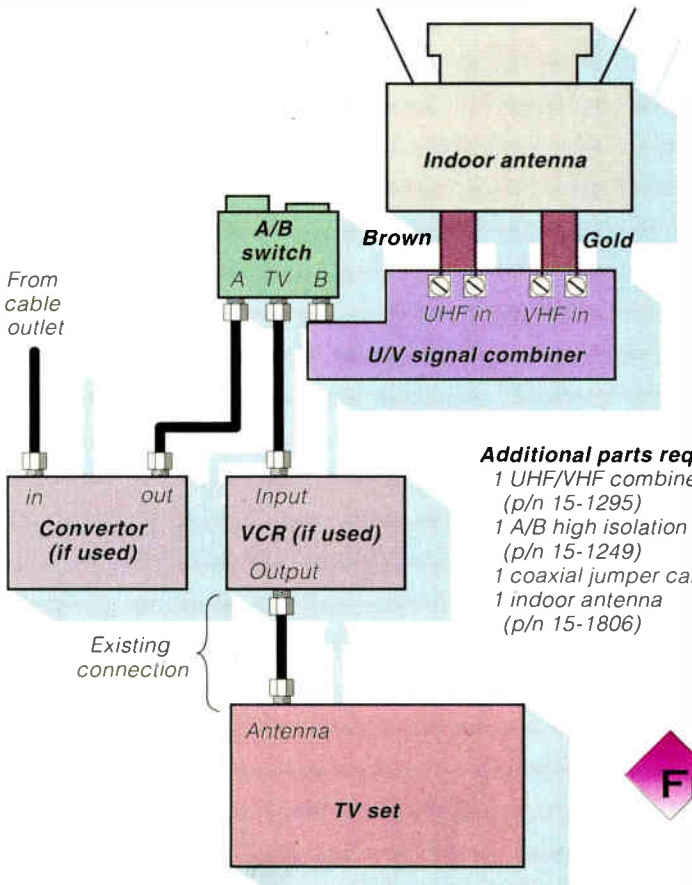


FIGURE 14



Additional parts required:
1 UHF/VHF combiner (p/n 15-1295)
1 A/B high isolation switch (p/n 15-1249)
1 coaxial jumper cable
1 indoor antenna (p/n 15-1806)

FIGURE 15

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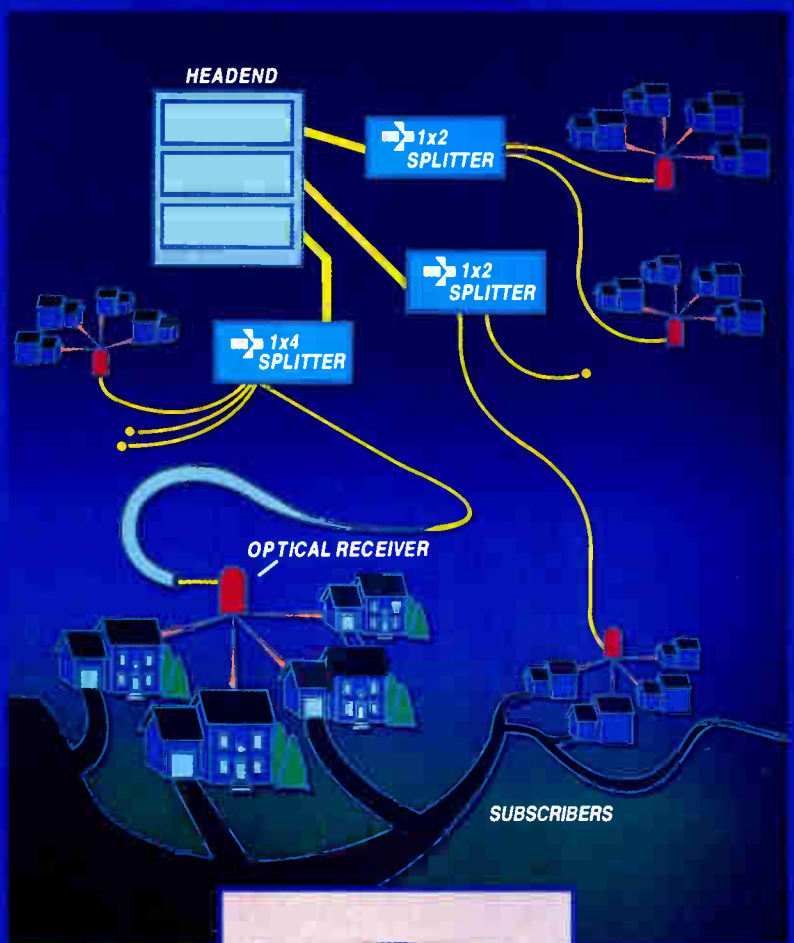

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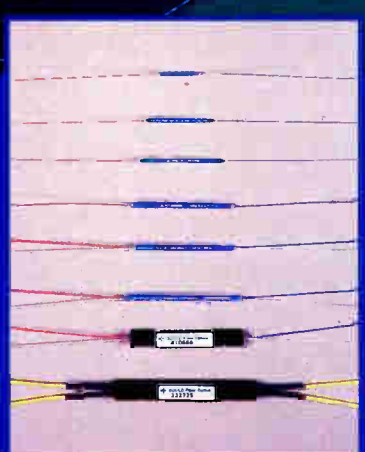

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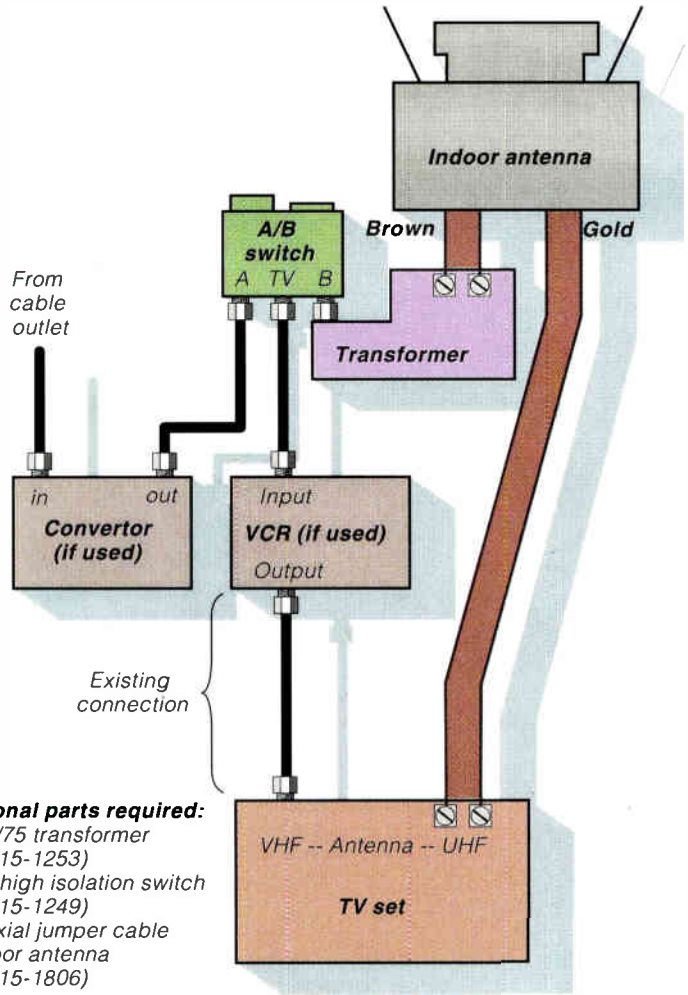


FIGURE 16

Additional parts required:
1 300/75 transformer (p/n 15-1253)
1 A/B high isolation switch (p/n 15-1249)
1 coaxial jumper cable
1 indoor antenna (p/n 15-1806)

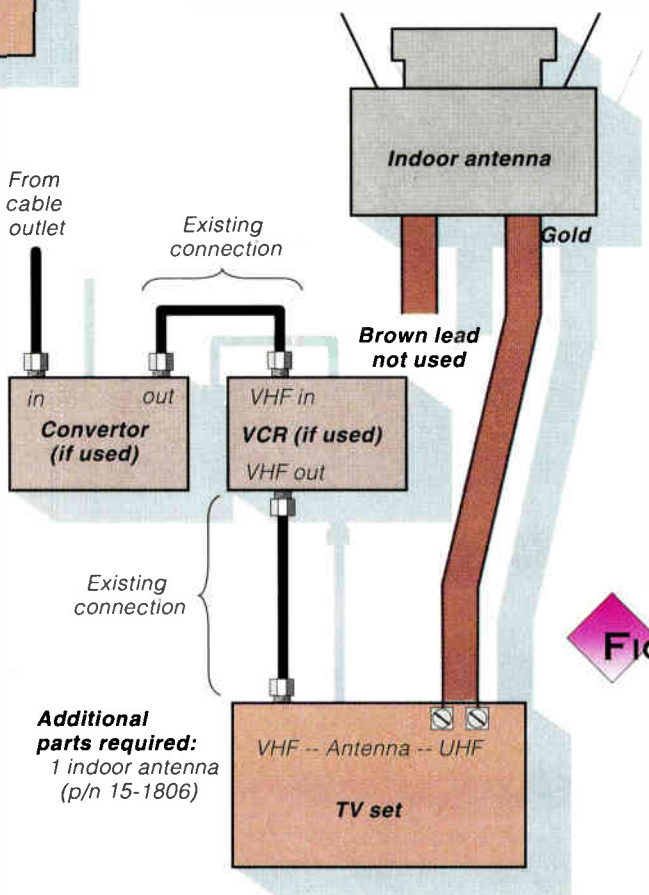


FIGURE 17

Additional parts required:
1 indoor antenna (p/n 15-1806)

FIGURE 18

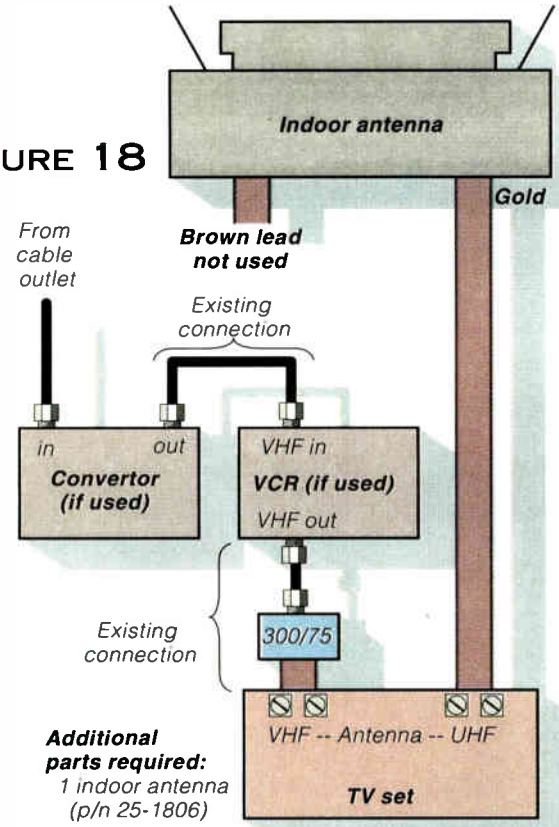
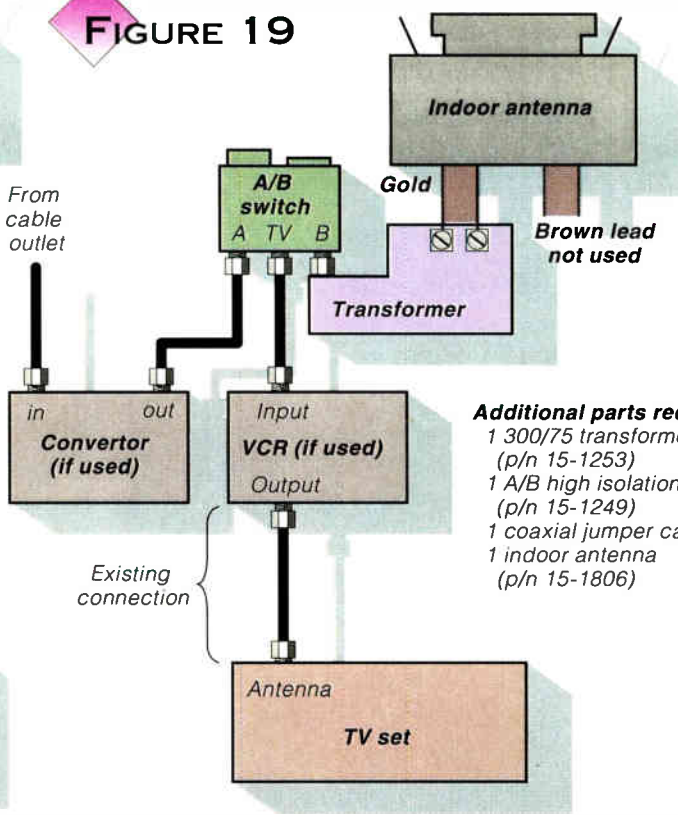


FIGURE 19



The consumer electronics bus: An update

A CEBus solution to compatibility

FIGURE 1
Basic CEBus method of operation

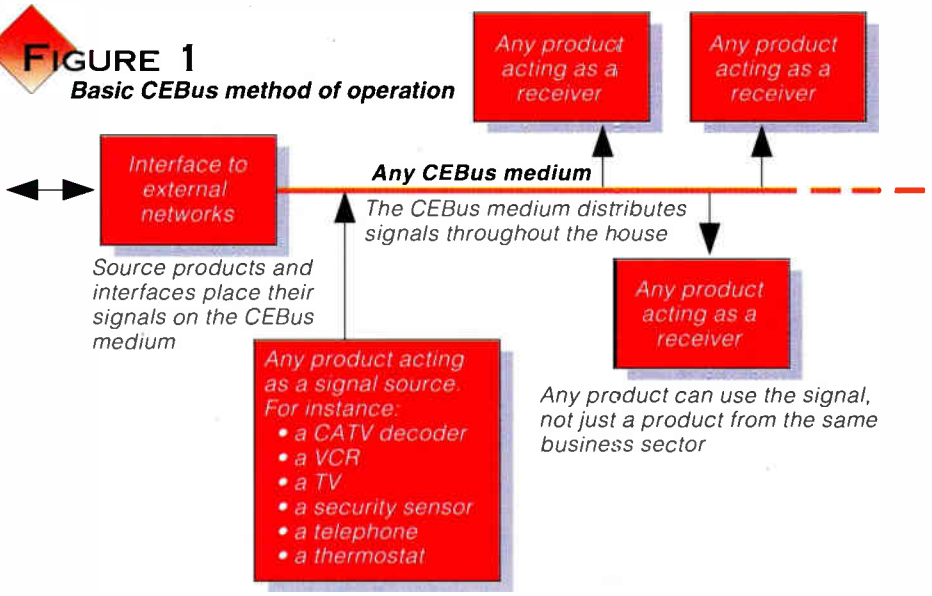
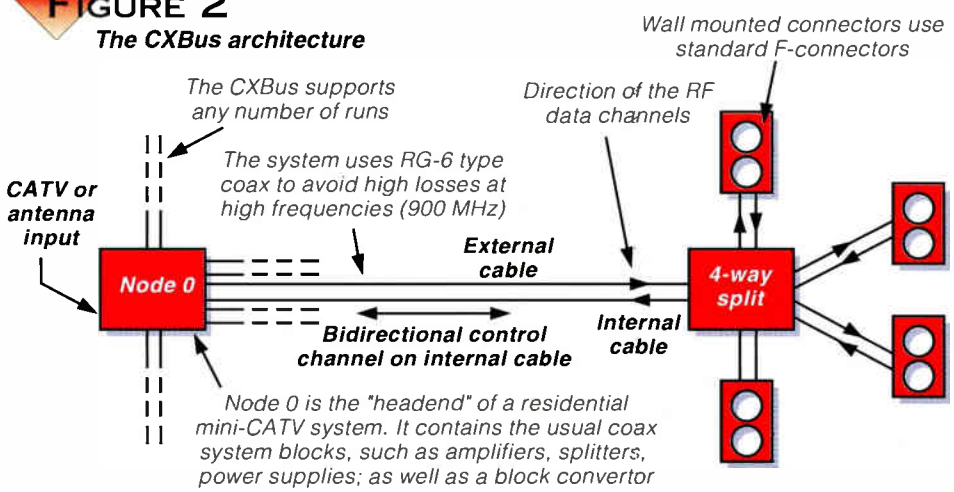


FIGURE 2
The CXBus architecture



This two-part paper has been expanded from a paper presented at the 1993 SCTE Conference. Those seeking more details about the Consumer Electronics Bus should also consult the paper.

The cable and consumer electronics industries have had an increasingly difficult relationship over the last few years, primarily related to the lack of a seamless interface between the two businesses' equipment. These interface and multi-room distribution problems are bound to become increasingly more complicated as the new generation of equipment and services penetrate the cable marketplace. This is because in the present consumer home environment, compressed video and interactive games will require new interface boxes on the set-top, which could generate more interface problems, and the wide range of new services means the simultaneous use by members of the subscriber household must be done in separate rooms.

Clearly, the long-term goal of the cable and consumer electronics businesses must be to develop an effective, standardized method of multi-room distribution of audio-video services which also provides a seamless interface between the subscriber's equipment and the cable system.

In a home in which such a system was in place, the cable industry would be able to implement its systems in any way it wishes, and the consumer electronics industry would no longer be "in the way" when new services require new signal formats. The Consumer Electronic Bus (CEBus) environment is presented as providing just such capability in the long term: in fact, if the architecture is correctly designed, the interface problems disappear.

The Electronic Industries Association's Consumer Electronic Bus Committee was formed in 1984, with the intent of finding and standardizing a method of networking consumer entertainment and telephone products. Targets for the standard were:

✔ Create and promote a product networking environment for the home,
✔ This environment must be economically suitable for both new and existing homes,
✔ The new environment must enhance communications between products from different companies, products from different business sectors (e.g., cable and security, security and lighting, etc.) and the home network and outside networks (e.g., cable and telephone).
✔ Above all, keep the costs low–in keeping with the economics of the consumer product marketplace. A corollary of this rule was to keep the wiring simple.

General description of CEBus

The functional description of the CEBus system is quite simple: it is responsible for signal distribution and remote control of products. Within the realm of signal distribution, it handles signals from outside the home and those from within the home. That's it. It is important to note that the CEBus network does not require a central computer.

In order to implement this simple functionality, the standard has three major portions:

✔ It describes methods of signaling over five media within the home,
✔ It provides automatic methods of moving messages from medium to medium,
✔ It describes a common language for all

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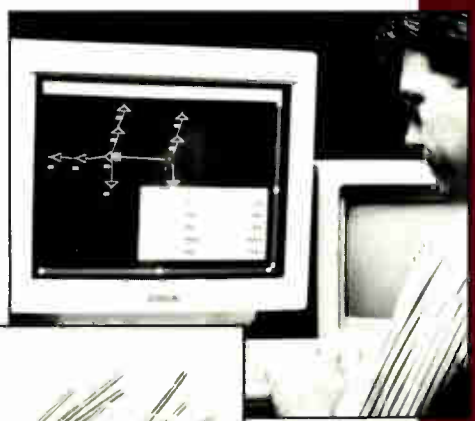

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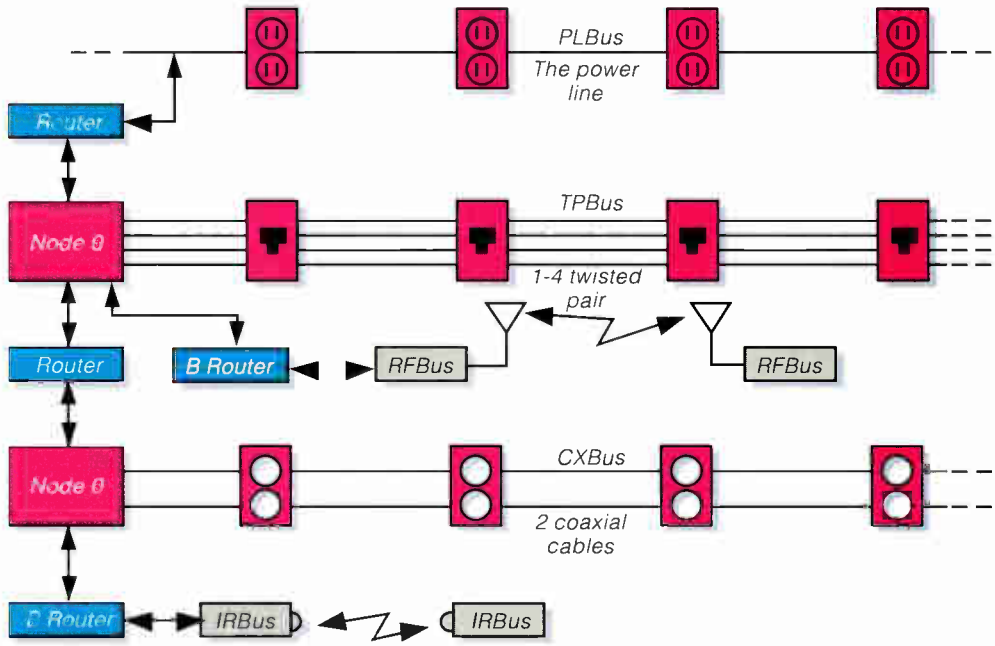
products using the network.

The five media are the power line (PLBus), twisted pair (TPBus), coaxial cable (CXBus), infrared (IRBus) and low power radio (RFBus). The medium of broadest interest to the consumer electronics and cable industries is the CXBus, because of its wide bandwidth.

To be able to provide both control and distribution functions, the fundamental architecture of the CEBus environment is to divide a transmission medium into a control channel and, in some cases, a number of data channels. The function of the control channel is to provide a tightly characterized "meeting ground" on the medium, where all of the products on the medium can interact. It is intended for short commands and messages. Products use the control channel to negotiate for network resources such as spectrum space on a medium and addresses.

On the other hand, the data channels are used to distribute signals whose bandwidth, modulation type or duration do not fit the control channel specification. Examples include analog telephone transmit and receive voice channels, digitized audio such as in CD or DCC formats, or TV signals at RF. Almost any type of signal can be sent

FIGURE 3
The CEBus network: Moving between media



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over a data channel.

The basic operation of the CEBus system is outlined in Figure 1. Signals are placed on the data channels by either a source product from within the home (such as the output of a cable descrambler or VCR) or from outside the home (such as the cable spectrum from the subscriber drop). This promotes the concept of interoperation between products.

The CEBus network

Certain product areas tend to naturally "fit" certain media. For easy interoperability, it is essential that products on different media be able to contact each other on the control channel. To provide this intermedia control channel coupling, devices called "routers" and "brouters" are specified in the standard.

A router couples two wired media, while a brouter couples a wired medium to a wireless medium. These are shown in Figure 3. Thus, even though a product is located on a given medium, it can communicate with and control a product on another medium; and a signal coming in from outside the home can be moved to another medium to control a product.

One of the fundamental targets of the CEBus Committee is that products from the various business sectors can be easily designed to work together. Perhaps the largest promise is services provided through the cable system interacting with products on the network.

The coaxial cable bus

The CXBus is designed to be directly compatible with cable applications. CableLabs, some MSOs and cable hardware vendors have guided the architecture and frequency allocations used in the CXBus standard. The CXBus is designed or provide several general services, including:

✔ That of interfacing to the cable system and distributing cable signals and services throughout the CXBus network,

✔ Providing the distribution of in-house generated signals, such as the outputs of descramblers, VCRs, video disk players and compact disc players,

✔ Providing multi-room remote control of all the products on the network.

The architecture of the CXBus is shown in Figure 2. It is a result of the need to provide reliable cable service at consumer prices.

The wall-mounted connectors can be arranged in any desired configuration. For instance, the four wall outputs could be placed in one room (one on each wall, perhaps) or could be placed separately in four rooms. The CXBus is independent of geography; that is, a product can be located anywhere in the network and then moved without problem.

The use of CXBus in subscriber homes has a number of benefits, including:

✔ The CXBus network is buffered from the subscriber drop, substantially reducing the amount of signal leakage from the home back into the system,

✔ The network uses cable industry architecture and wiring practices–there should be no concern about damage to ATV and 16-. 32- and 64-QAM signals passing through the network,

✔ Cable equipment such as descramblers can be located anywhere in the network and still can provide the descrambled picture to any TV or VCR on the network. The descrambler(s) can be controlled from anywhere in the network. For example, the descrambler(s) can be located in a centralized utility box inside or outside the home in board form, thus saving cabinet and power supply costs. On the other hand, they can be located on a set-top and still provide the same network-wide services.

In the next part of this article, we will explore what is involved in converting products to CXBus network operation, and some CXBus implementations that completely eliminate the current points of friction between the cable and consumer industries. CED

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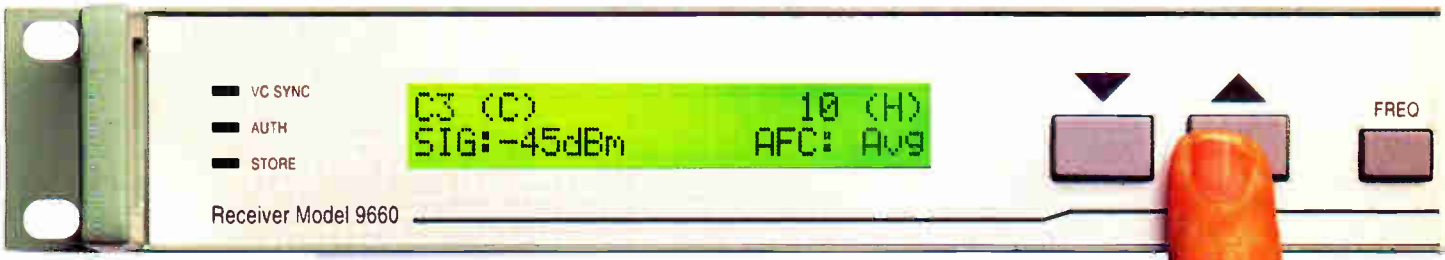

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Local area network technology for cable TV

Using existing plant for LAN

FIGURE 1

RF modulation scheme	Spectral efficiency	Carrier/noise
BPSK Bi-phase shift key	1.0 bits/Hz	12 dB
QPSK Quadrature phase shift key	2.0 bits/Hz	15 dB
64-QAM Quadrature amplitude Modulation	6 bits/Hz	27.5 dB
16-VSB Vestigial side band	8 bits/Hz	33.5 dB

Note: chart assumes an ideal system--Nyquist bandwidth with excess bandwidth

By Ed Zylka, director of marketing, Zenith Communication Products Division

The impact of the digital super highway has created a transition for cable operators from one of providing video entertainment services to that of non-traditional services such as local area network (LAN) connectivity and telephony. These changes have been facilitated by new competition to the cable TV industry, the deployment of fiber optic systems, digital technologies and government regulation.

Because the basic cable TV infrastructure is a high bandwidth conduit for the transmission of multimedia services, cable operators have the ability to implement LAN services over their existing plant to create incremental revenue. A ubiquitous metropolitan community network can be developed with specific LAN applications for markets which include residential, campus, health service, manufacturing and internal use.

Part one of this two-part article will address LAN and MAN technology fundamentals including LAN basics, two-way cable TV plants, RF modulation, and software and hardware systems. Part two will discuss LAN system applications and case studies for the cable TV operator.

Network basics

Depending on the geographic coverage of the data network, the system can be categorized or defined as a local (LAN), metropolitan (MAN), wide (WAN) and even global area network (GAN). There is no clear definition on what constitutes a network coverage.

In general, a LAN tends to support computer communications within an enterprise, campus or facility. A MAN can extend a LAN node or, in the case of a cable TV plant, act as a backbone to carry multiple data services including LANs or switched data services across a community or city. A wide area network or WAN supports the connectivity of LANs over T-1 carrier circuits, telephone lines, X.25 circuits or digital switched circuits. To complete shrinking of the world boundaries, network communications have now become global through the use of satellites.

Topology defines the physical and logical organization of the nodes on a network and are typically laid out in a bus, tree-and-branch (variation of the bus), star and ring. The tree-and- branch topology common to the cable TV industry requires a centralized controller or headend device to create a duplex data path.

A bus, on the other hand, is more simplistic and typically requires a headend device only for broadband cable TV systems. Star-based networks require an intermediate controller device which attaches to all network nodes. A ring can be thought of as a bus turned around on itself and does not require a common controller.

Media access control

A local area network, in contrast to a point-to-point data network, must provide simultaneous access to multiple users all attached to a single physical cable. Media access control (MAC) provides what essentially amounts to a function similar to polling in traditional multi-drop networks. It ensures an individual node has fair access to the media, and that not more than a single node at any one time uses the media.

ALOHA is one of the earliest access methods and was developed through early packet radio experiments. It provides access onto a network by having the user node transmit without first checking to see if the network is quiet. If a collision occurs, the node waits for a random time interval and retries until it gets its message through and receives an acknowledgment from the other node. Because of collisions, maximum theoretical channel loading is about 18 percent. The development and origination of many local area network MAC protocols can be traced back to ALOHA.

The MAC protocol used by Ethernet LANs based on bus topologies is defined as carrier sense multiple access with collision detection, or CSMA/CD. When a node attempts to transmit, it first listens for traffic on the wire and waits to transmit until the wire is quiet. Due to distances and media propagation delays, it is possible to have two stations transmitting at the same time on what appears to be a quiet wire.

The resulting collision between the two stations will initially go unnoticed. In this case, the transmitting node will fail to receive a positive acknowledgment from the destination node and will re-transmit.

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When a collision occurs between multiple nodes, each node will not transmit immediately, but will back-off or randomly delay the next message to avoid another collision. Theoretical network utilization for CSMA/CD systems is approximately 80 percent.

Token passing is a MAC protocol applied to ring or bus topologies which passes a token from node to node on the network. Whichever node possesses the token has complete access to the wire. When the node is done transmitting, the token is forwarded to the next node. In contrast to CSMA/CD, which relies on random access, token passing is deterministic in nature and lends itself to manufacturing operations which require timely delivery of data for repetitive processes such as robotics equipment.

Several popular LAN systems have been standardized by the IEEE for baseband networks. These include 802.3 for Ethernet baseband, which is a CSMA/CD based system, and 802.5 for Token Ring baseband, which uses token passing MAC.

Two-way communications

To support interactive LAN services over two-way residential cable systems, several factors dictate the communications architecture required to permit data transmissions over 1) extremely long distances, 2) harsh signal conditions, 3) access for thousands of users on a single wire and 4) a tree-and-branch topology. The system must be designed as such to provide effective and reliable operation over these unique sets of conditions.

First, a uniform MAC protocol is needed to overcome the distance limitations of the baseband networks which are to be "backboned" over the cable plant and to create an efficient transmission system–efficient in the sense that user access can be negotiated quickly to achieve performance close to the theoretical speed of the wire.

(Zenith for example, has developed several generations of MAC protocols designed to operate on the extremes imposed by metropolitan cable TV plants. The first protocol was developed as a result of work done on Z-View, an interactive two-way system for home subscribers. Z-View utilizes a slotted ALOHA reservation scheme. KBLCOM of San Antonio, Texas, with approximately 100,000 Z-View home units installed, provides viewers with several real-time interactive applications, including IPPV (impulse pay-per-view), gaming and Star Response(TM) an electronic advertising request service. This system is for all practical purposes the largest local area

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network in the world. Second- and third-generation protocols were subsequently developed for Zenith's Metropolitan Community Network family of LAN-based cable TV products. These products are based on an enhanced CSMA/CD protocol.)

Of great concern to cable operators is spectral efficiency and frequency agility. It is the function of an RF modulation technique to not only provide higher data rates within a cable TV channel (i.e. bits/Hz), but to also ensure reliable performance with extreme carrier-to-noise conditions. The data network's transmission must be rugged so it can operate in an environment where white noise, ingress and common-mode distortion may be present–especially on the return path.

Comparisons of various modulation schemes can be found in Figure 1. The ability of an RF modem to utilize a range of frequencies allows the cable operator to use open channels to deploy new data services. Agility ensures that forward channels are compatible with entertainment video, and reverse channels could be moved to avoid ingress or other system related problems, especially on sub-split cable plants.

Typically, cable plants are designed using a tree-and-branch topology with newer fiber–based systems constructed as tree-and-star. In a tree-and-branch topology, downstream from the cable headend (also referred to as forward) channels are of a broadcast type, whereas upstream channels to the headend (also referred to as reverse) are of a multi-access type.

This implies that in the forward direction all communicating nodes listen to the same information emanating from the headend which is the main signal point. Therefore, in the forward direction, no data collisions can occur since only the headend "controller" communicates. However, in the reverse direction, many nodes may broadcast at one time, hence, there is a need for a common MAC protocol to alleviate upstream collisions on the reverse channel.

To establish a full duplex path on a cable TV plant, a device known as a frequency translator is used. The network node transmits data on an upstream channel to the headend. At the headend, the translator up converts the node transmission and broadcasts the information to all network nodes. Multiple independent data networks can be operated on a cable TV plant via frequency domain multiplexing by simply installing an additional frequency translator for each new LAN (see Figure 2).

In general, the system architecture, i.e. a metropolitan cable TV plant configured in a tree-and-branch topology, dictates the most effective MAC protocol. The standard baseband Ethernet and Token Ring LAN protocols described earlier would have to deal with a cabling environment that is significantly noisier and longer. Two-way digital transmissions on residential cable TV plants encounter long propagation delays of approximately 300 microseconds for 20 miles. Pure polling, CSMA/CD and token passing schemes would incur delays so severe that throughput would be poor.

For example, an Ethernet node expects to "hear" itself within a 51 microsecond window as part of its collision detection and enforcement mechanism; this effectively limits Ethernet to local connectivity of approximately 4.5 Km (span). The token ring MAC protocol dictates specific token holding or access times on a per node basis; it also ensures that the insertion of new nodes become recognized by all stations on the network.

The overhead of these processes limits the effective range of token ring to 4 Km. It is obvious that both Ethernet and Token Ring MAC protocols, even if modulated onto an RF carrier, could not support the

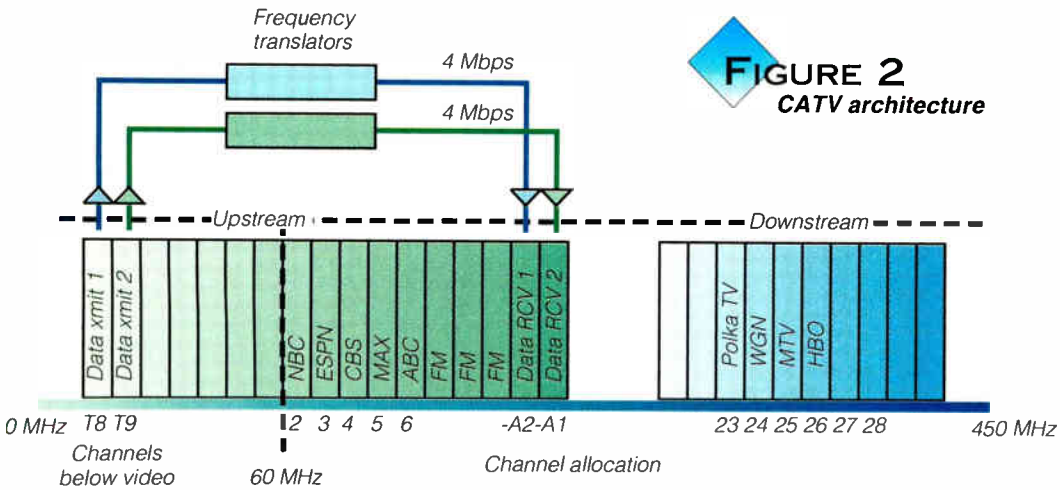

FIGURE 2
CATV architecture

delays associated with a metropolitan cable TV plant.

Software –the common thread

Data networks were created to establish more effective means of communications, and to permit more convenient access to electronic resources. The hardware connection system, whether it is Ethernet, Token Ring or cable TV-based LAN, provides a simple conduit between users and resources.

However, to create a homogeneous network, software called a network operating system (or network protocol) is needed. A network operating system (NOS) can be thought of as a spoken language. It enables users on dissimilar computer platforms, such as mainframes, IBM PC compatibles, and even Apple Macintoshes, to communicate via a common protocol.

The NOS serves other important functions as well. It establishes a "virtual" connection between two stations on a network and ensures end-to-end error-free delivery of data. Connections are created in much the same manner as the postal delivery system–the NOS appends address information to the data packet on where to route the information.

Several popular examples include TCP/IP (Transmission Control Protocol/Internet Protocol), Novell IPX and Apple Computer's AppleTalk. These software protocols allow connection into various computer resources, including file servers, electronic bulletin boards and mainframes.

For example, a user with TCP/IP software installed on their personal computer could access the Internet, the largest computer network in the world, via LAN, MAN or WAN facilities. The Internet contains a vast array of electronic information resources for researchers, students and business professionals. Electronic connections can be made to the White House, NASA, the Library of Congress and thousands of other facilities. Topics range from aeronautics to zymurgy (homebrewing).

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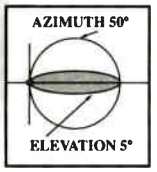

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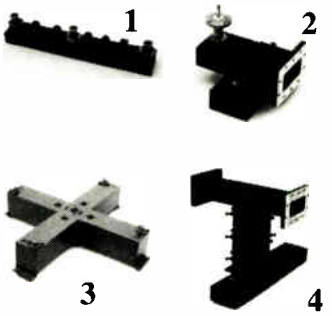

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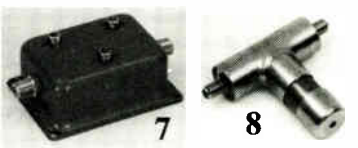

***Glyn and Emily Bostick have been designing and marketing products for the communications industry for 25 years. They have produced many *firsts* for the TV industry. They founded Microwave Filter Company in 1967 and were its chief executives until April, 1992, when they left and started Communications & Energy Corporation.**

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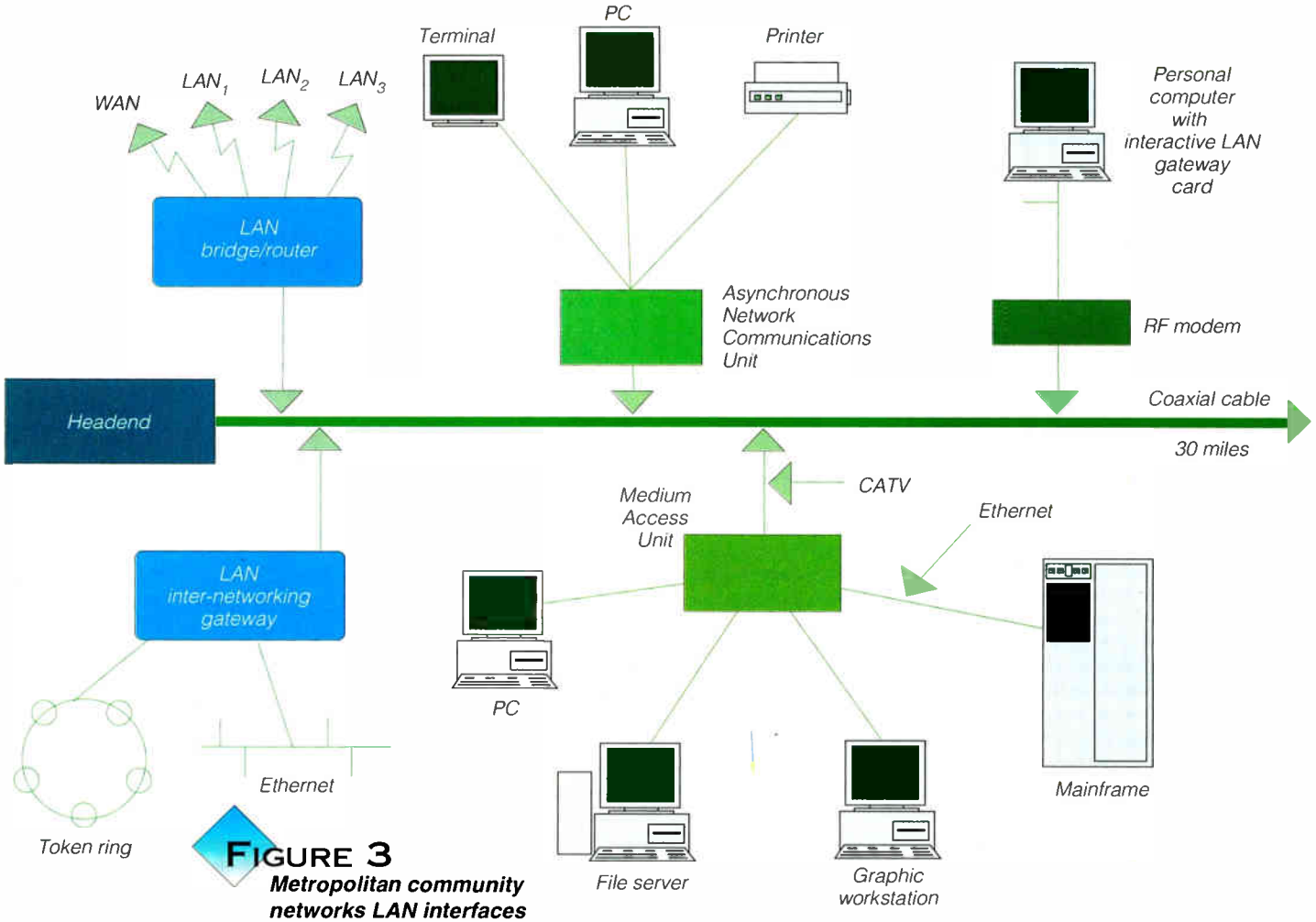

FIGURE 3
Metropolitan community networks LAN interfaces

ranging from mainframes to IBM PC compatibles to Apple Macintoshes to Sun SPARCstations to terminals and printers, requires a variety of connectivity solutions from the perspective of a network provider. Physical medium interfaces are available for network connections to coaxial, twisted pair, fiber optic and even wireless.

The most common hardware interface components are network adapter cards for personal computers. The units are installed within the computer and are designed to interface with the internal bus. This provides what is essentially a direct attachment from the computer bus to the network wire.

A network bridge, by definition, connects similar networks. Bridges can be used to isolate localized user traffic from a backbone through filtering methods by analyzing the physical address contained in a user's network interface device. A LAN bridge will ignore NOS protocol addresses and transparently forward all transmissions. Bridges are also used to extend network spans. LAN routers function similarly to bridges, with the exception that they understand and use NOS protocol address information contained in the data packet as routing and filtering criteria.

Zenith's Galaxy Exchange bridge/router can act as a gateway between different LAN systems–for example, the data packet structure for Ethernet differs from Token Ring. In this situation, the bridge or gateway must translate one protocol to the other, or encapsulate the data packet from one protocol to the other. As described earlier, the transportation of Ethernet or Token Ring data over cable TV backbones requires the translation of the protocol to operate over the distances and signal conditions imposed by the plant.

Gateways referred to as medium access units (MAUs) permit the extension of standard based LAN interfaces for 802.3 Ethernet over cable TV facilities; the physical connections include a standard AUI (attachment unit interface) port and an "F" type interface for connection to the cable TV plant.

Devices which provide RS-232 connections to common computer equipment are available for cable TV as well. Similar to dial-up phone modems, they are sometimes referred to as network communications units and offer asynchronous interfaces to printers, terminals and mainframes. Real-time control applications may include traffic signal control and remote data monitoring.

The LAN connectivity products shown in Figure 3 can provide flexible metropolitan community network solutions for education (K-12, campus, dormitory), work-at-home and electronic resource services. Cable TV-based LANs can also support computing needs for community businesses in the health and medical, legal and financial sectors.

Digital services–new source of revenue

Several factors outside the cable TV industry have accelerated the move to the deployment of interactive services. These factors include digital compression, the Cable Act of '92, fiber optic backbones, and even telco entry into cable.

The ability to provide data services exists today and presents new and exciting opportunities for the cable TV operator for incremental revenue. The high bandwidth coaxial cable to the home remains the greatest single advantage cable operators have over other telecommunications providers. CED

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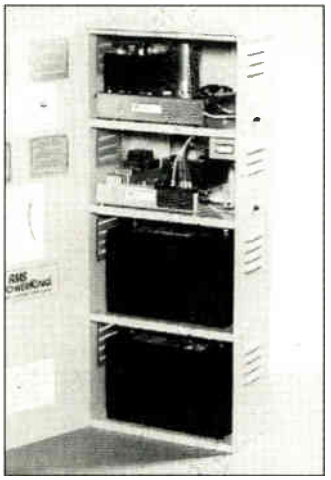

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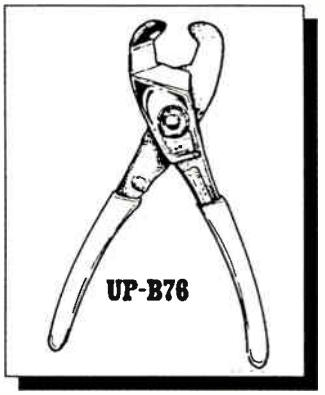

The UP-B76, also known in the trades as The Banana Cutter because of the distinctive yellow handles, is used by CATV installers all over the world. This coax cable tool is a clean cutting, one-handed instrument that is both lightweight and compact to fit into a tool pouch. It is designed to function just like a tube cutter to eliminate cable distortion during cable preparation. The UP-B76 is the ideal tool for communication and CATV industry applications. For more information, call our toll-free customer service hotline: (800) 992-3833.

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Circle Reader Service No. 128

The issue: Status monitoring

In the past, cable operators have avoided purchasing network status monitoring devices because they were often perceived to be too expensive or poor performers that didn't provide much useful information. However, as traditional cable networks evolve into more complex architectures demanding more reliability, will there be a need for better network telemetry and control? What do you think?

The questions:

1. Have you ever worked in a system that utilized status monitoring equipment?

❑ Yes ❑ No ❑ Don't know

2. Does your system presently utilize any status monitoring devices?

❑ Yes ❑ No ❑ Don't know

3. If so, what type of status monitoring system do you use?

❑ Power supply ❑ End of line ❑ Entire system

❑ Other

4. Do you think status monitoring will become more necessary in the future?

❑ Yes ❑ No ❑ Don't know

5. Are you more interested in status monitoring as a concept now than you were a few years ago?

❑ Yes ❑ No ❑ Don't know

6. Would you prefer to automate all, or nearly all, of your system tests?

❑ Yes ❑ No ❑ Don't know

7. Has the imposition of technical standards by the FCC sparked an interest in the use of status monitoring equipment within your system?

❑ Yes ❑ No ❑ Don't know

8. Would status monitoring be helpful during your mandated FCC proof of performance tests?

❑ Yes ❑ No ❑ Don't know

9. What do you think is the major problem with status monitoring systems?

❑ Price ❑ Performance ❑ Reliability

❑ Other

10. Would you be more interested in purchasing an expensive, complex monitoring system, or a less expensive system that offers just simple alarms?

❑ Yes ❑ No ❑ Don't know

11. What's more important to you: internal hardware info (temperature, bias, etc.) or external system info (carrier-to-noise, etc.)?

❑ Yes ❑ No ❑ Don't know

12. Would you favor the development of a common communications protocol that all status monitoring developers could use?

❑ Yes ❑ No ❑ Don't know

13. Should such a system just provide data or would it be more useful if it could actually help *manage* a system via modules for fleet management, spare parts inventory, etc.?

❑ Yes ❑ No ❑ Don't know

Your comments on status monitoring:

FAX Us

303-393-6654

Make a copy of this page and fax it back to us at the number above or mail it to CED, 600 South Cherry Street, Suite 400, Denver, Colo. 80222.

We will tally the results and print it in a future issue. Your suggestions for future questions are always welcome.

We also want some written comments from you on this subject. Names won't be published if you request your name to be withheld, but please fill out the name and job information to ensure that only one response per person is tabulated.

Your name and title

_____

_____

_____

System name:

_____

Your MSO:

_____

Location:

_____

Your job function:

_____

RESULTS

The issue: in-home wiring

Cable operators would welcome the opportunity to turn over maintenance of in-home wiring to homeowners, but are reluctant to do so because they're responsible for signal leakage all the way up to the television, according to the results of a recent survey on in-home wiring.

Consequently, few cable systems encourage homeowners to wire their own premises, fearful of substandard installation practices and low-quality parts purchased from neighborhood electronics stores. Incongruously, nearly every operator charges fees to wire homes and for additional cable drops. Many subscribers wire their homes themselves to avoid paying those fees.

To add to the confusion, respondents said they favor making high-quality cable, splitters and connectors generally available to the public so they can install their own wiring.

Almost unanimously, operators say they are committed to using high-quality drop components, but nearly half said this is a change in attitude over past years, when cost ruled every decision made about connectors and cable.

There was less certainty when it came to the question of drop robustness. About half said their systems could handle a digital signal, while one-third doubted it and about one in five wasn't sure.

We asked for thoughts about in-home wiring policies and practices. Some companies charge for additional outlets, while others leave the in-home wiring and additional outlets up to the homeowners. This survey asked how our readers feel about the subject.

The answers:

1. Does your system believe in installing high quality components for the drop portion of the system?

89 Yes	**11** No	**0** Don't know

2. If so, is that a change in attitude compared to a few years ago?

39 Yes	**46** No	**7** Don't know

3. Does your system use in-house installers?

93 Yes	**4** No	**4** Don't know

4. Does your system use contract installers?

68 Yes	**32** No	**0** Don't know

5. If you use contract installers, would you say they generally perform good work?

43 Yes	**32** No	**4** Don't know

6. Some predict a high-quality drop system will be needed to deliver digital signals to the home. Do you think your system can deliver a digital signal between the tap and the house?

46 Yes	**32** No	**18** Don't know

7. Does your system consider the drop to be a "system" that should rarely be broken open?

50 Yes	**36** No	**11** Don't know

8. Does your system provide drop cable to local homebuilding contractors free of charge or at a discounted price?

64 Yes	**32** No	**4** Don't know

9. Does your system encourage homeowners to wire their own homes?

25 Yes	**71** No	**4** Don't know

10. Does your system charge homeowners a fee to wire their homes for additional outlets?

89 Yes	**11** No	**0** Don't know

11. Does your system charge a monthly fee for additional outlets?

86 Yes	**14** No	**0** Don't know

12. Does your system suffer from excessive direct pickup interference?

29 Yes	**68** No	**0** Don't know

13. Would you favor making high-quality coaxial cable, splitters and connectors generally available to the public?

71 Yes	**29** No	**0** Don't know

14. Would you favor a program where the cable company would be responsible for only the outside plant, much like the telephone company approach to maintenance?

79 Yes	**21** No	**0** Don't know

Selected comments:

I'd rather do my own installs because you meet your customers and can answer questions they have.
–Fred Tompkins, Cooney Cable, Bolivar, N.Y.

I don't believe the homeowner should fool with any part of the wiring in the home.
–Name withheld

We need to do the job right the first time to make a more satisfied customer and save us money in the long run.
–David Mingus, Sonic Communications, Logan, Utah

OCTOBER

6 Ark-La-Tax SCTE Chapter Technical Seminar and Testing. "Back to Basics." Installer and BCT/E exams to be administered in all categories at both levels. Call Randy Berry, (318) 238-1361.

7 Chesapeake SCTE Chapter Technical Seminar. "Telephone Systems in CATV." Location: Columbia, Md. Call Scott Shelley, (703) 358-2766.

7 Great Plains SCTE Chapter Testing Session. Installer and BCT/E exams to be administered in Categories II, III, IV and V at both levels. Location: Courtyard Cafe, Bellevue, Neb. Call Randy Parker, (402) 292-4049.

7 Upper Valley SCTE Chapter Technical Seminar. "Bucket Truck Operation and Maintenance" and "Road Regulations." Location: Holiday Inn, White River Junction, Vt. Call Chip Winchell, (315) 682-1446.

7 Upstate New York SCTE Chapter Technical Seminar. Call William Grant, (716) 827-3880.

11-15 Fiber Optic System Training. Hosted by Antec. Location: Denver, Colo. Call 1-800-FIBER-ME.

12 Desert SCTE Chapter Technical Seminar. "Transportation Systems and Fiber Optics." Location: San Gorgonio Inn, Banning, Calif. Call Greg Williams, (319) 640-1312, ext. 277.

12 Heart of America SCTE Chapter Technical Seminar. "Mid America Show Technical Sessions." Location: Kansas City, Mo. Call Don Gall, (816) 358-5360.

12 Southeast Texas SCTE Chapter Technical Seminar. Location: Warner Cable, Houston, Texas. Call Tom Rowan, (713) 580-7360.

Conferences

5-6 Atlantic Cable Show. Location: Atlantic City, N.J. Call (609) 848-1000.

12-14 Mid-America Cable Show. Location: Kansas City, Mo. Call (913) 841-9241.

18-20 European Cable Communications '93. Location: Olympia, London. Call 011-44-71-222-2900.

25-28 Broadcasting Cable and Satellite India. Location: New Delhi, India. Call 011-91-11-4622710.

26-27 Training '93. Location: Disneyland Hotel, Anaheim, Calif. Hosted by The Cable Publishing Group. Call Jayne Conant at (303) 393-7449 for details.

30 Annual Rocky Mountain Women in Cable Charity Gala. Location: The Phipps Pavilion, Denver, Colo. Call Joanne Lintjer, (303) 778-5555.

13 Digital Audio Training. Hosted by Scientific-Atlanta. Call Bridget Lanham at (800) 722-2009.

13 Delaware Valley SCTE Chapter Technical Seminar and Testing Session. "Computers in Cable" and "Data Transmission." Location: Willow Grove, Pa. BCT/E exams to be administered in categories II and IV at both levels. Call Lou Aurely, (215) 675-2053.

14 SCTE Satellite Tele-Seminar Program "Digital Compression: Part I," featuring Bob Luff of Scientific-Atlanta. Videotaped by the Wheat State Chapter. To be transmitted on Galaxy I, transponder 14. Call SCTE National Headquarters, (215) 363-6888.

16 Cactus SCTE Chapter Technical Seminar. "OSHA and Cable Construction." Call Harold Mackey, (602) 352-5860, ext. 135.

18-20 SCTE Technology for Technicians II Seminar. Hands-on technical training program for broadband industry technicians and system engineers. Location: Harrisburg, Pa. Call SCTE headquarters, (215) 363-6888.

19-20 Distribution Systems Training. Hosted by Scientific-Atlanta. Location: Secaucus, N.J. Call Bridget Lanham at (800) 722-2009.

20 Big Sky SCTE Chapter Technical Seminar. "Fiber in your system." Location: Locomotive Inn, Laurel, Mont. Call Marla DeShaw, (406) 632-4300.

20 Palmetto SCTE Chapter Technical Seminar. "Plant Maintenance and Outage Control." Call John Frierson, (803) 777-5846.

20 Rocky Mountain SCTE Chapter Technical Seminar. "Outage Reduction." Call Ron Upchurch, (303) 790-0386, ext. 403.

20 San Diego SCTE Chapter Technical Seminar. Call Kathleen Horst, (310) 532-5300, ext. 250.

20-22 Fiber Optic Training. Hosted by The Light Brigade. Location: Aiea, Hawaii. Call (206) 251-1240.

21 SCTE OSHA/Safety Seminar. Training seminar for system managers and safety coordinators on maintaining records and developing safety training programs. Location: Harrisburg, Pa. Call SCTE headquarters, (215) 363-6888.

21 Big Sky SCTE Chapter Technical Seminar. "Fiber in your system." Location: Elk Lodge, Helena, Mont. Call Marla DeShaw, (406) 632-4300.

21 New England SCTE Chapter Technical Seminar. "Communication Networks of the Future, Part III–Network Applications and Deployment." Location: Radisson Inn, Marlboro, Mass. Call James Kelley, (401) 943-7930, ext. 230.

21-22 Headend and Earth Systems Training. Hosted by Scientific-Atlanta. Location: Secaucus, N.J. Call Bridget Lanham at (800) 722-2009.

22 Greater Chicago SCTE Chapter Testing Session. BCT/E exams to be administered in all categories at both levels. Call Bill Whicher, (708) 362-6110.

Dual beam satellite retrofit

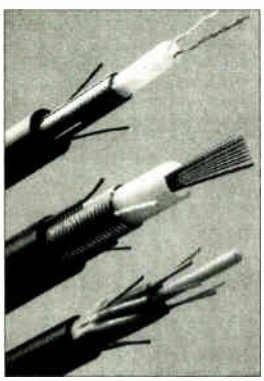
OCALA, Fla.–New from Antennas for Communications is its dual beam, multi-satellite retrofit for 3.7 meter diameter class antennas. The feed enables simultaneous reception from two satellites spaced at two orbital degrees, AFC officials said.

MSF-12

AFC has researched the design of the new product for over a decade, it says, and designed the retrofit such that existing antennas can be equipped to handle multiple satellite reception at a fraction of the cost of a new 12-foot diameter antenna system. Based on the theory of over-moded, dielectric-filled waveguide feeds, the dual beam MSF-12 series retrofit is adaptable to a broad class of small focal length antennas, company officials said.

Circle Reader Service No. 57

Optical ribbon fiber cable



Optical ribbon cable

RESEARCH TRIANGLE PARK, N.C.–Sumitomo Electric Fiber Optics Corp. has announced the addition of optical ribbon fiber cable to its outside plant cable line. The ribbon cable is available in Litepipe-Armorlux sheath construction in counts up to 216 fibers. The cable offers a high fiber packing density for tight ducts or in populated urban areas; the ribbon fibers can be separated easily for splicing of individual fibers and are fully compatible with Sumitomo's T-61 mass fusion splicer.

Circle Reader Service No. 58

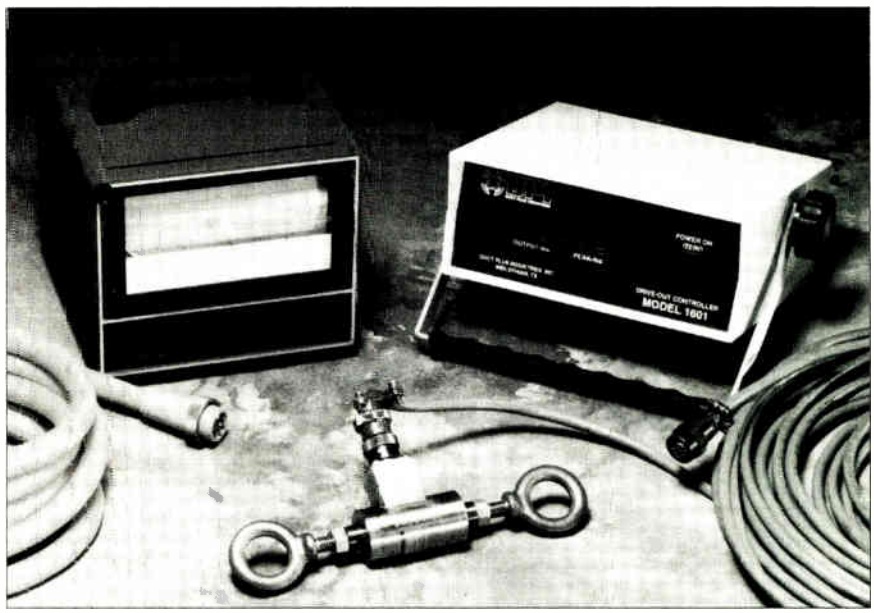
Fiber optic modems

BRANFORD, CT–New from Prodot Communications Inc. is a line of fiber optic modems, designed to provide full duplex transmission over a single fiber. The modems are available in asynchronous and synchronous models for multimode fiber applications and transmit over two to three miles.

Prodot officials said that because full duplex communication is achieved over a single fiber, the modems are capable of doubling the data transmission capability of existing facilities without the need to install new fiber cables.

And, in new installations, raceway cross-sectional area and load bearing requirements can be reduced by 20 percent, company officials said.

Circle Reader Service No. 59



DriveGard

How to know your pull limits

CLEVELAND, Ohio–Carlon Power & Telecom Systems has introduced a force sensing unit for monitoring, recording and responding to the pull force applied to cables. Whether they are aerial or underground is irrelevant: pulling force is monitored through movement of a pulling vehicle. Called the DriveGard, the unit is designed for use with multipair, coaxial or power cables.

The unit includes a small, rugged and weatherproof force sensing unit that can be attached to the pulling vehicle. A microprocessor-based controller and chart recorder (remotely positioned in the vehicle's cab) provides the vehicle's driver with an LCD of pull force, an adjustable alarm set point and a permanent record of pull force used.

Circle Reader Service No. 61

16mW laser board

TARZANA, Calif.–Ortel Corp. has announced its 3620 series of cable lasers and board assemblies which offer up to 16 mW of output power. The series is a complete, fiber optic transmitter subassembly designed to meet the needs of OEM manufacturers of cable fiber optic transmission products. It is available in bandwidths of 600 MHz and 860 MHz.

The higher output power supplied by the 3620 enables signal transmission over longer distances, Ortel's VP of New Business Development Larry Stark says. Or, it can be split into multiple receivers with higher performance.

"We believe that the continuing trend of higher power from DFB lasers is leading toward fiber to the last amplifier as a standard network design," Stark said in a press release. "Such designs would use only passive coaxial cable, splitters and taps downstream from the optical receiver."

The 3620 line includes a high performance DFB laser and an RF predistorter board. To maintain laser temperature and bias control, however, the board must be used in conjunction with DC circuits also supplied by Ortel.

3620 series laser boards

Circle Reader Service No. 60

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Don't throw me in that briar patch!

By Archer S. Taylor, Director and Senior Engineering Consultant, Malarkey-Taylor Associates

He was a Cockney whose parents combined aggressive toughness on his mother's side with enthusiasm and imagination on his father's. They were of England's lower middle class, struggling to hang on to the thin ledge that separated them from the Respectable Poor.

At the ripe old age of 15, after eight years in a good private school at Oxford, Samuel Insull rebelled against his father's determination that his son become a minister, finding employment as an office boy in a firm of actioneers. He learned shorthand, enjoyed opera, and devoured classical works in political economy and literature. He joined a literary society through which he was able to keep abreast of current events.

As secretary of a literary society in 1877, Insull invited a visiting American, Phineas T. Barnum, to lecture on publicity and promotion. He later described it as "screamingly funny," and learned well from the renowned American circus man the principles of public relations, P.T. Barnum style.

A year later, Insull himself lectured on an article in *Scribner's Monthly* about an American inventor named Thomas A. Edison. He was so impressed that he read everything he could find about Edison, who quickly became his hero. Within three years, Sam Insull was firmly installed as Edison's private secretary and "financial factotum."

By 1892, Insull had migrated through the Byzantine, often harrowing corporate financial maze of the Edison companies to become president of Chicago Edison. He also soon assumed the presidency of each of the two rival industry trade associations.

In his presidential address in 1898 to the National Electric Light Association (NELA), predecessor to the Edison Electric Institute (EEI), he proposed that "*the electric utility industry seek to have itself regulated by state commissions clothed with full power to fix rates and standards of service, and seek to alter the conditions of franchises so that if a company failed to render satisfactory service, the municipality it served would have the right to acquire its plant at cost less depreciation.*"

The members were stunned!

For the next few years, Insull set out to win public favor with a remarkably farsighted concept of public relations:

"I care not", he said, "how good may be the franchises under which you operate . . . , how able may be the management of your property . . . , or how good may be your engineer and how perfect your plants, unless you can so conduct your business as to get the good will of the community in which you are working, you might just as well shut up shop and move away." By understanding and respecting the business of urban politics, Sam Insull became a master political craftsman.

By 1905, the Public Policy Committee of NELA was lobbying energetically for state regulatory commissions. While many in the industry still considered regulation to be the lesser of evils, fear of municipal ownership was so great they adopted a working policy almost exactly coincident with the three-volume report of the prestigious National Civic Federation.

Comprised equally of businessmen, leaders of organized labor, and "the public," the Federation had been effective in bringing about a number of far-reaching reforms. Its executive committee included John Mitchell, head of the United Mine Workers, Louis Brandeis, who later became an esteemed Justice of the Supreme Court, and Samuel Insull. Spurred by the Federation report, legislatures in Wisconsin, Massachusetts and New York established in 1907 the first regulatory commissions.

Insull was right. The state commissions have provided protection against competition. Since the commissions were not in the business of creating bankruptcies, their rate-fixing power came close to a guarantee of profitability. It was a bit like Brer Rabbit pleading: "Don't throw me in that briar patch."

It also brings to mind Senate bill S-2653 lobbied in 1959-60 by NCTA with an expectation of success until, at the last minute, Milt Shapp (Jerrold) and Henry Griffing (Vu-More Theaters) roused the industry grass roots to vigorously oppose any kind of regulation. S-2653, as I understand it, would have given the FCC pre-emptive authority to regulate the CATV industry. But the simplistic, emotional appeal of "no regulation" carried the day and S-2653 failed by a single vote, amid angry charges of "double-cross" on all sides of the issue. So, denied the authority to design regulations based on its own not inconsiderable financial and technical expertise, the FCC chose in 1972 to assign the major role to the cities and counties.

Thus, primary financial and regulatory authority was diffused among elected city councils and county boards that were never constituted to deal with such complex and esoteric financial and technical issues. Demagogic treatment based more on emotions, passions and prejudices than on economics and technology was assured. It can be argued that if S-2653 had passed, the cable TV industry might have been spared the severe bashing and punitive legislation of the last few years.

In the end, Samuel Insull's $3 billion empire (in 1926 dollars) collapsed in the aftermath of the 1929 financial crash, arguably because of lack of regulation of holding companies and banks. "What I did," he said in 1934, "when I did it, was honest [i.e. legal]; now, through changed conditions, what I did may or may not be called honest." After resigning under duress from all of his corporate positions, Sam Insull retired to Paris in June 1932.

Anticipating the grand jury indictment on October 4, 1932, he fled with his wife first to Turin, then to Athens, hoping to avoid extradition. In March 1934, he was apprehended and, after a spectacular and stormy trial, was acquitted of charges of embezzlement and larceny. He returned to Paris, living on generous $75,000 pensions, until he died in 1938, stripped of his former power and respect.

Note: Much of this information, including the direct quotations, is found in the fascinating and well-documented biography entitled simply "Insull", by Forrest McDonald, University of Chicago Press, 1962. CED

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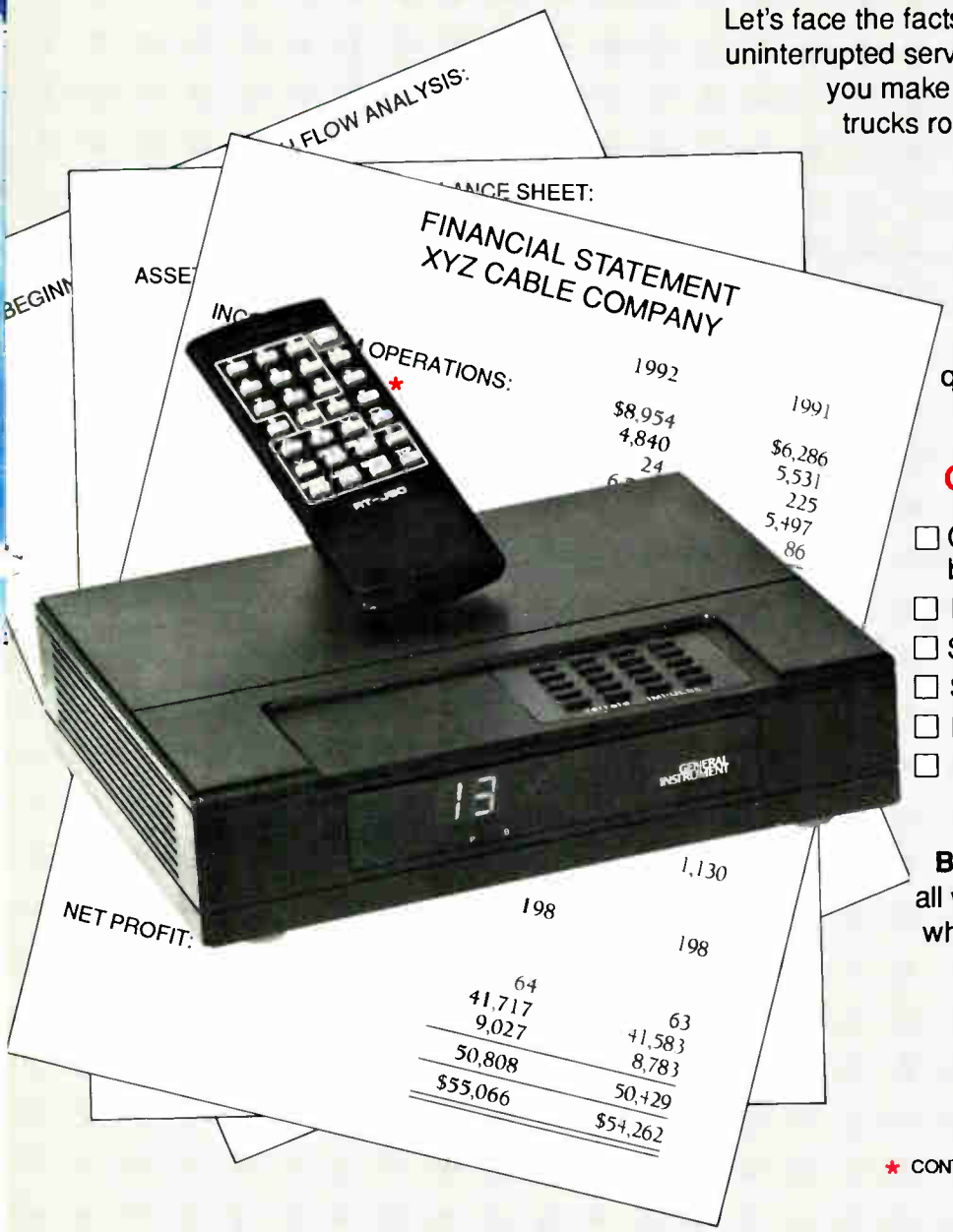

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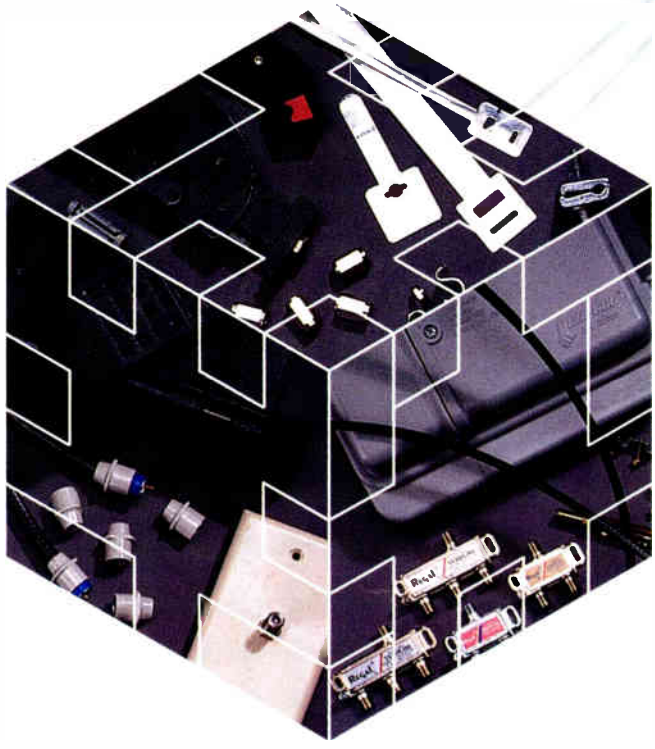

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