CED

THE MAGAZINE OF BROADBAND TECHNOLOGY / MARCH 1990

COMPLIANCE

System design made easier

—page 42

Crossing barriers with infrared video

—page 60

The dream of digital video: When will it come true?

—page 28

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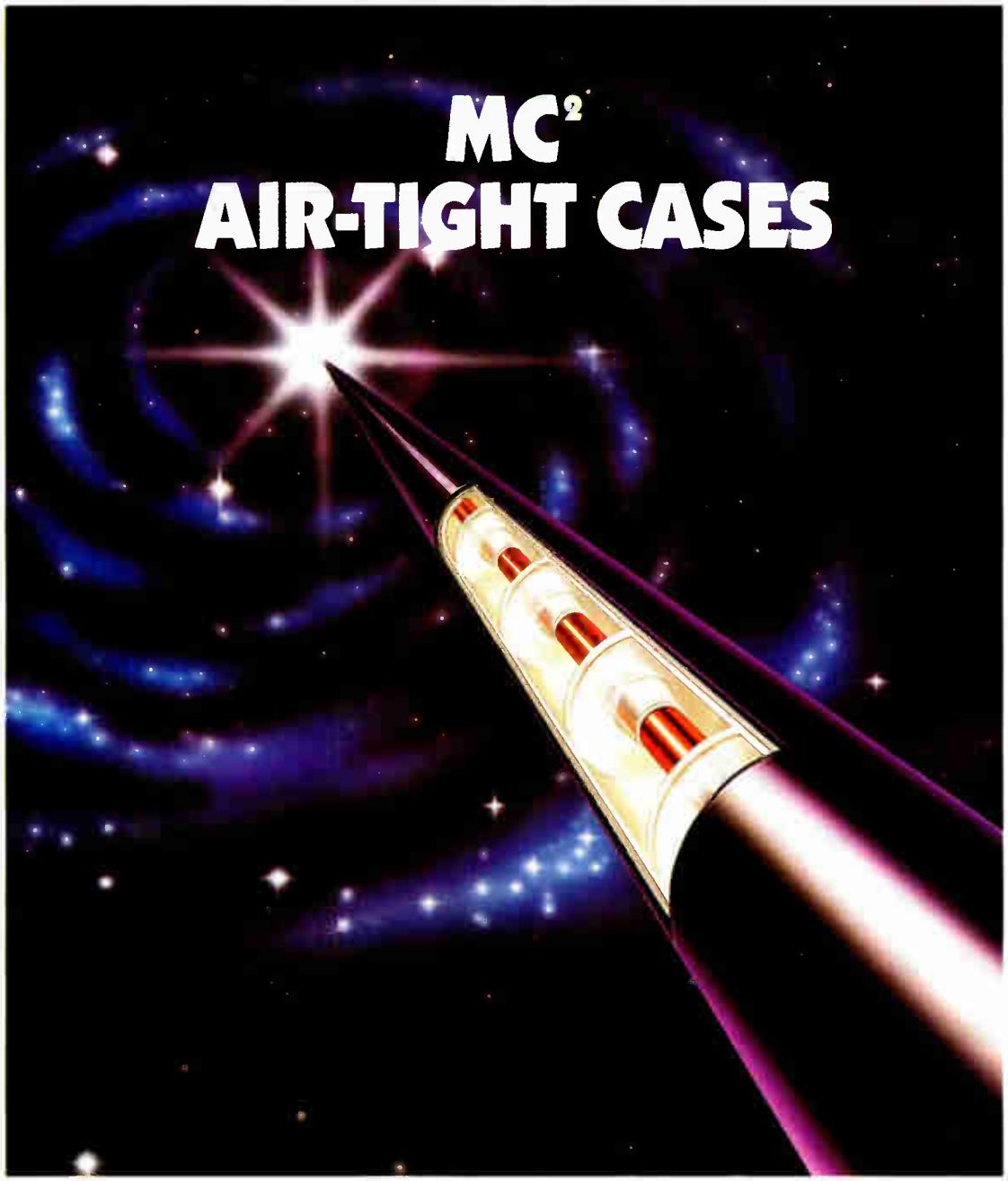

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March 1990 | CED | Volume 16, Number 3

Ready or not, here it comes—maybe 28

Now that fiber optics has been accepted by CATV operators, the question has become 'When will it make sense to use digital equipment?' Some, like C-Cor/Comlux, are ready to offer product that is price competitive with FM supertrunk gear. Others say digital's day is still a few years away. Who is right? *CED*'s George Sell attempts to answer this and other relevant questions in this look at digital fiber optics.

'Video over Fiber' examined at OFC 36

At this year's optical fiber conference, held January 23-25, both the telecommunications and cable industries took a closer look at video over fiber. While still focused differently than CATV, the telecommunications oriented technical sessions demonstrated a definite awareness of the possible opportunities for both industries. *CED*'s Kathy Berlin looks at what the show meant for the cable industry, along with a discussion of new product announcements from the exhibition floor.

Using CAD to design cable systems 42

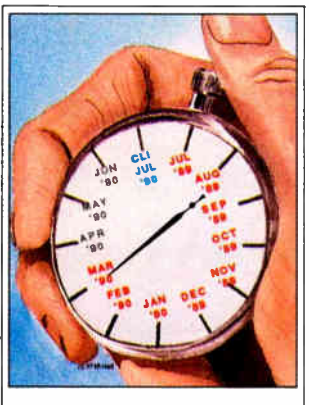
Because of the inherent waste involved in designing cable systems by hand, many CATV systems are turning to computer aided design and drafting to aid in the development and maintenance of system maps. In this paper by Tony Steinmetz of Star Cablevision Group and Michael Bauer of American Digital Cartography, the various aspects of CAD are examined including such topics as mapping, digital maps, system feasibility, market studies and system layout.

CLI COMPLIANCE

The flyover as a tool 52

As the first quarter of the new year draws to an end, the July 1990 compliance deadline looms ever closer. Many operators are only now beginning a program to assess system leakage; others have long since begun a program but still work diligently to maintain the system. For both, the use of a flyover as a maintenance tool is what Chris Duros, of Cabletrac, evaluates in this article. Finding leaks, analysis and maintaining system integrity are all explored.

CLI COMPLIANCE



Using the flyover, *see page 52.*

Crossing natural barriers 60

Although it's not a new technology, atmospheric infrared optical transmission links are becoming a viable alternative to hard-wire and microwave in order to cross man-made or natural barriers. A description of the technology, its benefits and drawbacks, and some applications are examined in this article by *CED*'s Kathy Berlin.

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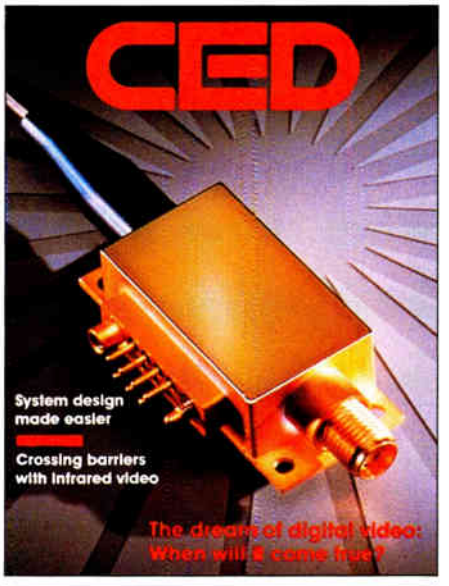

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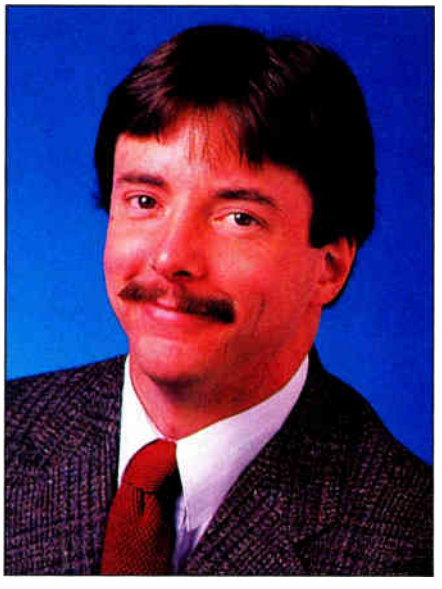
Reader Service Number 3

Filling the air with footballs

Now that the MSO consortium has formally reached agreement to provide a Ku-band direct broadcast satellite service to the United States (see page 10 for details), we'll finally have an opportunity to find out if DBS can ever get beyond the starting blocks in this country.

Previous announcements and half-hearted attempts to offer DBS either died on the vine or failed to attract a critical mass of subscribers. C-band TVRO remains viable, but lost much of its luster with the advent of scrambling in the mid-1980s. The result has been that large numbers of rural Americans have been unable to augment their television menu without laying out a lot of cash for a large satellite dish.



What this new Ku-band venture hopes to do is avoid the price of hard-wiring rural areas and offer a small package of broadcast fare. It's a pre-emptive strike of sorts; one fashioned to keep competitors at bay while the MSOs add to their subscriber counts.

By the time this magazine went to press, the consortium had not yet decided what scrambling system it was going to utilize. Inside speculation indicated that General Instrument's VideoCipher technology—already the *de facto* standard for satellite video scrambling and descrambling—would be the choice of the new venture as well.

Why? Unfortunately, probably not for the right reasons. The engineering staff charged with deciding which scrambling technology to use should be free to select the best technological and cost-effective answer. However, it's become impossible for good technologists to operate in a vacuum and ignore the political ramifications of their decisions. And this decision is fraught with political footballs.

If VideoCipher is chosen, the consortium will have to hope, along with all the other programmers, that the new VideoCipher II-Plus descrambler will deter the rampant piracy which has encumbered the previous-generation VideoCipher II boxes. They'll have the benefits of being compatible with the installed base of C-band dishes (many of which have dual feedhorns, allowing them to receive both C- and Ku-band programs) and, thus even more potential subscribers.

However, if the venture were to select a different, non-compatible system (Scientific-Atlanta's B-MAC system, for example), a number of other benefits and obstacles come included. A different vendor could help establish a marketplace balance and provide VideoCipher with competition (and nothing improves products like competition). And with advanced TV on its way, the Ku-band service could act as a good test bed for satellite delivery of the various proponents.

Theoretically, the consortium doesn't have to choose VideoCipher, but if it doesn't, it will suffer from a "backlash" from the satellite community and, most likely, a bevy of senators and congressmen who would love to unleash another round of cable-bashing tirades and barbs about cable's "monopolistic attitudes."

The bottom line is this: a new scrambling system should be chosen if it's better than VideoCipher. But VideoCipher will probably be installed because of all the political baggage. And that's too bad.

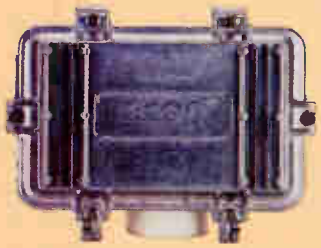
Roger J. Brown

Roger Brown, Editor

IN ORDER TO SHOW YOU EVERY PRODUCT WE HAVE AT CABLE SERVICES - WE'D HAVE TO FILL EVERY PAGE OF THIS MAGAZINE. SO, HERE ARE JUST A FEW EXAMPLES.

■ Head-end

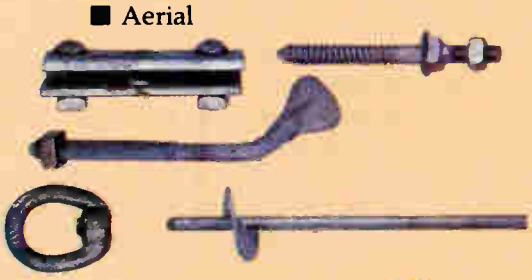
■ Distribution



■ Test equipment

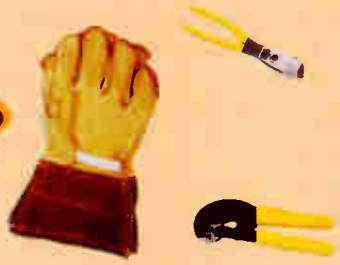
■ Cable & Connectors

■ Aerial



■ Underground

■ Tools & Equipment



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Reader Service Number 5

GE Americom, 9 major MSOs team to offer Ku-band DBS service

After nearly a year of nebulous rumor linking several major cable television multiple system operators with a new Ku-band DBS service, it appears the rumblings were true as the consortium has, indeed, reached agreement to offer programming to rural America.

The consortium of cable operators and GE Americom, which will be known as K Prime Partners, will lease 10 of the 15 operating transponders on GE Americom's medium-power Satcom K-1 satellite and offer a programming package of seven "superstations" and up to three pay-per-view channels. The value of the agreement with GE Americom is said to be more than $100 million.

Nine major MSOs, including Tele-Communications Inc., American Television and Communications, Comcast, Continental Cablevision, Cox Cable, Newhouse, United Artists Entertainment, Viacom Cable and Warner, have pooled their resources and plan to offer the service to consumers through exclusive territorial distributorships sometime in the third quarter of 1990.

The programming mix chosen was designed to be different than that currently offered by C-band TVRO and traditional CATV in order to appeal to viewers who have already, for one reason or another, shunned that type of programming. Slated to be offered are: WWOR and WPIX, from New York; WSPK from Boston; WGN from Chicago; WTBS from Atlanta; KTLA from Los Angeles; and KTVT from Fort Worth, Texas.

In addition, up to three PPV channels will be offered. Exactly which service(s) will be chosen had not been decided by press time.

The service will also differentiate itself from C-band services by offering a "total package service," where the subscriber pays a one-time installation fee and a fixed monthly sum (expected to be between $20 and $25 per month) in exchange for the programming and rental of the receiver.

An option to purchase the one-meter dish will be offered to subscribers. However, only the service's distributors will be allowed to own the decoder in hopes that the piracy problems encountered by VideoCipher in the C-band arena are avoided.

As of press time, the consortium had not determined if it planned to use VideoCipher scrambling or a different, non-compatible type. However, observers speculate that the much-maligned VideoCipher technology will be chosen in order to gain favor with the Satellite Broadcasting and Communications Association.

In fact, SBCA's Retail Council and the MSOs have already met head-to-head, and the SBCA was given "assurances" that existing owners of home satellite equipment would have "ready access to the new service," according to a press release from SBCA.

"If the K-1 venture involves some system not compatible with the industry's *de facto* standard (VideoCipher II), there will be a strong industry backlash," said Rik Hawkins, chairman of the SBCA Retail Council.

K Prime Partners' participants acknowledge that similar Ku-band ventures have failed, costing more than $200 million, but believe that the programming mix is correct. Also, with more partners involved, the relative risk on any one participant has been significantly altered.

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CableLabs specifies 1990 goals, projects

It's one of those things you probably take for granted, but CableLabs and Raychem have agreed to conduct a testing program to figure exactly why and how F-connectors placed outdoors fail because of corrosion.

The testing program will examine what occurs at the molecular, or materials, level. CableLabs and Raychem will electrically and mechanically document interface failures that are accelerated in the lab. The testing will explore material changes and electrical degradation that occurs as a result of copper accelerated salt spray exposure. Also, the effects of low voltage and low current power passing in drops will be examined.

"This process...will create a scientific basis for us to move toward a 'system' solution to the problem," said Tom Elliot, CableLabs vice president of science and technology.

Also, CableLabs recently spelled out its 1990 work plan in *Specs*, the Boulder-based consortium's monthly newsletter. The key components of the Labs' two-pronged strategy are Optimized System Operations (OSO)—which focuses on improving current system operations—and Advanced Network Development (AND)—which investigates cable's future networks and modes of operation.

The work plan is a is a key part of the Labs' $3.5 million operating budget and will draw nearly $1 million from the research fund established for R&D in 1990.

The goals of OSO are to "improve the operation of existing systems by identifying all the alternatives available for execution in a cable system," according to the newsletter. For example, the first project under the OSO involves intra-home wiring with the goal of insuring signal quality into the home and the TV and VCRs. Also, the Labs plans to work with builders, architects and contractors to provide detailed information on the design, layout and installation of cable wiring inside the home. Also, projects like the above-mentioned F-connector testing will be undertaken in order to improve system operations.

The AND project, on the other hand, looks to the future with a heavy emphasis on field testing concepts. Some initial plans for testing and evaluation under AND are: design and operation of a 1 GHz system; appraising the technical and economic feasibility of interactive and on-demand services; assessing the optimum number of channels that make economic sense for an operator; integrating non-video services on a tree-and-branch network; and identifying future business opportunities.

Development costs force HDTV merger

Speaking of consortiums, the huge costs of designing and creating an advanced television system have forced a consolidation among two major HDTV system proponents, effectively narrowing the field of contenders trying to win FCC approval down to just six players.

North American Philips and the David Sarnoff Research Center have joined forces under a new name, the Advanced Television Research Consortium, and will focus on developing Sarnoff's previously-announced Advanced Compatible Television I (ACTV-I) and ACTV-II systems.

Sarnoff expects to be able to offer the ACTV-I system, a 6 MHz, 1,050-line, 16 x 9 widescreen format, sometime in 1993 and follow with its ACTV-II, which will display true HDTV, a few years later, according to Sarnoff executives.

Like fellow contender Zenith, the new consortium will focus its development efforts on a simulcasting approach, in which traditional signals are sent on one NTSC channel while the HDTV information is sent via a separate channel.

The consolidation of efforts means more funding for Sarnoff Labs, which observers say has already spent more than $75 million developing advanced television systems. Once the system becomes operational, Thomson Consumer Electronics and Philips Consumer Electronics will market the ACTV and HDTV receivers.

Other observers say the agreement by the two proponents to pursue the simulcasting approach effectively kills any thought of developing an augmentation approach. Zenith and NHK (with its narrow MUSE system) also have proposed simulcasting systems in order to remain compatible with today's NTSC transmission scheme, a stipulation mandated by the FCC.

What remains unclear is how the announcement will impact the advanced TV testing calendar scheduled by the FCC Advisory Committee on Advanced Television Service. In that calendar, Sarnoff was scheduled to test ACTV-I in the fall of 1990. ACTV-II and Philips' system were slated to begin testing in 1991.

VideoCipher slates upgrade plan

Last month, we told you of VideoCipher's efforts to plug the dike and stop the piracy associated with the VideoCipher II satellite descrambler by introducing the new VideoCipher II-Plus ("Can VideoCipher regain cable's trust?" *CED*, February 1990, p. 26). Since then, the San Diego-based division of General Instrument has announced the details of its upgrade program.

Slated to begin on April 2, the upgrade program will provide an optional upgrade path for current VC II owners to replace it with a new VC II-Plus unit.

Distributors, dealers, licensees or consumers who own untampered, undamaged VC II modules may trade them in for a charge of $129, plus shipping, handling and dealer service charges. Consumers may swap the module on their own or choose to have an authorized VideoCipher Module Service Dealer to the work.

Significantly, anyone holding a damaged or tampered descrambling module may also exchange the module for a new one, for a limited time. The upgrade charge for consumers is $299 plus $20 shipping and handling. Dealer and distributor exchange price is $279 plus shipping and handling. Also, a non-working VC II module may be upgraded for $129 plus shipping and handling.

The VC II-Plus module offers tighter security through the use of a very large scale integrated chip that combines the functions of multiple ICs, and expands the number of tier bits (essentially, channel capacity) from 56 to 256.

The new VC II-Plus units are already being manufactured and shipped to dealers, according to VideoCipher officials. About 50 percent of the modules manufactured in January were VC II-Plus units. The company expected to reach 100 percent production of the new, second-generation modules by the end of February.

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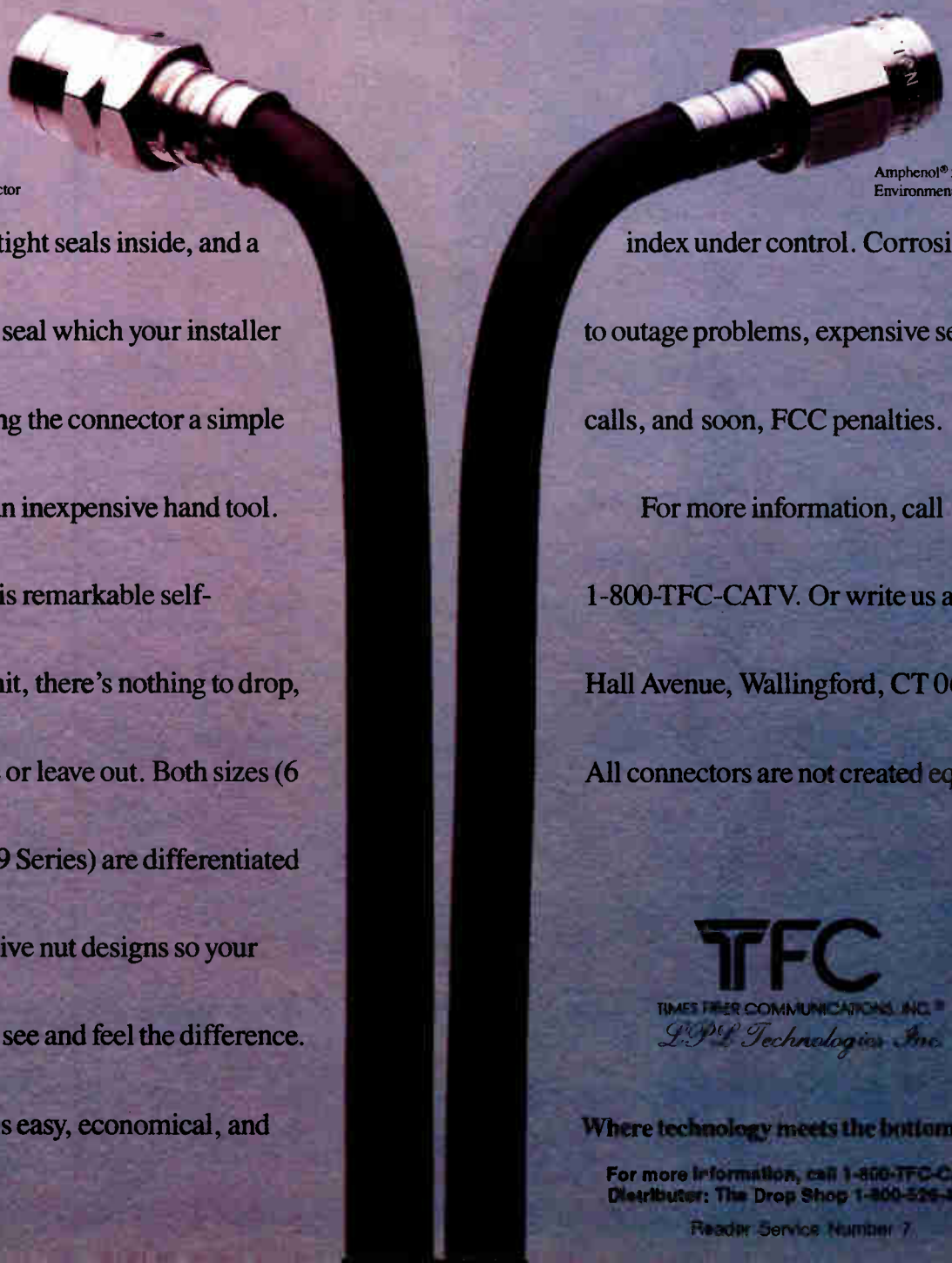

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Reader Service Number 7

Garden State Cable announces rebuild

Garden State Cable TV, previously known as NYT Cable and based in Cherry Hill, N.J. has announced it plans to embark on a four-year upgrade that will boost channel capacity from 36 to 54 channels.

The 3,200-mile system presently passes 270,000 homes and counts 170,000 of those as paying subscribers. The franchise area covers 59 communities and 700 square miles of geographic area.

The system has chosen the new Jerrold SX amplifier for its distribution equipment and Impulse 7000 converters, according to Patrick McCall, Garden State's vice president and general manager. The system will remain a real-time two-way system and will maintain the present base of Kanematsu-Gosho's Sprucer converters, said McCall.

In addition, the rebuild will include seven FM fiber optic trunk runs from the main headend to a series of hubs. From there, traditional coaxial tree-and-branch architecture will be employed. The first trunk run is scheduled to be completed by September.

Videotron set to offer new converter

It's beginning to look like the early part of the '90s will be characterized by numerous introductions of "advanced services" via traditional CATV operators.

A case in point is Le Groupe Videotron, Canada's second-largest MSO, who plans to team with a U.S. MSO to roll out a new cable converter capable of offering video, videotex, data, closed-captioning services, electronic mail, video games and software downloading. In addition, the box can be configured to receive Videotron's ACTV, an ad-supported interactive pay service that is up and running in Canada and slated for a pilot test in Continental Cablevision's Springfield, Mass. system.

The new box, dubbed Videoway, is being built for Le Groupe Videotron by Zenith Cable Products. They will be used in the U.S. for ACTV affiliates who need the converters to offer the service.

According to ACTV officials, 300 homes are scheduled to take part in the Continental test, which will last eight to 12 weeks. ACTV and Continental have reportedly been working jointly to develop local interactivity with sports and music and expect to offer roughly six hours of programming per day.

TCI rolls out Starport in Boulder

As announced last fall, Tele-Communications Inc. has begun receiving large numbers of General Instrument's Starport addressable module for the MSO's well publicized "on-premise" broadband signal delivery project, according to Tom Elliot, director of research and development for the nation's largest operator.

Approximately 50 Starports have been installed and operating in TCI's Boulder, Colo. system for several weeks, said Elliot. Now that TCI has begun receiving the units in bulk from Jerrold, Starport will be installed in all Boulder households, and rolled-out to other TCI systems immediately, Elliot said.

However, the other systems probably won't be 100 percent addressable, he added. Starport will be initially offered to subscribers who take pay services, pay-per-view and high spin and high churn areas, concluded Elliot.

In other news,

- Comlux announced the first sale of its Series 3000 eight-bit digital fiber optics terminal gear to Rogers Cable TV. The new gear, which debuted at the Western Cable Show in Anaheim last December, will be installed in three Rogers systems and will serve as the top layer, or backbone, of the Rogers fiber optic architecture.

The systems will initially transport 58 video channels, eight per fiber. Video signal-to-noise is specified as better than 60 dB. The systems will be installed in Toronto, Vancouver and Grand River, Ontario.

- Scientific-Atlanta has jumped on the Eidak bandwagon as the fourth corporate investor in the anti-taping technology. The Eidak Copyguard System, when applied to PPV events, renders VCR recordings of the event essetially unwatchable while leaving the original broadcast of the event intact.

S-A joins CableLabs, TCI and Continental as investors. Together, the four partners account for 27 percent of Eidak equity. The Eidak system has been tested in two markets and has been found to be compatible with laser disc technology. Initial commercial applications will be CATV and hotel PPV channels.

- In case you thought CATV was catching up with the consumer electronics guys, Hughes Aircraft has developed an integrated circuit chip that will allow audio-based products to produce a three-dimensional audio effect from conventional mono or stereo broadcasts.

The Sound Retrieval System has been incorporated on a single chip and is expected to be placed in a variety of audio products, including televisions.

The Hughes Sound Retrieval System is a patented sound reproduction technique that recreates the ambience and dynamic range of an original live performance or studio situation. It has now been incorporated on a single chip and is expected to be placed in a variety of audio products.

The effect on cableis expected to be negligible, yet it is another benchmark of quality against which cable transmission will ultimately be measured. ■

—Roger Brown

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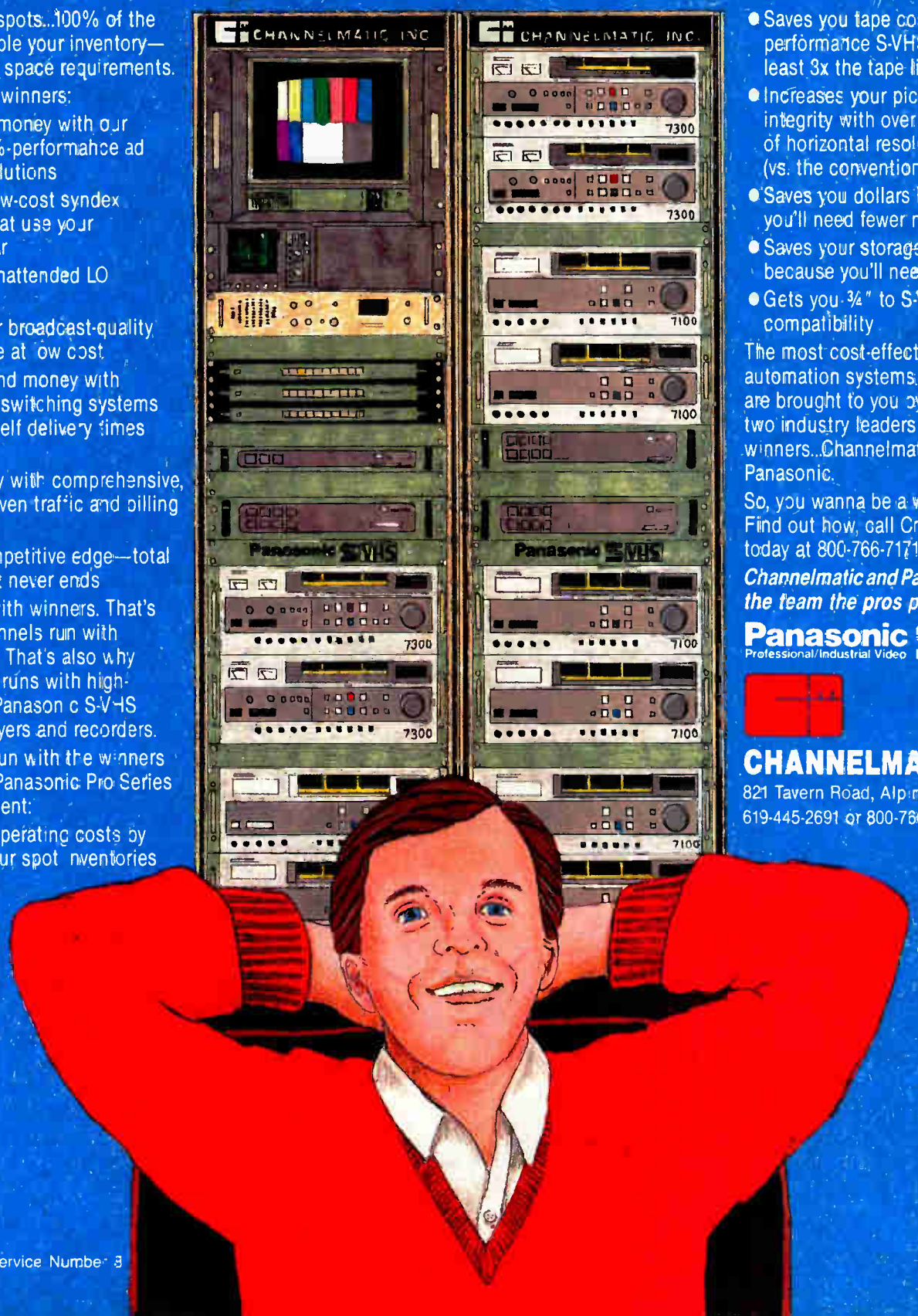

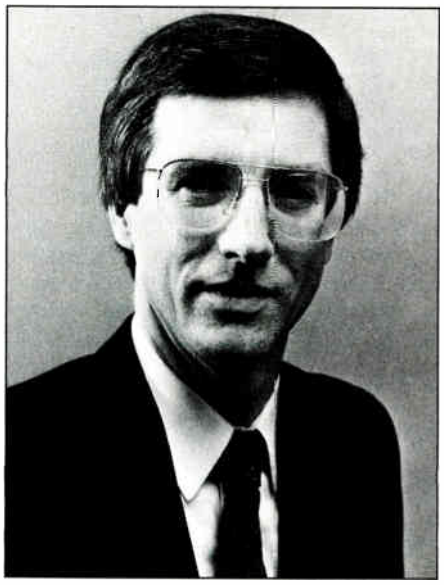

Paul Heimbach

On technology's cutting edge

With so much emphasis lately on better technology, improved service and expanded channel capacity, the cable industry seems immersed in a beginning where new technologies will eventually result in expanded channel capacity for the consumer. But with this expansion also comes the much asked question of what to do with the additional capacity.

"Maybe we, as programmers, will be in a position where we can narrowcast," says Paul A. Heimbach, senior vice president of engineering for Viacom Networks Group. "Maybe there are ways to provide other kinds of entertainment programming on more of a demand basis; maybe we have the opportunity of delivering digital video or high definition television or other digital services."

Regardless of the product being delivered, technology is hitting the programmers as firmly as cable operators. And staying on top of technology demands the same commitment from program engineers as system engineers. Heimbach, who spent seven years with CBS before beginning a 10-year relationship with the cable industry, has the drive, dedication and foresight necessary to meet that demand.

"CBS had an extremely professional atmosphere in the engineering department," states Heimbach. "Everything that was done, was done correctly or it wasn't done at all. I learned to do the best I can and to make sure that whatever is done is done as well as possibly can be."

'A friend of a friend'

Heimbach began his employment with CBS in 1973 after his wife (who at that time was just an acquaintance) informed him in 1972 that the director of engineering for the broadcasting company was looking for people who had a broadcasting background, understood computers and also had an electronics background.

Heimbach, who at the time was employed by the Department of Defense at the Naval Air Development Center in Warminster, Pa. (after graduating from Penn State in 1971 with a degree in electrical engineering), submitted a resume to CBS. It was a year later that Heimbach received a letter asking him to interview with the company.

While at CBS, Heimbach gained experience in television broadcast engineering and television facilities engineering including video, audio, computer control, architecture and to some extent, acoustics. It was this well rounded experience that perhaps enabled Heimbach to make the move to Home Box Office (HBO) in 1980 when he felt the need to find an industry offering new challenges.

Reflecting on his beginnings in cable, Heimbach said, "Back in 1980, the operators were still learning about satellites, how they worked, how the receiving equipment worked, how to install the equipment and use it properly. So we spent a lot of time working with the cable operator trying to educate him about this new method of program delivery and trying to help him maintain the system so there was continuity in programming and delivery of the best possible signal to viewers."

The involvment with satellites was also new to Heimbach. But he dove in, learned quickly and soon became involved with putting together a specification for a satellite scrambling system. "We wanted a system that would provide a high degree of security, would provide very good signal quality and be cable operator friendly," says Heimbach. "I wrote the initial spec and once I did that I couldn't pull myself away from the project."

Looking back on some of the piracy problems encountered with the VideoCipher II, Heimbach remains optimistic. "We learned our lesson early on; there's no such thing as an unbreakable scrambling system. We underestimated the pirates and how clever the pirates were or could be." In the future, says Heimbach, "we have to begin thinking about HDTV, digital audio transmission and improved NTSC television. Maybe there are better, more efficient ways to transmit our signals...perhaps we should begin thinking about the future transmission format. Not because the VideoCipher is a failure or it's not providing security, but because we're a lot smarter than we were five or six years ago."

Staying in front of technology

After nine years with HBO, (during which Heimbach received a masters degree in business policy) Heimbach made the move to Viacom in his current capacity. "The nine years I spent at HBO were good, challenging years. But I felt it was time to explore other opportunities, to try something new and different." Now responsible for engineering development, satellite-related issues and affiliate engineering support for the company's basic cable and pay television networks, Heimbach sees Viacom as a leader in cable technology. "That's the kind of work I like to do and enjoy doing," says Heimbach.

In order to keep in touch with cable operators, other programmers and manufacturers, Heimbach is a member of the NCTA engineering committee as well as being Viacom's representative on the ATSC (advanced television systems committee). The involvement with both committees is important to Heimbach to discuss related issues with other representatives and, as with the ATSC, having a small impact on what the United States' position can or will be in HDTV matters.

For the cable technical community, as the capability of delivering more programming to the home increases, having that relationship with someone like Heimbach will be beneficial. "I think there's going to be a lot of change," says Heimbach. "We're going to see improved quality in television. We're going to have better NTSC, hopefully HDTV where it makes sense. To whatever extent I am able to provide some engineering expertise, some engineering support or engineering input to the industry, I'm happy to do that." ■

—Kathy Berlin

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Television as a worldwide media

At an early February meeting of the Montreux International Television Symposium Planning Committee, I was struck by comments made by several of the committee members. In particular, comments by the high ranking government television officials from the Soviet Union, China, Hungary and Czechoslovakia gave me pause. These, as well as the comments made by several Western European television executives, spoke about the way television has shaped and changed their world during recent events.

Since its inception over 50 years ago, television has had an impact on everyone that it has touched. While all of that has been well documented, the issue of how television as a media will be viewed—in the historical context of the most recent changes in East/West relations—is really what the conversation was about.

Each and every one of the Eastern bloc representatives, at one point or another during the course of the meeting, commented on their interest in cable television for their countries. While cable has been a great success story in the United States, it has taken many years for its potential to bring diverse views to the average American—and to be recognized by the rest of the world.

I should point out that cable in other Western European countries, and indeed in some Latin American countries, is not new. People are frequently surprised to find that places like Belgium have penetration rates around 90 percent and that the city of Zurich, Switzerland, has had a cable system, very much like an American system, for over 30 years.

What was particularly striking, however, about these conversations was that they involved countries where we (as Westerners) have traditionally felt that the government was not overly anxious for the number and/or diversity of views that cable and cable technology implies to become readily available.

Yet at this time and place, the leaders of several Eastern bloc countries were not only keenly interested in the possibility of cable technology, but positively asking their American and Western European committee colleagues to put them in touch with cable equipment suppliers and cable executives who could help bring cable television into their countries.

Indeed, one committee member made a public request of the entire committee that the 1991 Montreux Symposium have a major session on cable for developing countries. In particular, he went on to say, the issues of bringing low-cost multiple program services to a mass market should be explored.

Low-cost important

These low costs take on particular importance because in Third World or developing countries there are various other infrastructure issues that must compete for any available resources. Reliable road systems as well as reliable electrical main systems have not been fully developed in some of these countries. Naturally, they frequently take first priority in governmental planning, but, apparently, so does information for the general population of today's world.

Privately, several of the members said to me that it was their personal beliefs, and the belief of many of their friends and colleagues, that television had played a part in the changes that the world sees today. Now this is not news, everyone who has paid attention in recent times has come to that conclusion. Indeed, the ability to report news under trying circumstances with portable satellite uplinks has become, in many instances, news itself.

But, more than just the ability to put news on the air, the growth of multi-program sources seems to have been part of the fuel for the ferment of change in the world. While these people are asking about the technology and potential for bringing cable television into these areas, one can't help but have a suspicion that the issue is not so much cable television itself, but the ability to rapidly connect a large number of people to a satellite receive station for distribution of multiple programs.

As I travel in other countries I'm struck by the commonality of interest that I see amongst people who have come to depend on television as a primary means of receiving daily information.

Government more than a say

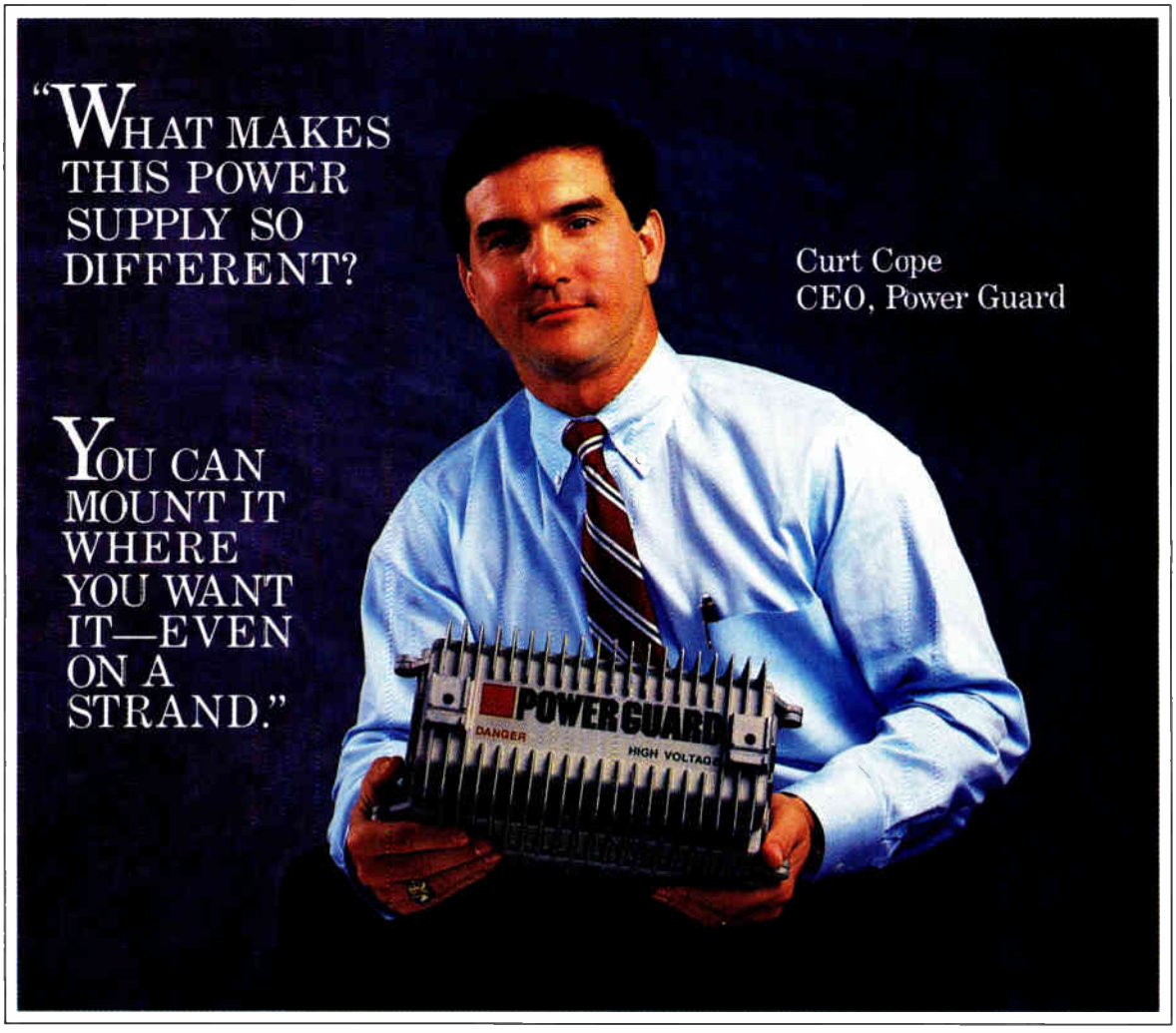
What has really begun to change is who owns and controls those conduits. We Americans don't quite understand that in most of the rest of the world (both the West and the East) private ownership of the means of distribution is almost unheard of. The government not only grants the licenses for television stations in most parts of the world but, programs the transmissions as well.

Many of the world's people have come to recognize that news from a different source has intriguing possibilities. One cannot stay in a hotel room in the Western world without seeing an American cable news program. If you listen carefully to the reports, all the reporters will mention the issue of who has control of the radio and television transmitters. While this is only one milestone in the sequence of events, it seems to have more to do with how the issue comes out than almost any other military or political action.

The cable television industry has been involved with the bringing of diverse views to a wide number of people for many years, almost as long as there has been television. And while we think of cable as uniquely American in concept, the fact is that some of European countries have had cable nearly as long as we have.

Now it would seem that many more countries and many more ideologies will be affected by the diversity of voices that cable television and satellite programming can make possible. Think about that as you go about your day-to-day business of trying to run a cable system in America—in a way that your subscribers will find pleasant and worthwhile. ■

By Wendell Bailey, Vice President Science and Technology, NCTA



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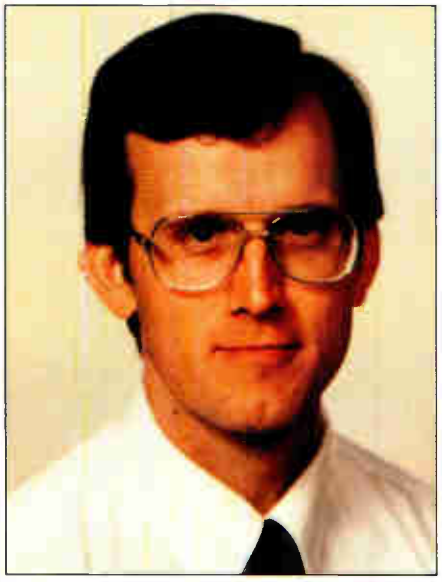


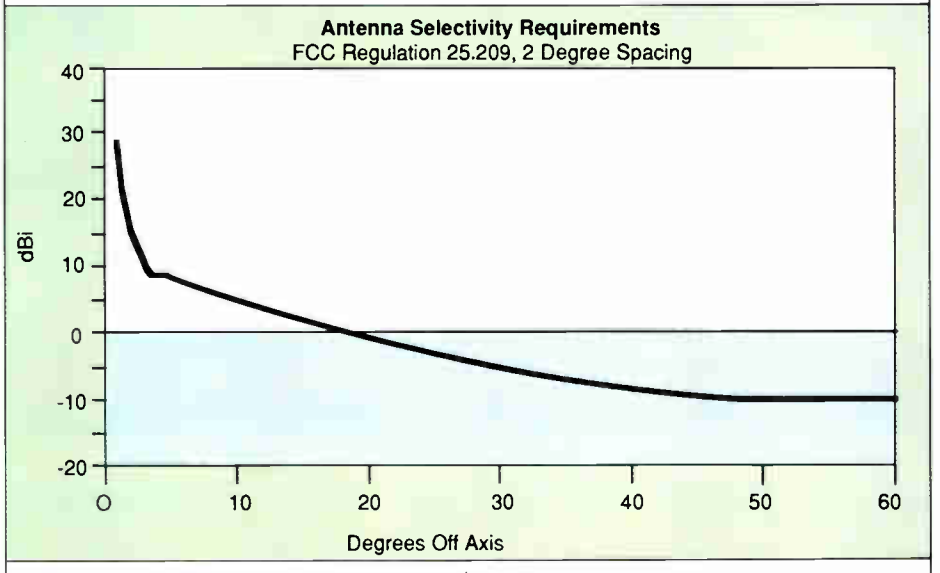
Antenna directivity

Since the mid-1970s, the growth of the domestic fixed-satellite system has been phenomenal—much of it the result of the growth of the CATV industry. During the early growth stages, orbital locations for satellites were not a problem. Earth station antenna directivity performance was such that there was not a concern with placing satellites as close as 3 or 4 degrees apart. As more and more satellites were launched however, it became apparent that these so-called widely-spaced orbital locations were very quickly being used up. With no end to demand in sight, the FCC in 1983 decided to provide for the expansion of the fixed-satellite services by allowing a reduced orbital spacing of 2 degrees between satellites.

But even before 2-degree spacing was implemented, the FCC's monitoring station in Laurel, Md. received about 130 complaints of earthstation interference during 1985, and 49 complaints through the first half of 1986. The causes of these complaints ranged from incorrect cross polarization, to adjacent satellite interference, to incorrect earthstation pointing accuracy.[1]

One obvious problem to overcome was the need of the earth station to be able to differentiate between two satellites, each only 2 degrees apart, and each having exactly the same frequency plan. In order to do this, the antenna's directivity, or "spatial selectivity," must be sufficiently narrow to provide some amount of attenuation to signals from the adjacent satellite, while helping to set the system's G/T for the satellite of interest. So just how much directivity is required of an antenna in order to operate effectively with only 2 degrees between satellites? Back in 1987, the FCC released Docket 86-572 to deal with this and other interference related issues. In the Docket was a proposed re-write of FCC rule 25.209, called "Antenna Performance Standard." In part, the FCC specified that the gain of any antenna used in the fixed satellite service shall lie below the envelope defined by:

29 - 25 log (θ) dBi for θ between 1 and 7 degrees; +8 dBi for θ between 7 and 9.2 degrees; 32 - 25 log (θ) dBi for θ between 9.2 and 48 degrees; and -10 dBi for θ between 48 and 180 degrees, where θ is defined as the angle in degrees from the axis of the main lobe of the antenna, and dBi refers to the gain of the antenna in dB relative to an isotropic radiator. Since a picture is worth 1,000 words, the mask described above is shown in Figure 1. (Only a portion of the mask is shown.)



Note however, that the prescribed mask is not an absolute requirement, except for the range between 1 and 7 degrees. Beyond 7 degrees, the FCC allows a small percentage of the antenna's sidelobes (<10 percent) to exceed the recommended envelope providing that no individual sidelobe exceeds the envelope by more than 3 dB.

In effect then, a 3.2 meter antenna with a typical main-lobe gain of about 41 dBi could provide as little as 19.5 dB of spatial selectivity 2 degrees removed from the main axis, and still remain within the required mask. A 7-meter Cassegrain, on the other hand, with a typical gain of 47.5 dBi at 3.95 GHz, would require 26 dB of attenuation 2 degrees off axis to meet the FCC requirement.

Keeping the antenna accurate

An antenna's ability to meet the requirements specified in 25.209 is a function of the accuracy of its design and construction, and is dependent upon a multitude of factors including:

1. The antenna's rms surface tolerance—a measure of the deviation of the surface of a reflector from a perfectly shaped, mirror-like surface.
2. The amount of blockage, scattering and diffracting caused by the spars and/or subreflector or feed assembly.
3. The accuracy of illumination of the main reflector by the feed.

Each of these factors affects the performance of the antenna and its ability to help the earth station receiver in isolating signals from a given satellite from those of another. In the future, as we move closer toward the full implementation of 2-degree satellite spacing, such performance will be critical. ■

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2. Barker, Rick and Friesz, John, "Earth Station Antennas RF Considerations," Scientific-Atlanta Satellite Communications Symposium, 1981.

By Chris Bowick, Vice President of Engineering, Headend and Earthstation Systems, Scientific-Atlanta, Inc.

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Copyright fees at issue

In last month's issue, we discussed the compulsory copyright license—where it came from and how it works. This month, as promised, we'll describe three currently pending cases that will affect the fees that cable operators must pay pursuant to the compulsory license.

First, a proceeding has begun in the Copyright Royalty Tribunal that ought to result in lower fees for cable operators in the future. When Congress established the compulsory license in the Copyright Act of 1976, the Federal Communications Commission's old syndicated exclusivity rules were in effect. Those rules required cable operators to black out any programs on distant signals for which a broadcaster serving the cable operator's community had obtained exclusive local rights.

Congress provided that if, in the future, the FCC should decide to repeal its syndex rules, the Copyright Royalty Tribunal could increase the compulsory license fees for carriage of distant signals—because those signals would be more valuable to cable operators without the syndex blackouts. In 1980, the FCC did decide to repeal syndex, and in 1982 the CRT added a syndex surcharge to the fees.

Last year, however, the FCC adopted new syndex rules, and, as of January 1, 1990, cable operators are once again required to black out syndicated programming on distant signals on request of a broadcaster who has obtained local exclusive rights to such programming. NCTA and CATA immediately petitioned the CRT to remove the syndex surcharge. This ought to be an open-and-shut case: The surcharge was adopted because syndex was repealed. Now syndex is back, and the surcharge should be repealed.

By Michael Schooler, Deputy General Counsel, NCTA

The second proceeding

The second copyright proceeding of industry-wide significance is pending in the United States District Court for the District of Columbia. It arises out of another federal district court case that was decided in 1986. At issue in that older case was the manner in which copyright fees were to be calculated when distant broadcast signals were carried on a tier that also included nonbroadcast cable services.

Under the Copyright Act, the fee paid by cable operators for the carriage of broadcast signals is a percentage of the operator's "gross receipts...for the basic service of providing" retransmissions of broadcast signals. The percentage varies according to the number of distant signals carried. The Copyright Office had long maintained that "gross receipts," for this purpose, meant the total subscriber revenues attributable to all tiers on which any broadcast signals appeared.

In *Cablevision vs. MPAA*, a federal district court decided that the Copyright Office's interpretation was wrong and that the "gross receipts" upon which fees were calculated should be prorated somehow to reflect only those revenues attributable to the carriage of broadcast signals. After that decision in 1986, many cable operators prorated their payments in accordance with the court's decision. In 1988, however, the court of appeals reversed the district court's decision and upheld the Copyright Office's interpretation. As a result, cable operators were required to make supplemental payments to make up the difference between the amount that they should have paid and the amount they actually paid.

What's at issue is whether cable operators should also be required to pay interest on the supplemental payments. The Copyright Office had never required cable operators who had underpaid or paid their fees late. In the wake of the court of appeals decision, the Copyright Office adopted a new rule under which it would collect interest on late or supplemental payments. But this rule would only apply prospectively; it would not apply to the supplemental payments resulting from the Cablevision case.

The Motion Picture Association of America has asked the district court to overturn the Copyright Office ruling, so that cable operators would be required to pay interest on their supplemental payments from the Cablevision decision. The Copyright Office is defending its rule, and NCTA has intervened to show that the rule is proper and wholly consistent with the ordinary practice of not applying new rules retroactively.

Final proceeding

Finally, a third proceeding is pending in the Copyright Office. That proceeding concerns the definition of a cable system for purposes of the Copyright Act. Under existing rules, any adjacent systems that are under commmon ownership or control are treated as a single system. The purpose of this rule was to prevent large cable systems that serve several communities from artificially fragmenting their systems in order to pay smaller fees. Small systems pay a smaller percentage of their revenues than the larger "Form 3" systems.

But the rule has had two unfair effects on cable systems. First, sometimes two adjacent systems really are separately operated small systems that now have the same parent company as the result of a corporate acquisition or merger. The "contiguous system" rule imposes on such small systems fees much larger than Congress intended. Second, often such adjacent systems do not all carry the same program services. But under the Copyright Office's rule, any signal that is carried on any one of the adjacent systems that make up a single contiguous system is counted as if it were carried on all the systems—and fees are calculated as a percentage of the total revenues of all the systems.

This approach is obviously unfair, and NCTA has asked the Copyright Office to change it. Under NCTA's proposal, contiguous systems would be treated as a single system only where they shared a common headend, and, in any event, fees for carriage of a particular signal would be paid only on the basis of revenues in the communities where such signals were actually available. Whether the Copyright Office adopts this proposal remains to be seen. ■

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Cable in the year 2000—A technologist's view

We have all by now had our fill of people pointing out that we are entering a new decade. It is, nevertheless, beneficial to take a step back from the tumult of today's events and ponder where we might be a decade hence.

There is certainly enough happening right now to keep us distracted. Cable is pondering threats of re-regulation from Congress and the FCC, while each month sets new records in terms of subscribers, revenue and cash flow. The trade press has a never-ending stream of articles about fiber optics and advanced television systems, although these things have not yet really impacted most operating cable systems. Pay-per-view's much-vaunted potential remains just that, while local advertising sales have become the champion for percentage revenue growth.

Longing looks

Our industry's revenues from subscription pay television, while growing, have been eclipsed by those generated by video rentals, and a host of other potential video delivery competitors are gathering on the horizon. Telephone companies, multichannel MDS ventures, satellite owners, real estate developers, and just plain overbuilders look longingly at our industry's revenue stream. We are in the midst of a changing business, and seem to be poised for lots more—but what's new? Hasn't continual change been the only certain thing about cable television? What's really new about this decade that we didn't see in the last one?

In considering where we'll be a decade hence, it's helpful to hark back 10 years, to see what kinds of change our industry has seen since then. In 1980, the franchise wars were in full flower, but relatively few urban systems had yet been built. The average cable system probably had a capacity of between 20 and 30 channels, although 400 MHz (54 channel) systems were being promised in franchise proposals. There were a large number of systems which still carried only 12 channels, and did not use converters. Satellite services were really beginning to proliferate, as others began to understand the implications of what Ted Turner and Home Box Office had accomplished. The cable industry served only 18 million basic subscribers;[1] 14 million took pay TV.[2] Financial markets were becoming more and more comfortable with cable's ability to repay substantial debt.

In short, in 1980, all the elements were already in place for explosive growth. We all know about the years which followed. It was a time of almost unparalleled opportunity. There was such economic growth that risk-taking had relatively little downsides; virtually anything could be tried without substantially harming the business and almost everything was. While growth encouraged healthy risk-taking and forgave mistakes, it also masked much in the way of poor management and sloppy operation. Everything seemed to work in marketing and in business operations, as long as we didn't make it physically impossible for the customer to buy our service.

On the technical side, all that seemed to matter was building plant with some sort of signal on it past more homes every month. It seemed relatively unimportant if that plant sometimes operated a little below specifications, or was not constructed for long-term reliability: getting it built was the point. The Eighties were a wonderful time for cable in many ways, but they left us with some growing up to do.

As the decades change, we see an increasing sense of maturity in the cable business. There is a serious market developing for system components and architectures aimed at improved performance and reliability; there is even a willingness to pay more for them! In the absence of external forces, cable over the next decade would see a natural flattening of growth (limited by the number of households in the country) and a settling down into fine-tuning the business. Financial managers with spreadsheets would find optimum trade-off points for subscriber satisfaction vs. penetration and profit; for reliability vs. first cost and maintenance labor; for acceptable customer irritation vs. CSR staffing levels. We are, in fact, already beginning to see trends in this direction.

A history lesson

One lesson which history teaches us is that we all attempt to live as if the future were a continuation of familiar events and trends from the past. Another lesson is that assumption is never valid in the long run. While we cannot foresee possible national or global political or economic spasms, we can foresee some of the forces which will cause the next decade for the industry to be something other than a mellow, maturing extension of the Eighties.

One thing which is almost certain, the decade ahead is the proliferation of competitive video delivery media. These will necessarily sharpen our focus on customer service, signal and product quality, and cost-effective operation. Fiber optic trunking will make our plant work better and more consistently, while allowing a dramatic increase in channel capacity at a relatively low cost, but there will be a lot of hard work to be done in this area.

Another certain trend will be a dramatically tightening labor market. The baby boomers are aging, and there will be stiff competition for workers capable of doing the kinds of tasks which the cable industry has always required: answering phones and making installation and service calls to subscribers' homes. This poses a special challenge for engineers to design plant, particularly at the subscriber premises, which is substantially less labor intensive than that which we have at present.

A third trend will arise out of one of our industry's attempts to meet our customers' needs in an increasingly competitive environment: an ever increasing number and variety of cable television channels. I believe that the dreams of a decade ago are being

By Jim Chiddix, Sr. Vice President, Technology and Engineering, ATC

realized: cable is the "medium of abundance," it is ideally suited for "narrowcasting" to highly focused audiences. Indeed, if the growth of special interest magazines is any indication, we have great potential to continue the growth of advertising revenues through the delivery of targeted audiences, as well as to hold the interest of many different kinds of subscribers. In fact, cable's strength may be its potential to deliver far more choices than many of its potential competitors.

However, the challenge associated with this will be to keep 60 or 80 or 150 channels of programming from confusion and overwhelming our subscribers. It is all very well to use a remote control to graze through 20 channels for something interesting; at 150 channels that becomes totally impractical. If each customer is truly interested in only 10 or 15 of our services, we will need to find ways to make those particular services easily understandable and accessible even though the mix is different for every viewer. We may even embark on an experimental basis, on the delivery of switched video services, aided by the changes in architecture which fiber optics will have brought throughout the decade.

There are a number of other things which may be unfolding a decade from now. Information services may finally have found their time in spite of all the false starts that our industry and others have tried (including today's Prodigy service—an uninspiring repackaging of "The Source" computer information service of a decade ago, in spite of its illustrious sponsors and half-billion dollar funding). Nevertheless, I believe that in the year 2000 our core business will be very similar to what it is today. If we are successful in meeting the challenges before us, our service will be far easier to buy, understand, and use, and will offer significantly better service, quality, and choice than it does today. We will certainly be a participant in the advanced TV delivery systems which should be coming to maturity by that time.

If we stay focused on the customer and on cable's fundamental strengths in providing variety and quality product in a consumer-friendly way, the end of the decade should still be a most cheerful time for our industry. ■

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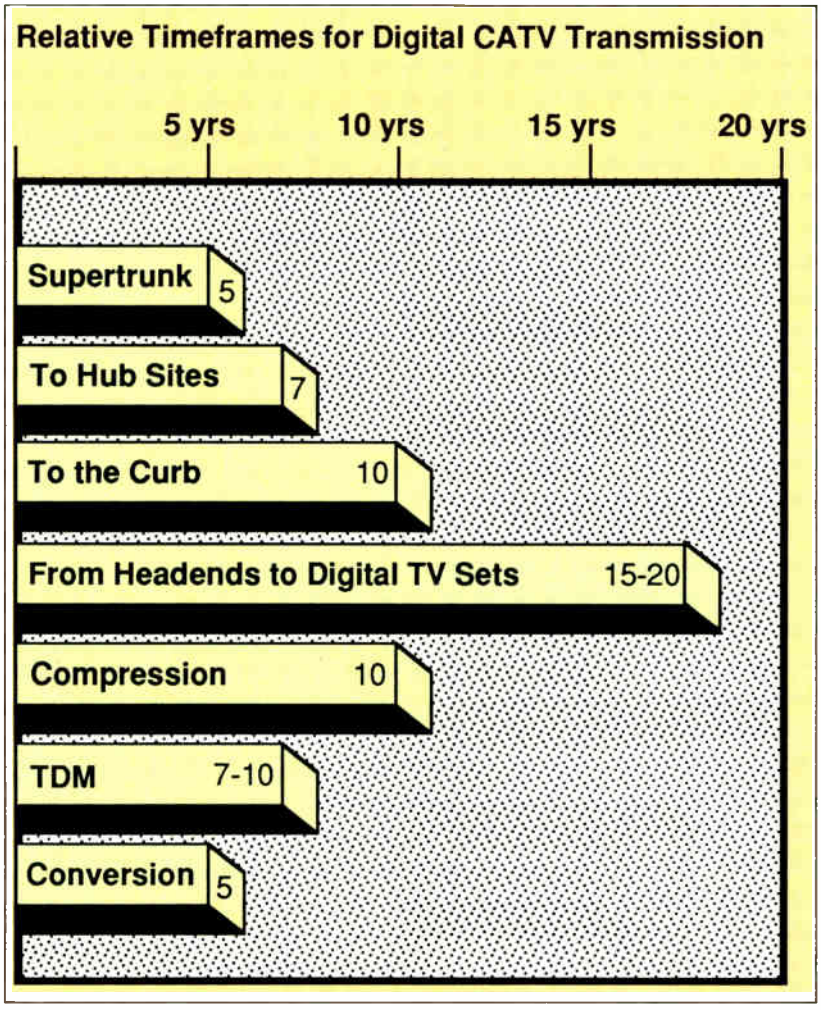
2. Paul Kagan, 1981 figure.

The changing face of fiber optics

System-level cable engineers have some time to bone up on bits since digital signal transmission is not "just around the corner." Our knowledge of digital will evolve with the increasing deployment of the technology. As known aspects of digital technology are transferred from industries such as computers and telecommunications, and further developments occur specific to the cable industry's needs, digital will improve our operations, reduce costs and actually simplify the tasks of system engineers.

In the near term, digital transmission will be used increasingly in fiber optic supertrunking for large metropolitan areas. Rogers Cable TV Ltd. of Toronto, Canada, has just purchased three digital fiber optic systems from Comlux, a Mountain View, Calif. manufacturer. They will be used for digital supertrunking applications in Vancouver, B.C. and Grand River, Ontario, and for an inter-city transport system in the Toronto area. And, according to sources at Comlux, they will be supplying a nine-bit system for transporting video for CBS and NBC from Manhattan to an earth station uplink in New Jersey this spring.



How long?

But when will digital fiber optics penetrate deeper into our distribution networks? The answer is unclear. Most of those who will venture a guess will talk in terms of decades. But when it arrives in a big way, say, to the pedestal or, perhaps, to the set, we will all be talking bit error rates (BER) instead of decibels (dB) when measuring signal quality, gigabits per second (Gb/s) instead of gigahertz (GHz) when expressing channel capacity, and quantum noise instead of thermal noise when discussing distortion.

Channel capacity will be measured in data rates. Presently, to send 40 channels down the fiber, the data rate will need to be around 4 Gb/s (roughly, 100 Mb/s equals a 6 MHz channel slot). Since this transmission method is so bandwidth hungry, digital transmission is best accommodated over fiber, which inherently has greater bandwidth capacity than coax.

Digital is a technology that is now well known and performs well. But some hardware elements of it remain costly. Full implementation must await developments and/or cost reductions in the areas of analog-to-digital/digital-to-analog (A-D/D-A) conversion techniques, compression schemes, time division (TDM) and/or wave division multiplexing (WDM) equipment, and nine-bit pulse code modulation (PCM) systems.

Future deployment of digital transmission technology holds the promise of many advantages and solves problems both large scale and simple. The most immediately useful large scale advantage is sending video signals over long distances, to multiple hubs or even inter-city via fiber supertrunks. And, exact data streams can be sent without alteration—allowing CATV to transmit uniform signals to all subscribers. There will be no intermodulation distortions and no interaction between video and audio.

And digital transmission is rugged. "You can't hurt it by the distance of transmission through splitting or coupling. You can regenerate it, split it, TDM it, and WDM it," says Ken Regnier, VP of sales and marketing for Comlux. Damage can be done, however, during A-D or D-A conversion.

"But the true advantage," says Vince Borelli, president of Synchronous Communications Inc., "is that we take something very complex such as video signals and we bring it down to something that we can deal with in a relatively simple way; ones and zeros."

"A digital format, in and of itself, is not helpful," advises Jim Chiddix, senior vice president of engineering and technology at American Television

By George Sell, Contributing Editor

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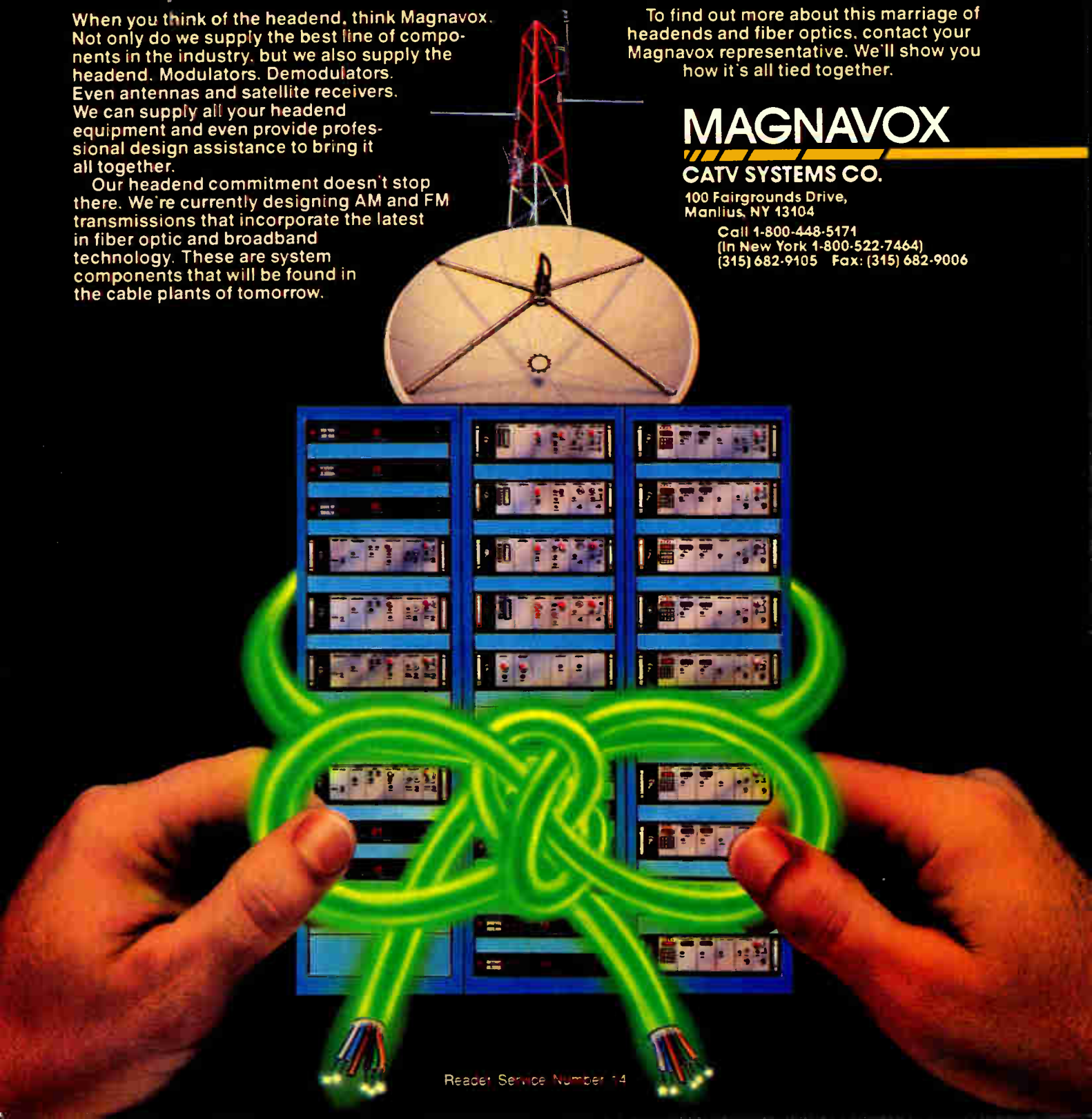

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Inspired by the radio wave theories of Heinrich Hertz, Guglielmo Marconi built and perfected the world's first wireless telegraph.

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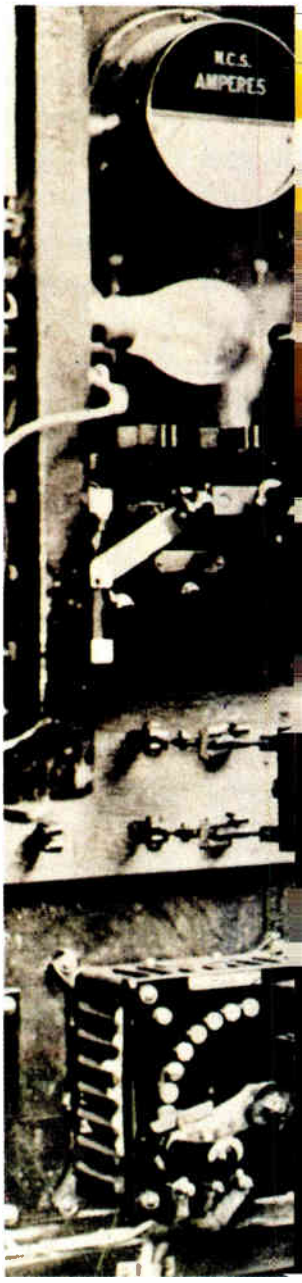

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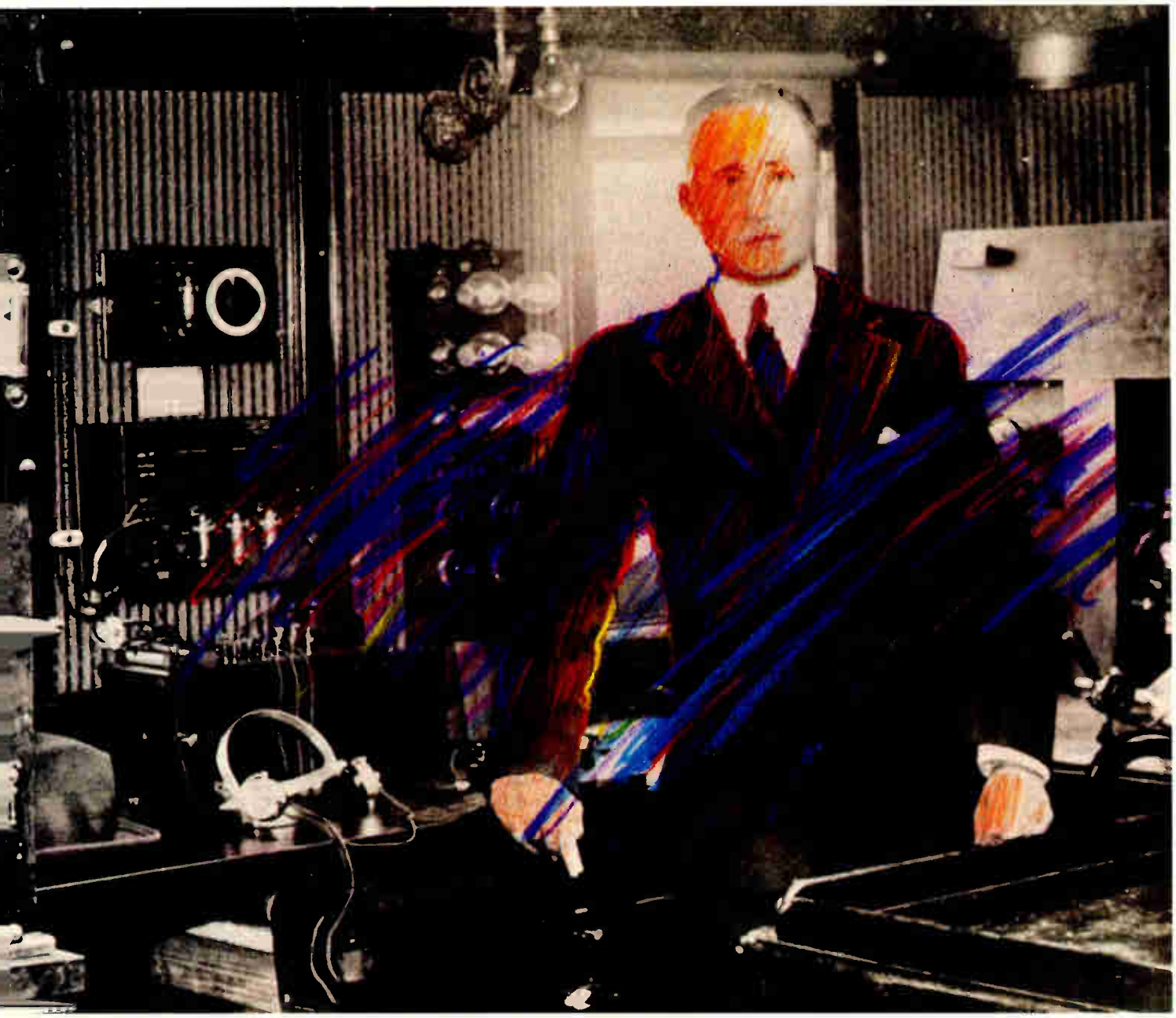

Reader Service Number 15

not necessarily the most cost-effective way of implementing a digital system from equipment costs."

"It allows them (the telcos) to shoehorn a digital signal into some other protocol like a DS-3 channel, which is not a very convenient size for video," Chiddix explains. "One of the strengths of fiber, particularly for digital applications, is its very high bandwidth. Simple is good and you've got a lot of bandwidth. Why not keep things simple and not bother to compress your video? Instead, go to higher and higher transmission rates or use multiple fibers rather than go through all the difficulties of compression. Now, that's an oversimplification. If, indeed, you wanted to wire the whole country with a switched digital network, digitize anything and transport it anywhere, fit it into protocols."

Jordan at C-COR adds, "It just doesn't seem to make a whole lot of sense to us at this point to try to compress all that information into a limited amount of space when HDTV and all the other services require expanded bandwidth. If you really want to deliver an enhanced video picture to the home," Jordan goes on, "you are going to lose something when you go through compression and decompress it at the other end. And that runs counter to the argument of delivering the best quality picture to the home. So, if you really believe HDTV is going to happen, it doesn't make sense to run down that path and do an about face two or three years down the road."

"You take the push for compression today," explains Borelli of Synchronous Communications, "the main force behind compression is the telephone industry. 'How can we get video to 45 Mb/s? Well, you switch it.' If you are in the cable business, you are not going to do any switching and is 45 Mb/s what you want to compress to?"

"Well, obviously, if you are in the manufacturing business," Borelli elaborates, "you want to compress to 45 Mb/s because then you can sell to both marketplaces."

Trying to have it both ways can lead to frustration. "But if it is something that you want to do for the telephone companies, then you are going to have to wait because right now they haven't decided on the format or algorithm they want to use. Bellcore has an algorithm and they'll let you know that they are working on a new one. If you really want to come into some sort of compression technique today, you are going to have your own system and it's going to be something that may not be compatible a year from now," Borelli points out.

And cable is not the only business impacted by the efforts of the telcos to compress video to their own requirements. The broadcasters have problems also. "When you can't get (broadcast) networks to accept 45 Mb/s," says Regnier at Comlux, who has a broadcasting background, "and in spite of what Bellcore is doing and what ABC is doing, when you get right down and ask individual broadcasters, there is a lot of hostility toward telephone companies trying to force this."

The digital input

And what do consumer electronics manufacturers want in this digital marketplace? Some high ticket television sets today have internal digital processing of various sorts. There is no standardization of those inner workings and it's doubtful in the foreseeable future that they will grant access to their digital circuits via a digital input on the back of the set. There is no digital signal that would be present at that input and why would you put that port there just in anticipation of such a signal. It's extra dollars spent unnecessarily.

But when the day comes that a digital signal arrives at the back of the TV set, perhaps at the same time that HDTV sets have penetrated the marketplace, many of the problems with digital transmission will be eliminated. D-A conversion, for one, would be unnecessary.

The idea of a digital input on advanced television sets can be analogized to the cable industry's experience with cable-ready sets. Chiddix explains, "We talked to TV manufacturers early on about tuning non-standard channels without the need for converters, but there was no market out there. Only after we went out and put boxes in front of millions of TV sets that there was a sizeable market now that is mature and ready to spend money on this feature. Then they began making cable-ready sets. So, I suspect HDTV sets will not have digital inputs in anticipation of some as yet unrealized transmission scheme."

But, as John Sie of TCI says, "Processed digital will incorporate a lot of transactional capabilities. You can't sell the second generation advanced television (sets), which I'm projecting to be processed digital, on resolution alone. You have to sell it on bells and whistles or other capabilities like memory, data manipulation, transactional ordering, and so forth."

Transactional ordering implies a return path from the digital set back out over the fiber. If as few as four or as many as 10 channels are delivered to the set at a time, signalling back to the hub or headend will be required to request other channels or for pay-per-view.

A digital port may become a feature on HDTV sets in some future time when digital systems have evolved and all the standards and data protocols have been established, and all that is needed to fully optimize the system is direct digital inputs to the sets. But by that time they may have invented a television delivery system that offers direct inputs into the human brain and that would probably bring us back to analog.

Toss the analog on the fire?

Analog has and continues to serve CATV well. But don't consign it to the flames yet. "Digital will never have the capacity to the home of a large coax system," Gillett of CableLabs asserts.

But "never" is an unforgiving word when talking about the future. "It is not inconceivable that we could take our whole spectrum," Chiddix offers, "Channel 2 to channel 80, and consider that a signal and digitize the whole thing at a horrendous sampling rate, and then transmit that as a 5-, 10-, 20- or 30-gigabit data stream. And then go into a detector and a blindingly fast D-A converter, and what comes out is our broadband spectrum. That solves the problem with digital transmission in the cable industry, which is that if you come out the digital link with baseband video, you are going to have 80 modulators and you've got to have 80 modulators to generate the AM channels you require. You've got a roomful of stuff, a very expensive room.

"If we can digitally encode our complete spectrum, then we can repeat it all over town and we could trunk it from city to city if we wanted to. And to drop it off, we just need a detector and a D-A converter. We wouldn't need to demultiplex or anything.

"So, that's a dream that may not sound too silly 10 years from now. Today, that's way beyond what people can do with digital technology. It's too fast. But it's not inconceivable," Chiddix adds. "We may wind up with digital fiber going very close to the home." ■

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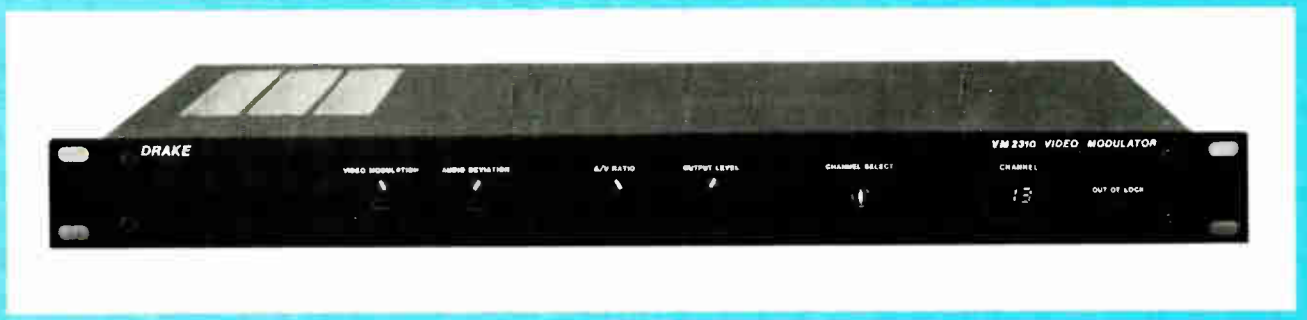

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OFC looks to future with 'Video over Fiber' theme

In 1975, the Optical Fiber Society held its first optical fiber conference in Williamsburg, Va. Fifteen years later, the show, co-sponsored by the Optical Society of America (OSA) and the Lasers and Electro-Optics Society (LEOS) of the Institute of Electrical and Electronics Engineers, boasted 175 exhibitors as compared to the original 37 exhibiters. But for many in the cable television and telecommunications industries, the show indicated more than a growth in optical component manufacturers. With an aggressive theme of "Video over Fiber," the conference signaled a passionate awareness by both industries of the opportunities and possible synergies for optical video transmission in the future.

However, although the awareness was evident, you could see "the overwhelming influence of the telephone companies' definition of video," says Dave Robinson, director of Cableoptics, a business unit of Jerrold Communications. "It's good that the component vendors are starting to think about broadband and video, but it's going to take a number of them awhile to wake up to the big market for AM in cable television as it exists today. It's not going to have to wait for broadband ISDN (integrated services digital network), digital modulation to actually happen."

Over 200 papers were presented on optical fiber technology and included such topics as high-speed systems, coherent systems, optical amplifiers and analog transmission. Two special symposiums focused on networks and switching and integrated circuits for lightwave systems. The plenary session on the first day of the show (January 23) brought together four speakers who focused on various aspects of video over fiber, from technologies promoting progress to regulations inhibiting it.

Lem Tarshis, vice president and general manager for Jerrold's distribution systems, led the charge for the cable industry with a paper focused on "Technology Options for Cable TV." Stating that he was not going to solve the issue between telcos and cable TV, Tarshis spoke of the technology, devices and politics that are currently of concern to the cable television industry.

While focusing on cable technology, Tarshis expressed hope that component manufacturers would see what cable needed and help with those devices, especially optical amplifiers. It is this hope that Jim Chiddix, senior vice president of technology and engineering at ATC, feels is good news for the cable industry.

"This (OFC) is a meeting of the people who make the components and subsystems which allow us to use fiber technology," says Chiddix. "Those same subsystems are the things that have the potential to make the technology work better, and most importantly, less expensively, for us. They need to understand our market and, if for no other reason, it is important for the cable industry to support this show."

Beyond technical sessions

While excitement for video transmission on fiber was a dominating factor by engineers in the technical presentations, the interest in video, at least for cable television, was not as prevalent on the show floor. Most vendors felt the cable television industry "was too small a fiber market," or that the "top players in cable television weren't using fiber enough to warrant a move into cable television."

Although disappointing, this reflected the component orientation Chiddix spoke of. While exhibited new developments may have some value to cable operators further down the road, most applications of product on the show floor were for telephone or local area networks. Still, "the OFC was informative as well as being strategically important for the cable industry," says Chiddix. "I thought it was very good, it had changed a lot and it's important to get involved with it."

Next year's Optical Fiber Conference, to be held in San Diego, will have even more cable involvement. Helping on the organizing committee will be Jim Chiddix at ATC; Dave Fellows, president of the transmission systems division at Scientific-Atlanta; and Matt Miller, vice president of technology for General Instrument Corp.

Even though component oriented, there were several cable related product developments announced at the show. Following is a breakdown of those announcements.

Amoco Technology Co.

Amoco Technology Co., a subsidiary of Amoco Corp., announced the acquisition of Meret Optical Communications. Meret specializes in wideband analog fiber optic transmission systems. Amoco Technology was developed by Amoco Corp. to extend its interest in new areas of technological development, particularly in the fields of photonics and biotechnology.

British Telecom & DuPont

BT&D Technologies and British Telecom jointly announced that its CTB1000 Coherent System Test Bed is now commercially available. The coherent system packages all component parts necessary for a fully operational coherent optical communications laboratory. Included are tunable semiconductor narrowline lasers, optical isolators, modulator, polarization adjusters, variable attenuator, fiber coupler, receiver, supporting power supplies and temperature controllers, all packaged for laboratory use. The announcement marks the first commercial release of a coherent optical communications system. The system initiates actual delivery on the potential of coherent optical communication says Edmund Smith, Jr., director of advanced products for BT&D Technologies.

Corning Inc.

Corning announced its new Titan™ single mode fiber (SMF) designed to better withstand the rigors of today's fiber applications. A layer of titanium dioxide (titania) along with silicon dioxide (silica) is deposited in the outer cladding glass during the manufacturing process in order to give the fiber added durability. Corning Titan SMF is said to exhibit the same optical specifications and performance as Corning SMF-28, and is fully field compatible with SMF-28 fiber and other

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main. The lasers feature a coaxial SMA connector and matched 50 ohm input impedance for integration into existing microwave systems. The new design allows for a higher laser-to-fiber efficiency, by approximately a factor of three, say Ortel spokesmen. The minimum optical power available now from the fiber, at normally operating currents, will be 3.0 mW, with typical units providing 4 mW to 5 mW.

Ortel also introduced the Model 5001A, a fiber optic microwave delay line, incorporating a spool of optical fiber in conjuction with Ortel's lasers and photodiodes to delay the signal. The delay lines virtually eliminate triple-transit responses, because the company's optically matched photodiodes produce no reflected wave, according to Ortel spokesmen.

PCO Inc.

PCO Inc., an equity partnership of Corning Inc. and IBM, announced a new ridge waveguide (RWG), single-mode laser diode module, the PLD-1300R. Operating at 1300 nm, the PLD-1300R is housed in a "TO-type" package containing an InGaAsP laser diode and an integrated rear-facet InGaAs PIN diode to monitor the laser's output. The TO-packaged "internal" module is hermetically-sealed, epoxy-free and constructed with high temperature solder. The laser diode is coupled to a single-mode fiber by means of a special PCO-designed integral system to provide precise positioning and stable alignment over time and temperature.

Also announced by PCO was the ATX/ARX 1300 nm transmitter/receiver modules, a wide bandwidth, wide dynamic range analog signal link. The ATX optical transmitter incorporates an InGaAsP edge emitting LED with associated drive circuitry. The ARX optical receiver uses a PCO hybrid PinFet receiver amplifier. The modules are offered with a fiber pigtail for coupling to the transmission fiber. Features include small size, low power consumption, large link budget, long wavelength and a temperature range from -20 degrees centigrade to +70 degrees centigrade.

In a final announcement, PCO introduced the PCO 5000D video codec (coder/decoder) pair designed to transmit NTSC signals at distances up to 3 km. The coder accepts an analog signal, digitizes it using a flash A/D, performs parallel to serial conversion, 4B/5B encoding and uses an optical transmitter to convert the high speed digital data to optical pulses.

The decoder recieves the optical data stream and converts it to digital data. The data is subsequently demultiplexed, 4B/5B decoded, and then D/A converted to reconstruct the original signal. The codec is designed to meet RS-250B medium-haul video specifications.

Photon Kinetics Inc.

Photon Kinetics announced its lastest development in OTDRs (optical time domain reflectometers), the Model 4000 HiRes OTDR with single-mode masking. The Model 4000 offers a selection of 16 programmable masks available with the 413SA, 415SA and dual-wavelength 428SA optical plug-ins. The Model 4000 with the 428SA plug-in has a resolution of 30 meter recovery to backscatter and an event dead zone of five meters. Designed to measure short lengths of fiber, or fiber spans containing closely placed connectors, the Model 4000 with single-mode masking uses a loss table to automatically locate and measure all the features in a fiber span in seconds. Because the masks reduce reflections, the model offers measurement accuracy with a guaranteed backscatter range of 18 dB.

Photon Kinetics also introduced the Model 300 Active Fiber Detector to

Photon Kinetic's Model 4000

detect the presence of light on all optical fibers. The Model 300 is applicable to all fiber types and common transmission wavelengths, single and multimode, 850 nm to 1550 nm. Features of the active fiber detector include: small hand-held design weighing less than one pound; high sensitivity allowing detection to -50 dBm signal level; typical induced loss is less than 2 dB; detects direction of light as well as modulation; and audio and visual indicators. ■

—Kathy Berlin

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SIECOR

System design and management using CAD

Drawing and maintaining accurate system maps is an important aspect of operation management and maintenance for virtually any CATV system operator. From the beginning, maps of cable systems and facilities have been maintained on paper, drawn with traditional drafting techniques. This method is workable, but has several inherent problems. Paper maps are tedious to draw, hard to store and difficult to modify, especially as changes are made to the system. They quickly become obsolete, leaving the sytem operator with no documentation of his facilities. Even if maintained perfectly, they do not lend themselves to easy distribution, especially in different formats and levels of detail required by the people who use them.

The challenges of system mapping were, consequently, of no small concern to Star Cablevision, a CATV management/design firm operating as many as 500 cable systems in separate communities through the Midwest.

It was only two years ago that Star Cablevision embarked on the use of computer mapping technology to improve the efficiencies of system design, management and maintenance. This path ultimately led them to employ a unique combination of CAD software and digital map data. The results have not only proven outstanding to the CATV side of business, but has proven to be a springboard into other new communications-related businesses.

The advent of computer aided design and drafting (CAD) systems has offered many CATV system operators an alternative to their older mechanical drawing procedures. Until recently, these systems were extremely expensive, often costing hundreds of thousands of dollars. However, recent advances in computer technology have now put them within the reach of almost every CATV operator. With a modern CAD system, the CATV system, the CATV network designer can use the computer screen as his drafting table.

Sample of a 3-D terrain relief map

Not only does the CAD program contain many useful tools for preparing the initial, it also eases the task of maintaining finished diagrams. Maps can be easily plotted at different scales, formats, and at different levels of detail, still using just one master drawing as the source. This can virtually eliminate the task of updating many independent drawings, which soon become inconsistent with each other.

As a multi-system operator, Star Cablevision seemed like an ideal candidates for CAD-based mapping. The initial investment was made just over two years ago with Star's purchase of two computer systems for use by two operators. The computer processors were 80286 units running at 8 MHz with 40 megabyte hard disks for storing programs and data directly in the computer. Monitors provided 14 inch and 18 inch color screens. An HP 7580B plotter was also purchased for generating map output on paper. The CAD software employed was AutoCAD, one of the leading computer aided design programs used by many industries today. The plan was to digitize existing paper maps using a table top scanning device. Digitized map data would then be downloaded to AutoCAD where resulting files could be stored and modified as needed. What soon surfaced was the limitation of using existing maps alone or in combination to create a single, accurate digital map file.

The first hurdle is mapping

As good as computer aided drafting systems have become, they still have a major drawback for CATV system designers. In practice, the design of a cable system is essentially a mapping operation that entails planning distribution of a network of facilities deployed over a geographical area. Because it is a mapping function, the design of the network must begin with a set of "base maps" showing the area to be covered.

Ideally, these maps should show existing streets, water courses, political boundaries, survey information, and any other features which might affect the design of the system. A variety of sources for paper maps are usually available, but these maps are often out of date, inaccurate, and inconsistent with each other. They are seldom drawn to accurate scale, which makes any engineering calculations made from them subject to error.

As Star Cablevision also discovered,

By Tony Steinmetz, System Designer, Star Cablevision and Michael F. Bauer, President, ADC

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the digitizing process can be a tedious and time consuming process that enormously increases the cost of a project and makes the whole CAD-based mapping system much less practical.

With the CAD system purchased and operational, the real problem of obtaining base maps remained. Too much time was being spent copying unreliable paper maps. Star's system designers faced hours of drudgery before they could start their real work; laying out the cable systems. A reliable source of CAD maps was necessary.

Star Cablevision was not alone in its need for digital maps. Users in many different industries needed a source of computer-based maps, but none existed until 1988, the year the United States Geological Survey (USGS) completed work on several major data bases. These data files contain maps, in digital form, which were made from the USGS paper maps covering the entire continental United States. For the first time users could obtain consistent, reliable, and up-to-date digital maps for the entire country.

Unfortunately, the USGS data files are not directly usable by most small computer CAD systems. They must be converted to the proper format before they are compatible with the rest of the software. This is when American Digital Cartography provided data specifically converted for use with common CAD software.

Digital map contents and accuracy

The digital maps provided to Star Cablevision by ADC contain a variety of information from several USGS data bases. This information is drawn on many different "layers" in the personal computer CAD system. Since each drawing is layered, different map features may be turned on and off via the computer display, or removed from the drawing entirely. The effect is much the same as if the map were made on a large number of transparencies, any combination of which could be overlaid as needed to produce the desired level of map detail. There are a very large number of layers in each map. The most important of these are:

Roads: including major highways, country roads, residential streets, and jeep or foot trails.

2. Railroads

3. Airports

4. Water features; including rivers, streams, creeks, lakes and shore lines

5. Geographic names; showing the names of cities, towns, and prominent landmarks.

6. Contour lines. Alternately, the shape of the terrain may be shown as a three dimensional terrain relief map, in which the shape of the land is actually drawn in three dimensions on the computer screen.

All of these maps were digitized by the USGS from their published 1:24,000 and 1:100,000 scale paper maps, originally made from ground surveys and periodically updated from aerial photographs. The transportation and hydrography (water) features on each map are accurate, on the average, to about 75 feet—that is, each feature on the map falls within about 75 feet of its actual position. Most of the maps are up to date, within reason, being last revised between 1981 and 1986.

Top: Plotter printout of finished map. Middle: Modifying details of map on computer CAD. Bottom: Updating map features.

Star Cablevision had the added flexibility of ordering ADC digital maps according to the geographic areas of interest. Each USGS map file converted by ADC covers an area approximately 6 miles wide by 9 miles high -approximately 60 square miles.

To understand how digital maps would be used in the design and implementation of a CATV system, it is necessary to look at how Star Cablevision used CAD in the design of a typical system. This cycle can be divided into five major phases: 1) System feasibility and market studies, 2) system layout, 3) detail system design and construction, 4) system maintenance, and 5) system enhancement and extension.

System feasibility and market studies

The first step in the design of any prospective CATV system is to look at the geographic area under consideration in order to get a rough idea of the cost involved and of the economic feasibility of the network being planned. For this phase, Star Cablevision obtains digital maps to cover a broad geographic area. The designer applies his own knowledge of the area and uses AutoCAD to mark off the rough boundaries of the system and perform initial estimates of system costs. These maps are then plotted out on paper and sent to investors, government bodies, and civic groups.

Individual houses or apartment complexes may be marked on the map, if necessary, to perform estimates of the number of prospective subscribers in different areas. All of this work is used to determine the final boundaries of the system, which are then drawn on the map with AutoCAD.

Initial system layout

The next phase in the CATV system design is the initial layout of the system. For this task, Star Cablevision uses AutoCAD to break the map into smaller sheets. These sheets are given to strand mappers, who physically walk the system to determine the layout of the electric or telephone lines that the system is going to follow. Each line is marked on a paper map as it is found. At the same time, the strand mappers can note any inaccuracies in the USGS map, such as missing roads, or subdivisions that have been added since the maps were made.

When the strand mappers have finished their task, their annotated maps are returned to the designer at Star Cablevision's central office, who then uses AutoCAD to draw the features they have discovered on top of this original map. He now has a complete

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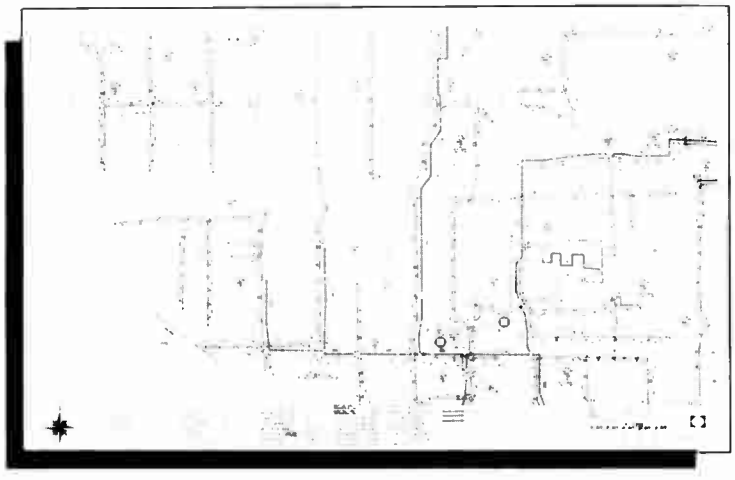

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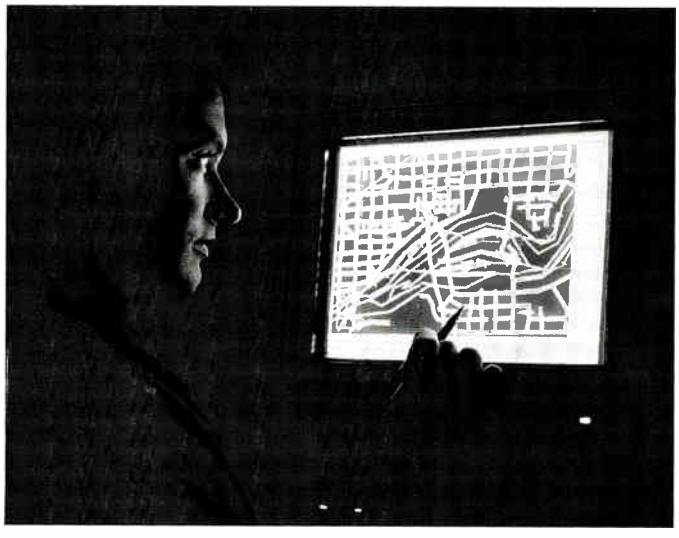
Reader Service Number 25

map of the area and can begin his detailed system design.

During the detail design of the CATV system, Star's engineers use AutoCAD to draw final plans for the network on top of the digital map that has already been developed. The map is drawn in real-world coordinates, so all distances can be accurately measured as the system is laid. Latitude/longitude coordinates can easily be found for specific points, such as the positions of the headend or of microwave relay towers, so that the antennas can be aimed correctly.

AutoCAD has features built into it that allow individual drawing components to be annoted with part numbers, cost and other information. These notations, or "attributes," can then be exported to external data base or spreadsheet programs, such as dBase or Lotus 1-2-3, which are used to print a bill of materials. The map is then broken up and plotted in individual pages which can be distributed to the construction crews as they are building the system.



Viewing map details before sending to system.

System maintenance

Once the CATV system is built, it must be continuously maintained. Once again, the digital system map is invaluable because all changes to the system may be easily noted on the master drawing. As changes are made, they can be plotted out and distributed to the field crews on a regular basis so every maintenance truck always has a current copy of the system map. These maps may be marked up and returned to the central office as maintenance is performed, providing the raw data for the next edition. Since all changes are being made to the central data base, and all maps are produced and distributed from there, all maps remain consistent with one another.

The marketing side

Marketing services as a CATV system design and management firm is serious business at Star. The greatest challenge comes all too often in the education and presentation to larger decision-making audiences, as in dealing with city councils and community development committees. That's where the computer and digital maps really help Star shine.

Using the slide show program in AutoCAD, a self-activated slide program that walks a viewer through each of the five phases of system develop-

ment is created. A computer and monitor are brought into the meeting room to give a first hand insight into how this technology is applied. The slide show brings up the maps one at a time and shows the progression they go through in their refinement.

A new business tool

As a progressive-think company, Star Cablevision recognized that there was limited opportunity in the CATV marketplace to expand market share and increase revenues. New business development has thus focused on extending Star's involvement in other areas of communication services, such as specialized mobile radio (SMR) and cellular telephone. Existing technologies of CAD and digital maps have proven to be the springboard needed to make this an equally successful effort.

In both mobile radio and cellular communication, field strength is a critical factor. Here, Star employs two separate software packages to capture specifications that help in determining the best possible location for towers, height of transmitters, transmission aiming or angle and more. Terrain Analysis Package is the first program used to extract elevation data along specified radials at the specific distances.

Once the elevation data is collected, bullinoton field calculations (determines the field strength) are performed and stored in an ASCII II -X, Y and Z data file. This data is imported into another program, surfer, that creates a field strength contour model. The models can then be overlayed onto typographical maps to produce a final graphic presentation of transmission coverage. The same application is used in locating broadcast CATV towers and directing signals.

Key to enhancement and extensions

Inevitably, the day will come when a portion of the CATV, SMR or cellular system must be rebuilt or extended into neighboring territory. Star will again use the flexibility of the digital mapping system to provide a base from which the new system can be laid out. If the new system extends past the edge of the area which has been mapped for the old system, new digital maps may easily be obtained for the new area. The best part is that these maps will always be consistent and compatible with the maps already obtained, since they come from the same source of digital data.

CAD systems and digital maps are very important resource for those who must design and operate CATV systems. Star Cablevision has found that the digital computer map provides the designer with a comprehensive "starting point" for the layout of his system and, thus, allows him to spend his time actually doing design work, rather than drawing base maps of the roads and streets in his territory.

Once completed, the CAD system map is easily maintained and provides a much better tool for recording the blueprint of the system than does an equivalent paper map. This enables Star's designers to be much more productive than they would otherwise be, allowing a small staff to have five or six CATV systems under-design at the same time. The result is significant cost savings to the CATV system operator. ■

CAD CALLBOOK

The following companies have paid a fee to have their listing appear in the CAD Callbook.

A.D.S.
Automated Drawing Systems, Inc.

A.D.S. . . . . .(404) 448-0977
Automated Drawing Systems, Inc.
WATS . . . . . .(800) 333-5223
FAX . . . . . .(404) 242-8687
3150 Gateway Dr., Ste. 700
Norcross, GA 30071
PERSONNEL: Jeffrey Eichler, President
DESCRIPTION: Lynx CADD—the only integrated design and drafting program for your PC. Simply draw a fence around the area on your strand map and have the design calculated and automatically posted directly on the map. Over 150 commands for fast and efficient drafting of base and strand.

ADVANCED COMPANIES

Advanced Cable Services .(512) 863-9581
FAX . . . . . .(512) 863-9582
1103-D Williams Dr.
Georgetown, TX 78628
PERSONNEL: Clark Watts
DESCRIPTION: A service oriented professional organization joining the talents of over 50 dedicated men and women to provide only the highest quality of service available. We offer a complete line of field/drafting/design services for CATV or LAN systems utilizing both AutoCad and Magic CAD systems. To better serve you, we also have an office at 7400 E. Caley Ave., Ste. 190, Englewood, CO 80111, Phone (303) 741-3504, Contact: Lisa Halloran.

ADC
American Digital Cartography

American Digital . . . . . .(414) 733-6678
Cartography
FAX . . . . . .(414) 734-3375
715 West Parkway Blvd.
Appleton, WI 54914
PERSONNEL: Doug Poland; Pat Liebman
DESCRIPTION: American Digital Cartography (ADC) software products and services include: Enhanced Digital maps, Double Line maps, Contour and Terrain Relief maps, Geographic Name Conversion, Coordinate System Conversion, TIGER file conversion, and Tralaine Geocoordinate Conversion software. ADC maps run on PC's and are compatible with AutoCAD DWG/DXF, USGS DLG-3, and Intergraph DGN formats.

Cable Technology Group

Cable Technology Group .(617) 969-8552
FAX . . . . . .(617) 964-1432
55 Chapel St.
Newton, MA 02160
PERSONNEL: Andrew Friedland, Sales & Marketing; Joel Anderson
DESCRIPTION: Authorized AutoCAD™ Applications Developer with software products for design and documentation of CATV, institutional cable, and local area networks. BCAT™ is a proven AutoCAD applications template for CATV drawing. It is connected to CAD/SUM™, an integrated CATV design software package. All run on IBM PCs under DOS. BCAT & CAD/SUM Jr. priced together start at $2,500 (not including AutoCAD).

inc.
Design Extender Inc.

Design Extender, Inc. . . .(314) 949-9223
WATS . . . . . .(800) 666-MAPS
FAX . . . . . .(314) 949-9226
3317 North Hwy.
94 Pilot House Center
St. Charles, MO 63301
PERSONNEL: Chris Kramer, President; Pam Lawrence, Design Manager
DESCRIPTION: Established in 1984, Design Extender, Inc. is a full service CATV design and engineering company. Services include, but not limited to, strand mapping, as-built mapping, design analysis, computer aided design, manual and computer aided drafting. Digitizing of existing plant maps also performed to compliment our map maintenance program.

Friction Design Company

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P.O. Box 5314
Englewood, CO 80155
PERSONNEL: Thomas T. Worster, President
DESCRIPTION: Offering quality software for design, engineering and drafting for the cable and LAN industry. Supported by the design and drafting of cable systems on CADD, Friction Design Company has grown since 1986. Contact us for quotes on your system requirement and design and drafting needs. No job is too big or too small.

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Network Facilities . . . . .(612) 934-2655
Professionals
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Minneapolis, MN 55344
PERSONNEL: D.L. Horgan, CAD Services Manager
DESCRIPTION: NFP offers complete CAD drafting services, specific for the CATV industry, including our own CATV menu. As an authorized AutoCAD dealer, we offer sales, training and customization. Additional services include CAD/COM, our cable management system for your facilities. So, NFP has you covered inside and out.

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Atlanta, GA 30350
PERSONNEL: Bruce Neurohr, President; James P. Worthen, Director/Eng. & Oper.
DESCRIPTION: Specializing in field engineering, fiber optic and RF broadband design, and computerized drafting, a principal part of TEA's business is cable layout for cable TV and telephone companies. Keeping in mind the ever growing demand for TV and phone services at the personal and business level, it becomes obvious that speed, quality, and competitive prices can quickly determine the level of success.

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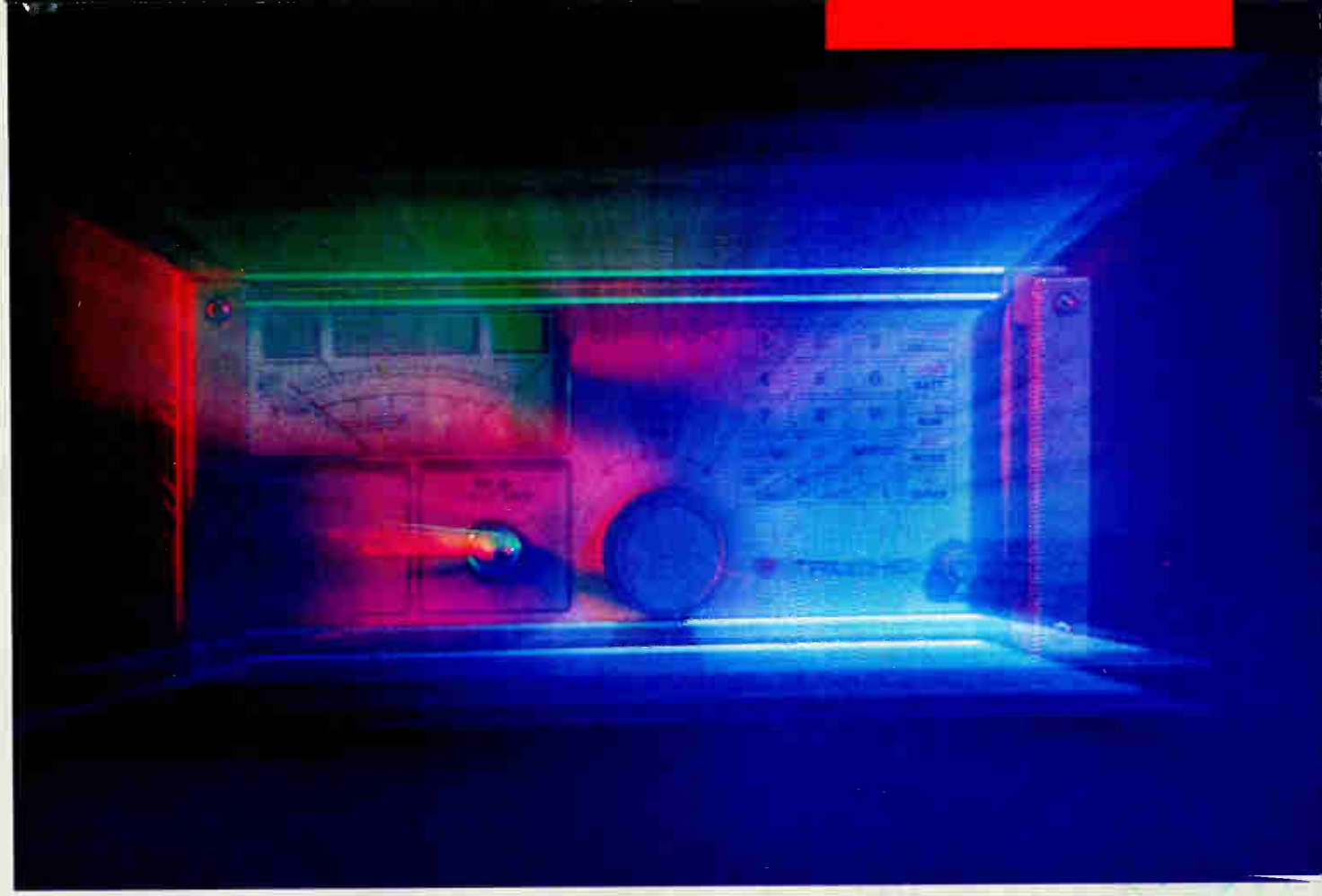
Video Design Pro . . . . .(505) 524-8959
FAX . . . . . .(505) 524-9669
749 Carver Rd.
Las Cruces, NM 88005
PERSONNEL: Dr. Walter P. Black, President; Dorothy Kerstetter, Sales
DESCRIPTION: Video engineers can reduce design time 70-90% with VidCAD software. Customized AutoCAD release 10 includes pre-drawn 3-D and block diagram components and "Touch & Cable" documentation (touch source and destination I/Os to export cable data). CableDOC makes cable reporting, labeling, and path calculations fast and easy.



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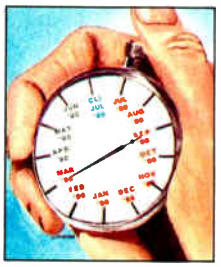
TRILITHIC

Reader Service Number 28

The flyover as a maintenance tool

COMPLIANCE



Webster defines "tool" as "...something regarded as necessary to the performance of one's occupational or professional tasks." Let's take the liberty of expanding that definition to include something which allows you to perform those tasks more efficiently, and then see how the flyover test fits that definition.

Herein we'll explore the use of airborne leakage measurement or "flyover" with attention given to type of information it can supply, vs. the ground based CLI and to how that information can be utilized.

As the "eleventh hour" for cable operators rapidly approaches, many find themselves scrambling to assess system leakage integrity and take the steps necessary to bring their plant into compliance. Others, having already done so, are now settling in on programs that insure the level of integrity they've achieved is maintained. Both need to make maximum use of the tools available to them.

Point-in-time evaluation

By now, hopefully everyone who ought to, knows what this annual exercise of proving your cable system worthy of continued use of the "aeronautical" spectrum is all about.

It should be understood the prime purpose of CLI or flyover is not to find leaks. The FCC has graciously supplied an entirely separate set of rules (the basic leakage limits of Part 76.605 and the quarterly monitoring of Part 76.614) that charge us with the duty of finding and fixing those in a much more timely fashion. But the annual check is a way to make a "point-in-time" evaluation of the degree of success you have had finding and fixing those leaks over the preceding 12 months.

However, one would be very short sighted to ignore the additional information available following the annual CLI or flyover.

Upon completion of the annual check the foremost questions usually are: "Does my system pass?" and "Where are the leaks?"

When we say "pass," we are stating either based on the flyover's direct measure or a prediction from CLI that the leakage emitted from the system is insufficient to generate field intensities exceeding 10μV/m at 450m over more than 90 percent of the service area. While here the flyover can claim to be the empirical test, the CLI values of "64" for I∞ and "-7" for I_{3000} are expected to typically correspond with the 90 perscent benchmark for the flyover.

It should be understood the prime purpose of CLI or flyover is not to find leaks.

A properly conducted and documented ground check for CLI calculation purposes will obviously net a detailed list of observed leak locations. To what extent similar information can be gained from a flyover test is subject to some variables which will be detailed herein, and the flyover may tell you some things the CLI didn't.

Assuming the flight track was recorded along with the leakage date during a flyover, the results can be reported in several different forms beyond a simple "pass/fail" percentage. Typical methods are as a list of measurement locations described as latitude/longitude coordinates with the associated field intensity (in μV/m or dB_{ref}) or by plotting of the measured field intensity values using the logged flight track coordinates.

When attempting analysis of such data, keep in mind we are actually dealing with measurement locations and observed values, rather than source locations. The values reported at each of these points represent the cumulative contribution of all leaks in the system, albeit in the case of distant sources a reduced contribution due to slant range.

While such a report may seem to side-step the question, "where are the leaks?", remember what this is all about: insuring aircraft freedom from interference over virtually all of the airspace overlying your cable system. Thus, such information is germane in that it depicts the physical dimensions of the area(s) being "polluted" by leakage from the cable system.

Sometimes based on his ground measurements, the discovery of over limit areas during a flyover comes as a surprise to the operator. Even with the best monitoring efforts, the system may sooner or later fall victim to the inevitable radial crack, loose connector or plate that for whatever reason is consistently missed during the drive out.

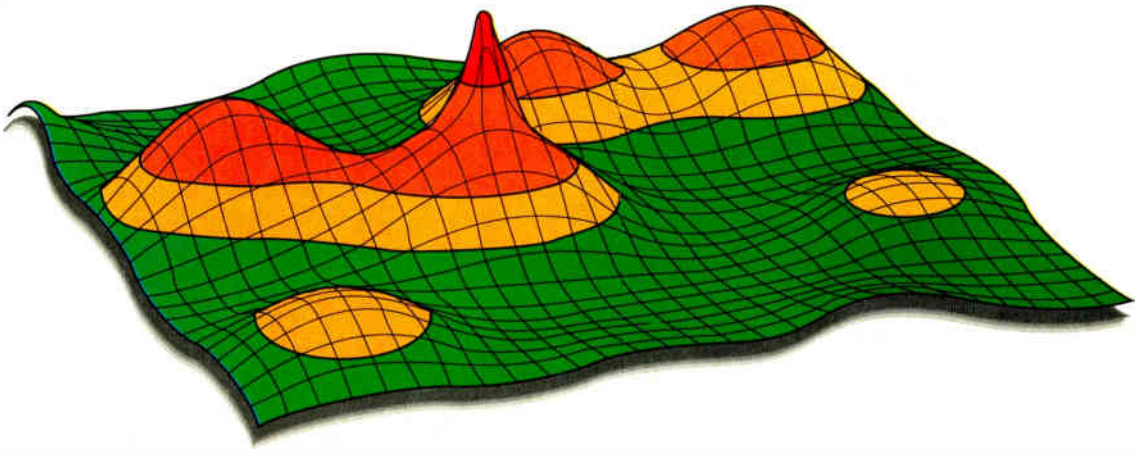
Often it is not possible to gather enough relevant data from the ground to accurately predict via CLI the presence of such leakage fields. This may be due to inaccessibility of cable plant located in high rise structures. Or it may be difficult to find the appropriate locations to take meaningful ground measurements when many closely located sources are involved, as may be the case with MDUs like apartments, dormitories, etc. Also, when the radiation patterns from a given source are distorted for whatever reason, the field intensity when measured using standard techniques from street side may result in a leak being missed all together, when in fact it is making a significant contribution when viewed from above.

Using the flyover to find leak locations has been equated to trying to do your CLI drive out while maintaining a distance 1,500 feet from the cable. Some of the variables that effect how closely leak locations can be resolved from the air are the total number of

By Chris Duros, General Manager, CableTrac Inc.

ComSonics

CLI FLYOVER



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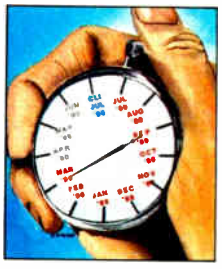
COMPLIANCE



leaks, their distribution throughout the system, physical size of the service area, and plant density.

For example, a system with numerous leakage sources spread randomly throughout the system will most likely produce flyover results which show what has been referred to as a "dome" effect, where in the leakage field is greatest over the center of the system. This would be the expected result, for instance, in a system which has aging, poor quality drop cable and connectors, or perhaps one whose hard-line cable was constructed using connectors without radiation sleeves. Both scenarios could potentially produce many individual leaks with 3m fields in the low to moderate range distributed evenly throughout the plant. Analysis of this plot may yield little useful information as to where to find individual sources.

This is in contrast to what we'll refer to as the "tight" system with a limited number of leakage sources. Here the plot will typically show isolated "hot spots" rising from a comparatively quiet background. Here the plot from a flyover test should be useful in locating the source(s). Obviously, rather than starting an investigative drive out at one corner of the system, the search should begin in the vicinity shown on the plot as the apparent center of the "hot spot," thereby reducing the time spent finding and correcting the problem.

A maintenance tool

While the flyover result from the leaky system may have only served to tell the system personnel something they already knew, its value as a maintenance tool may be your ability to, with report in hand, graphically depict the scope of the system's leakage problem to management when making budget requests for system repair or rebuild.

Comparison of subsequent flyovers with such an original report can provide an excellent means of evaluating the progress being made by such a repair or rebuild effort to bringing the system into compliance.

Both CLI formulae make the assumption that the leakage fields will sum together to be at their apex over the center of the cable system. Field data has shown this to not be consistently accurate, particularly when dealing with leakage from a relatively tight system. Here, when comparing I_{3000} results with those from a flyover, some interesting observations can be made. For instance, if the major leakage source(s) are far enough removed from the center of the system, their contribution to a I_{3000} calculation is sufficiently diminished to allow the system to generate a passing score (<-7). However, a properly conducted flyover may likely show more than 10 percent of the data points exhibiting levels in excess of 10μV/m and thus fail the test.

To consider the CLI I_{3000} result such as in this example as being acceptable would be unwise. It would most certainly be the result of leaks which far exceed the basic signal leakage limits of 20μV/m, and more importantly, the underlying goal of CLI has not been met, that being insuring freedom from interference in the airspace above. And besides, "Murphy's Law" would dictate that it will be in the end of town the FCC's field inspector enters the next time he comes by to pay you a visit.

A flyover may be considered a tool, given it's ability to quickly produce the point-in-time snapshot of system leakage integrity. This is an advantage whose importance will be determined by the resources available within the company and management's willingness to dedicate them. Committing the manpower for a ground based drive out that are necessary to gather accurate CLI data within a relatively short period may mean a virtual shutdown of all other service activities in the system for that period.

Conclusions

How well a flyover fits the definition of a maintenance tool depends on what shape your system is in, and what you are trying to accomplish. It may bring to light areas of the system where leakage is occurring of which you were previously unaware. It may only graphically confirm what you already knew.

A flyover's value as a maintenance tool may prove in the end to be its ability to allow you to spend more of your time and energy finding and fixing leaks instead of measuring them, thus helping you maintain a better operating plant that supplies better service to happier customers. ■

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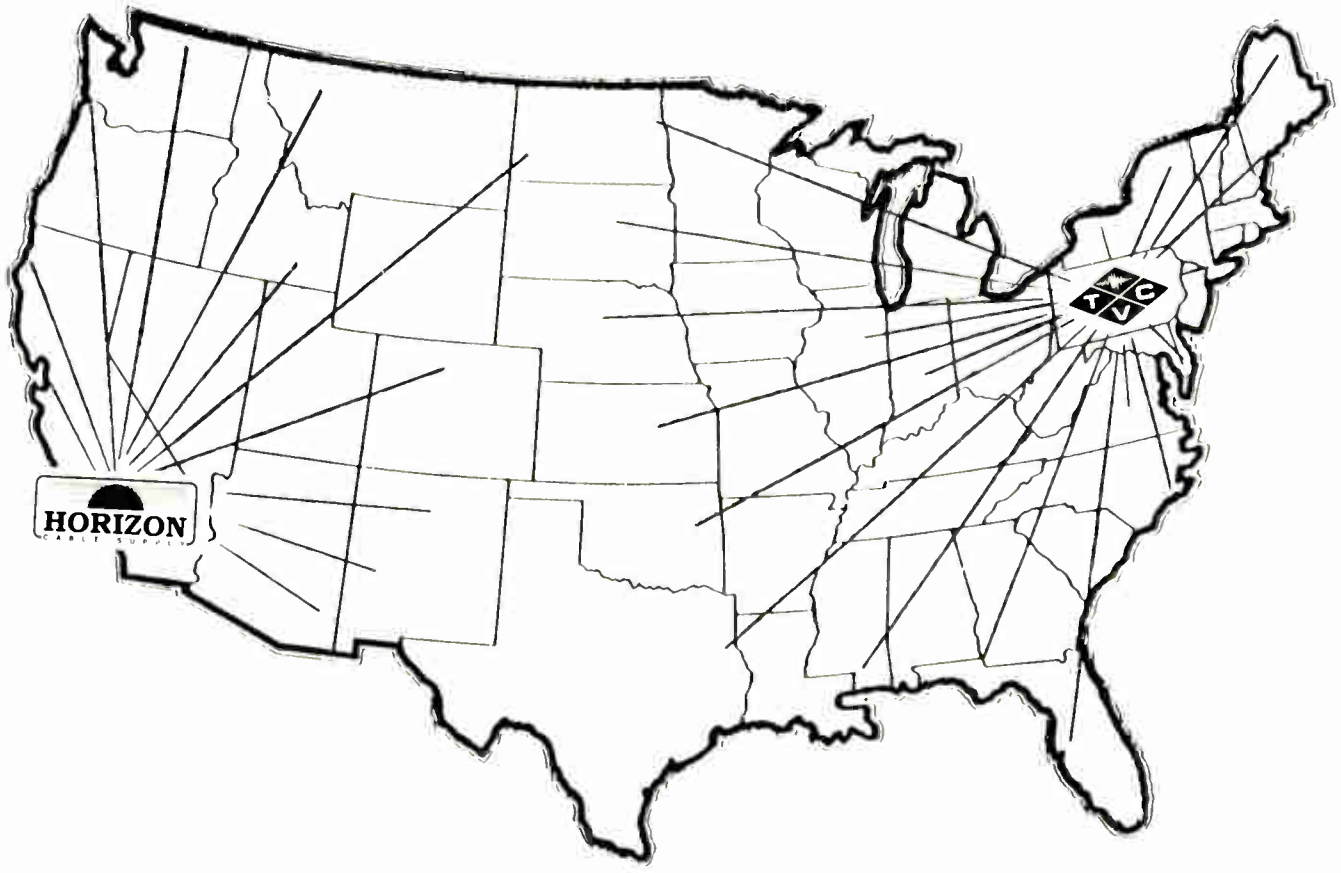

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Reader Service Number 31

The mysteries of NTSC video

BACK TO BASICS

While high definition television may be the captivating technology of the future, many in the industry believe improved NTSC may be the answer for today's television viewers. But what is NTSC? Does everyone really understand its fundamentals? In this month's Back to Basics, Bob Connelly explores the "Mysteries of NTSC" for those who want to take a fundamental look at NTSC.

The transition from cable installer to cable technician cannot be accomplished until the installer's understanding of cable signals grows to include not only the RF measured on the field strength meter but also a firm understanding of the baseband signals, including NTSC video. Contemporary literature available to installers and technicians abounds with graphs and charts illustrating the appropriate waveforms. However, many budding cable techs have difficulty correlating the images presented on the picture monitor with the oscillographic representation of the same image on a waveform monitor.

Television basics

The process involved in displaying images involves the use of reciprocal transducers. Transducers are devices which change energy from one form to another. A microphone is a transducer which changes sound energy into electrical energy. The loudspeaker is the microphone's reciprocal transducer that changes electrical energy into sound.

In television, the pickup device in the camera—either a pickup tube or a pickup chip—converts the light focused on it into an electrical signal referred to as video. The display device, either a cathode ray tube or a charge coupled device converts the electrical energy of the video signal back into light energy which our eyes then interpret as the scene on which the camera is focused.

In the camera, an electron beam scans the photo reactive material on which the desired image is focused. The image is scanned from left to right, and from top to bottom. The photo reactive material releases electrical charges in proportion to the intensity of the light focused upon it. When the beam reaches the right hand side of the pickup element it is turned off and returns to the left side to scan another line in much the same manner as a typewriter executes a carriage return before beginning the next line of text.

Television pictures are made up of a series of lines. In the NTSC system there are 525 lines in each complete picture. Motion is accomplished by creating 30 complete pictures per second. This means the scanning beam has to travel from left to right (525 x 30) or 15,750 lines of information per second. In order to reduce flicker, each complete picture is made up of two half pictures, called fields, of 262½ lines.

The beam starts at the top of the screen and scans all the odd lines first, i.e. 1, 3, 5, 7, ...525. When the beam reaches the bottom of the screen it is pulled back to the top and scans all the even lines: i.e. 2, 4, 6, ...524. This process is known as interlaced scanning. Because there are 30 new pictures each

By Bob Connelly, Transmitter Engineer, KCWC-TV, Wyoming Public Television

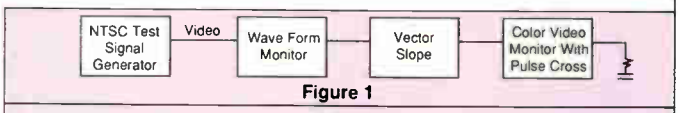

Figure 1

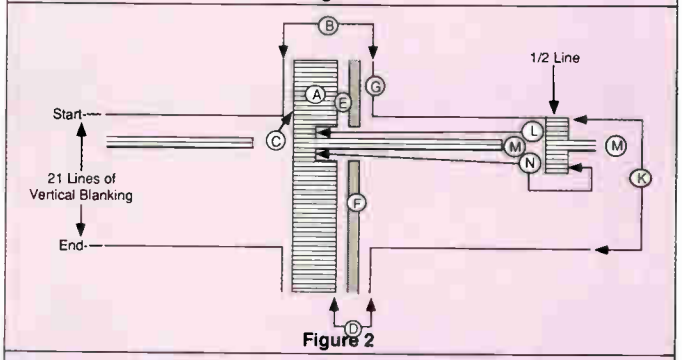

Figure 2

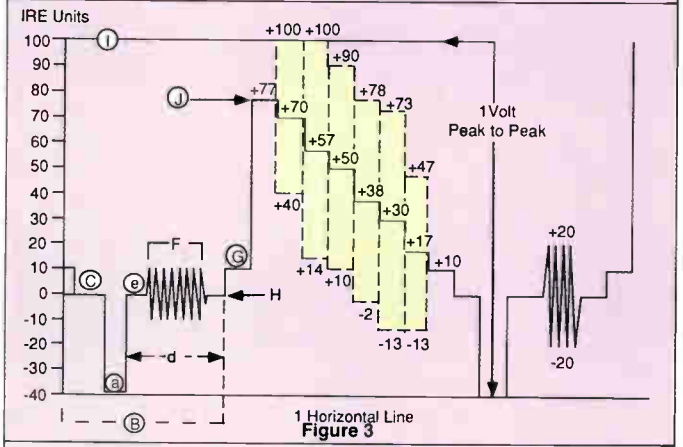

Figure 3

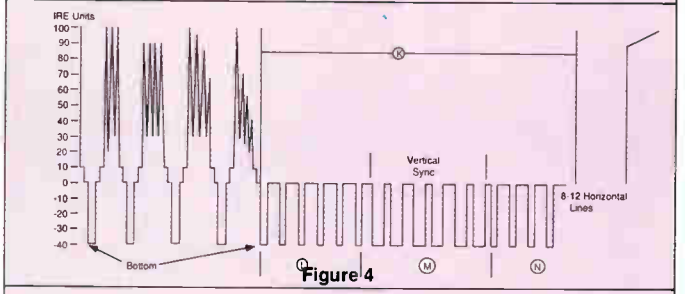

Figure 4

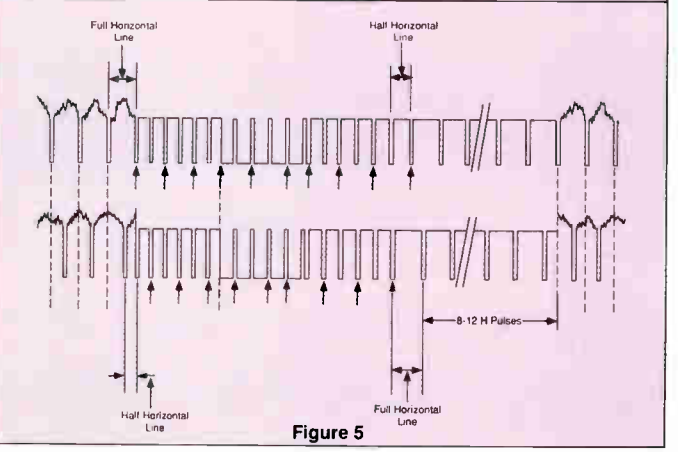

Figure 5

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second and each picture is composed of two fields, then there are 60 fields per second.

The process of recreating the picture involves moving another electron beam from left to right and from top to bottom in the identical fashion as the camera beam scanned the image. In the picture tube or screen, the electrical signal is amplified and used to excite photo sensitive chemicals in the display device, causing them to emit light. The amount of light that is emitted by any portion of the display is directly proportional to the amount of light detected by the pickup element in the camera.

The particulars of the television system used in the United States and Japan were developed over a number of years. The original parameters of 525 lines in 60 fields were recommended by the National Television Standards Committee and mandated by the Federal Communications Commission (FCC) on July 1, 1941. The NTSC standard was modified to allow compatible color transmission in 1953 and was modified again to allow multichannel sound in 1984.[1]

Armed with this basic understanding and a stack of diagrams showing the appropriate relationships between synchronization signals (sync) and the picture signal (video), the beginning cable tech is often equipped for confusion.

It should be noted that when sync and video information is combined into one signal, that signal is referred to as composite video. This discussion centers around the NTSC composite video signal.

The most practical means I have found for illustrating the complex relationships of NTSC composite video is to set up a waveform monitor, vectorscope, video signal generator and picture monitor with cross-pulse capability and walk the neophyte through the process.

The equipment was set up as shown in Figure 1. Particular attention was paid to making sure that the technician could identify the signal both on the waveform monitor, vectorscope and the corresponding representation on the picture monitor.

Make sure the technician can identify the following signals on both the waveform monitor and the picture monitor:

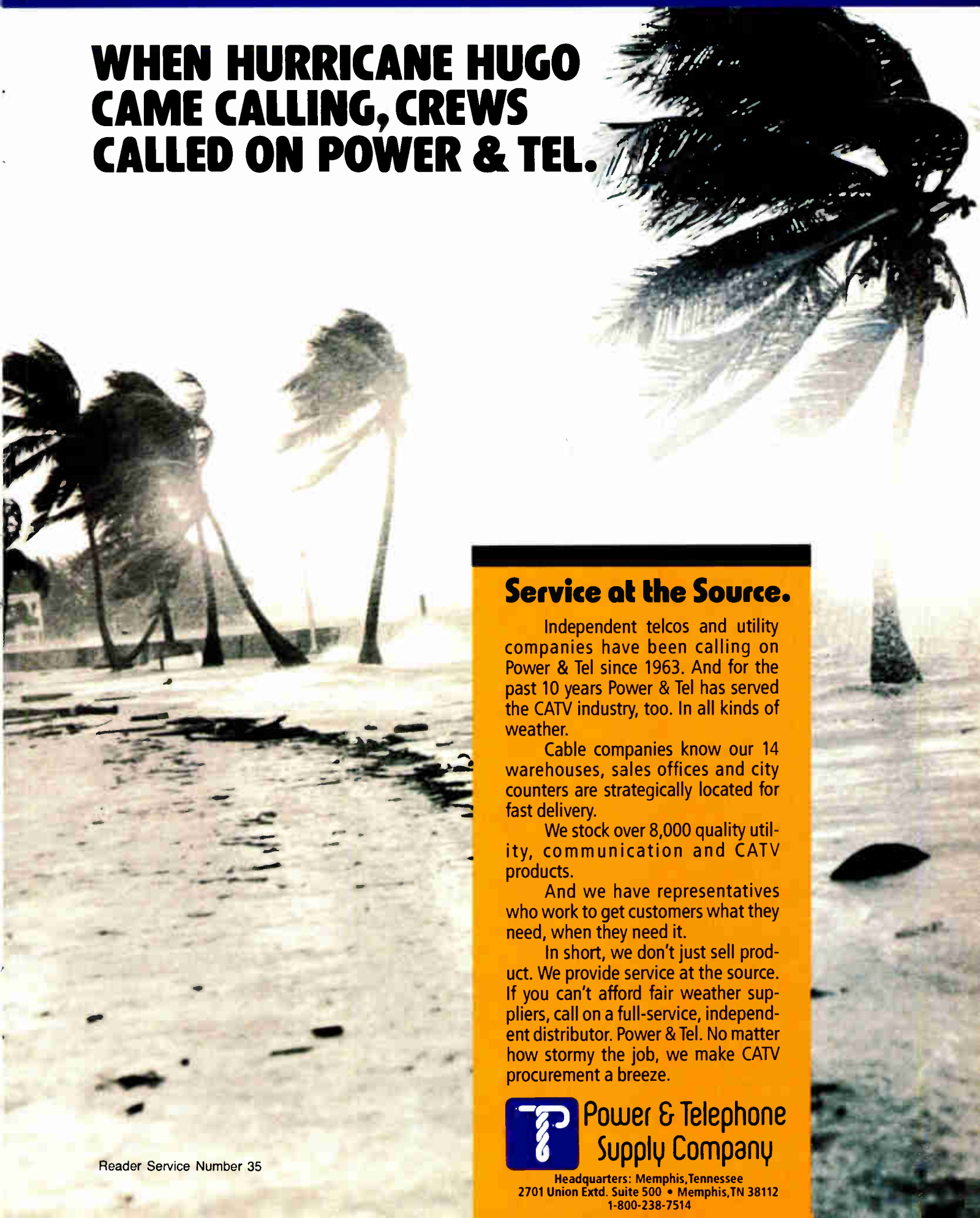
A. Horizontal sync pulses.
B. Horizontal blanking interval.
C. Front porch.
D. Back porch.
E. Breezeway.
F. Burst.
G. Pedestal level.
H. Baseline.
I. White reference.
J. Luminance level.
K. Vertical blanking interval.
L. Vertical equalizing pulses.
M. Vertical serrations in vertical sync.
N. Vertical equalizing pulses.
O. How to differentiate between field 1 and field 2.
P. Active scan lines coming out of and going into vertical blanking.

Using the vectorscope and a picture monitor, demonstrate for the technician the burst vector and the lack thereof with a black-and-white signal. Also demonstrate the burst phase differences between the different color bars using the color bar reference and then using the modulated 5- or 7-step staircase explain why there is no phase difference between the stairsteps. ■

References

1. Hurst, Robert, "A Brief History of Color Television."

WHEN HURRICANE HUGO CAME CALLING, CREWS CALLED ON POWER & TEL.



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Reader Service Number 35

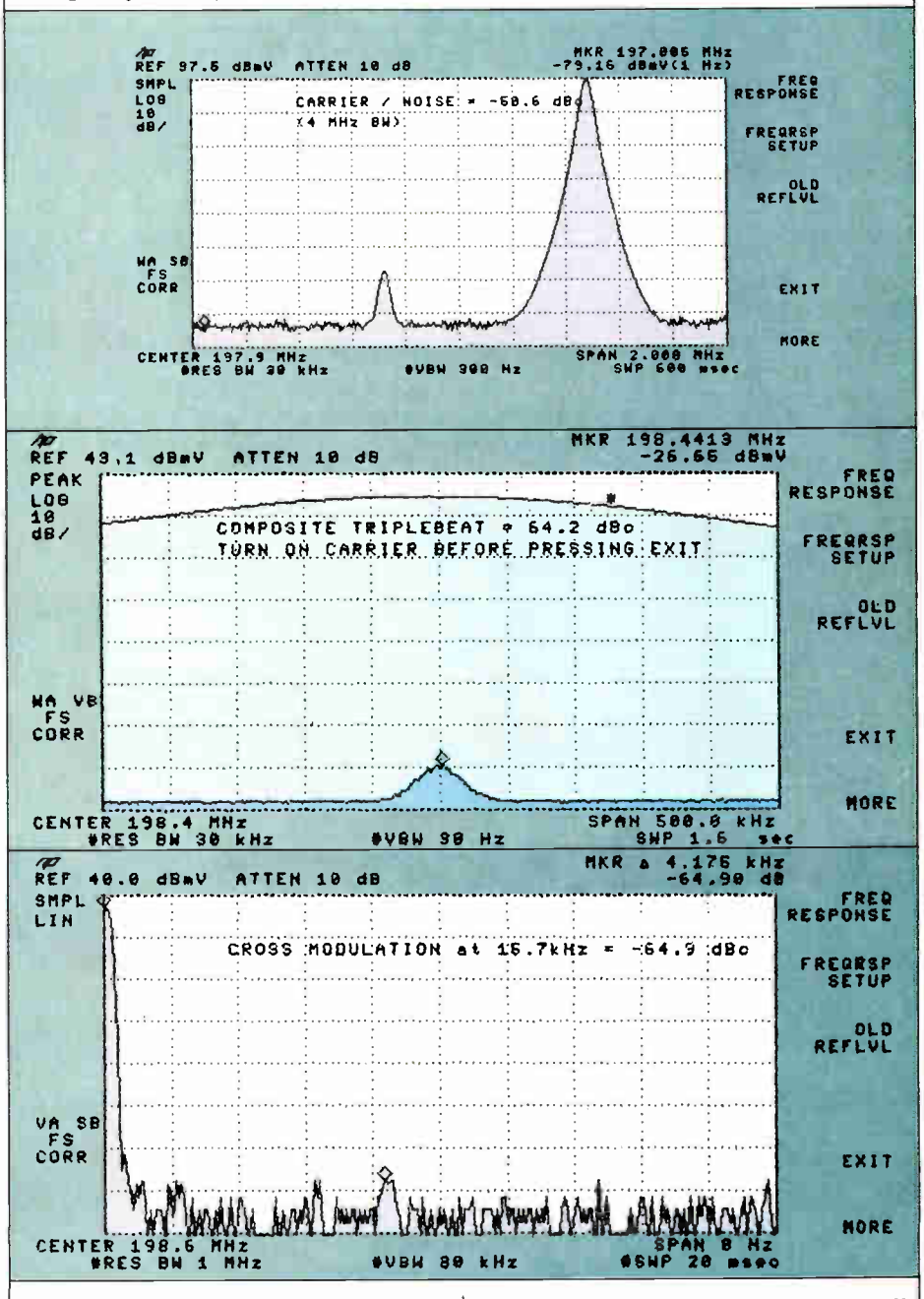
Optical technology in a different light

What do you do when you're a franchised cable operator and a private cable company in your area is delivering signals from one apartment complex to another via a cable *across* the street? Have them remove it of course. You're within your legal rights and that doesn't leave the private cable owner with many low-cost alternatives to providing television services to apartment owners.

Perhaps this same thought crossed the manager's mind when Viacom Cable in the Seattle, Wash., area asked NCS Cable TV to remove the offending cable in such a situation. NCS promptly did what Viacom asked. But instead of backing down or putting in a microwave link to cross the 200-foot span, NCS put in an infrared optical link to transmit 20 channels of video to the other side—legally and cost effectively. Now, two years later, NCS is not only successfully running a private cable operation, it has wired alongside Viacom Cable providing subscribers with an alternative means of getting cable television.

Although this isn't what Viacom had in mind, the episode brings focus on a technology that has been around for awhile, but is now rapidly gaining acceptance for short-haul applications—atmospheric infrared optical transmission links. The link consists of an optical transmitter (semi-conductor laser) and an optical receiver. The technology utilizes a very high frequency light wave carrier to send video, voice and data simultaneously over distances up to 2,000 feet.

Currently used in such applications as teleconferencing, telephone bypass, sporting event coverage, private cable and even multichannel multi-point distribution services (MMDS), the technology has applications beneficial to those in the cable industry wishing to cross a natural obstacle quickly and cost effectively.



Slow to gain acceptance

Unfortunately, one of the biggest drawbacks to the technology has been the relative ignorance about the optical link. Several companies have developed, manufactured and marketed the product, only to find themselves out of business in a few years. "The reason being," says Lanny Smedley, chairman of the board for Graycor Laser Systems Inc., "is number one, it's a difficult job to do and number two, because it's a more difficult job, it takes a lot of tender loving care. In order to do that, you have to spend money and you have to educate people."

For Graycor, in operation since 1984, the "educating" is beginning to pay off in this niche market. Today, only two companies exist to serve the market—Graycor and American Laser Systems. Graycor offers the ProLink 500, a

wideband infrared system capable of accepting and transmitting RF inputs within its 30 MHz to 350 MHz bandpass. The 42-channel system has a typical link power budget of 30 dB and can be constructed in a star or tree-and-branch topology. (See Figure 1 for performance specifications with 42 channels loaded on the system.)

American Laser Systems, in business since 1968, offers the Model 761 video transmission system which, although applicable for cable systems, is much more limited because of its single channel capacity. The 761 also consists of a transmitter/receiver capable of transmitting one channel of baseband video and audio up to a distance of one mile with a signal-to-noise (S/N) ratio of 47 dB.

Because of the operating frequency of an optical link, there is no interference and therefore, no licensing requirements. This makes it attractive in metropolitan areas where frequencies are difficult to obtain or where the only possible alternative is to run cable down a road and back in order to cross at a distant right-of-way. Optical links are even more attractive in situations where microwave may be cost prohibitive. The typical cost for Graycor's 42-channel system is $11,000, whereas American Laser's system will run approximately $7,000.

Not a perfect answer

Obviously, as with any technology, there are limitations to the technology. One of the inherent problems is building movement, or sway. "I found, after checking with engineers," says Dean Scott, president of Satellite Communications and Electronics, "that the top of a building, even a three-story building, can move as much as a foot."

This movement causes difficulties for the transmitted light beam. The infrared starts out as a very narrow beam, approximately the size of a pencil lead, but spreads as it travels. The resulting beam of light at the receive site may actually end up being a foot wide. "The beam is a cone shape," says Lorraine Shellenberger, marketing manager for American Laser Systems. "For every 1,000 feet you transmit, it will spread three feet."

But according to Scott, that was the only difficulty with the technology. "It worked beautifully otherwise," remarks Scott. "As long as that thing is solid, it will work." (Scott originally operated a cable system in St. Petersburg, Fla. with Telescript Industries Corp.'s L2000 laser system. The system was sold to Jones Intercable who replaced the link with coaxial technology. Telescript closed its doors approximately nine months ago, however, Jone's engineers expect to put the laser system back to work soon.)

Ron Chick, owner of NCS Cable TV, also feels the only problem with the infrared technology is building movement. However, Chick sees this as a "property" problem, not a system error. "These apartment complexes, what they looked like two years ago and what they look like now—I can see where doors are cracking and separating, the door no longer sits inside the door frame."

Because the laser demands such accuracy, Chick says the transmitter needs to be adjusted every nine months. "That's nothing," says Chick. "Even the Graycor requirements, what they consider maintenance, should be done every six months anyway. So, we're not doing anything out of the ordinary."

While both Graycor and American Laser Systems acknowledge the tracking error, they say the problem can be minimized by following some guidelines prior to installation of the laser. Graycor suggests avoiding structural elements such as wood, cantilevered steel pipes or tubes, long span roof elements or secondary or minor structural elements. For best case situations, optical links should be mounted on cast-in concrete, precast concrete, masonry and heavy structural steel buildings. For NCS Cable, the solution was to actually install concrete pillars to mount the transmitter and receiver.

Graycor also offers "Compulock," a closed loop digital system which, when implemented in a ProLink installation, allows for automatic correction of the transmitter's beam as the receiver moves from mounting instability or changes. Also available is "Signalock," a fast correcting, closed loop, automatic gain control system. Its purpose is to ensure stable RF output levels for distribution when atmosphere or alignment conditions change.

Rain, fog and snow

Adjusting for atmospheric changes obviously brings up another difficulty—severe weather conditions. "The problem is in conditions like fog, smog and smoke," says Shellenberger, "where you have small, dense particles in the air. Our light goes into that and just diffuses whereas microwave can cut through it. However, with rain and

CATV rules the Rockies

Which area is considered the birthplace of cable TV?

a) somewhere in Pennsylvania

b) somewhere in Oregon

c) somewhere else

The answer is: d) nobody can agree. In fact, the debate rages on to this day. However, there's little doubt as to the place known as the "capital" of CATV. This distinction belongs to Denver and surrounding area, served by the Rocky Mountain Chapter of the Society of Cable Television Engineers. "We're in the very heart of cable," says Chapter President Steve Flessner, Tele-Communications Inc. staff engineer.

Visitors soon discover the Front Range of the Colorado Rockies packed with thousands of CATV resources (peak-to-peak). "Here you don't feel isolated," said Chapter Vice President Pam Nobles, staff engineer/training at Jones Intercable. "It's helpful to know engineers from other MSOs in the region."

A gateway to both coasts, Denver became home base to early cable entrepreneurs. When cable skyrocketed in the mid-'70s, these companies also took off. Soon, many new CATV businesses sprang up in the vicinity. Today, no other area can boast a similar or greater concentration of operators, vendors and other related interests. (Another noteworthy item: Four of the 15 national SCTE directors live in this region.)

"The SCTE Rocky Mountain Chapter provides a direct link to the corporate headquarters," said Dave Willis, TCI director of engineering. And there are many links: You'll find the head offices of some large MSOs (TCI, United Artists, Jones) as well as other players (ATC National Division, Rifkin & Associates, Triax Cablevision, Fanch Communications, etc.). To better serve these decision-makers and buying authorities, many suppliers (Anixter Cable TV, Jerrold Communications, Scientific-Atlanta, Times Fiber, etc.) keep sales and/or support personnel here. To this lively mix, we add programmer affiliate offices, contractors, publishers, training facilities, media consultants and so on.

By Rikki T. Lee, Editorial Consultant, Rikki T. Lee Written Communications Services

And the variety just keeps growing. Last year, Cable Television Laboratories (CableLabs) set up shop in Boulder, 30 miles west of downtown Denver. According to Mike Schwartz, the R&D facility's director of clearinghouse, "A study was conducted to ascertain in which part of the country CableLabs should be located. Boulder was near the top of the list because of area industries involved in science and communications, the local university's interest in CableLabs, the economics and lifestyle of the area, and the proximity to cable companies."

An enviable position

Since its beginnings as a meeting group—with the first officers elected Oct. 17, 1984—and up to the present day, the Rocky Mountain Chapter has enjoyed an enviable position in the CATV capital. But with this privilege has come the responsibility in reaching out to corporate engineers as well as local system technicians and installers. As we'll see, such a wide outreach has resulted in some rather unique and innovative approaches to training.

A commitment to consistently high quality CATV technical training has been the trademark of the Society and its local groups for over 20 years.

Like all of the 50-plus SCTE chapters and meeting groups, the Rocky Mountain Chapter's primary mission is to provide technical seminars as well as regular BCT/E testing. In the past 5½ years of the group (the last four years as a full-fledged chapter), seminars have touched on topics such as cable powering, construction practices, antenna placement, preventive maintenance, AML microwave, installer safety, CLI and signal leakage, and many more. With mountains of resources at its doorstep, the chapter has no trouble tapping training talent. "We always have a large group of excellent speakers from which to draw," said Chapter Treasurer Steve Johnson, senior CATV project engineer at ATC's Denver support office.

A commitment to consistently high quality CATV technical training has been the trademark of the Society and its local groups for over 20 years. As a result, all levels of engineers, technicians and installers have taken the opportunity to further their professional careers through SCTE training. However, remembering its special responsibility to train corporate engineers in the area, the chapter has gone a step further (and perhaps a mile higher).

"Several times during the year, we hold Saturday sessions to appeal to the corporate engineer," said Chapter Board Member and Incentive Director Ron Upchurch, director of engineering at United Cable of Colorado. "But we're starting to focus more on what these engineers want to be taught. We've gotten input from UA's R&D department, which has recommended that we do higher level seminars on test equipment and fiber-optic design."

Thriving on cooperation from corporate engineering executives is another benefit of the Rocky Mountain milieu. In general, they support the chapter's training efforts, allowing corporate and local system technical staff time off to attend seminars. To quote Bob Luff, Jones group vice president of technology, "The Rocky Mountain Chapter provides an invaluable service in the cable capital. Most of us at corporate offices are terribly busy. We need the Society to bring all of us together periodically to share information and discuss issues common to all Denver-based MSOs." Also, in conjunction with the chapter, several MSOs in the area sponsor BCT/E testing during their engineering conferences.

The stuff of legends

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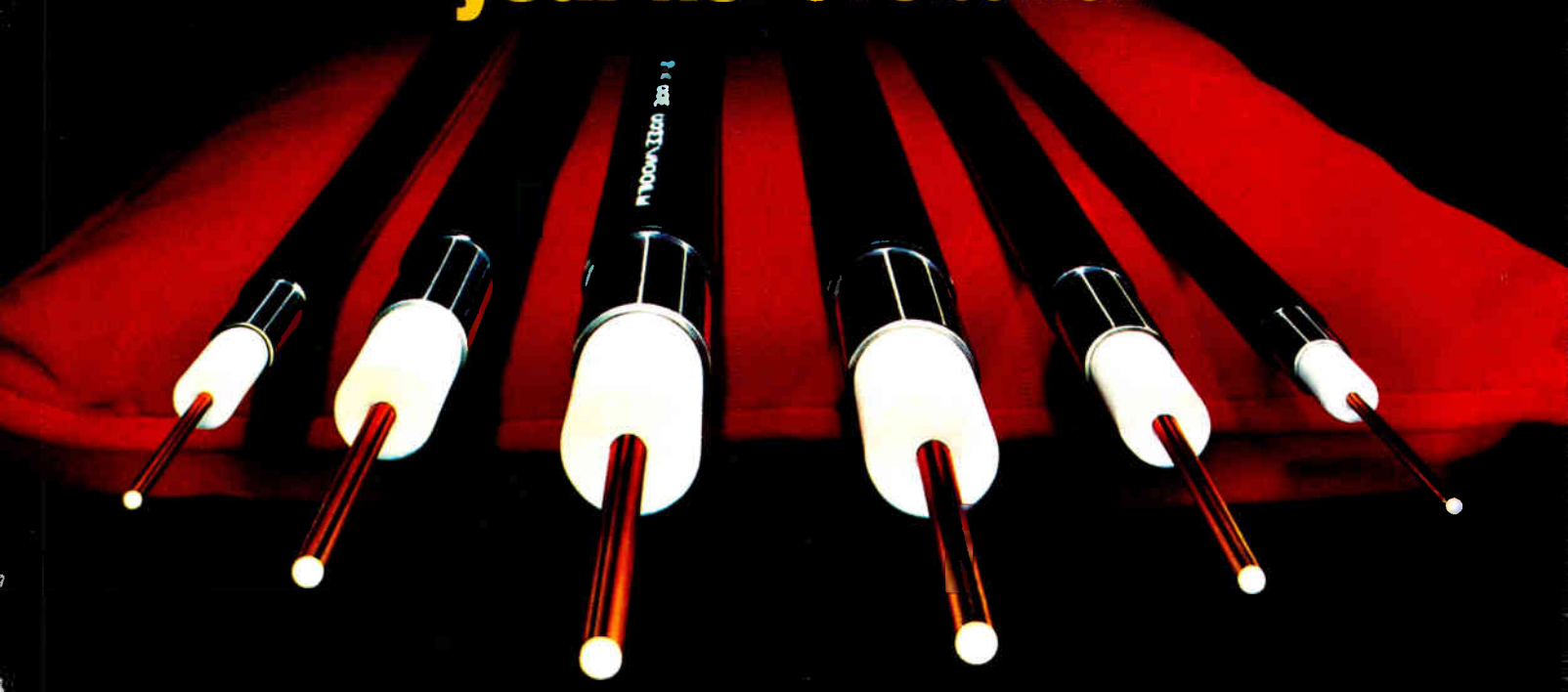

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Reader Service Number 39

presents seminars on professionalism and management each year. And once in a while, the chapter takes on an idea one step ahead of the rest. "We have more opportunities to do innovative things," said Chapter Secretary Eric Himes, sales representative for Magnavox CATV Systems. In this vein, the chapter in previous years has presented a videoconference on signal leakage and a meeting of minds between local broadcast and cable engineers.

"Last year's fiber-optic seminar could have passed for a national fiber event," said Tom Brooksher, director of marketing for the National Cable Television Institute, a CATV correspondence school based in the Denver suburb of Englewood. In this session last April, the top engineers from major MSOs gathered at Jones to present what their companies were doing with fiber here and abroad. The speakers included Jones' Luff, Jim Chiddix and Dave Pangrac of ATC, and Richard Rexroat of TCI. Engineers from New York, Chicago and other points infiltrated the audience.

But perhaps the most original stroke was the chapter's first Cable Games event, held last July during the Colorado Cable Television Association's convention in Vail. A series of four technical performance tests, the Games were the first effort at a participatory, competitive event for the technical community. Even after months of considerable planning and the sponsorship of local MSOs and vendors, the Games could have easily been blown along with the starting whistle. Quite the contrary: An audience of over 150 non-technical but curious convention-goers stood and watched until the final whistle nearly 90 minutes later. Can this possibly succeed again? You'll know that after the Second Annual Cable Games take place during this year's Colorado Show.

And there are surprises in this year's chapter schedule. Topics in its well-rounded seminar agenda for technical personnel includes system troubleshooting, connectors and cables, RF and video testing, and others. In addition, the chapter plans to reach out to a new group—CSRs—this December with a basic course on how the cable system works.

Incentive drive

Despite the large numbers of technical staff from area corporate, system and vendor offices, attendance at chapter seminars at times has been less than spectacular. Also, despite phenomenal growth at the national level, membership at the chapter level has remained relatively low. In an effort to reverse these trends, the chapter plans to implement programs for retaining current members and drawing new ones. As part of a membership incentive drive, seminar attendees will be offered chances to win special prizes, including a trip to Cable-Tec Expo '91. Also, the chapter encourages local system managers to inform their technical staff about the benefits of attending SCTE seminars.

No doubt, more exciting things are in store for the Denver area as well as for the entire industry; details are sketchy. In the meantime, just watch the SCTE Rocky Mountain Chapter continue to launch more "capital" ideas for training the technical community it serves. ■

WHAT'S AHEAD

SCTE

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

March 8 *Big Country Meeting Group* Abilene, Texas. Contact Albert Scarborough, (915) 698-3585.

March 10 *Chaparral Chapter* at the Howard Johnson Plaza, Albuquerque, N.M. Contact Brian Throop, (505) 761-6289.

March 13 *Central Illinois Chapter* "CLI Last Chance" at the Sheraton Normal Hotel in Normal, Ill. Contact Ralph Duff, (217) 424-8478.

March 14 *North Country Chapter* BCT/E testing to be administered in Categories I, IV, V and VII at the Edina Community Center, Edina, Minn. Contact Douglas Ceballos, (612) 522-5200, ext. 705.

March 14 *Mount Rainier Chapter* Contact Sally Kinsman, (206) 821-7233.

March 14 *Wyoming Chapter* "System Powering" with D.R. Johnston of TCI and "TDR" with J.R. Johnston of TCI at the TCI Cable Office, Riverton, Wyo. Contact J.R. Johnston, (307) 632-8114.

March 14-16 *Razorback Chapter* meeting to be held in conjunction with the "L'Ark Show" in New Orleans. Contact Jim Dickerson, (501) 777-4684.

March 15 *Southeast Texas Meeting Group* at the Warner Offices in Houston, Texas. Contact Tom Rowan, (713) 580-7360.

March 20 *Rocky Mountain Chapter* BCT/E examinations to be administered (tentative) at the Clarion Hotel Southeast, Colo. Contact Steve Johnson, (303) 799-1200.

March 21 *Greater Chicago Chapter* "Safety." Contact John Grothendick, (312) 438-4200.

March 21 *Dixie Chapter* in Montgomery, Ala. Contact Greg Harden, (205) 582-6333.

March 21-22 *Dakota Territories Meeting Group* BCT/E examinations to be administered in Categories I, IV and VII. Meetings will be held March 21 at the Ramkota Inn in Pierre, S.D., and March 22 at the Kirkwood Inn in Bismark, N.D. Contact A.J. VandeKamp, (605) 339-3339.

March 21-23 *SCTE National Seminar* "Fiber Optics 1990" at the Doubletree Hotel and Monterey Conference Center, Monterey, Calif. Contact SCTE National Headquarters, (215) 363-6888.

C-COR ELECTRONICS INC

C-COR Electronics "state of the art" seminars are three-day events designed to instruct relatively new technicians in basic theory, installation and maintenance of cable TV systems. Attendance is limited to a maximum of three persons from one system. The fee is $195. Call Teresa Harshbarger, (800) 233-2267, ext. 326 to register or for additional info on any of the 1990 seminars.

March 20-22
Atlanta, Ga.
April 24-26
Albany, N.Y.
May 22-24
Allentown, Pa.
June 19-21
Indianapolis, Ind.
September 18-20
Dallas, Texas
October 16-18
Phoenix, Ariz.

MAGNAVOX CATV SYSTEMS CO.

The Magnavox CATV Systems mobile training center is a fully-equipped laboratory on wheels for cable training. The three-day seminars combine instruction in theory and practical hands-on training. The fee is $300. Call Amy Costello Haube at (800) 448-5171 (in N.Y., (800) 522-7464) for information and reservations.

March 6-8
Chicago, Ill.
March 13-15
Lincoln, Neb.
March 20-22
Spokane, Wash.
March 27-29
Portland, Ore.
April 4-6
Stockton, Calif.
April 9-11
Los Angeles, Calif.
April 17-19
Phoenix, Ariz.
April 24-26
Santa Fe, N.M.

CED

Do you have a technical event or seminar you'd like to publicize? Just send a notice of your events to:
CED Event, 600 S. Cherry St., Ste. 400, Denver, CO 80222, (303) 393-7449.

BLONDER TONGUE LABORATORIES

Blonder-Tongue Laboratories will conduct technical SMATV/CATV seminars. Contact Rosemary Guarnieri at (201) 679-4000, ext. 265 for information.

March 22-23 Rockville, Md.
April 19-20 Edison, N.J.

Interference Control Technologies

Interference Control Technologies is sponsoring several electronics short courses for engineers and technicians. For more information contact Elizabeth Price, (703) 347-0030.

March 12-16 "Practical EMI Fixes," Atlanta, Ga.

March 13 "Product Design to Pass EMC Regulations," Palo Alto, Claif.

March 14 "Product Design to Ensure Immunity," Palo Alto

March 15 "EMC for Systems Engineers," Palo Alto, Calif.

March 16 "EMC for Managers," Palo Alto, Calif.

March 20-23 "Grounding and Shielding," San Francisco, Calif.

March 26-30 "EMC Design and Measurement," Orlando, Fla.

Scientific Atlanta

Scientific-Atlanta offers technical training for subscriber products for customers as well as advanced training for the industry. The following seminars will be held in Atlanta, Ga. Contact Patti Kitchens at (800) 722-2009 to register or for additional information.

March 7-8 8570/90 System Manager

March 14-15 Subscriber Manager V Training

March 26-28 Advanced Systems Hardware & Software Training

March 29-30 Advanced PPV and Impulse PPV

SIECOR

Siecor Corp. will sponsor fiber optic training programs designed to meet the needs of installers and users of fiber optic products. Following are dates for the program "Fiber Optic Installation and Splicing for Outside Plant Applications." For information on classes, pricing and registration call, (800) 634-9064.

March 12-15
August 13-16
December 3-6

March 21-23 Siecor will sponsor a seminar at the Fiber Optics '90 sponsored by the SCTE in Monterey, Calif. Call (704) 327-5000.

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Reader Service Number 42

Trade Shows

North Central Cable Television Association **March 26-29** Minneapolis, Minn. Contact Mike Martin, (612) 641-0268

NAB **March 31-April 3** Atlanta, Ga. Contact Rick Dobson, (202) 429-5335

CAB **April 1-3** Marriott Marquis, N.Y. Contact Vince Fazio, (212) 751-7770

MIPTV **April 20-25** Cannes, France. Contact International Exhibitors Organization, (212) 750-8899.

NCTA **May 20-23** Atlanta, Ga. Contact Michael Hill, (202) 775-3606

Canadian Cable Expo **June 3-6** Edmonton, Alberta. Contact Christiane Thompson, (613) 232-2631

BPME & BDA Seminar **June 10-14** Las Vegas, Nev. Contact Gregg Balko, (213) 465-3777

SCTE **June 21-24** Nashville, Tenn. Contact Anna Riker, (215) 363-6888

Colorado Show **July 12-14** Breckenridge, Colo. Contact Rebecca Scoggins, (303) 863-0084

CTAM **July 15-18** San Diego, Calif. Contact Christina Nelson, (703) 549-4200

NECTA **July 29-Aug 1** Newport, R.I. Contact Rosemary Vozzella, (617) 843-3418

Eastern Show **September 16-18** Washington, D.C. Contact SCTA, (404) 255-1608

Great Lakes Cable Expo **September 19-20** Indianapolis, Ind. Contact Dixie Russell, (614) 272-0860

Atlantic Show **October 2-4** Atlantic City, N.J. Contact Rhonda Moy, (609) 848-1000

Wireless Cable Association **October TBA** Location TBA. Contact Conifer Corp., (202) 452-7823

MIPCOM **October TBA** Cannes, France. Contact International Exhibitors Organization, (212) 750-8899

FC²

Fiberoptic Communications Corp. offers 5-day fiberoptic splicing and termination workshops. All workshops are held at its training facility in Sturbridge, Mass. The fee is $1,495 for 1-3 students and $1,195 for more than four students. For info call, (508) 347-7133.

March 19-23
April 23-27
May 21-25
June 25-29

Reader Service Number 43

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Reader Service Number 45

The CABLE POLL

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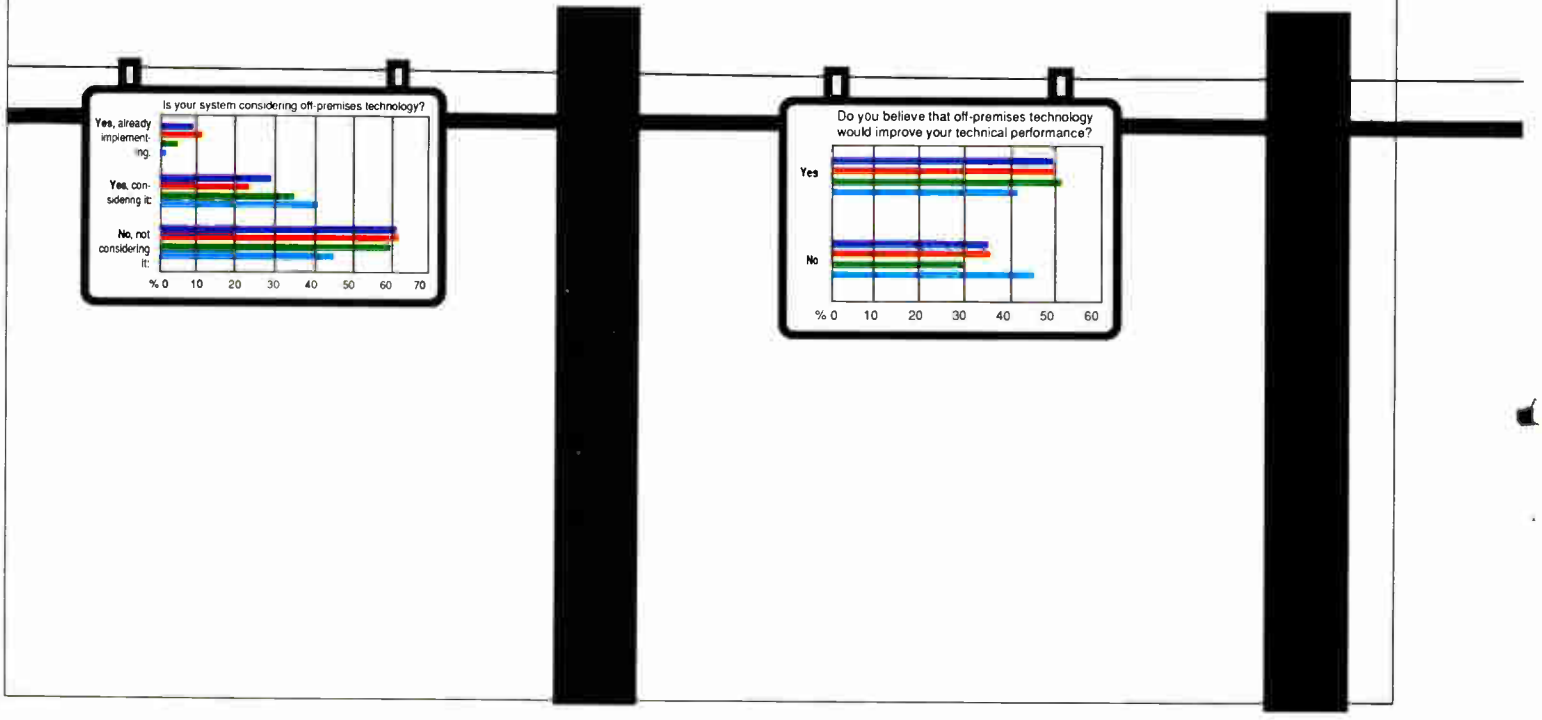
High level of interest found in removing subscriber equipment from inside the home

Better than one in four cable operators interviewed say they are considering abandoning set-top converters in favor of new technology which moves all subscriber control equipment out of the home, according to a Cable Poll™ survey which found operators about equally impressed by the technology's potential for increasing profits and in improving their systems' technical capabilities.

While the Cable Poll™ found a surprisingly high level of interest in on- and off-premises gear, it also confirmed that most operators are far from ready to rip out their huge embedded base of set-top converters. Sixty percent of the nearly 400 system management personnel surveyed said that they are not considering out-of-the-home subscriber equipment of any kind. But on the other hand, eight percent of operators interviewed during the same survey said their systems already are implementing off-premises technology and another 27 percent said they are considering it. [For simplicity, for purposes of the survey and for this article, off-premises embraces both pole-mounted (usually referred to as off-premises) and exterior house-mounted (on-premises) gear.]

And that level of interest cuts across all segments of the industry, according to an analysis of the Cable Poll™ data, ranging from a low of 23 percent of operators of small systems who say they are considering the technology to a high of 41 percent at large systems. That should buoy the hopes of manufacturers who have entered the field, including Scientific-Atlanta, which is underway with a test of its pole-mounted Addressable Interdiction system at the Warner system in Williamsburg, Va.; Jerrold Communications, which last year gained a groundbreaking commitment for 250,000 units of its Starport house-mounted product from TCI; and Midwest CATV, which has sold its Matrix product to systems



in Texas, Pennsylvania, Missouri and Tennessee. An MDU version of Matrix has been installed in an apartment complex in Wilkes-Barre, Pa., and soon will be installed in a large complex in Denver. AM Cable and Eagle also have similar products.

Asked if they thought off-premises technology would improve their system's technical performance, 48 percent of Cable Poll™ respondents said yes and 35 percent said no. Considering just the responses of managers at systems owned by the Top 25 MSOs, that affirmative response rises to 51 percent.

By a slightly greater margin, operators said they believe off-premises would improve their system's financial return, with 53 percent agreeing and 32 percent disagreeing.

Jack Bryant, marketing manager for Scientific-Atlanta's Subscriber Systems Group, said the Cable Poll™ data "are fairly consistent with what we found" in two internal research surveys. Two Jerrold executives who also were asked to comment on the data, Don Moloney and John Burke, said the information tracked with their market research.

Bryant remarked that he found it "very positive" that 27 percent of the Cable Poll™ respondents said they are considering off-premises technology. "If you look at the way GMs run their systems, that is very high because if they're considering something it usually means they have plans for it in the near term. I have talked with 23 of top 25 MSOs at the corporate level, and there were only two who were not interested."

Moloney, Jerrold director of product management, said "the level of interest that has been generated in consumer friendliness has led a lot of operators, in fact the majority, at least to consider what alternatives there are to what they have been using. That is a pretty good number—35 percent—implementing or considering it as a viable alternative."

Updating the Williamsburg situation, Bryant said "things are going well." Six of the units, each of which can serve four homes, were installed in November. Another 13 or 14, he said, were installed in mid-January, with the balance—for a total of 100 units serving an upscale neighborhood of 220 homes—in place by early February. The conversion from set-top converters was to begin right after the Super Bowl.

Bryant said he was not surprised at the level of interest in off-premises' potential to enhance bottom-line revenue. "The operating cost savings are real just from the fewer truck rolls. And any technology that allows you to control connects and disconnects cost-efficiently is a big area of operating cost savings. The third area that's really exciting is the potential lift in basic and pay penetration, particularly pay. Many subscribers today avoid pay just to avoid the descrambing set-top converter."

The first of Jerrold's Starport units are scheduled to be installed in early February at TCI's Boulder, Colo., system, and initial test results available by the end of the month. Burke, Jerrold's product manager, said full-scale production of the Starport, where each unit serves a single home, will begin in mid-February.

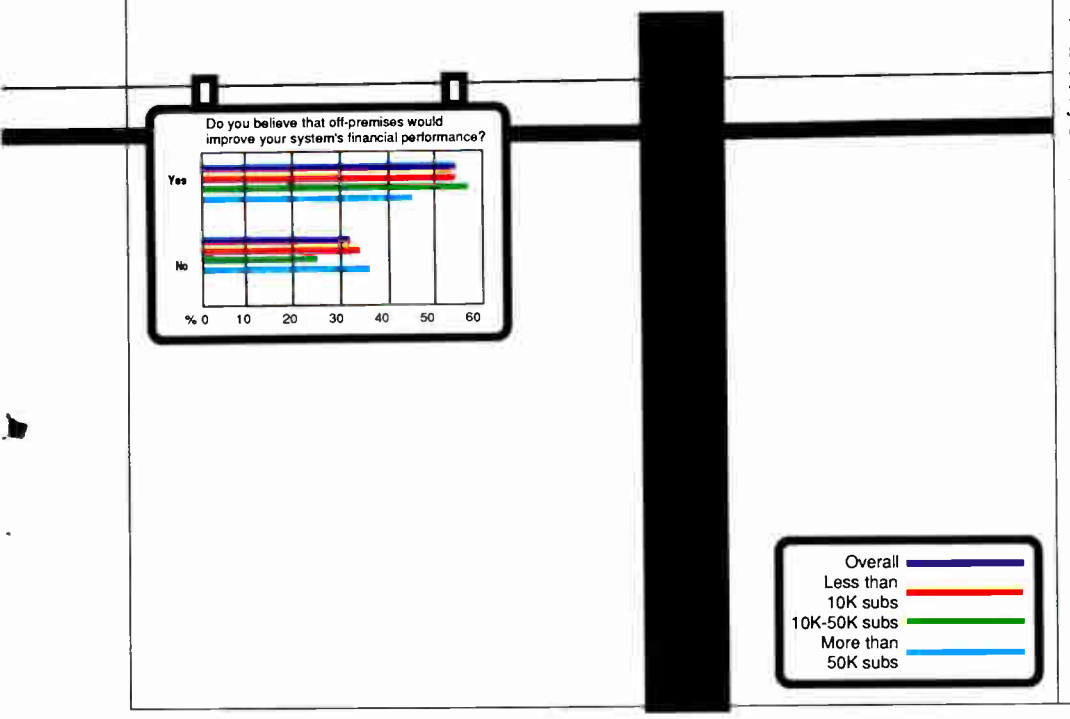
Matrix, a marriage of standard traps with addressability, was developed with Syrcuits International and is marketed by Midwest, noted Steve Brazil, vice president of marketing and product management.

Burke, Moloney and Brazil commented that the biggest advantages to off-premises, whether pole-mounted or house-mounted, is its consumer friendliness and the control the operator gains over distribution. They also noted that it eliminates theft of subscriber equipment and reduces signal leakage (because taps are permanent, they can be shrink-wrapped or otherwise made to withstand leaking).

The Jerrold, S-A and Midwest executives said they believe off-premises technology will be the wave of the future, probably after some refinements to tailor capabilities to individual needs of operators. "In 1990 you will see a lot of field trials by MSOs with one or two systems," Moloney said. "Then in '91 I suspect that what you will find is several other MSOs jump in who have various other applications for on- or off-premises.

"It has to happen," Moloney continued. "Consumer friendliness must be dealt with over the next few years to keep subs happy. But there probably will be an evolution of all these products... ultimately leading to some sort of device in the home that integrates all sorts of services."

Brazil said that "cable should be no different than gas or electric service in that we should allow the customer to do anything they want inside as long as our signal allows it to be done." He said CLI considerations are a major attraction of off-premises technology. "A lot of the surveys I have seen show that most leakage comes from the subscriber's drop or the dwelling. With an off-premises device you can solve that easily." ■



New line of fiber connectors

Gould, Inc. Fiber Optics Division has introduced a line of fiber optic connectors, cable assemblies, adaptors and receptacles to its existing line of fiber optic couplers and wavelength division multiplexers/demultiplexers. The product line includes NTT compatible FC and SC connectors in both single mode and multimode styles. Cable assemblies are available in both connector styles in a variety of cable diameters including 3.0 mm and 0.9 mm versions and cable lengths as customer specified. An option featuring back reflections less than -40 dB and less than -50 dB are available.

Gould has also announced the availability of an in-line optical isolator which acts as an optical diode in that it allows light from a laser to pass in one direction but prevents light traveling in the opposite direction from getting into the laser. The isolator provides a peak isolation of as much as 40 dB in either the 1.31 μm or 1.55 μm windows with less than 2.5 dB insertion loss and greater than 60 dB return loss. Singlemode fiber pigtails are also a feature.

Gould has introduced multimode tree and star couplers tha operate over the 400 nm to 1600 nm wavelength range. Available in multiple configurations (1 by 3 to 32 by 32), the couplers come in a variety of fiber sizes and types. Packaging styles for the couplers include light duty miniaturized, heavy duty pigtailed and rack mounted versions. For additional info on Gould products call, (301) 787-8311.

Siecor Corp. has announced a family of fusion splicers to meet application needs. The M90, M91 and M92 splicers provide low-loss splices of multimode and single mode fibers. The M90 unit is available with both the proven LID-System® unit and profile alignment for all types of fibers. Its LCD video display slows two views of the fibers simultaneously as well as menu prompts and splice loss readings. The M91 unit with LID-System unit to align fiber cores is a lightweight splicer for volume splice users. The projection screen with 30 times magnification allows pre-setting of Z-alignment and checking of fiber cleaves.

The M92 unit provides for splices with reduced capital outlay expenses. Incorporating the projection screen with 30 times magnification, the M92 features automatic fiber feed and fixed V-groove alignment. The standard 110/220 VAC power is used with the three units. For more details call, (704) 327-5000.

Second generation IRD

Available from **ISS Engineering, Inc.** is the second generation of its C/Ku-band IRD satellite receiver—the

ISS Engineering's GL5020A

GL5020A. Featuring front panel access to the descrambler module, the receiver is designed to be VideoCipher®II Plus ready. The GL5020A has separate C/Ku-band inputs for dual antenna/feed, a low temperature rise and incorporates a switchable narrow bandwidth filter. The receiver can also be

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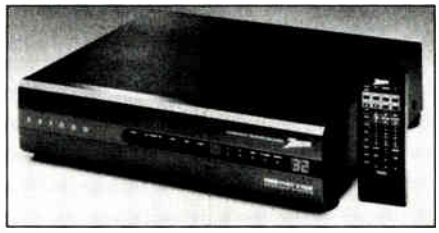
remote controlled via its RS-232 interface and a serial communications software disk (PC/XT/AT compatible) is provided with the unit at no charge. For additional info call, (415) 967-0833, (800) 351-4466 or (800) 227-6288.

Zenith Electronics Corp. has introduced the Model ZS-7000, satellite integrated receiver/decoder (IR/D). On-screen menu displays, driven by Zenith software, allow for easy program selection and operating choices. Zenith's "Space Command" UHF remote control allows viewers to tune satellite



Zenith's Model ZS-7000

channels on TV sets anywhere in the home, regardless of where the ZS-7000 receiver is. Additional features include a built-in VCR timer, 50-satellite memory, 200 favorite programs (100 video and 100 audio), parental security and Zenith automatic peaking (ZAP), which automatically finds and tunes to the ideal satellite position for the selected program. For more details call, (708) 391-8181.

Trilithic, Inc. has introduced a new 1 GHz bench sweep system. Components of the system include the PS 1000Z sweep generator which features digital display of center frequency; sweep width or variable market frequency; standard 1 MHz, 10 MHz and 50 MHz harmonic markers; and front panel test presets. The DSC 1000 Digital Sweep Comparator features electro-mechanical attenuators with digital readouts for reference and test attenuation. Also featured is a digital readout for attenuation difference. A second reference trace allows alignment within a predetermined window. Completing the system is the SDS 1000 nine inch display scope. For more information call, (800) 344-2412 or (317) 895-3600.

Available from **Viewsonics, Inc.** is a new battery operated dipole preamplifier. The portable package makes CLI measurements by increasing signal levels off the dipole by 20 dB, so that measurements are easier to read. The unit includes a 20 dB amplifier, re-chargeable NiCad battery, power cord and battery pack. The unit is priced at $89.50.

Viewsonics has also announced its "Ultra Seal" tape designed to seal and weatherproof all aerial and underground fittings. Ultra Seal is a self-bonding tape which can be used to protect all types of fittings, including 90° and housing to housing connnectors without interrupting service. The tape does not require heat or flame for application. For more info on Viewsonic's products call, (800) 645-7600 or (516) 921-7080 in New York.

C-COR Electronics, Inc. has announced the FH Series of 8-Port Finned Lid Housing. The housing incorporates 242 square inches of additional heat-sinking area. A 10° centigrade reduction in the ambient temperature is achieved with an overall size increase of 0.75 inches in the housing height and no increase in the housing length. The FH series also incorporates C-cor's 3 Ampere Power Supply. The 8-Port housing is completely compatible with the company's current 500 Series RF

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modules and ancillary products. For additional info call, (814) 238-2461.

Loma Scientific, Inc. has introduced a new channel combining system for use in the ITFS/MMDS/OFS broadcast services. The 700SDF series of "stackable" waveguide directional filters allow any non-adjacent channel in the 2.5 GHz to 2.7 GHz frequency band to be combined with up to 15 other "stacked" channels while maintaining insertion loss to any input at less than 0.7 dB. A wide-band port is provided on each unit for insertion of MDS channels into a common waveguide. Isolation from any input to any output is typically 40 dB, VSWR on any input is better than 1.20:1. For more details call, (213) 539-8655.

Tektronix, Inc. has announced a non-interfering CATV system sweep to its line of broadband test equipment. The system allows for continuous swept response measurement with no interference to the visual content and is programmed to inject sweep pulses across any selected portion of the 5 MHz to 600 MHz band and fire those pulses only during the vertical blanking period of the video. Comprised of two units, a rackmounted transmitter (2721) and a battery-operated portable receiver (2722), the 2721 transmitter has a fully frequency-agile telemetry carrier that may be positioned anywhere within the 5 MHz to 600 MHz band and allows the system to be set for sub-split, mid-split or other configurations.

Tektronix's 2722 receiver

The 2722 receiver features normalization techiques to eliminate flatness errors in the sweep trace during set-up and has internal storage for up to eight different reference traces. Additional functions include a built-in AC/DC voltmeter, temperature probe, full alphanumeric keypad, and a signal level meter function which allows monitoring of carrier levels with a 'spectral' display of all carriers at once. Call, (800) TEK-SPEC for additional information.

Test systems for EMC and EMI

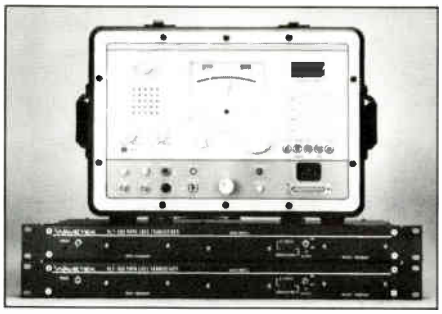
Hewlett-Packard Company has introduced four test systems for electromagnetic-compatibility (EMC) and electromagnetic-interference (EMI): the HP 84100A EMC design-development system; the HP 84110A EMC preproduction-evaluation system; the HP 84120A EMI commercial-precompliance measurement system; and the HP 84130A EMI commercial-compliance measurement system. Complementing these systems are two receivers and all the necessary transducers and accessories, the HP 8573B and 8574B EMI receivers and the HP 11966, 11967 and 11968 series transducers and accessories. These measurment systems evaluate EMI and EMC problems from early design to final testing against standards. For more info call, (800) 752-0900.

An addition to the Con-Sert™ Screw System has been announced by **Diversified Fastening Systems of America**. The new #8 Con-Sert screw is an American-made product of the DFS/USA line of concrete fastening systems, have ICBO approval, were tested to ASTM E488 standards and exceed FF-B-561C specifications. The #8 Con-Sert tools provide a dual-purpose drill and driver allowing for one-person installation. Con-Sert screws replace plastic expansion anchors, plugs and other inconvenient, lightweight masonry fastening products. For details call, (800) 833-6417 for the number of a representative.

Diversified #8 Con-Sert screw

GMP has announced a new Craftwork coaxial crimping tool. The CW1317 coaxial cable crimper can crimp all RG58, RG59 and RG62 AU, BNC and TNC three-piece MS39012-type connectors, for complete compatibility with Paladin, Amphenol, AVA, Cambridge, Delta, Trompeter, Kings and other connectors. The CW1217 crimper has ergonomically-designed handles, steel body precision-stamped dual nest dies and is backed by the Craftwork five-year, service life guarantee. Call, (215) 357-5500 for info.

Wavetek RF Products, Inc. has introduced a new test system for broadband local area networks (LAN). The BITS 4000 bidirectional interactive test system enables quick reaction testing to assure minimum network downtime. Two-way certification, maintenance and alignment tests may be performed by one person. The system



Wavetek's BITS 4000

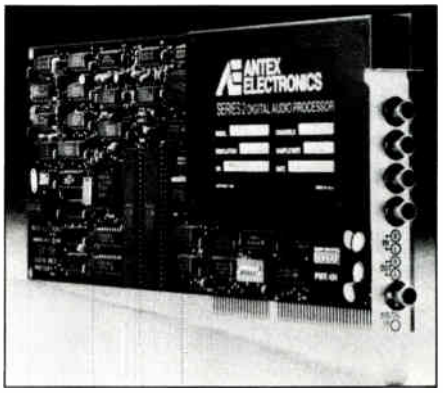
is frequency agile and consists of a LAN 450D network signal analysis meter and two PLT 1000 path loss tranceivers. The LAN 450D incorporates signal level measurement and signal generation in one test instrument. The PLT 100 path loss transceiver is a frequency agile test signal generator and translator. The LAN 450D allows the operator to carry the system to different points in the system and measure outbound and inbound path loss, carrier-to-noise and hum modulation. For more info call, (800) 622-5515.

Available from **Chaparral Communications** is the Monterey™ Model 30 home satellite receiver. The Model 30 features digital or analog stereo, on-screen menus and UHF remote control, 100 favorite channels and AutoTrack™ for automatic location of satellites during installation. The unit is priced at $1,400 (could vary by dealership). For details call, (408) 435-1530.

CableData has announced the availability of the Teleclerk 386 Interactive Outage Management system, a fully automated system that proactively detects and manages plant outages. The system automatically handles incoming calls, differentiates between a "possible" and a "definite" outage, notifies key personnel, tracks an unlimited number of geographical areas, reports trouble calls by area and then calls subscribers back to inform them service has been restored. For more info call, (916) 636-5631.

CableData's Teleclerk 386 System

Antex Electronics Corp. has introduced a digital audio board featuring



Antex Electronic's Series 2/SX-10

2-channel stereo, CD quality audio recording and playback for IBM-PCs and compatibles. The "Series 2/Model SX-10" is part of the Antex family of PC based digital audio boards and is designed to fit into the expansion slot of any IBM-AT, PS2 Model 30, or any compatible 286/386 computer. The SX-10 allows users to receive both analog and digital audio signals from a variety of sources including natural voice, CDs, DAT players and other digital devices. The SX-10 can digitize two audio channels, converting the stereo sound into digital input that can be stored to a hard disk, or CD-ROM. For additional info call, (213) 532-3092.

Two new courses designed to introduce cable television industry suppliers and non-technical personnel to the basics of cable television technology have been released by the **National Cable Television Institute** (NCTI). CATV Technology for Industry Suppliers (a 17-lesson course) and CATV Technology for Non-Technical Personnel are self-study courses, similar in format to NCTI's Career Path courses for cable industry technical personnel.

NCTI has also announced plans for 13 new lessons for its Installer and Installer Technician course and will be enhancing five key areas of its current Installer lessons. The new lesson additions and revisions are designed to keep NCTI's courses up to date with changes in cable television technology and field practices, and to add information in areas of growing interest to the industry. Eight new lessons for the Installer Technician course will be among the releases. For more info call, (303) 761-8554.

New product announcements at NAB

To be introduced at the National Association of Broadcasters Show, March 31 through April 3, 1989, by **Conifer Corp.** are five models of low

noise, GaAs FET, 2.1 GHZ to 2.7 GHz preampliers. The various models can be interfaced with existing receive sights, allows for enhancement of fringe area reception and can be used as microwave line amplifiers. The model QL-1015, a 32 channel wireless downconverter features an interanl GaAs FET preamplifier resulting in a noise figure of less than 2 dB and over 35 dB of conversion gain. Conifer will also be demonstrating a new wireless cable/ITFS repeater (beam bender) system. For more info call, (319) 752-3607.

Schmid Telecommunication will also introduce a new product at the NAB, the SIAT (short interval audio testing) audio network testing system. SIAT is a fully automated system that can monitor any audio network with an entire test sequence capable of being completed in five seconds. SIAT checks up to 10 parameters of audio transmission, including frequency response, phase/level difference, total harmonic distortion, crosstalk, noise, channel transposition, intermodulation distortion and more. The complete system, which conforms to CCITT standards, consists of three pieces of equipment: the SZ316 signal generator, SZ346 measuring receiver and SZ SIAT-NET software for network supervision. Demonstrations of the SIAT system will be held at Schmid's booth, 1035-1133.

Also being demonstrated at the NAB is **Television Equipment Associate's** Matthey Video Delays with flat responses to 30 MHz. Also shown will be HDTV filters with passbands up to 40 MHz, all phase equalised. For low frequencies, the Matthey CDF (customer definable filter) for audio anti aliasing will be shown. Products will be shown at Booth 5501, 5503, 5505 and 5507.

On the move

John W. Bowler has been named president of **Zenith Cable Products**, a division of Zenith Electronics Corp. Most recently vice president of operations for Zenith Cable Products, Bowler succeeds James L.Faust. Bowler has held a variety of key engineering and general management positions at Zenith over the past 16 years.

John Bowler

William Roper has been appointed President and Chief Operating Officer of **BradPTS**. Roper will be based in Schenectady, N.Y. and will have daily operating responsibilities for all of BradPTS' operations and ten service center facilities. Prior to joining BradPTS, Roper held management pollsitions with Clevite Industries in Chilcago, Kearney Management Consultants and holds a consulting partnership in the firm.

William Roper

NCTI has announced a change in the management structure to accomodate the institute's rapid growth. **Roland D. Hieb**, the institutes founder and executive director, will assume the title of Chairman and will step out of the day to day operation of the company. **Byron K. Leech** will continue as the institute's president but will relinquish day-to-day operating responsibilities to **Thomas W. Brooksher**. Previously, the marketing director, Brooksher has been named Executive Vice President and General Manager. In addition, **Gerald Neese**, formerly director of student services, has been appointed Director of Operations.

John Demos

John Demos has been appointed to the position of account executive in the sales department for **Cable Security/Power Guard**. Demos, a nine year veteran of the cable industry, comes to Cable Security from Hudson Supply Company in Atlanta where he also held the position of account executive.

Anixter Cable TV has named **Al Bierman** fiber optic product manager. Bierman serves as liaison with Anixter's suppliers to ensure accurate stocking and inventory management. Bierman is also responsible for bringing new fiber optic products to Anixter's inventory. Bierman most recently served as product manager for tools, test and safety equipment.

Passive Devices, Inc. has announced the appointement of **David Green** as vice president of sales. Green joined PDI in 1987 and held various sales positions in the company prior to this latest appointment. Green has been

IN THE NEWS

associated with the cable industry since 1983, coming to PCI from Intercept.


Dennis Donnelly

Dennis Donnelly has joined **Orchard Communications Inc.** as Western regional sales manager. Donnelly, who was recently manager of systems engineering for Catel, has 16 years of broadcast and CATV experience and will be based in the San Francisco Bay area. Previously Donnelly was employed by RCA, first by RCA Broadcasting, then by RCA Cablevision Systems, as product manager for both headend and distribution.

K.Y. Chou has been named vice president and general manager of **General Instrument/Taiwan's** Jerrold Subscriber System Division. Chou will be responsible for overseeing all Jerrold manufacturing activities in the Far East. Chou has been with General Instrument since May, 1966, holding key positions in production engineering, manufacturing, engineering management and operations management.


Jennifer Churchill

In another announcement, **Jennifer Lambert Churchill** has joined **Jerrold Communication's** Slough, England office as director of business development. In this capacity, Churchill will seek out and develop new business opportunities in Europe. Churchill, who was most recently director of affiliate relations for Digital Cable Radio, will concentrate her efforts on growing new DCR and Cable Video Store opportunities.


John Venner

John Venner has also joined Jerrold Communications as an account representative in the sales organization. Venner will work with Cablevision Systems Corp. Venner comes to sales Subscriber Systems Division marketing department where he was a product manager for address-

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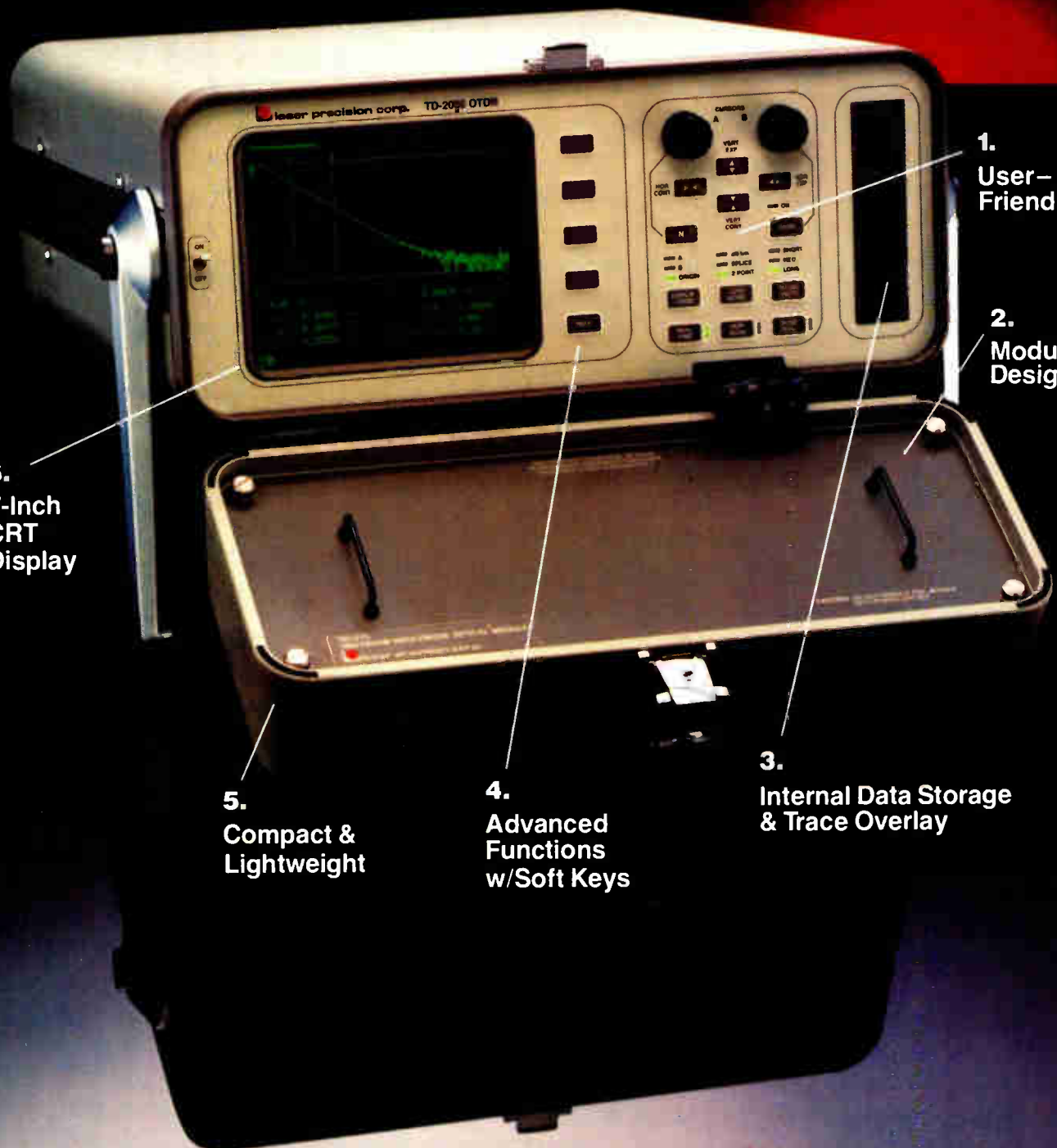

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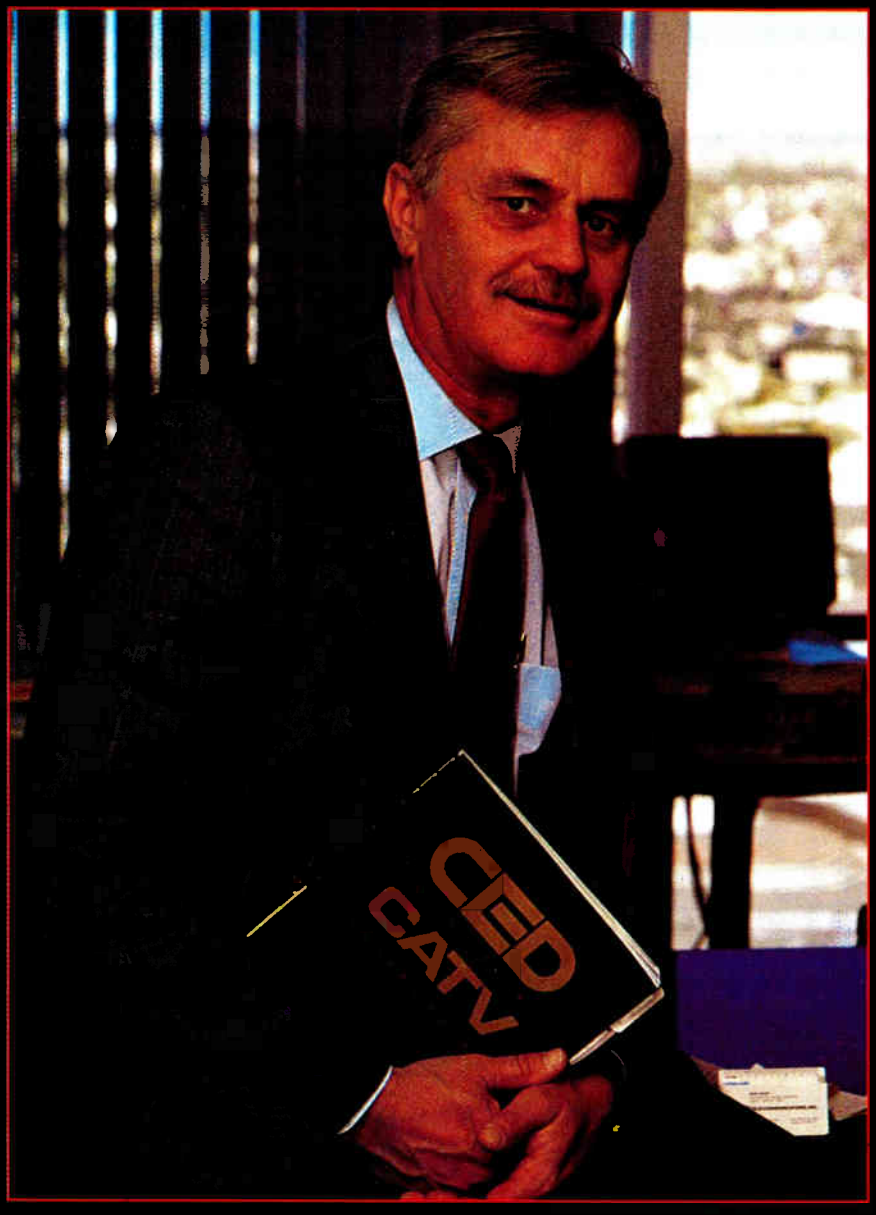

"The CED CATV Buyers' Guide has been a tremendous aid to me over the years. I particularly like the front section that tells me who the company is and who the players are. What I like best about the guide are the sections and tabs that lead you quickly to whatever you're looking for."

Jack Joynt
TCI Corporate Purchasing Coordinator

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1990 CATV Buyer's Guide

able converters. He joined Jerrold in 1983 as a product analyst.

Thomas J. Ferraro has joined **Digital Cable Radio** (DCR) as director of affiliate relations for the Eastern region. Ferraro will negotiate DCR carriage and implement marketing support programs for each cable system. Ferraro was previously director of marketing for Prism.

TBS, Inc., a consulting and engineering firm, has announced the appointment of **Wes Schick** as vice president and partner of the company. Schick was recently vice president of fiber optic products for Anixter Cable TV, having spent six years in positions as regional manager, product manager and regional sales engineer. Schick will be responsible for the day to day business operations and managing all sales.

CableData has named **Eric Jungemann** to senior vice president of product development. Jungemann was recently vice president of system development. Jungemann will assume overall responsibility for software product development at CableData and focus on long-range, strategic planning for the company's products.

CableData has also named **Perry Edwards** as director of software development. Edwards is responsible for managing the company's QBS (QuickData® Business System) software development group. Edwards initially began working with the company's founder, Bob Mathews, in 1984 and has been a consultant to CableData on software issues.

Plessey Semiconductors announced that **Joe Palmiotto** has been named director of sales for North America.

Palmiotto has over 22 years experience in the semiconductor industry and will be responsible for all sales activities for Plessey. Palmiotto previously spent seven years with Raytheon as national sales manager. Prior to Raytheon, Palmiotto held sales management positions with RCA Semiconductors for 15 years.

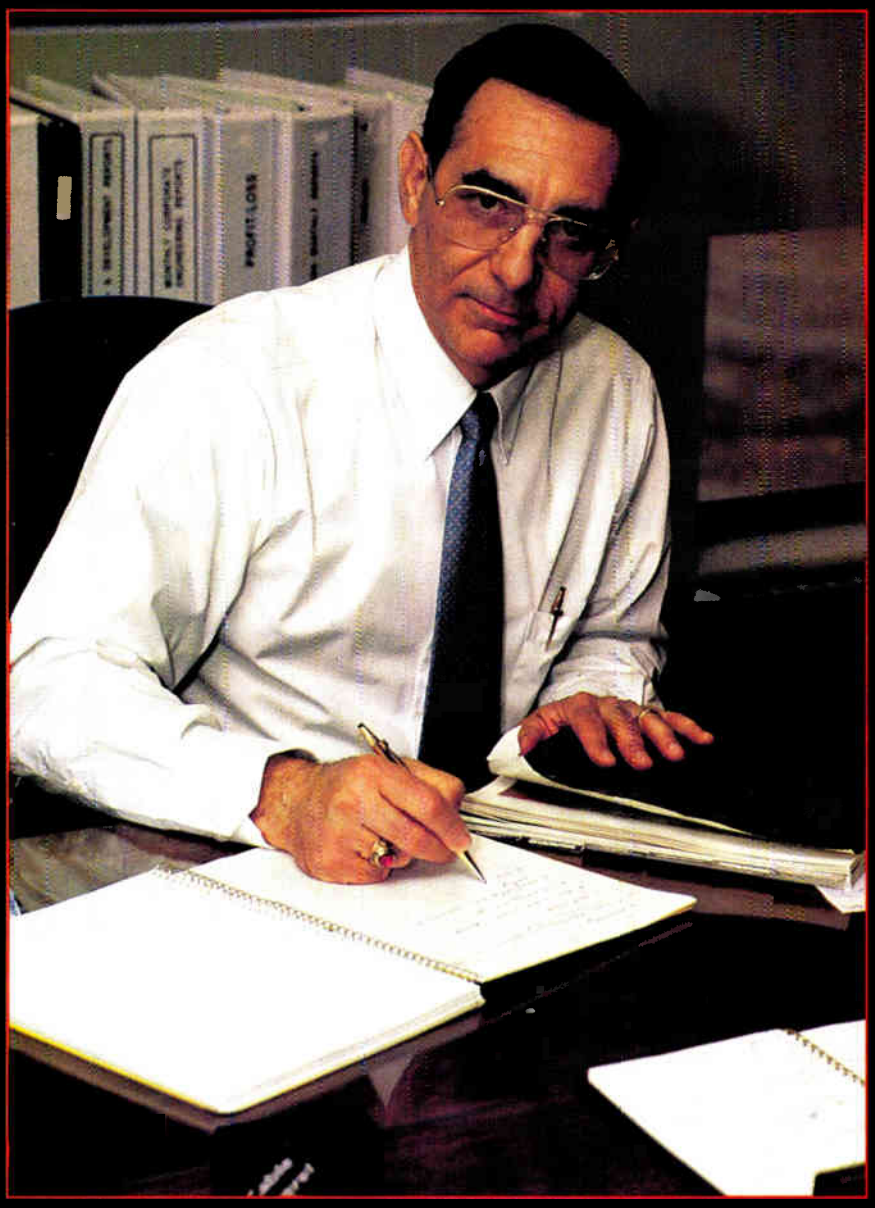
Cable Laser Ad Sales Services™ (CLASS) have assigned new liason personnel. **Tim Evans** will serve as its CLASS technical project manager and **Russ Clapp** as its Northern New England CLASS sales representative. Evans joined Cable Ad Sales in early 1989 as director of technical operations. Clapp has been serving as Cable Ad Sales' account executive in the Berlin and Gorham, N.H., Warner Cable System.

J. Gary Batson

J. Gary Batson has been appointed director of new product development for **Power Guard, Inc.** Batson's responsibilities will include the electronic design and development of new products for Power Guard. Batson is a 10 year veteran of the CATV industry and comes to the company from Athena Digital. Prior to Athena, Batson served as engineering manager for Lectro Products, Inc.

Patrick J. Parrelli has been named director of development for **Cadco Inc.** With a background in data interface products, Parrelli will be responsible for expanding Cadco's customer and market base. ■

—Kathy Berlin



"Our approved vendors list is constantly updated and the CATV Buyers' Guide keeps me informed on current products and vendors. It's strictly hardware oriented, which makes it easy to use."

Steve Raimondi
Senior Vice President of Engineering
United Artist Cable Systems

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Candidates must have attended a technical institute or junior college pursuing Electronics, Communications, Computers or Math as a major, or have equivalent work experience. 1-2 years CATV systems design experience, OR 2-4 years in communications systems or electrical design also required.

We offer a competitive salary and excellent benefits. For consideration, send your resume to: Erin Conaway, Personnel Representative, Jerrold Communications/General Instrument Corporation, 2200 Byberry Road, Hatboro, PA 19040. An equal opportunity employer.

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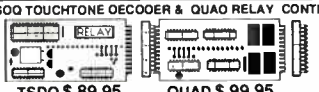

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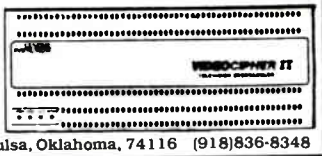

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BUSINESS DIRECTORY

Transmissionless competition

Last month we began looking at the role played by the NTSC technical standard as a fundamental constraint on video quality in cable systems. We'll now continue the consideration of transmission path problems and then comment on competition from transmissionless video.

One of the major picture imperfections introduced by the transmission path is caused by reflections of the signal along the path. The reflection problems fall into two categories: distinct ghosts and micro-reflections. Ghosts are more common in terrestrial broadcast. However, there is one form of ghost in cable practice which is very annoying, Direct Pick-Up interference (DPU). DPU is the result of the receiver's internal circuits directly picking up a terrestrial signal. When the signal is the same television signal delivered over cable, a pre-ghost results.

A more common form of reflection difficulty in cable is the micro-reflection. "Micro" here has two meanings. First, the signal is usually very weak; secondly, the delay of the signal is very short. While each individual micro-reflection produces a very minor distortion, there is a multitude of them. This results is many very faint images displaced a small fraction of the screen width from the principal image. The composite effect is a significant blurring. These reflections are caused by impedance mis-matches in the cable plant. Taps are a common cause.

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

Baseband techniques

Techniques for dealing with NTSC's baseband problems have been relatively successful. The biggest success has been with separating the luminance signal from the chrominance information. You'll recall that color information has been shoe-horned into gaps in the luminance spectrum. In still pictures with no diagonal picture elements, the gaps are perfectly empty. Motion and diagonal components in pictures cause these gaps to carry information which gets confused with the color signal. Since the gaps are uniformly spaced, a special kind of filter, called a comb filter, can be used to clean out the gaps. This is not without its price. Diagonal resolution and motion rendition are negatively impacted. However, the minimization of crawling dots and spurious rainbows is a bigger positive than the losses caused by the comb filter. The second price exacted by comb filters is an increase in cost. Comb filters were known to the original inventors of the color television system. However, the cost of the filters was then prohibitive. They have become practical for consumer electronics products only in the last dozen or so years. Very sophisticated comb filters can do an excellent job.

Another technique applicable to baseband improvement strategies is the line doubler. This device attempts to estimate information from between the transmitted lines to allow the display to have twice the scan lines. The principal benefit is a reduction of annoying flicker in the picture. On large screens, the visibility of the picture's line structure is reduced. When the estimation is accurate, the result is spectacular. Various proprietary techniques exist which yield varying degrees of performance.

Unfortunately, techniques for dealing with transmission problems have been considerably less successful. Most of the difficulties result from the vestigial sideband nature of the television signal's amplitude modulation. Amplitude modulation is rather vulnerable to noise. There are numerous techniques for minimizing the vulnerability to noise. Unfortunately, most of the better of these methods would make the signal incompatible with the existing 160 million TV receivers. As long as compatibility is a requirement, our hands are tied. Techniques for compatibly processing out noise usually also process out picture detail resulting in a "Sunday comics"—looking picture. This "cartooning" can be more objectionable than the noise.

There is a lot of talk about "ghost cancelling" in television receivers. Again, the vestigial sideband signal is a major impediment. The in-phase and the quadrature components of the signal get cross contaminated and become very difficult to unwind. Two filters with many closely spaced sections are usually suggested. In addition, a special "training signal" to adjust the filters is proposed. In Chicago, VHF station transmitting antennas located on top of the Sears Tower move a major fraction of a wavelength as the building sways in the wind. The ghost cancelling circuitry has to be fast enough to track this.

Transmissionless competition

Based on the above comments, we can expect substantial results at affordable prices for improving the baseband portion of the NTSC system. We should expect disappointing results for relatively higher costs when dealing with the transmission aspects of NTSC.

From a competitive perspective, we are in a better position than our friends in the broadcast arena. Their transmission path is more often worse than ours. We can spend modest amounts of money to significantly improve our transmission path. The broadcaster is often in the situation where no amount of money will improve his transmission path.

When it comes to competing with video disks or video tape, the competitive situation is considerably less favorable. When baseband video and audio connections are made between the player and the TV, that media has no transmission path at all! None of NTSC's transmission impairments impact the quality of the picture which pre-recorded media can produce. At the same time, these media can take maximum advantage of the techniques for improving baseband NTSC performance since they have better control of both the recording and the playback ends of the process. Cable must be sensitive to the competitive threat from transmissionless video. ■

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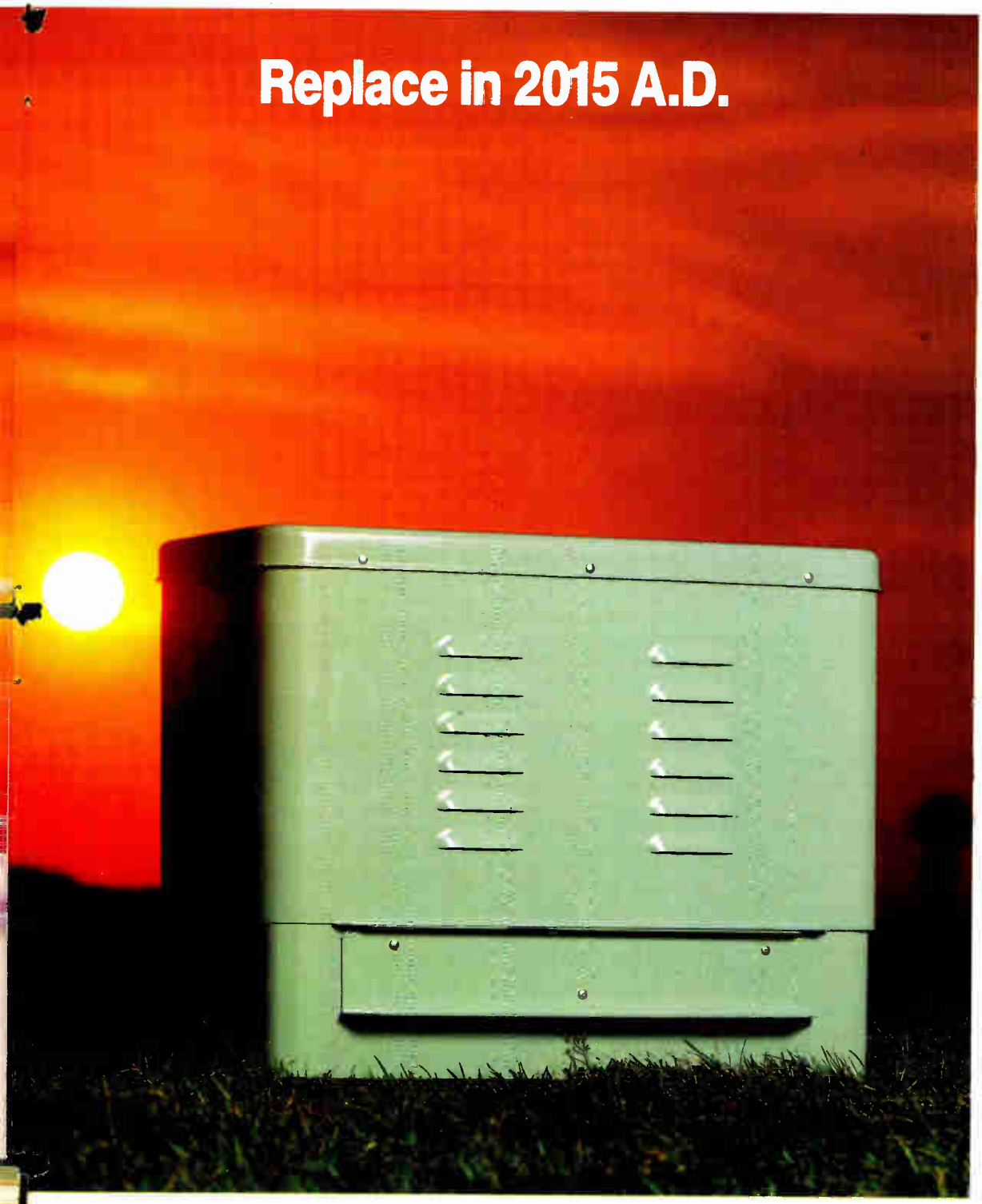

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