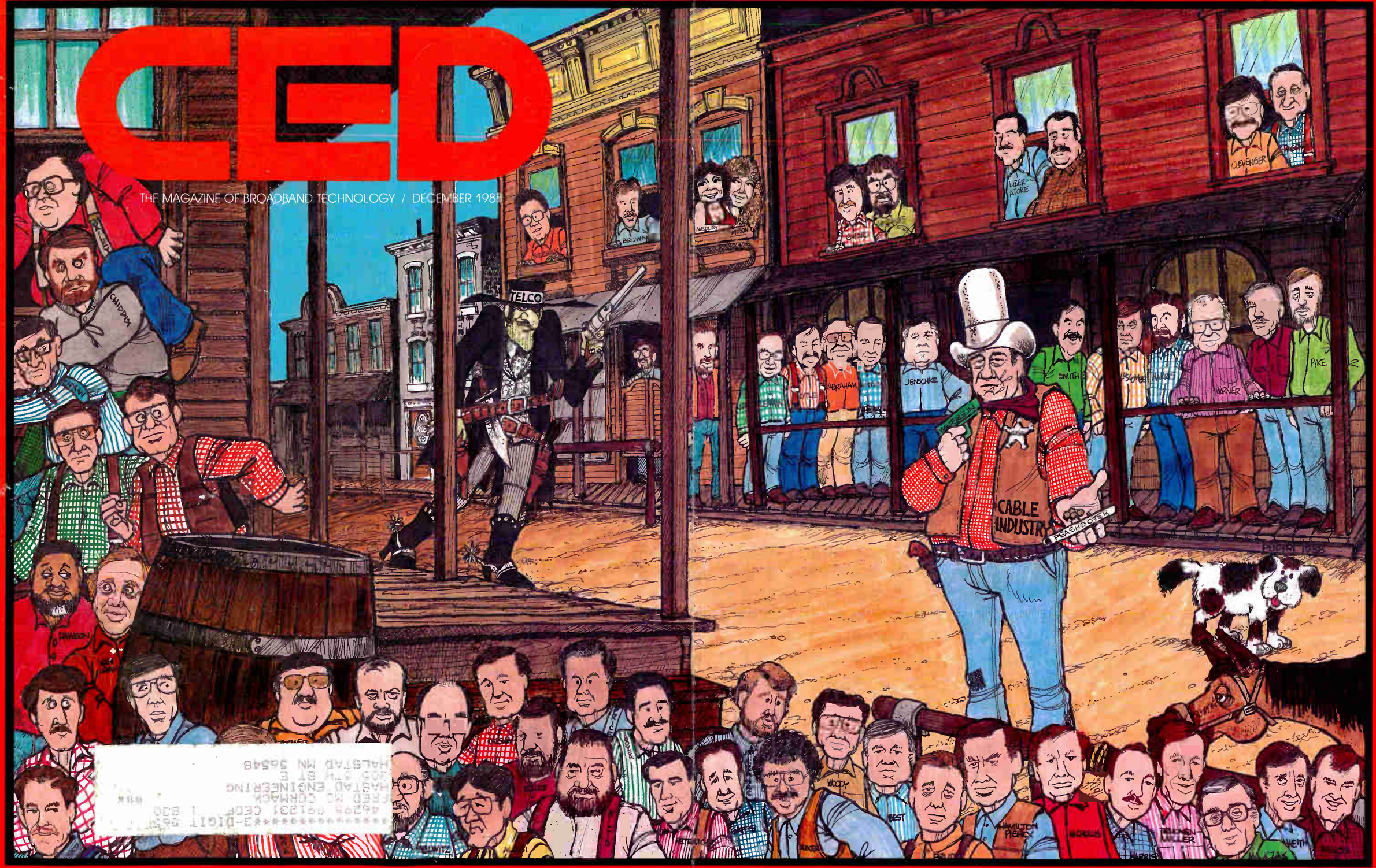
CED

THE MAGAZINE OF BROADBAND TECHNOLOGY / DECEMBER 198



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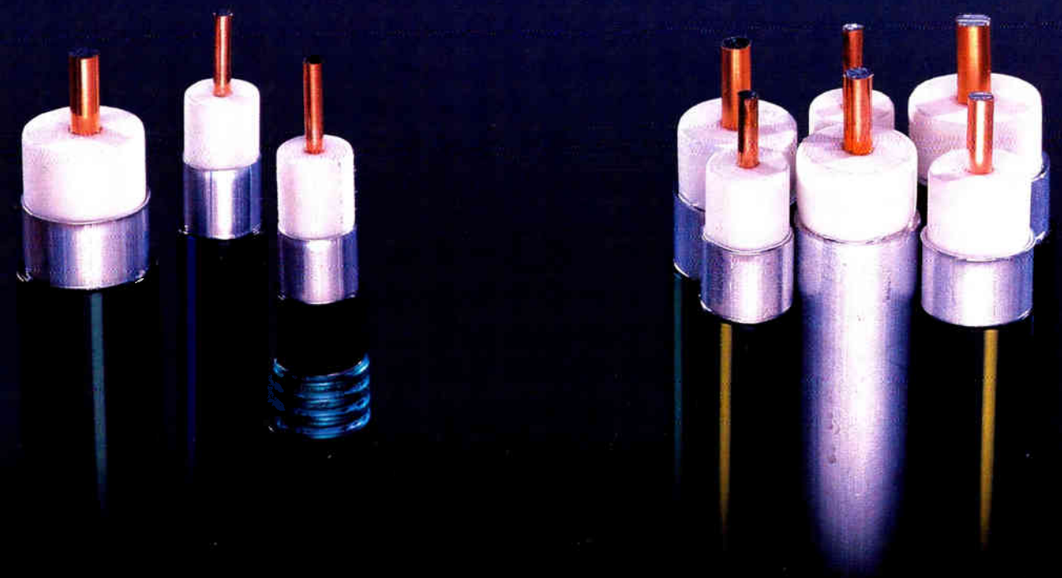

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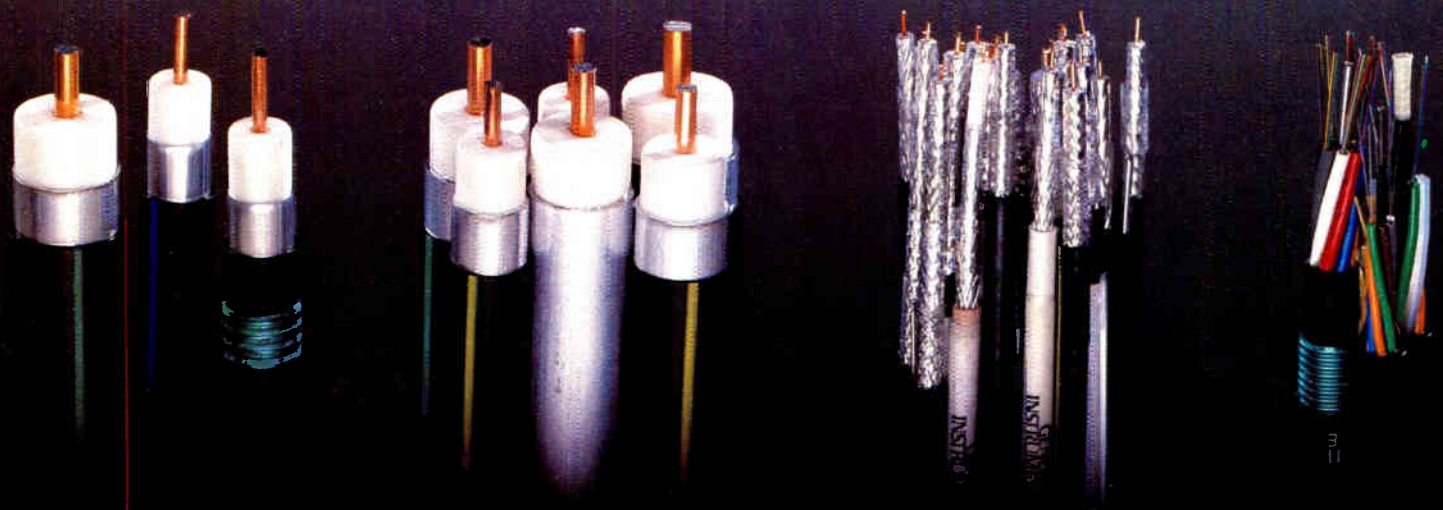

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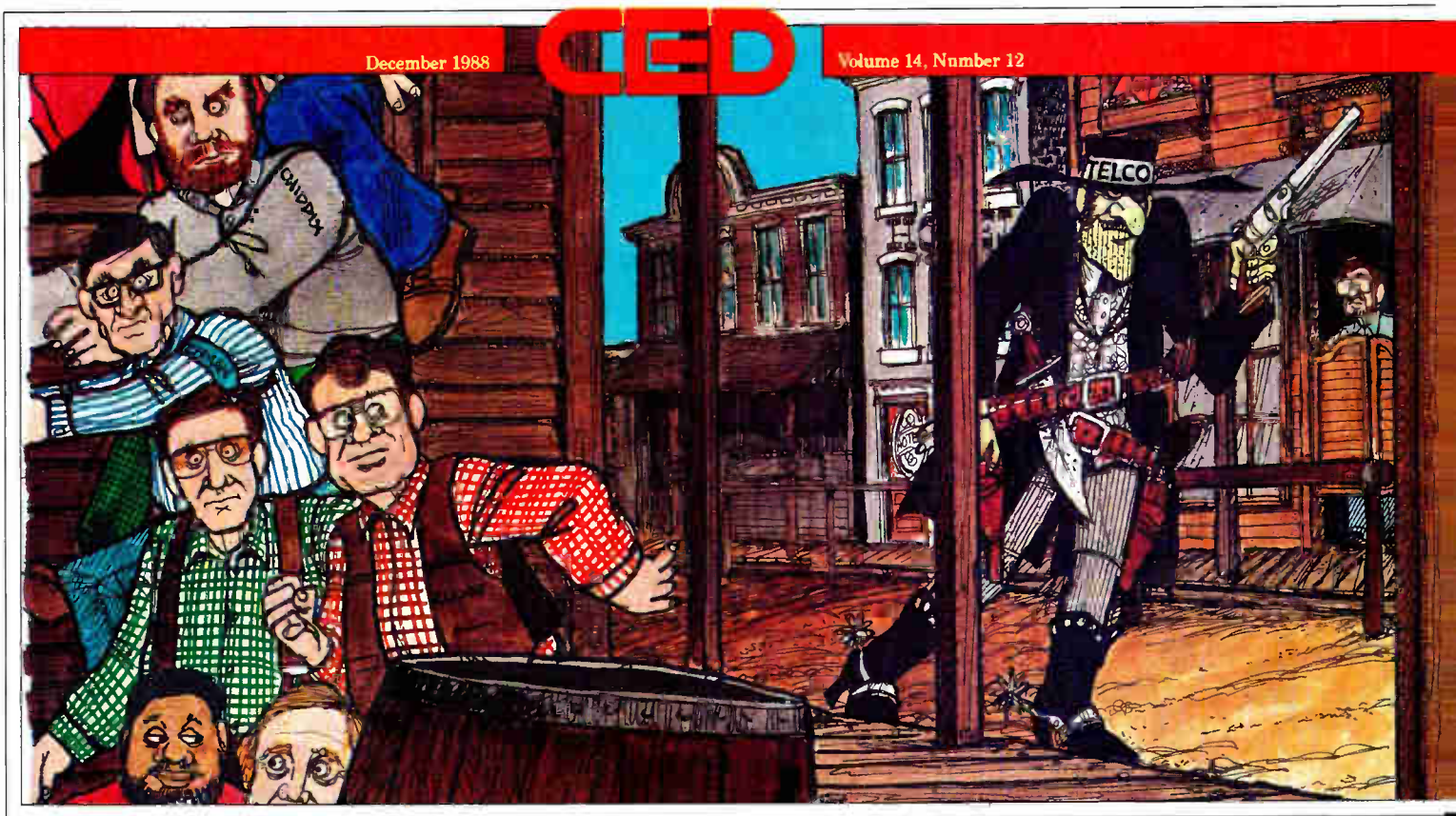
December 1988 CED Volume 14, Number 12



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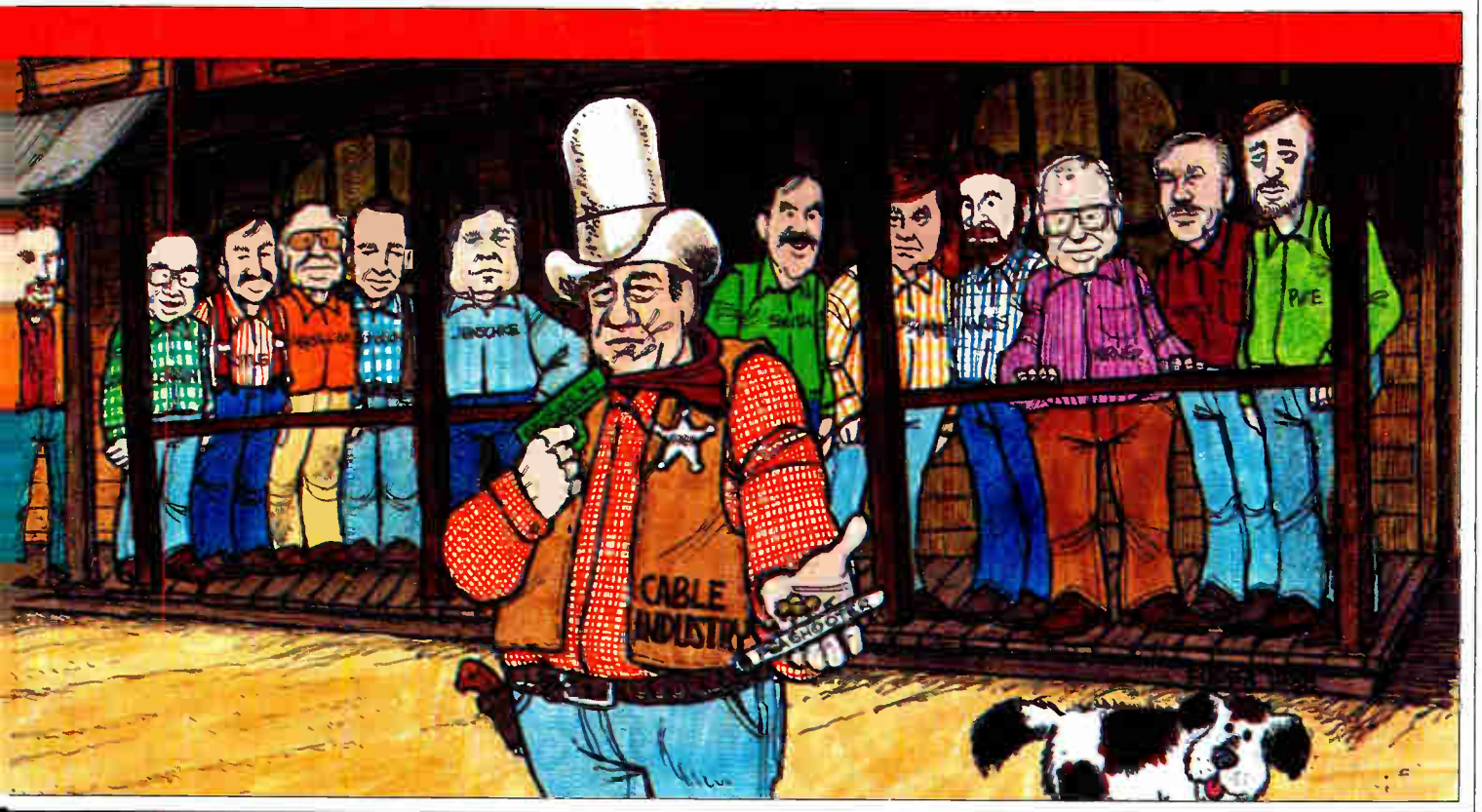
Filters in CATV—Part VI, page 92



About the Cover:
Will the 1988 Western Show be the location of the great shoot-out between telcos and cable? Illustrator Rob Pudim sets the stage for such an occurrence, with members of the SCTE Board of Directors, the CED Board and many top operating engineers trying to stay out of the way. For a list of who's on the cover, see page 124.

DEPARTMENTS

CED. (USPS 300-510) (ISSN 0191-5428)is published monthly by International Thomson Communications Inc., 600 S. Cherry St., Denver, CO 80222. ©December 1988, Volume 14, Number 12. Subscriptions free to qualified industry readers. All other one-year subscriptions are $26, prepaid in U.S. funds only. Second-class postage paid at Denver, CO. and additional mailing offices. CED is published on behalf of the cable television and broadband communications industries. POSTMASTER: Please send address changes to 600 S. Cherry St., Suite 400, Denver, CO 80222. MEMBERS OF THE BPA.

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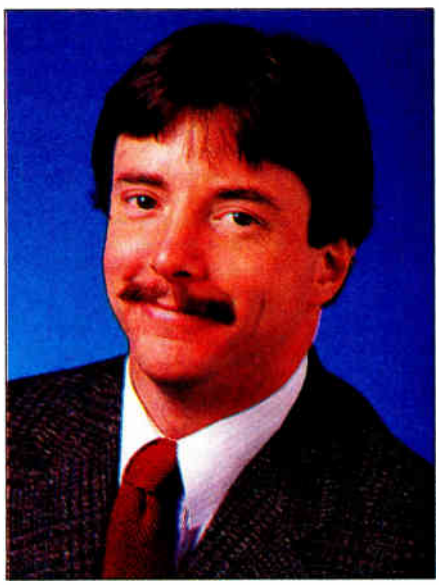
Reader Service Number 3

An industry full of change

If you haven't noticed already, if you look to the right you'll see that for the first time in five years, Gary Kim's name doesn't appear anywhere on *CED*'s masthead. As most of you know, Gary was the guiding editorial influence for the magazine and helped make it the most timely and influential CATV engineering trade journal available. But with time comes change.

Gary is no longer associated with the magazine and his presence will be missed. But we've been successful in bringing Robert Stuehrk on board; a move we think gives us the best all-around team anywhere.



Rob, who was formerly associated with *Communications Technology* magazine, now joins *CED* as associate publisher. Actually, this isn't the first time Rob has worked for *CED*; he was part of the Titsch Communications team back in 1981-83 as director of photography. Since then he's led the charge at CT as the leading sales representative and then as associate publisher. So it's obvious he knows the CATV business and will be able to bring valuable insight and perspective to *CED* as we continue our effort to remain the pre-eminent cable technical trade journal.

On the editorial side, the reins have been handed to me. While I'm still constantly learning, I think we can continue to bring you a valuable source of information without skipping a beat. All in all, I think *CED* will continue to thrive. You'll still get timely information on emerging technologies, thoughtful commentary from some of the industry's leading thinkers, full product coverage of cable suppliers' new introductions and in-depth analysis of major technology trends. In addition, there will be more "how-to" articles for the engineers of tomorrow and more emphasis placed on news analysis, now that fiber and HDTV developments are moving at breakneck speed.

Examples of what we do can be found here in this issue. Open the magazine to page 32 and start reading the Western Show preview story. As the article points out, there are more suppliers of fiber optic systems for cable than ever before. And conventional technologies aren't standing still either. In all, it's a show that promises to be upbeat and full of optimism as CATV heads into the 1990s.

The team here at *CED* is looking forward to a future that promises good things for the cable industry and we want to be an integral part of that. If there's ever anything we can do for you, call or drop us a line. We'd like to hear from you.

Roger J. Brown

Roger Brown
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Mike Aloisi

A long way in a short time

They say it's lonely at the top, but Mike Aloisi is out to prove them wrong.

Aloisi has not yet reached the pinnacle of his career, but at 31 years of age, he's already climbed the CATV system ladder and gone on to become director of field engineering for Viacom Networks Group—those people who bring you Showtime, The Movie Channel, MTV, VH-1, Nickelodeon and Viewer's Choice.

"I've been very fortunate to be able to work with people who weren't afraid to share their knowledge with me," says Aloisi. Included in that list are some well-known names, like Bill Riker (now executive vice president of the SCTE) and Paul Beeman, Viacom Networks' vice president of engineering.

Mike began his CATV career as many do—doing it all from installs to construction to (later) system design. He started in 1975 with a small but innovative system in Waldorf, Md. known as St. Charles CATV while he was attending Charles County College.

A good education

During that time he received well-rounded on the job training about CATV operations. Aloisi, a quick study, learned about home security monitoring (his system was one of the first on the East Coast to install such monitoring equipment) and return path electronics and by 1980 was the system's chief tech.

Actually, Aloisi's interest in electronics goes back to his childhood. When he was 13, he met a 12-year-old friend who was seemingly and electronics wizard. The two of them would often hunt for old discarded radios and TVs, diagnose what was wrong with them and then make the necessary repairs. A trip to Goddard Space Flight Center, courtesy of a NASA computer analyst friend, also left and indelible imprint.

In 1981, Mike jumped over to a Jones Intercable system in Lakeworth, Fla. as chief of technical operations. "I still was responsible for everything, but now I was supervising rather than doing it myself," says Aloisi. He hosted biweekly technical meetings and tried to educate his staff so they could educate others. "I really learned the value of education. I don't think I'm ever going to have enough education, I don't think anyone ever is."

At a crossroads

After just two years, Aloisi again stood at a crossroads. The Florida system in which he worked was about to be sold and he felt as though he had reached his zenith there anyway. So he decided to make another change.

Showtime Entertainment (as it was known before the merger with The Movie Channel) was looking for a manager of engineering services, sort of a regional engineering position. Mike interviewed with Riker (who previously held the job but had been promoted) and Riker apparently liked what he saw in Mike.

"The company (Viacom) was very concerned about what Showtime's on-air 'look' was in cable systems and it was my responsibility to go out to systems and make sure they were doing everything they could (to deliver) optimum picture quality," sums Aloisi. Consequently, he was in constant contact with system engineers and technicians all across the country.

But that wasn't all Mike did. He wrote an important part of Showtime's Theft of Service Combat Kit when theft was a big issue; he traveled the nation and built numerous remote studios for local marketing telethons; helped with the logistics of moving programming to Galaxy III; and he was part of the team that spearheaded the satellite scrambling effort for Showtime/The Movie Channel and later, the other Viacom networks.

Of all that, the work he did prior to scrambling was the most taxing. For seven months Aloisi commuted from his home in Atlanta to Viacom's offices in New York. He credits his wife Irene for helping him get through it all emotionally. "She's put up with a lot of stressful situations," says Mike.

After Viacom bought MTV Networks in early 1986, Aloisi became manager of field engineering for the Eastern United States. His responsibilities for overall picture quality remained the same, but the workload increased because three more networks were added.

Efforts rewarded

Early this year all his efforts were rewarded with a promotion to director of field engineering. He now reports directly to Beeman and is responsible for the look of 10 different network feeds. The job keeps him busy and in contact with affiliates everywhere.

To stay a step ahead, Aloisi says it's important to indulge in healthy activities outside of work. He enjoys cycling (he's entered some amateur road races) and fishing.

Though most dyas are spent talking to or visiting affiliates, Aloisi also must keep abreast of the latest developments in signal distribution and how those developments affect signals. HDTV keeps him hopping these days.

"HDTV is a new arena that will allow us to compete with other consumer electronic technologies" like Super-VHS, high-def tape machines and digital TVs, says Aloisi. "We're doing everything we can to stay up to date with all the developments."

Despite his youth, Aloisi has the perspective and knowledge of a 13-year CATV veteran. That's why he's so active in SCTE training efforts and never says no when asked to speak on a subject. All the effort is paying off in deserved honors, too.

In the past six months he's been named SCTE's Member of the Year for 1988 ("I can't say enough about being honored by my peers for the work I've done," he says); been admitted to the Tower Club in recognition of his work for the Southern Cable TV Association; and received the President's Award at this year's Eastern Show.

With that much support and the constant demands on his time, how could Aloisi ever get lonely? ■

—Roger Brown

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Reader Service Number 5

Job security

Anxiety appears to be growing in the cable TV technical community over job security. News of the release of several well known, top-drawer engineers was indeed foreboding. Anxiety over both personal economic health and career development are natural and entirely understandable. Change is inevitable; but change ofen opens doors to new opportunity.

As an employee of the Federal Government a long time ago, I discovered that layoffs, or even firing for cause, were almost impossible. Job security for government employees is almost as great as that of tenured university professors. You might be censured, or transferred, or denied a raise; but you could not be fired. Yet, it is a most remarkable fact that many government employees are terribly insecure about their jobs. True security depends more on inner strength and self-confidence than on the vagaries of a particular job.

Causes of apprehension

The present mood of apprehension apparently arises from two interrelated developments that seem likely to have an impact on the cable TV industry:

1. Ominous demands, echoing from the past, appear to be gaining headway toward removal of restrictions on telephone company cross-ownership.

2. HDTV, Advanced TV and fiber optics are sneaking up on us, veiled in such sophisticated confusion that it is hard to discern the course of the future.

The fact is that the cable TV industry has many real and potential advantages over the telephone companies in the field of video distribution. We were there first. The capital cost of our tree-and-branch facilities is far below that of the switched star facilities designed to integrate plain old telephone service (POTS) with video distribution to subscribers in a sort of off-premises converter configuration.

'Fair play' decides

Notwithstanding the enormous economic and political power of the telephone industry, Congress, FCC, the courts, and the basic American concept of "fair play" are not presently inclined to permit the telephone companies to subsidize entry into cable TV by laying on their telephone customers the capital and other costs of developing a presence in cable TV. There are also growing indications that telephone engineers are beginning to wonder whether the sophisticated BISDN (broadband integrated services digital network) is really the best way for them to get into the video business.

They are now talking joint ventures with existing cable TV operators, or even overbuilders. At least some of them would apparently rather do it our way, with tapped coaxial or fiber cables and analog transmission entirely independent of the voice and data facilities.

What's the real question?

The real question here is not technological. Surely, we know how to do it; or we can learn fast enough. But, is the cable industry economically positioned to accomplish this task? Engineers and technicians generally are neither able to determine, nor to control, the answer to that question.

It is instructive to review the plight of radio in 1950. Broadcasters were so sure that the new technology called "television" would eliminate radio broadcasting that they simply quit investing in radio, and began to look for ways to bail out. And that was only black-and-white television. Soon, they said, we will have color, 3D, and even "smellivision" or "feelyvision".

In 1950, there were 2,000 AM and 700 FM radio stations. Now, in 1988, there are 4,900 AM and 5,300 FM radio stations. Total annual radio advertising sales in 1987 amounted to $7 billion, compared with only $2.6 billion 10 years earlier. Pretty good growth rate for a corpse! The obituaries for radio were quite premature; and so they are for those with the stamina to operate cable TV as a going, competitive business.

Shrinking technical staffs

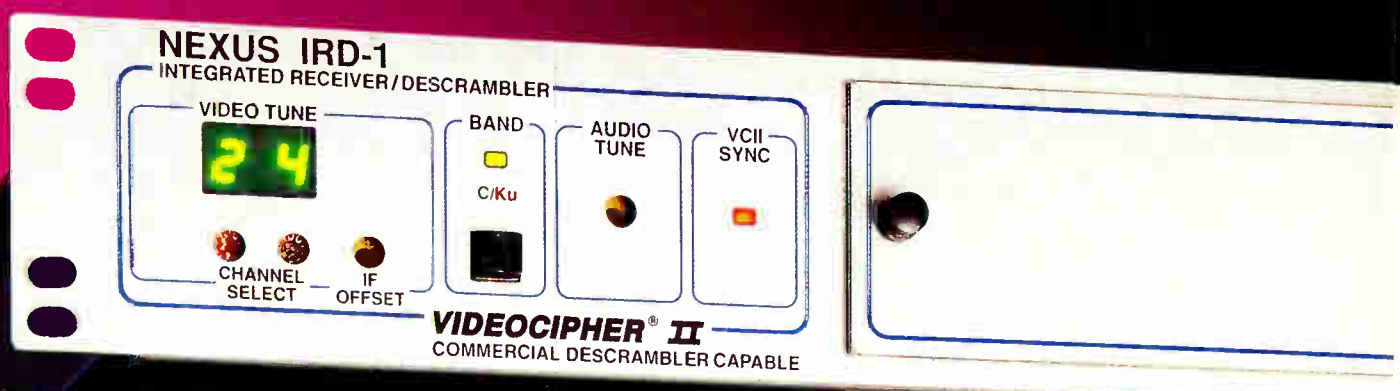
The technical staff required to maintain and operate the modern radio station is very much smaller than it was in 1950. Technical excellence, formerly mandated by regulations and standards, has given way to marketplace surveillance in a sort of Darwinian "survival of the fittest."

Yet, there are still opportunities for technicians and engineers, in almost four times as many radio stations as in 1950. Moreover, the technical staff required for 1,400 TV stations, 8,500 cable TV systems, several networks, program producers and advertising agencies far outnumbers the staff laid off in the 1940s.

Cable TV has to change in the next decade. Competition in the marketplace between wired video distribution (CATV, SMATV, telco, overbuild) and wireless (MMDS, DBS, backyard TVRO, video store) is increasing. CATV is no longer the only way to see the movies at home or to watch such programs as ESPN, CNN, C-SPAN, Discovery, A&E, and so forth. It is still the most satisfactory and economic way to view programs that, like news and sports, must be seen in real time but are not available over-the-air.

How will CATV change? Only time will tell. For starters, the distribution plant probably will be upgraded, with optical fiber as close to the subscriber terminal as is economically and technically feasible. Frequency modulation, or even digital, may be used so that HDTV transmission quality can match the best that future video tapes can offer. Reliability could be improved by automated performance monitoring and by reducing the number of active devices to be maintained. But, in order to maintain its present service price advantage over its competitors, CATV may have to reduce its technical payroll and greatly improve the effectiveness of its sales and marketing activities. ■

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



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Reader Service Number 6

Don't let July 1990 catch you unaware

I'm not the first person to say this. In fact, I'm going to quote Bob Luff in one of his numerous speeches about this issue. The question goes something like this, "How do you turn a 54-channel cable system into a 20-channel cable system? Answer: Ignore the FCC's signal leakage rules."

While that supposed joke always got a nervous laugh, it never had the impact or immediacy it does now. Beginning in July 1990, cable television systems will come fully under a new set of signal leakage rules that were adopted in November 1984. In that infamous docket 21006 (which took the FCC eight years to resolve), it appears to all concerned that the cable television industry got off very well.

Not ours solely

While we can bemoan the fact that the scrutiny lavished on cable systems and their leakage problems by the FAA and the FCC were the result of a measly five cases of squelch break in a period of time that saw literally thousands of interference incidents caused by such mundane items as electronic cash registers and stuck microphone buttons in airplanes themselves, the fact is that we were the people who were using frequencies in our cables that were licensed for over-the-air use by other services.

Cries of "it ain't fair" just won't cut it here. We are allowed use of these frequencies only so long as we don't cause an impact on the authorized, licensed users. To further this goal of cooperation and joint usage, the FCC decided to implement a series of rules that replaced old rules we had operated under since the mid-'70s.

By Wendell Bailey, Vice President Science and Technology, NCTA

Must be able to comply

The first one is that you must, once a year, beginning in July 1990, provide evidence that you are capable of complying with a formulation that is generally known as CLI, or cumulative leakage index. There are a variety of ways in which you can comply with this requirement. They include driving your system and plugging data into a specific FCC formula (this is the actual CLI). Another is by conducting a fly-over and meeting the requirements specified by the FCC for that activity. Moreover, you must comply with this regulation once a year. If you cannot comply you will not be authorized to use the aeronautical frequencies at issue.

Secondly, you must perform monitoring and maintenance activities on a quarterly basis. The FCC expects you to monitor and maintain the signal leakage aspects of your entire plant. A footnote in this section of the rules also indicates that the FCC will take as evidence that you do ongoing and thorough monitoring and maintenance as proof that you meet this requirement.

The rules also contain details on the channel offsets required under the new rules, the power loading authorized under the new rules and any grandfathering and waiver provisions that individual cable systems might wish to take advantage of. As is frequently the case in FCC pleadings, rules of this nature, written in bureaucratic language, can be less than enlightening.

CLI seminars planned

The NCTA recently announced that it would begin holding a series of signal leakage seminars on a regional basis. These seminars were developed as an outreach plan to get the knowledge of specific rules and requirements into the hands of system level engineers and managers. They are being based regionally so that the most number of people can attend. There is no charge for the seminars, but interested personnel must register because space and time is limited.

For your information, the next seminars are: January 7 and 8 at the Seattle Airport Hilton, January 24 and 25 at the Albuquerque Hilton and February 14 and 15 at the Atlanta Airport Hilton. The day and one-half seminars are designed to explain the FCC rules and regulations and how to cope with them on a day-to-day basis. Special emphasis will be placed on the programs and techniques which are proven to be successful in meeting the CLI requirements and reducing signal leakage. In addition, all participants will be given an opportunity to see products and services developed specifically for signal leakage detection, and companies that make such products and services will be given an opportunity to display their wares.

FCC won't be lenient

It's not likely the FCC will be lenient toward people who fail to meet the deadline. The sooner you come to grips with this issue, the better off you will be. Not all is doom and gloom here. Those systems which have undertaken stringent signal leakage efforts for the past several years have unanimously reported that two side benefits fall directly into their laps. One, the pictures improve noticeably on the subscriber's TV sets and, two, their trouble calls decrease markedly. This is a direct result of the attention paid to condition of their plant.

This would seem to indicate that a good signal leakage monitoring and maintenance program will pay for itself in customer satisfaction and reduced trouble calls. In a letter sent to cable executives, NCTA President Jim Mooney stated, "As you know, a large part of the cable industry success has been directly related to the diversity and number of programming services that we now offer on our cable systems. Your system personnel in both management and technical positions need to understand and implement these FCC requirements now in order to protect your rights to continued use of the affected channels."

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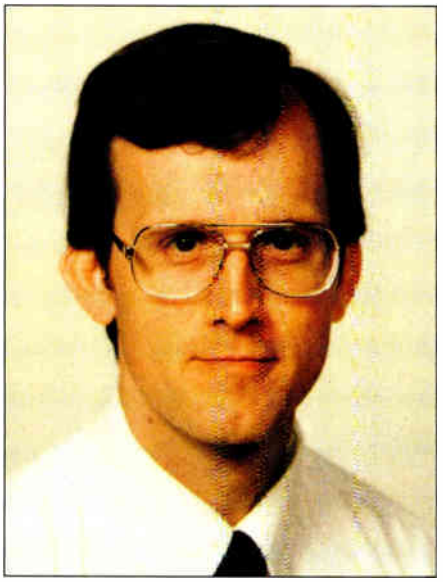


Components of the Pulse and Bar

The Pulse and Bar signal (see Figure 1) is one of the most commonly used full-field video test waveforms. It's typically used to measure short-time distortions, line-time distortions, chrominance-to-luminance gain inequality, and chrominance-to-luminance delay inequality.

The Pulse and Bar signal consists of three components which are each used to measure different video distortions in a transmission system. The first of these signals is called the Modulated 12.5-T Pulse. The Modulated 12.5-T pulse is a very precisely controlled sine-squared pulse with a half-amplitude duration (pulse width at 50 IRE) of 1.5625 microseconds. Note that the letter T, when referring to the half-amplitude duration of an NTSC video waveform, is defined as 125 nanoseconds, the Nyquist sampling rate for a 4 MHz bandwidth (more on this later). Thus, the 12.5-T pulse is so-called because its half-amplitude duration is 12.5 × 125 nanoseconds.

Susceptible to distortions

The 12.5-T pulse is modulated with chrominance information at 3.58 MHz. Because it contains both relatively low-frequency information (below 640 kHz), as well as the higher-frequency color subcarrier in a convenient packet, the shape of the pulse is especially susceptible to distortions which might be caused by unequal gain or group delay between the lower-frequency luminance components and the higher-frequency chrominance components of the video signal. Group delay distortions, commonly called chrominance-to-luminance delay inequality, will show up quite readily through imperfections in the baseline of the pulse.

The 12.5-T pulse, which has a nominal amplitude of 100 IRE units, is also useful in measuring the relative gain of a transmission system between the chrominance and luminance information. An increase or decrease in the amplitude of the chrominance information will show up as over or undersaturation of the color in the video signal and can be identified in the 12.5-T pulse by measuring its amplitude relative to the white bar.

The 2-T pulse

The second component of the Pulse and Bar signal which is useful in video measurement is the 2-T Pulse. Just as with the 12.5-T pulse, the 2-T pulse gets its name from the fact that its half-amplitude duration is 250 nanoseconds (2 × 125 nanoseconds). It also is a very precisely controlled sine-squared pulse having a nominal amplitude of 100 IRE units.

Because of its controlled shape, the 2-T pulse has RF spectral content which is relatively flat (-6 dB) out to 2 MHz, but which falls off rapidly such that at 4 MHz, there is negligible energy. This was done so that the pulse could be used to monitor the amplitude and delay performance of the *passband* of the transmission system. If the pulse were to contain spectral energy beyond 4 MHz, its usefulness for passband characterization would be nil because the truncated spectra, as a result of transmission through a 4 MHz channel, would result in a highly distorted waveform while potentially masking passband problems.

Where to place blame

However, since the 2-T pulse only contains energy out to 4 MHz, any distortion of the signal through a transmission channel can be directly attributable to passband amplitude or delay problems. If the transmission channel is too narrow, for example, the amplitude of the 2-T pulse will fall far short of its nominal value of 100 IRE.

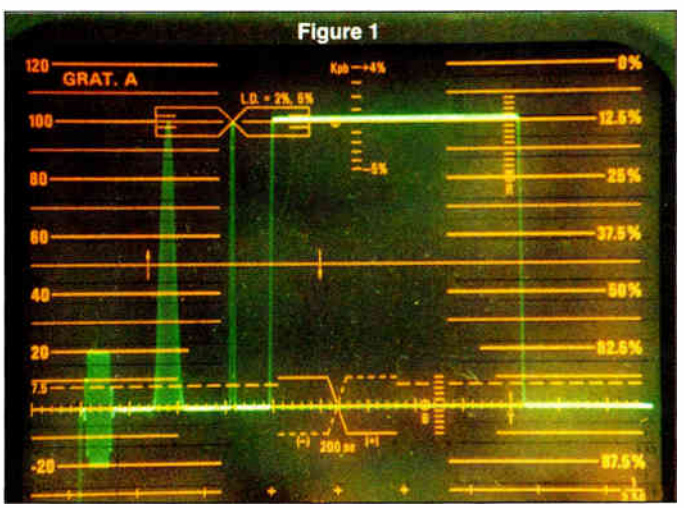
If, on the other hand, the 2-T pulse amplitude is greater than 100 IRE after transmission, it is very likely that the transmission channel exhibits a peak in its amplitude response between 1 MHz and 3 MHz.

Since the pulse is so symmetrical, it is a very good indicator of phase (delay) distortions in the channel. Leading or trailing ripples surrounding the pulse are a sure indication of such distortions.

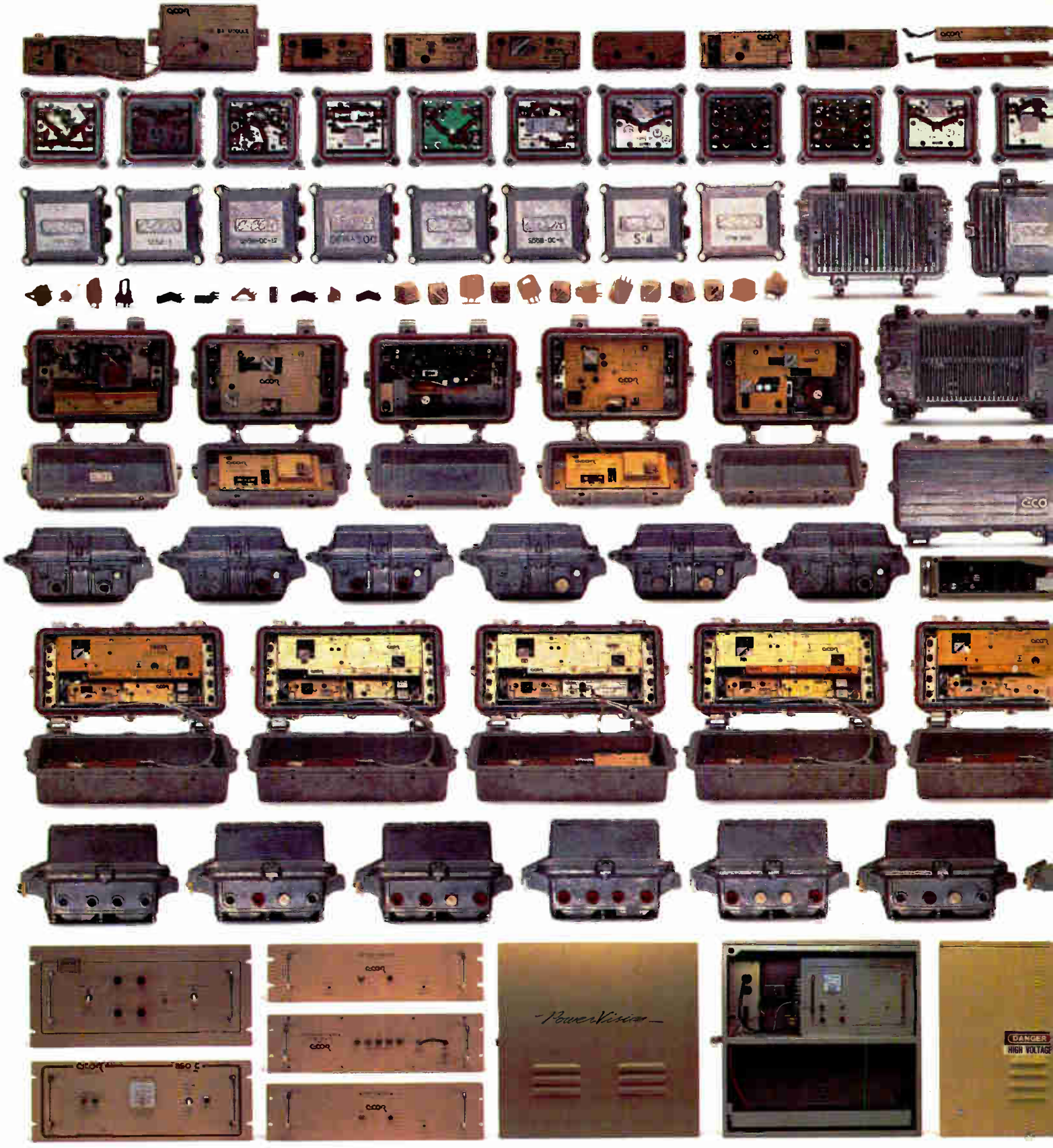
Note that while the 12.5-T pulse gives an indication of amplitude and delay errors between the chrominance and luminance information, the 2-T pulse provides an indication of the overall amplitude and delay performance of the passband.

The third and final component of the Pulse and Bar waveform is called the White Bar; an 18 microsecond duration rectangular luminance pulse at a nominal level of 100 IRE units. This pulse also has a very controlled rise-time, and mathematically is the integral of the 2-T pulse. When a pulse of a given half-amplitude-duration is integrated, it results in a bar with a rise-time equal to 0.96 times the half-amplitude-duration of the pulse integrated (virtually a 2-T rise-time). ■

Figure 1



By Chris Bowick, Engineering Dept. Manager; Scientific-Atlanta



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Reader Service Number 8

FCC to consider technical standards

In last month's column, we discussed some of the post-Cable Act bones of contention between cities and the cable industry. One of those issues was the FCC's preemption of local regulation of technical signal quality standards. On October 11, the FCC released the text of a "Further Notice of Proposed Rule Making" reopening the matter of technical standards. So, in anticipation of the new proceeding, it may be useful to review in greater detail what's happened so far and what's currently being proposed.

As early as 1972, the FCC adopted a series of technical standards for cable systems. Those standards imposed minimum levels of performance with respect to signal strength, noise and distortion. The FCC concluded that if these standards were met at the worst subscriber location, picture quality for most subscribers would far exceed an acceptable level. At first, the FCC also permitted local franchising authorities to impose more stringent requirements if they so chose. This turned out, however, to be an unworkable arrangement. In some cases, cities adopted excessively stringent standards that were virtually impossible to meet at a reasonable cost. Moreover, the absence of uniform nationwide standards thwarted efficiency and innovation in the design and production of cable equipment, forcing manufacturers to meet unique requirements in each community.

By Michael Schooler, Deputy General Counsel, NCTA

Local prohibition

Therefore, in 1974, the FCC prohibited local franchising authorities from adopting standards that differed from its own with respect to channels used for the retransmission of broadcast signals (Class I channels). And it prohibited imposition of any standards at all on channels used for unscrambled, non-broadcast cable services (Class II), for encoded non-broadcast services requiring a decoding or descrambling device (Class III), or for two-way interactive services (Class IV).

In 1985, the FCC decided that it was no longer necessary to impose mandatory performance standards on all cable operators. In its view, the need to attract subscribers in an increasingly competitive video marketplace generally provided a sufficient incentive to deliver high-quality television signals.

Although this change did not diminish the cities' regulatory powers, several cities and municipal organizations took the FCC to court. They argued that the Cable Communications Policy Act of 1984 gave cities the right to regulate technical standards and stripped the FCC of its right to establish a preemptive ceiling on the stringency of such standards. The court of appeals made short shrift of this argument, holding that the Cable Act specifically gave the FCC the right to promulgate technical standards and precluded cities from imposing standards that were inconsistent with the FCC's. While the cities maintained that the Cable Act only allowed the FCC to promulgate *minimum* standards, which cities could then exceed, the court of appeals held (and the Supreme Court subsequently agreed) that Congress had also authorized the FCC to adopt *maximum* standards to promote nationwide uniformity.

Standards necessary

While upholding the preemptive standards for Class I channels, the court of appeals was unwilling to accept the Commission's approach with respect to Class II, III and IV channels. The court held that the Cable Act did not permit the FCC both to refuse to promulgate any maximum or minimum standards and to prohibit cities form adopting any standards of their own. Without such standards, according to the court, it would be impossible for cities to consider technical performance in the franchise renewal process, as permitted by the Cable Act. Therefore, the court directed the FCC to come up with standards—either mandatory or permissive—for Class II, III and IV channels.

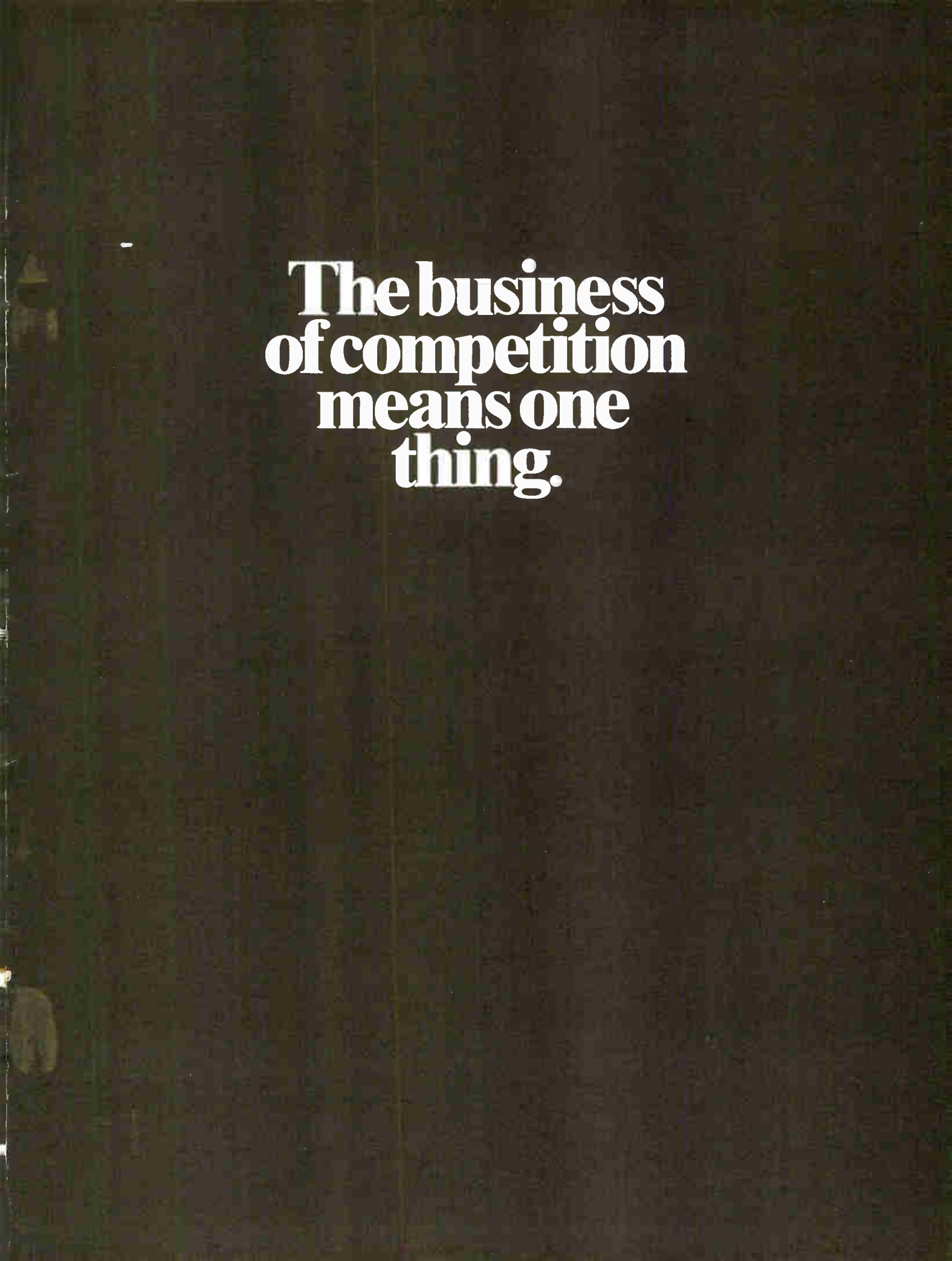
Adopting such standards is the purpose of the recently announced rulemaking proceeding. What the FCC proposes is simply to extend the same maximum standards that it adopted for Class I channels to video signals on Class II, III and IV channels. According to the FCC, there is no apparent reason why the broadcast-level quality that is embodied in its Class I standards should not be equally acceptable for nonbroadcast programming. Moreover, the FCC notes that all channels on a cable system typically share the same plant and facilities, so that it makes little sense to set different performance levels for different classes of channels.

At the same time, the Commission acknowledges that its existing video standards are not applicable to certain types of non-video signals that may be transmitted on Class III and IV channels. For example, there may be audio signals on some channels, as well as signalling information used for pay-per-view and other subscriber response service. So, at least in this respect, the Commission may have to consider altogether new standards in this proceeding.

Will standards be tightened?

Finally, while the purpose of the proceeding is simply to comply with the court's mandate by extending technical standards to Class II, III and IV channels, several cities and municipal organizations have indicated that they intend to use the proceeding to seek more stringent standards. They may also seek to persuade the FCC to reverse its decision to preempt local standards that exceed the federal standards.

Especially in light of the court's general approval of its preemptive approach, the FCC is unlikely to reverse course. But with respect to the particular standards adopted, the FCC is likely to take a hard look at any technical arguments presented by the cities and may consider adopting more stringent maximum standards. ■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To win, you never compromise on critical equipment. At Scientific-Atlanta, we never have. That's why we helped deliver cable to 45 million American homes–by delivering products with purpose that fulfill their promise.

And that's why we bring you the newest, best and broadest product line in the history of the cable industry. New addressables with user-friendly features that win subscribers for you. New basics that pack more function into the smallest footprint ever. New headend equipment that makes space and cost-saving sense. New distribution products that go the distance.

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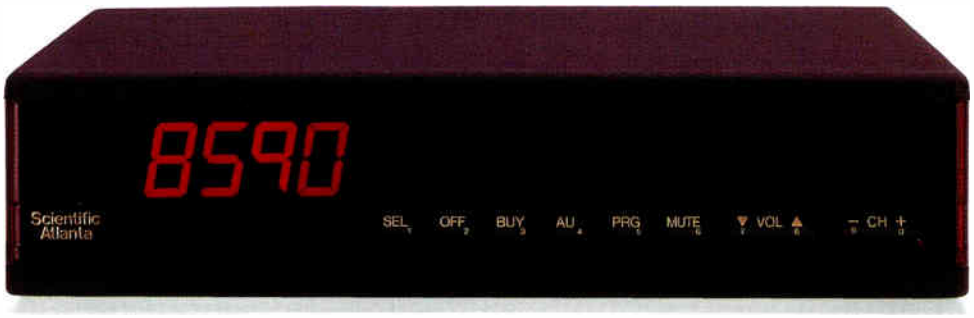
WIN THROUGH FRIENDLINESS

Our new addressable product line is the friendliest and fullest featured in the industry.



The new 8590 volume control set-top's unique display lets subscribers *see* sound and get optimum stereo separation. And it keeps a secret better, too. With over 50 security modes using three advanced technologies: dynamic sync suppression, dropped field and video and sync inversion.

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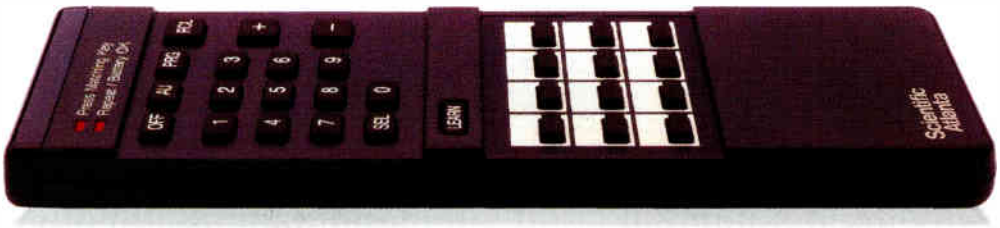

Our Complete Remote Control is so smart it eliminates multiple remotes by quickly learning their functions–providing volume control without a volume control set-top–that's friendliness subscribers will pay for.

WIN THROUGH BASICS

Our new line of basics stands out–the broadest and friendliest in the industry. With volume control. Sleek new styling. And they're the smallest in the business, so subscribers watch TV–not the converter.

The new 8540 has the same *see* sound volume control as its new addressable counterpart. And it helps subscribers be more friendly by letting them adjust sound *before* turning on the TV.

Their **attractive new styling** blends in easily with today's clean, contemporary home entertainment center.

From the functional 8510 to the feature-rich new 8529–from the descrambling 8536 to the volume control 8540–**we never stop improving on basics. Because fundamentals pay off for our customers.**

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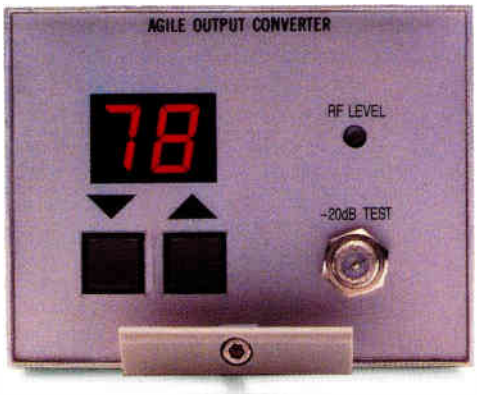
WIN FROM THE START

The headend is where it all begins. And more headends begin with Scientific-Atlanta equipment than all other manufacturers combined. Because Scientific-Atlanta is the best and stays the best. The new 9650 IRD, the new Frequency Agile Drawer, and the new 6380A are just a few of the reasons why.

The industry's first integrated receiver/descrambler, our new 9650 IRD, beats today's rack space squeeze. It cuts space needs in half by integrating the leading CATV receiver–the 9640–with a satellite descrambler in one package the size of the receiver alone. Result: twice the channels in the same rack–with perfect compatibility.



Our new Frequency Agile Drawer delivers agility when you need it–and only when you need it. One drawer backs up an entire headend. And, it provides quick, dependable slide-in convenience for those industry standards, the 6350 modulator and the 6150 processor. Plus, its 550 MHz range and built-in FCC offsets are compatible with every cable system.

We've also enhanced the industry's most popular stereo encoder–the 6380A. Clear, clean, crisp stereo. Its peak limiter assures consistent audio across all channels. The 6380A even lets local ads run in stereo through its alternate audio inputs.

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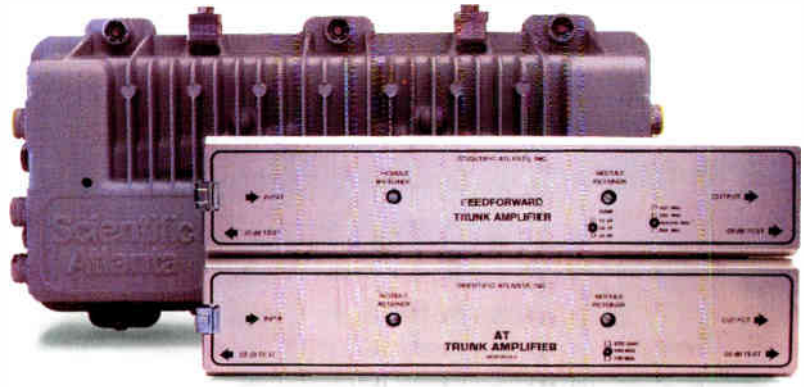
Like our new FT bridger and line extender amplifier. Takes super trunk performance out to the feeder. With the higher output needed for upgrades without respacing–taking those high quality AT, feed-forward, or fiber signals all the way to the home. It has twice the output of power doubling. Half the distortion and 27% less power consumption than the competition. So it's cooler and more reliable.



Our trunk amplifiers set the pace, too–with feedforward for broad upgrades and the AT for narrow ones–both outdistancing power doubling. **Our new taps fill out the winning lineup.** They're easier to install. Almost impossible to break. And prepared for any environment. So you can mix and match to optimize performance all the way from the headend to the home. Growing your system most economically. With high picture quality and drop-in upgrade convenience.

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Are we testing the wrong things?

I have been thinking for some time that the test equipment we use to measure the actual operation of our cable systems is woefully inadequate. We've got all those trusty regulars: the field strength meter (with or without calibration to a meaningful standard), the occasional spectrum analyzer, and the system response sweeper. When we try to relate these tools to what we are trying to actually accomplish in our systems, however, I would like to submit that we are missing the mark.

Troubleshooting the operation of our cable distribution systems today with our traditional test equipment is like trying to see and appreciate the New York skyline by peering through a telescope. We can see individual bits of information reasonably clearly, but only the most experienced and imaginative viewer can build up any kind of meaningful picture of the whole, and even he will be missing a great deal of significance.

A portion of the story

The field strength meter allows us to peek at individual signal voltage levels at one point in the system, one at a time. The spectrum analyzer is better, because it allows a quick picture of all those levels simultaneously. There is no question that operating levels are important; the problem is that they tell only part of the story.

When we construct and operate a coaxial CATV distribution system, we are endeavoring to deliver signals of reasonable quality (defined by the design specifications) to each subscriber. As long as we are within a reasonable range of signals levels at the back of the subscribers television set, the actual operating levels in the network mean relatively little. What is important is the maintenance of signal *quality* throughout the network.

Constant trade-offs

Cable system design and operation is a juggling act. We are continually balancing and trading off noise and inter-modulation distortions within the constraints of our channel loading and amplifier cascade. We can wind up with levels at the subscriber's home which are quite adequate, and still have horrendous noise, distortion or both! Good quality signals are the results of maintaining levels within a very narrow range throughout the entire network. That in itself is a challenge of no small proportion, and it is made more difficult by the fact that we lack a simple means of judging the outcome.

Can't measure quality

We certainly need field strength meters and their cousins, spectrum analyzers. Sweep response systems are also a valuable diagnostic tool. What we are lacking is a means of checking the *quality* of the signals we deliver to our customers as simply as we test the level at the back of their set. The ultimate service technician's meter would measure not only individual channel signal strengths, but would also give a quick read-out of relative carrir-to-noise ratio and some relative measurement of system intermodulation. Thus, we could immediately tell whether there were an alignment problem of some sort requiring the use of other tools through measurement directly related to the quality a subscriber perceives on his set and to the satisfaction he gets from our product.

There clearly are challenges in producing a simple, affordable cable "signal quality meter." Nevertheless, such a tool would allow us to do a far better job operating our businesses and would result in an ability to satisfy our customers' real needs, even given limits to the number of technicians we can afford and the amount of training they can practically receive. We would have a quick way of measuring the operation of any given trunk, and could spend our time sweeping and aligning only those trunk and distribution legs which needed it, rather than squandering precious resources sweeping every trunk in the system once or twice a year, whether they need it or not.

Another characteristic

There is another key characteristic of our cable systems which we are unable to measure well with available test equipment. That is performance as a function of time.

The electric utility companies have long dealt with intermittent or time-related problems through the temporary installation of chart recorders. Cable systems suffer from intermittent parasitic oscillations, intermittent grounds, losses and electronic operating characteristics which change as a function of temperature, as well as a host of other intermittent problems which significantly interfere with our delivery of quality video signals. At present, we are severely limited in the tools we can bring to bear as we try to diagnose these problems. While there are types of test equipment which can store information, we need something which is a modern version of the old-fashioned chart recorder; perhaps a spectrum analyzer which could be set to store a picture of systems levels every few minutes, or when levels exceed preset minimums or maximums would do the trick.

A reference

If there were then a mechanism whereby we could rapidly scan through the stored information, we would be able to go back in time and look at system performance during intermittent behavior. This would at last provide a tool which would allow us to troubleshoot and fix elusive time-dependent problems.

The challenge in designing and manufacturing test equipment which measures the actual quality of our product is significant. So is the size of the market which, I believe, such equipment would find. ■

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

Some thoughts about CLI

After many discussions with John Wong, (FCC engineering advisor for Mass Media Bureau), equipment manufacturers and many CATV directors of engineering, we have found two basic directions in CLI leakage detection and correction.

Direction 1: Mr. Wong has stated that if an MSO buys a lemon (a cable system which needs to be rebuilt because it is leaking so badly that that is the only way to correct it) then "let the buyer beware."

CLI detection added

Advanced Communications Ind. Inc. is adding CLI leakage detection to its System Evaluating Program. Any system that is for sale can be driven or walked out prior to purchase if the purchaser is equally interested in plant as it is in subscriber numbers. Subscriber numbers are useless if they, the subscriber, cannot continue to receive signals.

Direction 2: Existing systems or recently purchased systems which have leakage problems still have time to be corrected if the problems start to be addressed now. Advanced Communications Ind. Inc. offers a night ride out with a pole logging or address logging of problem areas. A follow-up visit to the problem areas recorded is done the next day by qualified technicians to determine the source of the problem. If the problem cannot be corrected at the second visit, it shall be scheduled for either our construction or installation department to correct. All required logging is packaged with these services.

Note: backyard and high rise vertical plants require walk outs or fly overs.

Additional services are suggested to be done during at least one of the quarterly walk outs. They are:

1. Trap and audits.
2. Pole and pedestal safety corrections.
3. As-built updates.

Help needed here

In conclusion, I should note that the systems most likely to need attention are the systems that were built to be sold, not maintained. These systems are easily identified by locating hotel, motel and other bulk accounts that share the same wiring as the master antenna. These systems were easily plugged into to give high subscriber bases, but need to be totally rebuilt or unplugged. Advanced Communications has a special program developed which keeps the subscriber count and rebuilds the problem units: We simply tell the multiple dwelling unit owner to remove his "Free HBO" sign from the motel if he does not allow us to upgrade his motel plant as per requirement of the FCC.

Advanced Communications personnel (were) seeking additional data on this at the Atlantic Show on customer needs. Also, I have been contacted by various equipment manufacturers regarding packaging an equipment and labor package.

Michael N. Johnson, President
Advanced Communications Industries Inc.

In tribute to Paul Perez

I want to thank you for the article in the October issue of your magazine (page 8). My mother, Alice Perez, and my brother and sisters were greatly touched by your kind words about Paul. His death on October 6 came as a great shock to us, although he had previous heart attacks as a child. Because of his brushes with death at such an early age, Paul lived each day to (its) fullest. His thirst for knowledge was never-ending, from fast cars to (the) latest audio/video technology, he had to know the latest data.

We have correspondence from people all over the world who knew Paul, and we're somewhat overwhelmed by the number of lives he touched in such a positive, caring manner.

Loretta A. Perez-Villegas

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Reader Service Number 10

Several new fiber systems scheduled to debut

Cable television equipment manufacturers are coming to the 1988 Western Show with a vengeance rarely seen since the halcyon days of the early '80s, when equipment and technology still ruled such shows. No fewer than seven companies will display, demonstrate or announce significant strides related to the development of fiber optic systems designed for CATV use.

Among those companies are cable's two full-line manufacturers, Scientific-Atlanta and the Jerrold Division of General Instrument. That's important because it signals that fiber will indeed make significant inroads in cable plants in the near future. Additionally, global heavyweight Matsushita (through the Panasonic Industrial Co.) will throw it's hat into the ring and traditional fiber suppliers Catel, Synchronous and American Lightwave Systems will have new things to show or talk about.

Although fiber will again be the big story when the show is over and closed, Zenith plans to show its recently-announced Spectrum Compatible HDTV system and numerous suppliers of conventional equipment will reveal some new offerings as well.

S-A gets serious about fiber

But first, fiber. S-A plans to demonstrate the second generation of its AM system, which was shown for the first time at the National Show in Los Angeles earlier in the year. The difference is that now S-A says it's a real product that will most likely begin to be tested in the spring of 1989. Although system details were not given, David Fellows, director of marketing for S-A's earth station/headend products, said the system will take advantage of distributed feedback (DFB) lasers and "will stand up to the competition." The transmitter will fit in a standard 19-inch rack and the receiver will be incorporated in a distribution amp housing, providing conversion of lightwave signals to RF signals.

ALS goes S-A one better by offering two new fiber systems. The AM over system, dubbed LiteAmp, has been designed to replace AM microwave links and long coax trunk runs, said John Holobinko, vice president of marketing and sales at ALS. Two versions of LiteAmp will be available; one for headends and one designed for strand mounting that will use cable system powering.

The second system, called TransMod, is an FM product designed to reduce the cost of FM systems. Designed for master headend-to-multiple-hub use, TransMod will deliver at least 60 dB signal-to-noise ratio performance guaranteed, said Holobinko. Also, the system will allow the user to use several different brands of AM modulators to convert the signals to the AM format. In volume, the system is projected to cost about $1,000 per channel, plus common equipment costs, Holobinko added.

Additionally, ALS has announced it concluded an agreement with Times Fiber Communications whereby Times Fiber will be the exclusive distributor of the ALS fiber systems. Times will also continue to manufacture and supply coaxial cable.

Panasonic debuts its system

Making its debut in the fiber arena will be Panasonic, which will show its AM fiber system, too. The system is the same one currently being tested by American Television and Communications' Hawaii division (see *CED*, November 1988, p.60). According to Jim Slade of Panasonic, the system will deliver 42 channels of video 15 kilometers with a 51 dB C/N ratio. He added that the system will be available generally sometime in 1989 and that the price has not yet been determined.

Other news expected to come out of the Panasonic booth are slight changes to the company's volume-control plain converter. Individual channel-2 and channel-3 output models have been eliminated, replaced by a switchable model. The price of the units is expected to remain the same and Panasonic's channel-4 output model will remain unchanged, said Slade. Finally, Panasonic is expected to announce that Cable Business Associates of Chicago will be the official parts refurbishing distributor for the manufacturer.

Ortel's AM system also has finally been upgraded to an "official" product, according to Larry Stark, director of applications marketing for the Alhambra, Calif. firm. That system will send 20 channels of video over a single fiber as far as 10 kilometers, Stark said.

Not to be left behind, Anixter will have on display its Laser Link AM fiber system at its booth. The system was previously announced and is slated to be tested in numerous CATV sites over the next several months. And Catel will be showing off its latest AM product, TransHub III, which was also announced earlier in the year.

Largest introduction ever

Despite S-A's announcements about its fiber system, the fact is that the product is just one of a slew of introductions the company plans to make in Anaheim. The largest product introduction in the firm's history, consisting of seven new devices, is slated to occur there. Coupled with the announcements S-A made at the National Show, more than 90 percent of S-A's product line has been enhanced or completely reworked within the past 12 months. No other manufacturer can boast such an accomplishment.

The most significant additional piece of hardware S-A will launch is the FT (Future Technology) bridger and line extender. By utilizing some novel and proprietary noise-cancelling techniques, the new FT products offer twice the output of power doubling hybrids but produce only half the distortion products and use 27 percent less power than comparable products, according to J. Larry Bradner, president of S-A's Broadband Division.

What that means is that this new amp can be used to get high-quality video signals closer to the home without respacing any amplifiers already in the system, said Fellows. The innovative product was developed by "reverse engineering;" that is, the specifications were determined first and the product was made to fit those specifications, Fellows said. Output levels around 50 dBmV or 51 dBmV can be achieved with this new amp and S-A expects

Jerrold Applied Media Lab

...exploring new paths to cable's future

Cable television's broadband communications "pipeline" into the home is an enormous resource with a potential that remains largely untapped.

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For a brochure on current activity areas, contact Jerrold Division, General Instrument Corporation, 2200 Byberry Road, Hatboro, PA 19040. (215) 674-4800.

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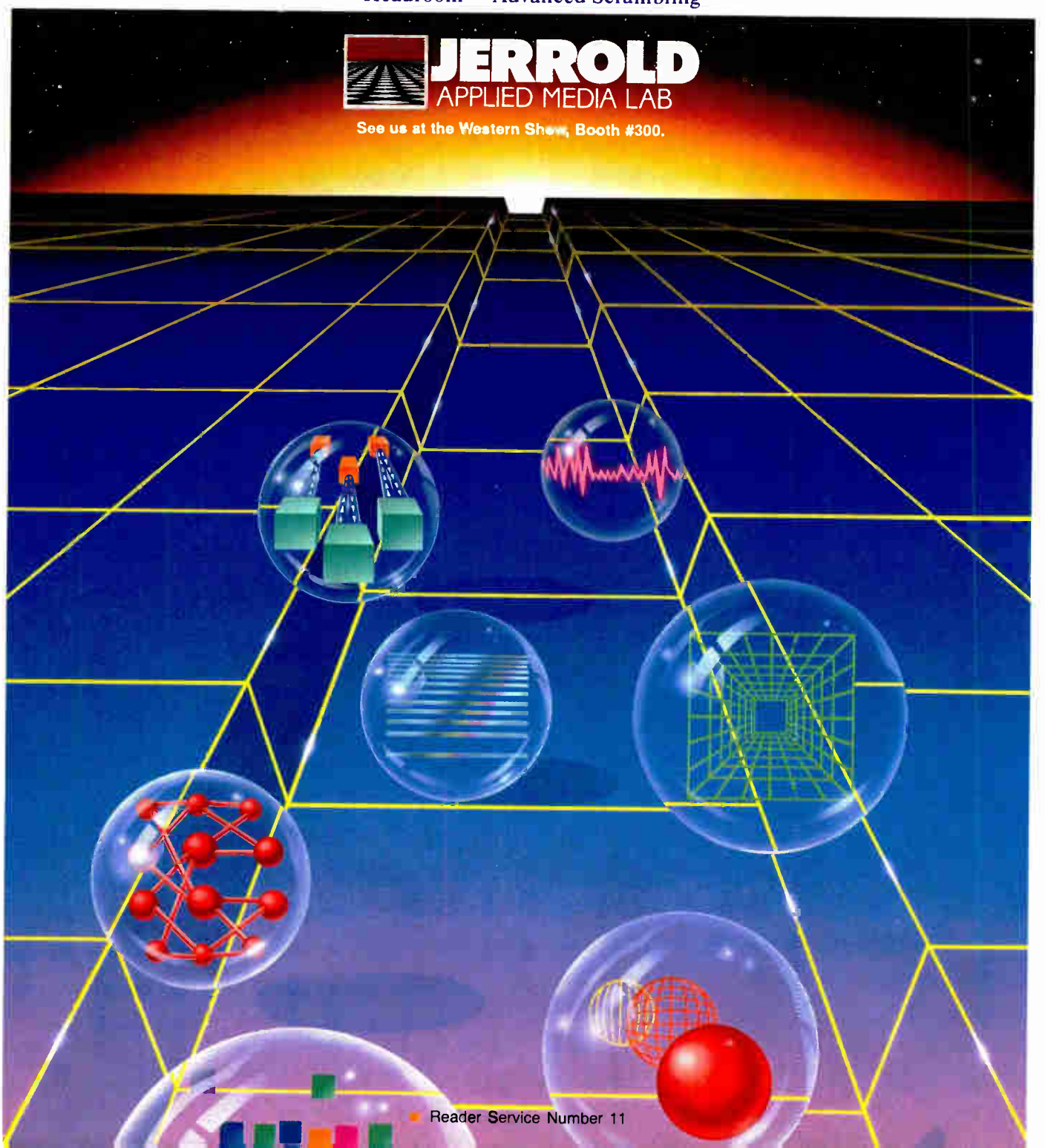
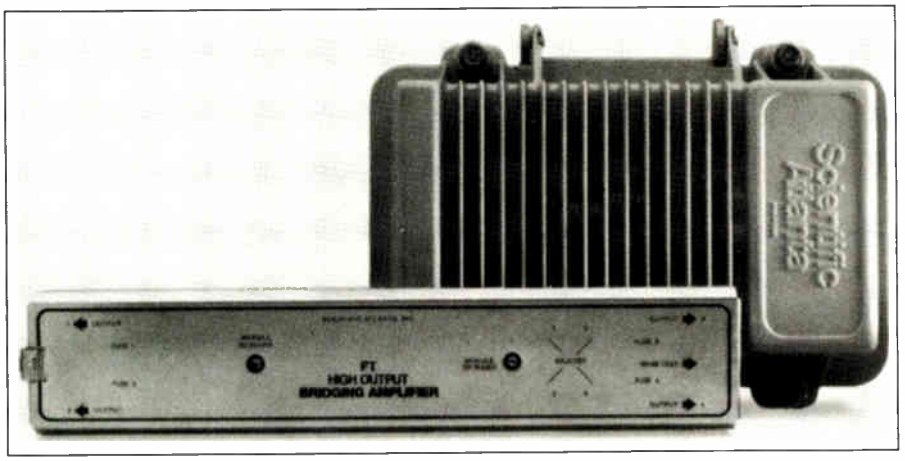


Reader Service Number 11



Scientific-Atlanta's new FT bridger and line extender

those outputs to get even better as research continues.

Further evidence of the growing popularity of off-premise techniques of providing video service (see *CED* November 1988, p.52) comes from S-A's Off-Premises product. Essentially an active tap, the product actually represents a new family of products that will include single-port, four-port and MDU versions.

Each version will use interdiction technology to control channel passage to the home. Each of the five channel bands will be oscillator-controlled and each oscillator will be able to control from four to 12 channels, said Steve Nusrallah, vice president and general manager of subscriber systems. Combined with an enable/disable function, operators can tailor their marketing programs through program delivery (like free weekends of premium channels), and can save money through reduced labor costs and fewer truck rolls to change service, said Donald Cooper, vice president of marketing for subscriber products.

A glimpse of the future?

Finally, Scientific-Atlanta will show off a new family of basic (non-addressable) converters that have the smallest footprint in the industry. The 8529 basic model, the 8536 descrambling converter and the 8540 with volume control have been designed to blend in with the consumer electronics commonly found in today's homes.

Also, a two-way interactive converter designed for the lodging market, model 2490, will be shown. On-screen prompts make it simple to use and increased memory allows guests instant access to their accounts. Guest messages can be shown on the screen by the hotel and the facility can also force-tune all TVs to broadcast messages, provide emergency information or wake-up calls. Bradner said technology such as that used in this converter could someday be used in all future converters.

Just what exactly Jerrold will be announcing in Anaheim relating to fiber was still unclear as of press time, but several conventional products have been enhanced. At the Western Show, where Jerrold will celebrate 40 years of business in the CATV market, the

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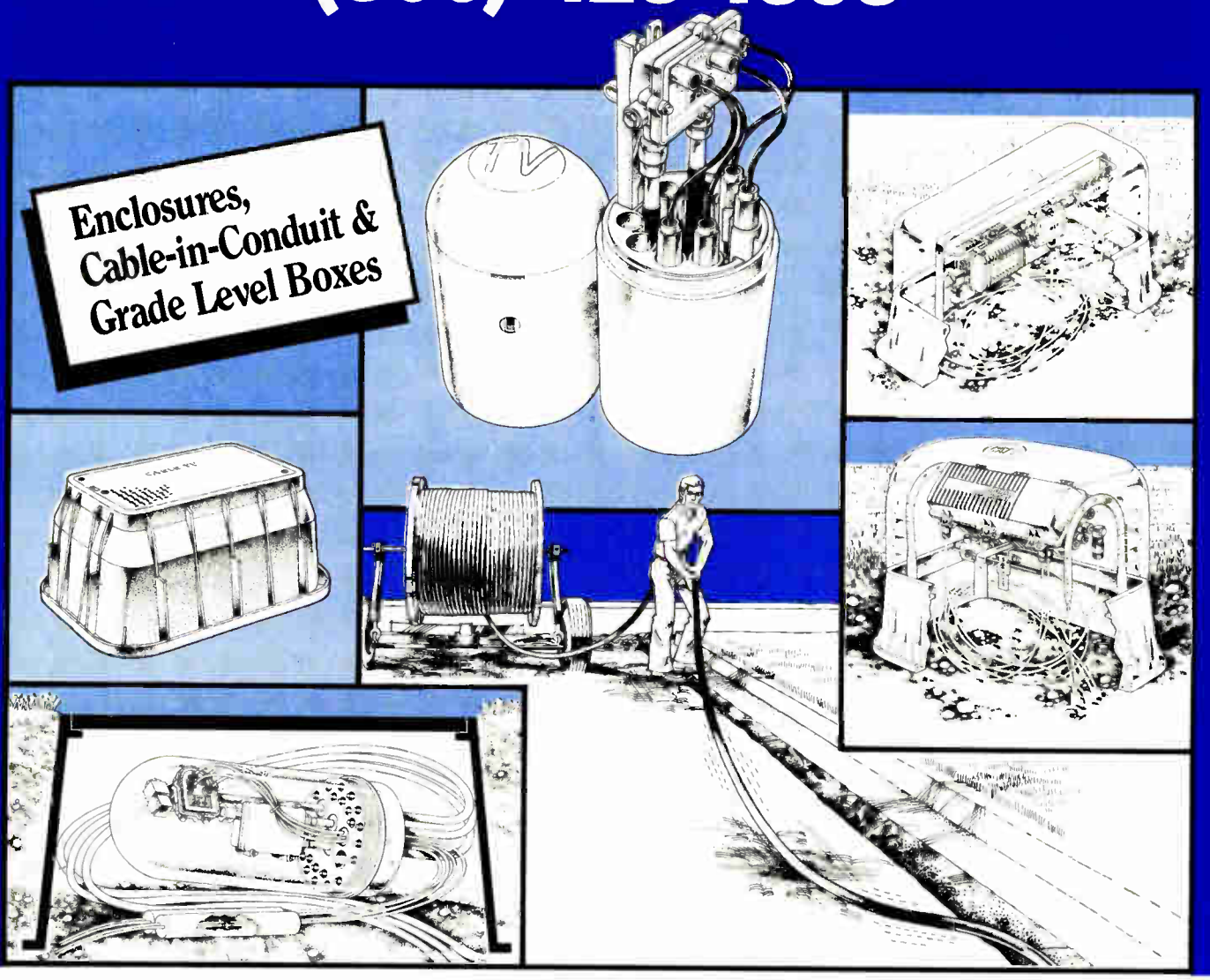

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Reader Service Number 13

See us at the Western Show, Booth #1170

Scientific-Atlanta's 8540 set-top with volume control

Hatboro, Penn.-based company will display a series of frequency agile headend products, new power doubling modules for amplifiers and line extenders and two new converters.

The line of agile products includes the S450M modulator, agile out to 450 MHz; the S450P heterodyne processor, which accepts VHF, UHF and cable channel outputs; and the S890D demodulator, agile out to 890 MHz. Also, the S1450R-VCII is a switchable C-band/Ku-band satellite receiver which incorporates a VideoCipher II descrambling module that eliminates up to seven inches of valuable rack space in the headend. The S1450R-VCII accepts signals from 950 MHz to 1450 MHz and features digitally synthesized video and audio tuning.

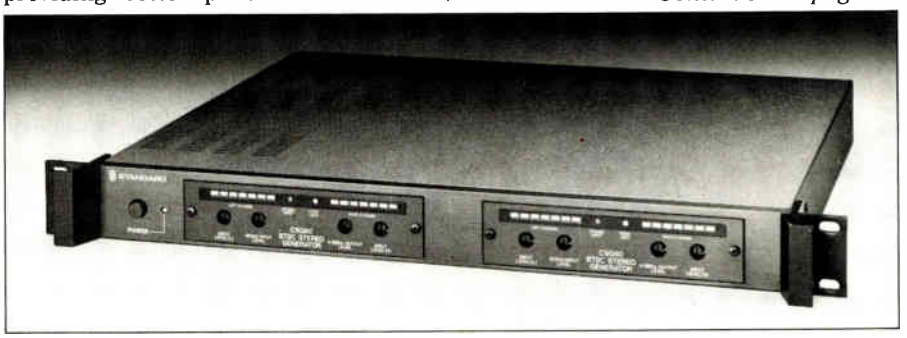
Power doubling modules have been made available for Jerrold's SJ line of amps and line extenders and were shown in Anaheim. The modules have been designed to make upgrading a system easier and less expensive than in the past, according to Jerrold officials. Also, a new power-doubled LE, the JLP-6-450-2W-450, a high-gain LE using standard J-series equalizers and JLP-6-450-2W/E-450 electronics and power supply, has been announced. These products can be used in systems of 350 MHz or less simply by plugging in a board, officials said.

Better pictures important

Another announcement that reflects the industry's growing commitment to providing better pictures is the one about Jerrold's taps receiving brass ports. All J series taps are now outfitted with brass ports that have been lengthened to accommodate locking terminators. The taps will be available in two-, four- and eight-port configurations.

On the converter side, a new baseband addressable has been added to the Impulse 7000 family of set-tops. Model DPBB7300 is capable of impulse ordering with an internal Starfone or Starvue module. It features volume control, stereo pass-through, last-channel recall, favorite channel programming and electronic parental control. A low-noise pre-amp is also available to

Continued on page 40



Standard Communication's Stereo Encoder

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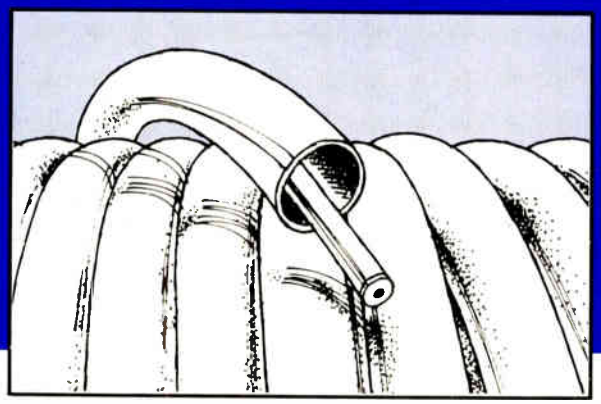

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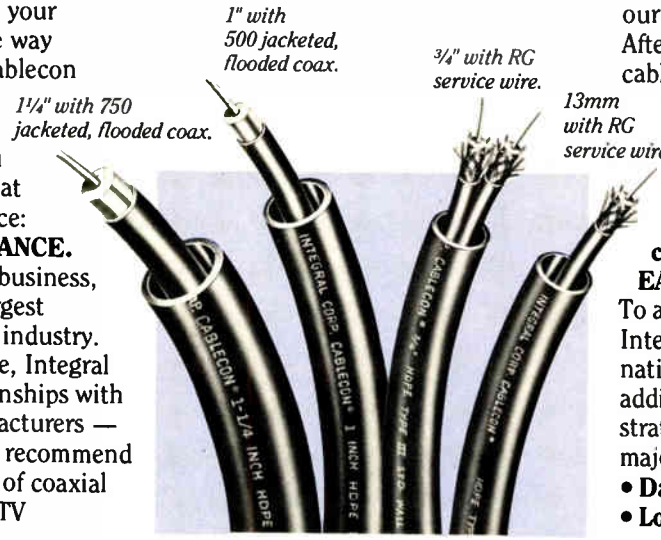

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Reader Service Number 15

William Johnson

Scientific-Atlanta approach to

WILLIAM JOHNSON

S-A's 1988 product introductions 'represent more of a systems approach to the (cable) business, more of an infrastructure approach.'

After spending enormous amounts of money, time and manpower to overhaul its broadband division product line and restructure the division's organizational chart, Scientific-Atlanta stands poised and more ready than ever to take cable television operators into battle with future competitors and come out winners.

As alluded to in the main story (on page 32), S-A is bringing seven brand-new products to the Western Show in Anaheim, more than ever before at any one single show. When combined with the five products announced in May at the National Show, the accomplishment is even more astonishing.

A systems approach

But the introductions aren't just pieces of hardware; they're all integral components of a grand scheme to bring a total systems approach to the cable industry. The man leading the charge at S-A is William Johnson, a specialist at corporate strategic redirections and turnarounds. A member of the team at S-A since January 1987, Johnson has brought a winning attitude that has become part of a new corporate culture to One Technology Parkway; an attitude that would seem to guarantee the company's health and welfare on into the next century.

Johnson is convinced that S-A's approach to providing technology with a purpose can enhance value, function and flexibility to CATV operators who are increasingly finding themselves under attack from telcos, DBS, HDTV and other competitors. Research and development has become a high priority for S-A; the level of spending is up 41 percent over fiscal 1987 levels.

S-A's 1988 product introductions "represent more of a systems approach to the (cable) business, more of an infrastructure approach, which we see as the next phase of development in the cable industry," says Johnson.

Thinking differently

"As (cable) has steadily increased penetration to where, in some areas, penetration is 60 percent or 70 percent...(there is a) need to think differently about how to use technology," he adds. "Instead of looking at technology as something where it's a home-by-home kind of thing...you think of putting in an infrastructure to serve the whole area."

To illustrate his point, Johnson points directly to the new Off Premises product, shown for the first time in Anaheim. He says the product benefits operators in three distinct ways:

It allows operators to handle growth, spin and churn efficiently because disconnects and service level changes are all done remotely. "That will become increasingly important as there is continued growth in programming and penetration levels because most of the cost and problems today are in the interface between the tap and the home," says Johnson.

The system is transparent, so it's friendly. By delivering a full spectrum of channels to the house, there are no converter/VCR interfaces (and associated headaches they cause) with which to contend.

A cable operator can enhance his marketing approach by offering free weekends or other promotions directly to those customers he wants to target.

Johnson believes the systems strategic approach will make Off Premises work for S-A although it has previously failed for several other manufacturers. "Off Premises shouldn't be looked at as a replacement for addressable converters (as it often is)...it provides a system infrastructure (or) management tool for the cable operator to provide video services to an area."

Not just glass

The same approach was taken in the research and development of the fiber system that has become a full-fledged product. Fiber cannot be thought of as just a piece of glass, it must be able to be integrated with existing conventional technologies in order to be cost effective, says Johnson.

Although this approach to product development differs from the way cable operators have traditionally planned and purchased, Johnson believes that increased pressure from a variety of potential opponents will force MSOs to think and design systems strategically in order to survive.

"(Cable operators) have got to begin to do some things (relating) to quality," he says. "It's very clear that we've got to do some things to provide a broader range of services so (cable) becomes more of an entertainment medium...as opposed to a pipeline for the same thing into the home that you can get on a

focuses on systems product development

J. Larry Bradner

J. LARRY BRADNER

The new addressable converter designed for the lodging industry is 'a generation or two beyond' today's converter.

pair of rabbit ears."

As operators adopt that type of thinking, Scientific-Atlanta will be prepared to deliver products to provide different services. Already, a glimpse of the interactive services that could be offered to subscriber homes in the future are incorporated in the new converter designed for the lodging industry, says J. Larry Bradner, president of the Broadband Division at S-A. The new product is "a generation or two beyond" today's addressable converter. But having been designed for service-intensive environments like hotels and motels, the experiences gained from that arena could be valuable in other CATV-related applications later.

Watching the competition

What's Johnson's perspective on telcos and the promises often made concerning fiber optics to the home? He acknowledges that cable needs to offer better pictures, more services and improved service to customers, but he doesn't support the idea of telcos having untethered access to video provision without being separately accountable for their telephone service revenues.

And fiber to the home? Well, despite what's being said in some quarters, it's still years away because it cannot be cost justified and ratepayers will complain in earnest if strapped with the expense. "If someone says, 'We can justify either putting a twisted pair in the home or putting a fiber in the home'...they forget that it's a different thing to say...they're equal. That's not the same as ripping up the twisted pair and throwing it away while it's still good. To hear people talk, they're totally ignoring the realities of the fact that this country is wired—it's wired for sound, not video. It's as simple as that; and it's not going to get wired (with fiber) overnight."

More market sensitive

Along with Scientific-Atlanta's shift to a more market-driven company versus an engineering-driven firm comes a desire to find out what operators want and then to build products that meet those needs. In order to stay directly in touch with customers, S-A actively solicits MSO input. Both Tom Elliot, director of research and development at Tele-Communications Inc., and Jim Chiddix, senior vice president of engineering and technology at American Television and Communications, have spent entire afternoons speaking directly to a room packed with S-A engineers. Johnson believes that if the engineers and product managers understand what the MSOs want, the proper mix of products and systems can be designed and delivered.

Additionally, Bradner has brought together the marketing and engineering functions in the Broadband Division via a restructuring of personnel and functions. On the subscriber side, Steve Nusrallah is now vice president and general manager; while David Fellows will be his counterpart for headend/distribution systems. Why? According to Johnson, the re-organization will allow S-A to focus its resources on providing operators with what they want, not what they're told they need.

It's all attitude

That "make the customer win" attitude brought by Johnson is also becoming the theme internally. The Winning Edge accentuates teamwork and commitment to win in a competitive environment. The employees have responded to Johnson's challenge; so much so that S-A employees who use innovation and quick action to help a customer overcome a problem are routinely rewarded through recognition. For example, the company's 1988 annual report to shareholders lists 15 of the 50 persons who have received awards so far.

In order to win as a company, Johnson outlined five fundamental components of business which the company must routinely win in order to expand business and instill loyalty in customers. Those five components—product value, top quality, cost leadership, marketing effectiveness, and customer commitment and support—are the ideals every S-A employee has been told to hold dear.

Are the efforts paying off? Apparently. Johnson says S-A gained some market share during the last fiscal year and he fully expects to get more. But he doesn't believe the turnaround is because of anything extraordinary, except an extraordinary emphasis on doing things right.

"We're not doing anything magical...we're just focusing on fundamentals," says Johnson.

—Roger Brown

Continued from page 36

improve picture quality. The unit is available immediately.

Also new from Jerrold is a digital plain converter. The DQNV7 is the same as the familiar DQN7 model, but adds volume control.

Other companies active, too

Meanwhile, Standard Communications will debut three new products at the Western Show, including an integrated receiver/descrambler (IRD) option, a stereo generator and a new block downconverter.

The IRD option for the Agile 40C/K (for large headends) and Agile 32C/K (for smaller headends) receivers has been designed to integrate the VideoCipher descrambling module into Standard's existing receivers without modifying the chassis design. A separate, add-on chassis with its own power supply attaches to the top of the receiver, forming a 3.5-inch high IRD. The IRDs will be sold only as optional upgrades. Cost is $725 with the VC module, $200 without it.

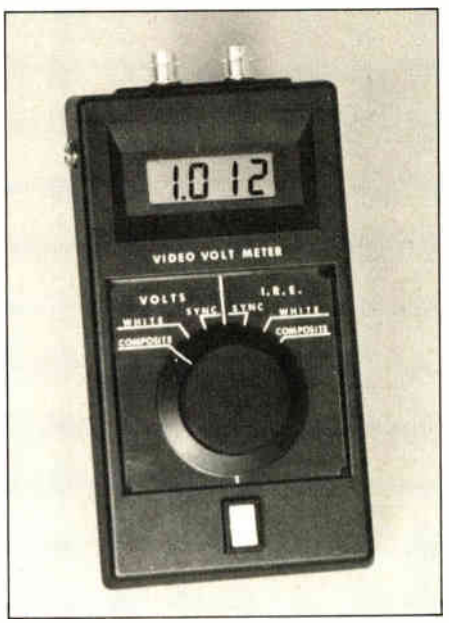
The CSG60 stereo generator is about half the size of other generators, so two modules can be placed in a single 1.75-inch rack space. True DBX companding is utilized, along with video sync lock, high quality filtering and 4.5 MHz modulated RF output to assure correct separation and maximum S/N ratio.

Commercial insertion is provided for in the stereo generator via a built-in dry contact switch and separate right, left and mono inputs can be balanced with front panel controls. The generator will be available starting in February and a single-channel system costs $995 and a dual-channel system is priced at $1,595.

Standard's new block downconverter, the ODC1A, is designed for upgrading and converting 270 MHz to 770 MHz satellite CATV systems to 950 MHz to 1450 MHz frequencies. This allows a CATV system to use the lower temperature range to increase overall receive C/N and improve baseband video S/N.

Help with audio levels

Setting and maintaining audio levels can be a nightmare for cable operators. To take some of the spooks away from the process, FM Systems has developed its new ALM673 Audio Level Master "dual mono" audio level control system. As many as six mono



FM Systems' Digital Video Voltmeter

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Reader Service Number 17

or three stereo audio channels can be controlled in just 1.75 inches of rack space. The ALM 673 uses split-spectrum control, program dependent time constants and independent noise gating. It can be converted from two separate mono channels to one stereo with a switch.

To measure video levels, FM Systems has developed the VVM digital video voltmeter. The hand-held, battery operated unit can be used to measure sync pulse amplitude, white level and overall composite video level in volts peak-to-peak or IRE units in a terminated or loop-through bridging basis.

The same size as an ordinary voltmeter, the VVM does not induce 60-cycle

Nexus Engineering's IRD-1

ground loops into the measurement and does not trail power cords. Maximum reading is 1.99 volts or 199 IRE units. The VVM's price is $325.

Joining the list of IRD vendors is Canada's Nexus Engineering. The new IRD-1 allows reception and descrambling of satellite signals, but the commercial grade units measures only 2⅝ inches high.

Also, Nexus will introduce its Series 100 line of compact, modular headend components at the Western Show. The family consists of the SR-100 multichannel satellite receiver, which allows reception of up to four satellite signals in one rack space; the VM-100 multichannel television modulator, which allows up to seven channels to be modulated; TD-100 demod which accepts channel 3 or 4 inputs and delivers baseband video and 4.5 MHz audio subcarrier outputs; and the VideoCipher Mainframe Board, which houses up to six VCII commercial modules.

Oak to show Oasis

Another well-known manufacturer of CATV equipment will introduce an

What follows is the most complete listing of the SCTE-sponsored technical sessions scheduled for the Western Cable Show at the Anaheim Convention Center. All listings are subject to last-minute changes. Consult registration materials for locations of each session.

Wednesday, December 7

1:30 p.m. to 3 p.m.: *FCC Update: An Overview of Technical and Regulatory Issues Currently Facing the Cable Television Industry.*
Moderator: **Bill Riker**, executive vice president, Society of Cable Television Engineers.
Speakers: **Wendell Bailey**, vice president science and technology, National Cable Television Association; **Sydney Bradfield**, staff engineer Federal Communications Commission, cable branch; and **Brian James**, director of engineering, NCTA.

3:15 p.m. to 4:45 p.m.: *Signal Leakage.*
Moderator: **Robert Dickenson**, president, Dovetail Systems.
Speakers: **Sydney Bradfield**, staff engineer, FCC, cable branch; **Roy Ehman**, director of engineering, Jones Intercable; **Steve Raimondi**, vice president engineering, United Artists Cablesystems; and **Chris Duros**, general manager, CableTrac Inc.

Thursday, December 8

8:30 a.m. to 10 a.m.: *Fiber and Cable: A View of the Possibilities.*
Moderator: **Joe Van Loan**, consultant.
Speakers: **Frank Little**, project manager, Scientific-Atlanta, "A Primer for the Marriage of Coaxial Cable and Fiber"; **Brent Bayon**, manager of engineering, Viacom Cable, "Remote Satellite 4 GHz Fiber Link"; **Jim Chiddix**, senior vice president, engineering and technology, American Television and Communications, "Strategic Issues with Fiber and Cable"; and **Jim Hood**, president, Catel Telecommunications, "Transhub-Transmissions of AM and FM Using Fiber."

10:15 a.m. to 11:45 a.m.: *Fiber Transmission Systems: Exploration of System Architectures.*
Moderator: **Jim Chiddix**, senior VP engineering and technology, ATC.
Speakers: **Dave Large**, director video product planning, Raynet Corp., "Video Distribution Using Tapped Bus Architecture"; **David Fellows**, director of marketing, headend/earth station products, Scientific-Atlanta, "Strategic Issues in Fiber Applications"; **Dave Robinson**, director fiber optic technology, Jerrold division of General Instrument, "Fiber Optic Architectures for Cable TV"; and **John Holobinko**, vice president marketing and sales, American Lightwave Systems, "Fiber Optic Trunking Systems".

1:30 p.m. to 3:30 p.m.: *High Definition TV—Moving Toward Reality.*
Moderator: **Ted Hartson**, vice president, Post-Newsweek Cable.
Speakers: **Wayne Luplow**, Zenith Electronics, "A Spectrum-Compatible HDTV System"; **Dr. James E. Carnes**, David Sarnoff Research Center, "ACTV Update"; and **Yves Faroudja**, Faroudja Laboratories, "Recent Developments".

3:45 p.m. to 5 p.m.: *HDTV Roundtable.* Experts in allied television fields analyze the coming impact of HDTV.
Moderator: **Ted Hartson**, vice president, Post-Newsweek Cable.
Panelists: **Gregory DePriest**, Association of Maximum Services Telecasters; **Brenda Fox**, NCTA; **Vito Brugliera**, Zenith Electronics; **Lex Felker**, FCC; and **Larry Irving**, Office of Telecommunication.

Friday, December 9

8:30 a.m. to 10 a.m.: *Consumer Electronics Interface Report.*
Moderator: **Walt Ciciora**, vice president strategy and planning, ATC.
Speakers: **Joe Van Loan**, consultant, "MultiPort Update, Toward a Success Story"; **Tom Mock**, Electronic Industries Association, "The EIA MultiPort and Advanced Television Systems"; **Joe Stern**, consultant, "A Digital Audio System for Cable"; **Anthony Radice**, General Instrument, "A Digital Audio Cable Radio System Using Adaptive Delta"; and **Walt Ciciora**, ATC, "Cable's High Definition TV Priorities."

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Reader Service Number 18

See us at the Western Show, Booth #263.

addressable control software package for use with IBM personal computers. Oak Communications will unveil "Oasis," which allows small- and mid-size cable systems to utilize Oak's premier Sigma addressable system. An adaptation of the new software will also be available for use with Oak TotalControl addressable systems.

Also new from Oak will be the new Sigma 3D stereo decoder. Standard features will include digital encrypted audio, set-top timer, IPPV plug and on-screen text display, all-channel MTS stereo, channel mapping, master/slave capability and infrared remote control. This new decoder is slated to be marketed in 1989 as Oak's flagship product, according to Oak executives.

ComSonics has adapted its "Window" product for remote use via a personal computer. The rack-mounted version interfaces to PCs over telephone modems and allows the operator to select a headend location from a database to link technical headend information to the computer.

Users can therefore retrieve technical information from the combined output of the headend by using the PC as an interface to the Window.

Comsonic's Remote Window

DropGuard given new life

On the distribution side, AM Communications has revived its DropGuard addressable tap product with a new version. DropGuard II will debut in Anaheim and is designed to control basic service to individual subscriber drops. With its enable/disable function, DropGuard II is perfect for areas with high non-pay disconnects or high levels of service theft.

AM Communications' DropGuard II

Enclosed in a weatherproof housing, DropGuard II is powered from the cable system. A plug-in coupler assembly provides for tap value changes in the field and control is accomplished by an

FSK data signal sent from a Master Control Unit and a PC. Up to 50,000 subs can be controlled by each MCU.

Systems that experience a lot of trap tampering will be interested in Sachs Communications' new Trap Shield. This new product features a break-off tab to identify illegals and eliminates broken tap ports, which should help reduce maintenance costs. Sachs officials said.

The SC70 Trap Shield can hold up to four traps and can be wall, strand or enclosure mounted.

A company that features low-cost actives and passives will have expanded its line of RF amplifiers at the Western Show. Viewsonics' new amps feature 50 MHz to 550 MHz (71-channel) capacity and hardline connectability. Twenty-nine models, with gains from 10 dB to 50 dB are available.

Among these are multiple self-contained four-, six-and eight-way splitter/amps with operating voltages of 24/30/60/110 VAC sine or square wave. Also, power insertion models for long drops and headend rack-mount forward/reverse and bi-directional models will be shown.

A new AML presence

A new player in the AML game will make its show debut in December. AML Specialties, a San Diego-based firm that's been developing products for nearly two years, will be on hand at the Convention Center. Formed by several former Hughes employees, the company promises to bring innovative design and ideas to the AML arena, said William Margiotta, CEO. "We intend to marry fiber optics to AML," promised Margiotta, whose firm recently introduced new transmitters. But he says AML Specialties won't stop there; a number of new ideas are percolating and should be announced soon, he said.

Texscan Instruments' PS1000Z Sweep Generator

CaLan Integrated Sweep Transmitter

Riser Bond's Cable Fault Locator

On the test equipment side of things, look for Texscan Instruments to introduce a new precision sweep generator. The PS-1000Z covers the 1 MHz to 1,000 MHz range with better than ±0.25 dB flatness, according to Texscan officials. Output level is adjustable over an 80 dB range in one-tenth dB steps.

The unit's small size makes it easy to use in both CATV and LAN environments. A sweep band preset capability allows two ranges to be set via rear panel adjustments for rapid changes between frequently used settings. In the preset mode, the digital display indicates frequency of a variable marker. Other features include built-in harmonic markers, an internal RF detector, a digital frequency display, plotter drive and provision for external markers.

Not to be outdone, CaLan will debut its new portable battery powered integrated sweep transmitter. The Model 1777P transmitter operates over the 5 MHz to 600 MHz range with up to three pilots and will be compatible with all existing CaLan sweep receivers.

Also, CaLan will announce new optional features for the 1776-1 receiver. They include an internal calibration source to assure level accuracy and full screen linearity; a 20 dB pre-amp to extend input range; a software "screen dump" routine which allows the display to be downloaded to a graphics printer; and a specialized software routine designed to perform frequency response measurements using only two carriers as a reference.

A new time domain reflectometer used to find cable faults will be shown by Riser-Bond Instruments. The new Model 1210 will be available in January.

—Roger Brown

What to do when ad sales become successful

Like most, if not all, cable companies that sell local advertising, Oceanic Cablevision started simply. At first, a few commercials were inserted into only one network. Since then, a combination of market forces have allowed Oceanic's ad sales to grow to the point that commercials run throughout the day on 10 channels.

This growth was accompanied by a change in the way advertising time was sold. That change, from run-of-schedule (ROS) selling to selling by time of day or program, along with the volume of spots being scheduled, proved to be more than the two main commercial insertion automation technologies available could handle. After thoroughly testing both linear (or sequential) and random access insertion systems, Oceanic adopted a less common alternative: automated commercial compilation.

Most, if not all, cable systems begin their ad sales efforts by offering ROS: clients buy a minimum number of exposures but aren't guaranteed specific time slots or programs. ROS offers a limited number of clients an efficient buy because they make up what they lose in specificity with volume. By keeping the spot traffic simple, ROS eliminates the need to produce custom logs each day and keeps the on-air operation very simple.

Some cable systems decide to offer more specificity to their clients by selling particular programs or times of day. Oceanic found it necessary to sell by program and/or time in order to compete with the 10 TV and more than 20 radio stations in Honolulu. Agencies and national rep firms shopping for advertising time wanted the same flexibility from Oceanic that they were accustomed to from the other media.

In addition, Oceanic became interested in using its own inventory of advertising time for tune-in promotion of its programming. To effectively support pay-per-view and other specific programming meant insuring that promos would not run after the program in question was over.

As the number of clients and promos increased, the volume of traffic changes increased. New clients started and new spots were added to existing contracts throughout the week. Coupled with daily programming changes, these factors required a unique commercial log for each channel, every day.

Different insertion systems

The importance of automation to the cable advertising sales industry cannot be overstated. Automation equipment makes running commercials on multiple channels a whole lot easier. It keeps costs down and delivers clean, reliable insertion of the clients' ads. But the automation system must be chosen to match the cable operator's needs; the wrong approach can be too inflexible or more flexible, and expensive, than necessary.

There are five basic approaches to running commercials:

1. Manually editing sequential reels and manually inserting the commercials.
2. Manually editing sequential reels and automating the commercial insertions.
3. Systems with multiple playback decks per channel that play one commercial cassette per deck.
4. Random access systems that have multiple spots per reel and multiple playback decks per channel. They search and cue to the spots needed for each break.
5. Automatic editing systems that create daily break reels that run in sequential insertion automation systems.

Like many cable companies, Oceanic started its and sales business by manually editing weekly commercial reels and manually inserting them on one channel.

This is the fastest and simplest way to get started: all it takes is an editing system, a playback VCR and a switcher.

The drawbacks are the cost of dedicating a person to inserting the ads and the inaccuracy of relying on human reflexes to start the ads. Frequent changes in the commercial reels become expensive, too.

Automatic sequential insertion

We bought our first sequential insertion system (rather than pay an additional on-air operator) when we began selling ads on additional networks. Sequential systems play clusters of commercials in the sequence they appear on a commercial reel. An entire day's commercials are on a single 3/4-inch tape for each network, and each tape is manually assembled. Each break airs upon receipt of network cue-tones. After the break airs, the tape parks at the next cluster of commercials on the tape. At the end of the day, the reel rewinds and the same breaks run in the next day's programming, or a new tape is loaded.

This system works very well for an ROS environment that requires little editing. The insertion technology is very reliable because each break is a single event instead of a collection of two or four events. One playback machine per channel means lower costs and less to go wrong. Sequential automation systems in an ROS environment work well unattended. Adding automation and VCRs for additional networks is relatively cheap.

Manual editing becomes very expensive if logs change daily. Our manually-assembled, sequential, automation insertion system was so labor-intensive as to significantly reduce the profitability of our advertising sales effort. It cost us between 25 and 30 man-hours per day to assemble new tapes for each of eight advertising supported channels, for an annual labor cost in the neighborhood of $75,000.

Single-spot-per-reel systems

The broadcast industry historically used single-spot cartridge systems to play commercials. These systems would have either enough transports to run each spot in a break without reloading, or a means of reloading each tansport during a break. As the first 2-inch cart machines reached retirement age, new

By Gregory Davis, Director of Video Operations, Oceanic Cablevision

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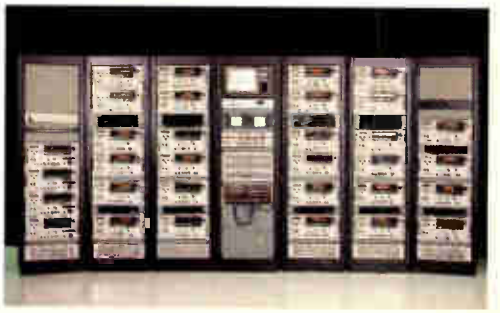

Reader Service Number 20

versions have been developed that use component 1/2-inch cassettes and robotics to change tapes. On a simpler level, some stations have used banks of 3/4-inch VCRs to play back single-spot tapes, manually reloading each VCR after each break.

Either single-spot approach is extremely flexible because last-minute changes can be made right up to air time.

But that same flexibility can be a liability. The need to manually load tapes leaves open the possibility of error, and if several channels are involved it can keep an operator very busy. Robotic systems will handle the tapes for you, and most current systems use bar-code identification schemes to insure the right tape is loaded, but they're extremely expensive. With or without robotic tape handling, adding channels to single spot systems is hugely expensive: additional controllers and additional VCRs aren't cheap.

The need to provide many copies of each spot, one for each channel, is expensive and complicated. The system is also vulnerable if the automation should break down: it's hard to cue and run individual spots.

Random access

Random access playback systems use multiple players loaded with identical reels, each containing copies of all active spots. Prior to each break, each player cues to a different spot. At the break, each VCR plays a single spot in turn, then re-cues for the next break. The normal random access configuration would have one VCR per each 30 seconds of the longest local avails on each network. For example: CNN offers two-minute avails, requiring four VCRs; Headline News offers one-minute avails, requiring two VCRs.

Random access uses the same spots over and over again instead of requiring daily construction of tapes. This makes it very easy to accommodate log changes (if they don't involve new spots; more on those difficulties shortly) because changes simply mean cueing to different spots.

In addition, many of the random access systems on the market capitalize on their computer sophisticatioin to offer integrated traffic, verification and billing features. This simplified, integrated, purchasing option appeals to many users.

The most obvious drawback to random access insertion systems is the need for multiple transports on each network. (This problem can be partially ameliorated by sharing VCRs between networks that have local avails that always run at different times, but not many networks would qualify for sharing.) In addition to the capital costs of having all these VCRs, there is the on-going maintenance cost, and some operators would have trouble finding room for that many VCRs.

Keeping all those VCRs filled with tapes is another big issue to consider in evaluating random access systems. If a network offers one-minute avails, you will need two copies of every spot; those that offer two-minute avails require four copies. The multiple copies allow any combination of spots to run during any given break. Starting a new spot running on all networks will mean dubbing that spot onto two reels for some networks, four reels for others. If you are running ads on eight networks, this can easily mean making 20 or

When you leave the office, can you rest assured your "spots" ran?

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Reader Service Number 22

more dubs of each spot.

The critical weakness

After using random access automatioin on two networks for several months, Oceanic concluded that it would never be able to comfortably handle more commercials, promos, IDs, and PSAs than would fit on a single 60-minute tape (roughly 100). This proved to be a critical problem for us; our active inventory averages around 250 items.

Having more spots than will fit onto a single 60-minute tape means having to continually change tapes or instal additional VCRs. Rather than changing tapes all day, we could triple the number of transports per network to allow all spots to be loaded at all times. (250 spots, with 100 spots per tape, works out to three sets of tapes for each network, and three times the VCRs. See Table 1 for Oceanic's VCR requirements under either scenario.) Each VCR would take up space, consume power, generate heat and cost $40 to $50 per month in maintenance.

With either approach (constantly changing tapes or installing extra VCRs), every new spot would need to be dubbed once for every playback VCR on every channel. With more than 200 active spots, we would have to keep 63 tapes current, organized and readily available. We receive from five to 10 new commercials and promos per work day to add to the active inventory. With that many sets of tapes, it would take two to three hours to make all the dubs necessary to add a new commercial to all channels.

Table 1

Random Access VCR Requirements

	Re-loading Tapes	Without Re-loading
MTV	3	9
VH-1	2	6
ESPN	2	6
USA	2	6
FNN	4	12
Nickelodeon	2	6
CNN	4	12
Headline News	2	6
	21	63

Assuming we used the fewest possible on-air playback VCRs to conserve space and reduce costs, the operators would be overwhelmed by the need to correctly re-load the 21 VCRs once or twice an hour, and commercials would likely be missed. If the operators have to constantly change tapes, we might just as well use the single spot per tape approach. At least it wouldn't need such a complex automation system.

Additionally, the need to play back tapes from multiple VCRs for each channel makes it almost impossible to manually run commercials if the automation should fail. The operator would be unable to cue and roll all spots without the help of the automation.

With multiple transports per channel and sophisticated controllers, random access systems have high incremental costs for adding additional networks.

Finally, while many operators may be interested in integrated traffic, insertion and billing systems, others may prefer the flexibility of picking out these systems a la carte.

Sequential/automatic compilation

Fortunately, Oceanic found a more practical solution. Rather than automating the playback of several tapes per channel, we chose a system that edits daily tapes automatically. Automatic compilation combines features of random access with sequential inser-

AWESOME!

We recently asked our first ADCART customer what he thought of his new ad insertion system. His immediate reply was *"AWESOME!"* His was a typical reaction among those who've seen the ADCART in operation, especially after having grown accustomed to other manufacturer's systems.

The ADCART, when compared to the other systems available, *is* awesome. It is the result of years of research and development and the expenditure of over *one million dollars* in hardware and software engineering costs. It represents the ideas and wishes of all our ad insertion customers. . . and that is a huge group of talent. With over 4,500 channels in operation, our customer base is by far the largest in the ad insertion business. The ADCART also represents the dreams of probably the most talented and experienced group of engineers and management people in the ad insertion business; they are the primary reason Channelmatic *remains* the industry leader.

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■ **GREAT SOFTWARE.** With the ADCART, everything you need to easily set up and program a random-access schedule is integrated into the software. From the very first screen you'll see on the CRT terminal, plain language will guide you to the next logical step; simple English prompting natural program flow. Our tape-encoding and traffic and billling software flows just as naturally. The system's architecture was designed from the outset to simplify user-training and to make life easy for the operator.

Just imagine having up to 75 auto-prompting screens to assist your operator in programming, and up to 200 additional color screens designed to facilitate traffic and billing functions. Then add 35 more screens that direct the simplest tape encoding in the business. Your ad insertion people will love you. . . and so will your accountant.

■ **SUPER FLEXIBLE.** Flexibility is synonymous with ADCART. Insert on virtually any number of channels. Assign VCRs to fit your avails: two on two channels, four on one channel, or four VCRs between two channels. . . without overlapped avails. You'll even have an auto-record capability, which has already made the ADCART the de facto standard in new interconnect design.

■ **SMALL STUFF.** The ADCART has many other features, some of which you probably never thought about. To name a few: stereo audio, with computer-controlled audio-level matching; TBC-switching; stereo simulator inputs; super-capacitor memory backup; non-volatile memory for system configuration data; and premium plug-in interface connectors to simplify installation and maintenance. Add to this an award-winning electronics package and numerous other features and you have the best cost-benefit ratio in the business. . . *by far.*

■ **DON'T WAIT.** If you're thinking ad insertion, take a close look at ADCART before you buy. If you don't, you'll hate yourself once you see one operate. Even if you have a system now -- regardless of the brand -- you owe it to yourself to look at the ADCART. Looking doesn't cost you a cent, but relying on outdated equipment can cost you plenty.

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CHANNELMATIC, INC.
821 Tavern Road, Alpine, CA 92001
(619) 445-2691 or (800) 231-1618

See us at the Western Show, Booth #1444.

Reader Service Number 25

The recognized leader in ad insertion. More than 4,500 channels in operation.

tion systems.

An automatic compilation system uses library reels, similar to the spot reels in a random access system, to create daily tapes for each channel. The logs are loaded into the system, becoming edit lists. The end result of an automatic compilation system is a daily tape for each channel, which is loaded into its respective sequential insertion system for on-air playback.

An effective compilation system must meet certain criteria:

1. It must use SMPTE time code for frame-accurate editing (see next item).
2. It must compile the breaks on the daily tape out of sequence, checkerboarding the tapes until all positions in all breaks are filled in. This allows the system to transfer all the needed spots from each library reel before requiring a library reel change.
3. It must allow for the use of multiple players and/or recorders. Multiple players reduce the number of library reel changes, and allow one machine to cue while another is editing. Multiple recorders allow spots to be transferred to different daily reels simultaneously.
4. It must allow direct down-loading of commercial logs from the traffic system, avoiding the need to type in logs manually.
5. It must automatically re-try edits that abort due to mis-matched time code. (With SMPTE time code, edits will occasionally abort when the controller is unable to get the machines to sync up properly. This is a random occurrence; the edit is almost always successful on second or third attempts.)

Unlike random access systems, each spot need only be transferred to a library reel once.

By retaining the sequential insertion system, the number of VCRs is kept to one per network, reducing capital costs, maintenance costs, space, power and cooling needs.

Sequential insertion technology has proven reliable and simple to operate. (Oceanic is still using the first Channelmatic inserter ever sold.)

Reliability is higher than manual editing, thanks to time code. Frame-accurate editing insures that frames aren't cut off of commercials or frames from old commercials don't show at the edit points. The computer is also less prone to careless editing errors than people are.

Labor costs of an automatic compilation system are limited to adding new spots to the library reels (once for each new spot, unlike random access) and the usual housekeeping involved in maintaining quality control of the video tape stock. Compilation itself doesn't require operator supervision. The time of the library tape changes can be accurately estimated in advance, and the system can be left unattended until the tape needs changing.

Perhaps the most significant advantage of an automatic compilation system is that it is very forgiving of problems or failures. Small glitches don't affect the airing of commercials because the system is operating off-line, preparing daily tapes a day or so in advance. Problems can usually be resolved in time to complete the required editing and air all spots as scheduled. The on-air operation, being a collection of stand-alone sequential inserters, is immune to catastrophic failures that might disable all networks.

Disadvantages

As may be apparent, one disadvantage of automatic compilation systems is the difficulty of making last-minute

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Reader Service Number 27

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PERSONNEL: Gerald Van Mondfrans, President; Bob Hall, Vice President
DESCRIPTION: Ad Systems' complete line of ad insertion equipment makes local ad sales more profitable by providing lower initial investment and ongoing labor savings. All systems are expandable and range from our low cost, four channel, one VCR insertion system through our four VCR, random access system. Ongoing labor costs are reduced by using the cost effective Automated Break Complier (ABC-100) to eliminate the tedious time consuming process of editing and tone cueing the 'on air' tapes. Ad Systems also is a supplier of the graphics and text insertion systems especially suitable to small cable and SMATV operations.

Adams Russell
VIDEO INFORMATION SYSTEMS DIVISION

Adams-Russell Electronics Co., Inc.
ARVIS Division . . . . . .(617) 890-5850
(800) 272-7847
(617) 890-7857 FAX
300 Second St.
Waltham, MA 02154
PERSONNEL: John Lynch, President; Trevor Lambert, VP/Video Information Systems; Roger Strawbridge, Project Director / Video Information Systems
DESCRIPTION: Adams-Russell Video Information Systems Division manufactures and markets automatic commercial insertion equipment for the cable and broadcast industries. ARVIS is a division of Adams-Russell Electronics, a multidivisional, international company in aerospace and high technology/electronic operations.

CHANNELMATIC

Channelmatic Inc. . . . . .(619) 445-2691
(800) 231-1618
821 Tavern Road
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DESCRIPTION: The recognized leader in ad insertion with more than 4,500 channels in operation. Fully automatic random access, random pod, and sequential VCR commercial insertion systems, programmable video cassette changer and multiple VCR playback systems for local origination, various standard modules to provide audio/video routing and switching; custom time/tone remote and local switching and VCR control; audio/video distribution amplifiers and many other low-cost A/V accessories.

Commercial Cable Inc. . .(615) 894-2580
2001 C. Hickory Valley Road
Chattanooga, TN 37421
PERSONNEL: John Brady Jr., President.
DESCRIPTION: Commercial Cable Inc. manufactures a complete line of commercial insertion equipment as well as Automated Local Origination systems. Our specialty is computer control of videotape machines with very close tolerance vertical interval switching among machines and network sources. We also feature a very dependable verification system.

Falcone International, Inc.

Falcone International Inc. .(404) 427-9496
1355 S. Marietta Parkway
Marietta, GA 30067
PERSONNEL: Walter J. Elliott, CEO; Bruce W. Elliott, V.P./Head of Operations
DESCRIPTION: Manufactures automated commercial insertion equipment. Assists in leasing and CATV ad sales consulting.

LA KART

La-Kart Corp. . . . . .(617) 244-0354
287 Grove St.
Newton, MA 02166
PERSONNEL: Edward Herlihy, President; Jeffrey Swift, VP Engineering; Michael Carlozzi, Director Sales Support.
DESCRIPTION: Providing commercial insertion systems, pay-per-view systems, traffic systems, automated tape library systems and complete hub studio system. Mini Kart AIS 5000 medium priced ad insertion system and La-Kart fully configured as insertion system.

TELECOMMUNICATION PRODUCTS CORPORATION

Telecommunication Products Corp. . . . . .(717) 267-3939
1331 South 7th Street
Chambersburg, PA 17201
PERSONNEL: Thomas P. Carbaugh, President; Tom Russell, Sales Manager.
DESCRIPTION: Manufacturer of ad sales automation systems, both hardware and software; NEXUS, MEDIUS, BASUS, ADministrator, ADPOD. Also dealers for Sony and computer systems. Also manufacturer of NVU and CGV generators, PVM-1000 audio level meter, and CLIDE Software Package for monitoring cumulative leakage information. Service center for Sony center for Sony VCRs and monitors.

MSI

Texscan MSI Corp. . . . . .(801) 359-0077
(800) 367-6011
124 N. Charles Lindbergh Dr.
Salt Lake City, UT 84116
PERSONNEL: David Keller, Div. General Manager; Denny Campo, VP/Marketing.
DESCRIPTION: Full line manufacturer of program automation equipment: complete automated commercial insertion systems with custom traffic and billing software packages, video tape playback controllers, character generators, graphic generators, and photo advertising digitized Image Capture Systems.

changes to the logs. These systems build the tapes in advance, so any late changes mean interrupting work in progress to re-edit daily reels that had been finished earlier, or manually editing the changes. (This is also true of *manually* edited sequential insertion systems. While random access systems do have an advantage in being able to quickly substitute one current spot for another, getting new spots on the air requires hours of dubbing.)

The start-up cost for acquiring an adequate compilation system is likely to be high due to the sophistication required; at its core, the system should be a multiple-VCR editing controller with time code capability.

The cost will depend on the editing workload. It's indirectly related to the number of networks served: when there are more breaks than can be assembled in one day, then additional VCRs must be added to speed up the compilation process. (Oceanic's current system compiles the daily tapes for 18 hours worth of avails on eight networks, using two players and three recorders, in about 12 hours.)

A final drawback to automatic compilation is the extra generation lost in dubbing spots first onto library reels then onto daily reels. It should be noted, however, that this same generation loss can occur when mass-producing identical library tapes for a random access system (each version of the library tapes would be dubbed to provide copies for all networks' VCRs.) This degradation of the video quality can be eliminated by using SP recording technology, or minimized by using the dub video connections between VCRs.

Oceanic Cablevision's experience

Oceanic has shown that converting eight channels to an automatic compilation system, even with the expense of modifying five VCRs for time code capability, was cost-competitive with converting to random access equipment and acquiring additional playback VCRs.

In our case, we calculated that random access would have eliminated four or five part-time editors, but three or four would have been needed to handle the dubbing of newly arrived commercials and promos. Furthermore, reliability would be reduced by the need to constantly change tapes in the control room.

Converting to an automatic compilation system has eliminated eight part-time positions. The editing of the daily reels is unattended. (Whomever is in the vicinity takes care of changing the source tapes about every 45 minutes.) The amount of editing needed to add new spots is low enough that the former editing supervisor (who no longer has a staff to supervise) can handle all compilation and library tape housekeeping chores. With the cooperation of our ad sales and traffic personnel, last-minute changes have been kept to a minimum. Based on labor savings, system pay-back will come in about 18 months.

Reliability has not been a problem. We have taken advantage of the off-line nature of automatic compilation: we've chosen a system configuration that allows us to complete daily compilation, add new spots and perform general housekeeping in around 18 hours, leaving up to six hours a day as a cushion if problems crop up.

Changing tapes only once a day has kept our control room operation simple and avoided a lot of tape inventory management problems. We've added additional commercial insertion channels cheaply by purchasing a single VCR and low-cost sequential inserters. ■

Reflections in fiber optic connectors and splices

Fiber optic CATV systems are rapidly gaining acceptance. The benefits of improved signal quality, higher reliability and greater channel capacity obtained with fiber optics are apparent to most in the industry. This new technology, while offering many advantages, does require some unique design considerations, pricipally due to the emerging use of amplitude modulated (AM) optical signals. The semiconductor lasers currently used to transmit these signals are susceptible to reflections from passive components, i.e. connectors and splices in the fiber links. Reflections can cause signal distortion, ghosting, increased noise and laser instability. It is important to understand the reasons that fiber reflections occur and what can be done to minimize them.

Connectors

Reflections are caused at connectors due to a separation that may exist between the fibers. This end separation may be caused by the way the connector is polished, the connector design or potentially by other factors such as dirt or dust that could find its way between the connectors and prevent the fibers from coming into contact.

Any small air gap is sufficient to cause reflections due to the change in index of refraction that the transmitted signal experiences in traveling from the core of the transmit fiber (n = 1.471), through the air gap between the two connector ends (n = 1.00), and back into the receive fiber (n = 1.471) (See Figure 1.) In addition to the back reflection which is generated at this point, attenuation across the connector is increased by about 0.35 dB due to Fresnel effects. (This Fresnel effect is the reflection component of the total connector loss.)

Almost all connector ends are polished. Because the optical fiber has a hardness which is different than that of the connector ferrule, they polish at different rates. This produces a polished connector whch may have the fiber end concave, convex, radiused or flat. (See Figure 2.)

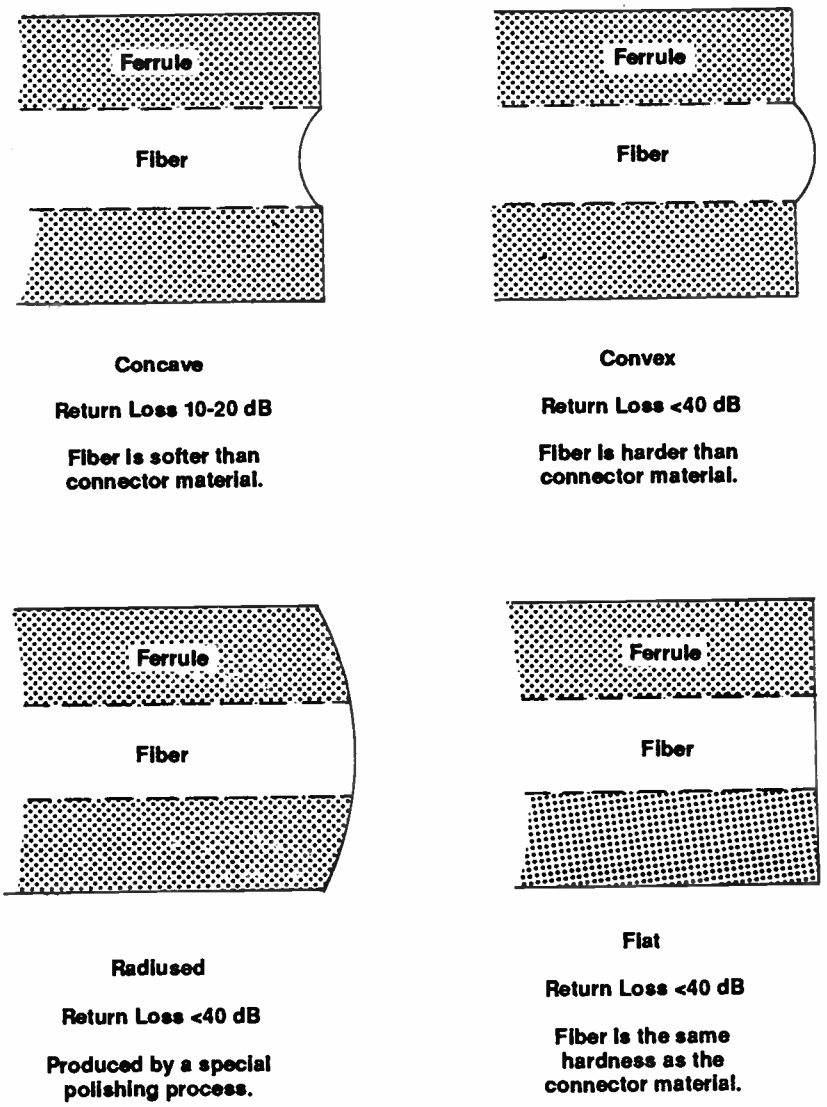
Concave

This type of geometry is typically produced when using a hard connector material such as ceramic. The concave end face will give poor performance with respect to reflection, typically 10 dB to 20 dB, and will always add 0.35 dB attenuation from Fresnel loss due to the air gap present between the two fiber cores.

An obvious method of eliminating the reflection losses that are caused by the end separation of the fibers is to place an index matching material between the connectors that is equal to

By Peter Ballhaussen and Dennis Knecht, Siecor Corporation

Figure 2



Note: The higher the return loss value, the better the reflection performance.

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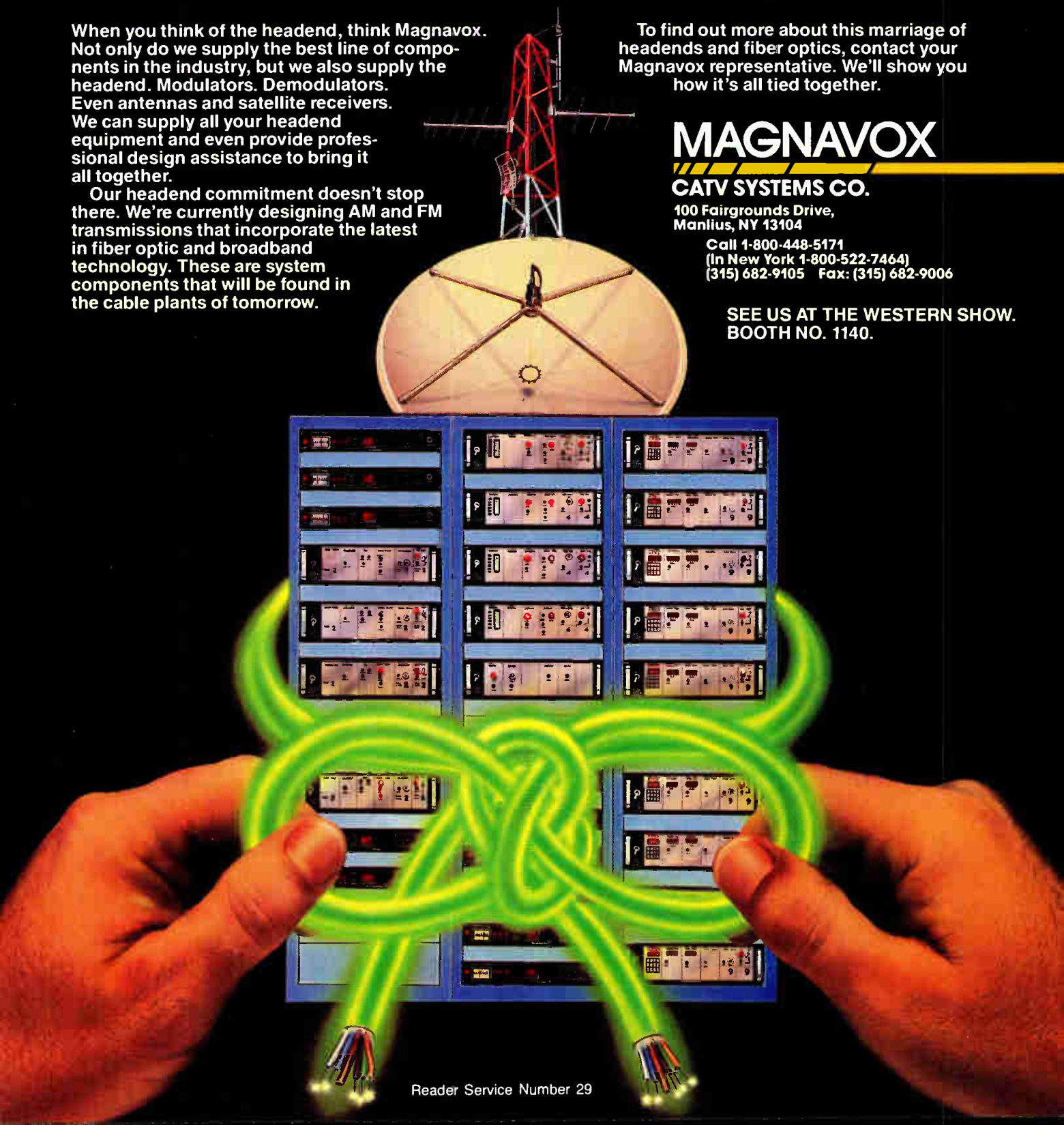


Reader Service Number 29

the refractive index of the fiber cores. However, there are potential problems associated with this technique. First, index matching materials are viscous (liquid) and over time, or after frequent matings, could flow from their desired location, thus reducing connector performance. Second, these fluids are very effective at attracting dust and, since the fiber cores to the aligned are only 8 microns in diameter, any dust between the fiber ends will adversely affect performance.

Convex

Although this type of polish will give good results for both reflection (>40 dB) and attenuatiion, durability becomes an issue. During connector matings, the protruding fiber face absorbs most of the impact and as the two connector halves come together under spring load it is possible for the fiber to shatter, producing high attenuation.

Radius

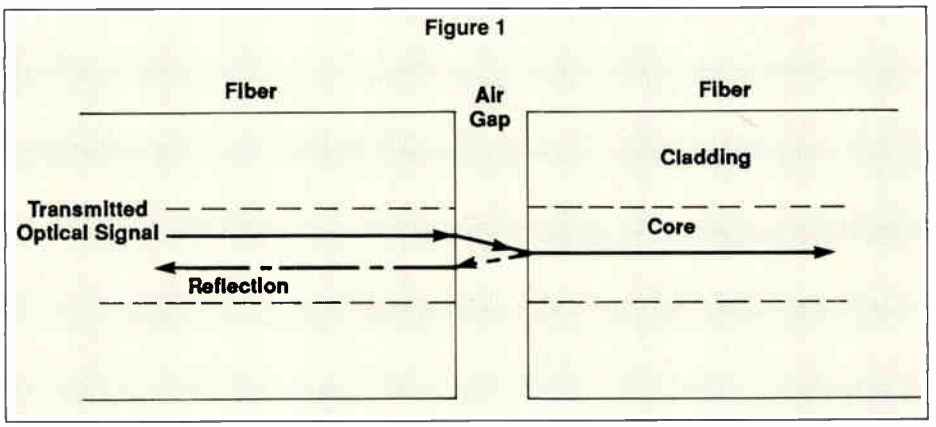
This end configuration is produced by a special polishing process that puts a radius, typically 20 millimeters to 60 millimeters, on the end of the connector. Because the fiber ends can now physically contact each other, this type of finish offers the advantage of low attenuation (<0.5 dB) and reflection (>35 dB). In addition, durability is improved due to the fiber being supported at its periphery and the absence of impact loads on the fiber end face.

Flat

This geometry is not a typical end configuration because the connector materials are usually either harder or softer than the glass fiber. However, connectors that utilize a glass insert (such as Siecors' glass-in-ceramic connector), match the hardness of the fiber to the connector and enables flat fiber end faces to be made. This allows the connector ends to physically contact without the special polishing equipment required to produce a radius finish.

Because of the physical contact that is obtained, attenuation (<0.5 dB), as well as reflection (>40 dB) is low. Durability is enhanced due to the large load bearing surface at the connector

Figure 1



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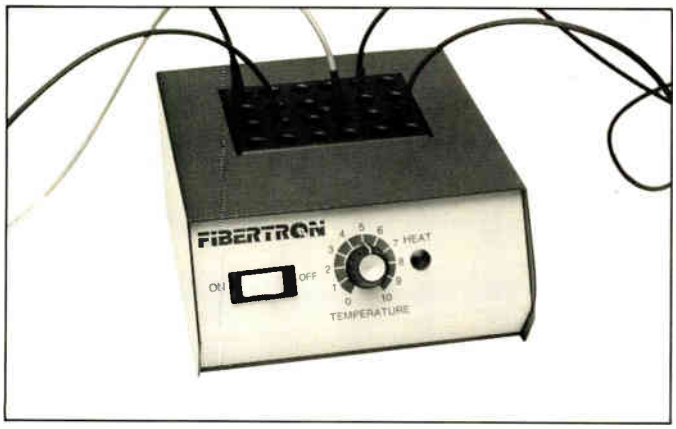

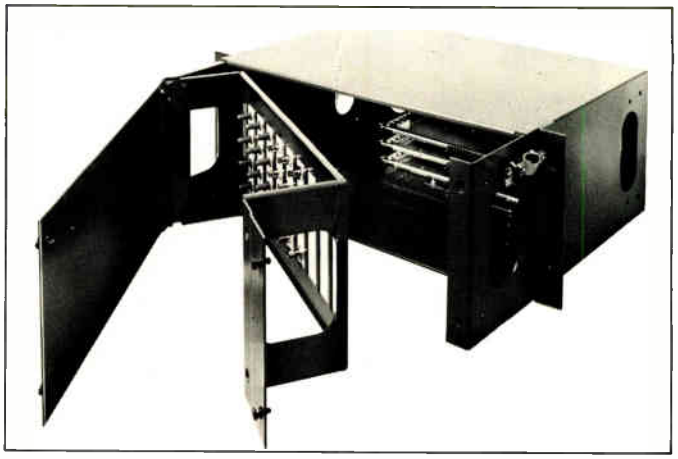

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end.

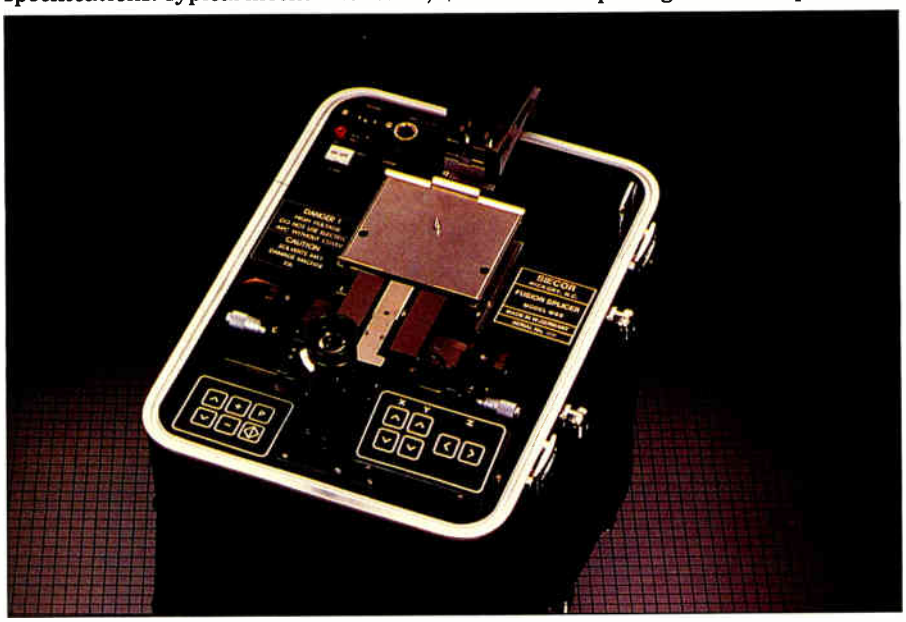
Another method of reducing reflections with a flat geometry is to polish the connector face at an angle, typically 8 degrees to 12 degrees. This technique does not allow the reflected light to be coupled back into the core of the transmit fiber. This results in good performance with respect to reflections but at the cost of increased attenuation due to Fresnel losses.

Not only is the geometry of the connector end important, the type of material used to attain the polish must also be considered. Polishing of the fiber changes the density of a thin layer of the glass in the area of polishing. This increases the index of refraction of this thin section and a secondary polish is required to remove this layer so that the index of refraction of the fiber is continuous. This secondary polish can improve the reflection loss value by up to 10 dB.

Selection of connectors

The connector type selected for use in CATV fiber links must first of all be compatible with the end equipment. FC, D4 or ST compatible connector designs are provided on most transmitters or receivers currently in use. To minimize reflections, it is critical to mate connectors with contacting end face polish designs. Connectors that provide return loss of greater than 40 dB ("super" PC) are preferred to minimize reflection related problems. These designs also minimize insertion loss due to the elimination of Fresnel effects and special polish techniques that provide a continuous index of refraction. Connector insertion losses are especially important on present AM CATV systems because link-loss budgets are typically less than 10 dB.

All connectors used should also meet certain mechanical and environmental specifications. Typical mechanical tests, such as vibration, repeatability and durability should have results within accepted industry standards. Connectors should operate from -40°C to +80°C with minimal insertion and return loss variation to permit installation in aerial systems.



Siecor's Model 68 fusion splicer

Splices

Mechanical. Mechanical splices have the same problems as connectors with respect to reflection. However, their function is different. Splices are intended to be permanent joints and as such do not have to be unmated.

The fiber ends that form the splice can be either cleaved or polished. In either case, the intent is to produce a very flat (<1 degree) surface on the end of the fiber. An index matching fluid is used at the fiber joint to reduce reflections. This eliminates any air gap and provides a fairly continuous index from the transmit fiber to the receive fiber. Reflections are not totally eliminated because of the inability to perfectly match the index of the fiber cores.

Typical reflection values for index matched mechanical splices are >40 dB if cleaving is used for fiber preparation. The performance of polished fiber ends will not be as high as a cleaved fiber end.

Fusion. Fusion splicing is a process which welds the two fiber ends to be joined together. This process eliminates any air gap and produces no reflective surfaces. Fusion splices generate no reflected power.

Fusion splicing is the preferred method for splicing AM CATV systems. The variable of return loss caused by splice reflections is thereby completely eliminated. Fusion splicing is a proven splicing method and has been the standard for most long-haul telephony carriers and major telcos since fiber optic cable became practical for field applications.

Recent advances include microprocessor controlled units with built-in splice evaluation. These units have considerably simplified the fusion process, increased reliability and greatly reduced training time. Units can operate at the touch of a button and are capable of making splices in one minute or less. Single mode splice losses are typically under 0.1 dB.

Pros and cons

An argument by some against fusion

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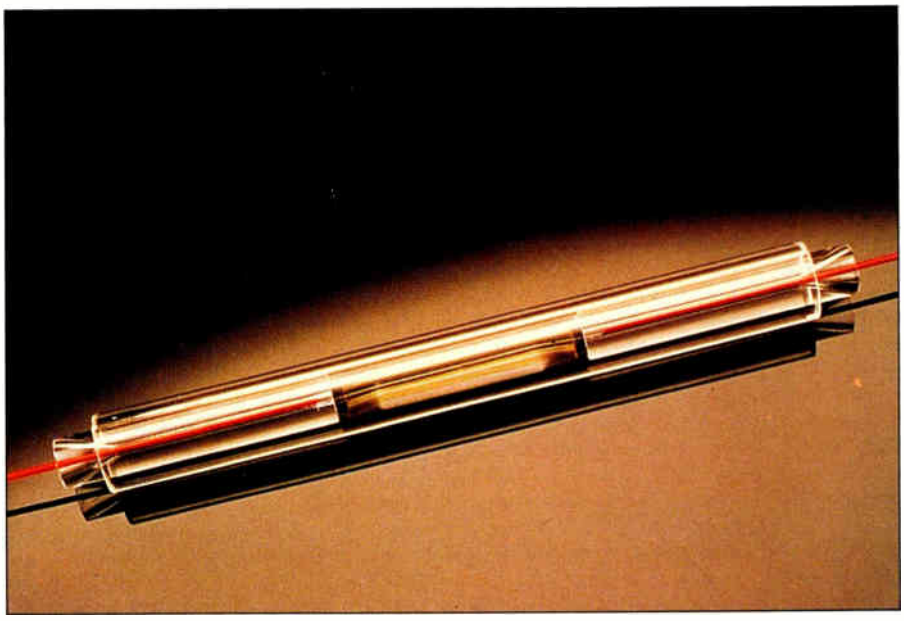
splicing has been the high initial cost of a unit. This can be overcome in several ways. If usage is sporadic, units can be rented for short time periods. If usage is significant, the initial cost can be easily justified in two ways. First, recurring splice part costs are eliminated with fusion splicers. Splicing times are typically equivalent to mechanical splices, except for those requiring polishing, in which case a labor savings may also be realized with fusion splicing. Fusion splicers also provide splice loss evaluation. This is not available with a mechanical splice without purchasing equipment such as an optical time domain reflectometer (OTDR), which may cost up to $20,000. A fusion splicer can be paid for with the equivalent cost of several hundred mechanical splices if these factors are considered.

The second justification is the elimination of the need for expensive optical isolators which would potentially be required in AM systems using mechanical splices.

Mechanical splices should not be completely discounted as an option. They are preferred for rapid restoration, because restoration crews can be inexpensively outfitted with mechanical splices for use in emergency situations.

Reflections on all mechanical splicing methods are, for all practical purposes, identical. This is because matching gel is used in all industry accepted mechanical splices to minimize reflections. Other criteria must be used to determine exactly what methods are optimal for use in the fiber optic CATV links. Splices must be easy to use by the field craftsman. Splices that require fiber end-face polishing or the assembly of several parts are not appropriate when the objective is to quickly restore service. Splices with factory pre-inserted matching gel are preferred so that sufficient quantities of gel at the fiber interface are assured. Required ancillary equipment costs should also be minimzed. Splices like the Siecor SeeSplice require only an inexpensive ultraviolet light and ultraviolet adhesive in addition to a standard fiber optic stripper and cleaver for assembly. They are preferred to those that utilize special tools. Mechanical splices should provide a positive feedback mechanism such as the ability to see fibers mate, thus insuring that a certain performance level is obtained without measuring the splice loss. Splice losses of 0.5 dB or less are usually acceptable for restoration splices.



Siecor's SeeSplice

Conclusion

CATV system providers must realize the potential impact of fiber reflection to their AM fiber optic systems. Through proper selection of connectors and splice methods, the negative impact of these reflections can be minimized. For providers who are designing their initial systems, it is beneficial to work with experienced fiber optic vendors that can assist in making component choices from among all of the currently available options. ■

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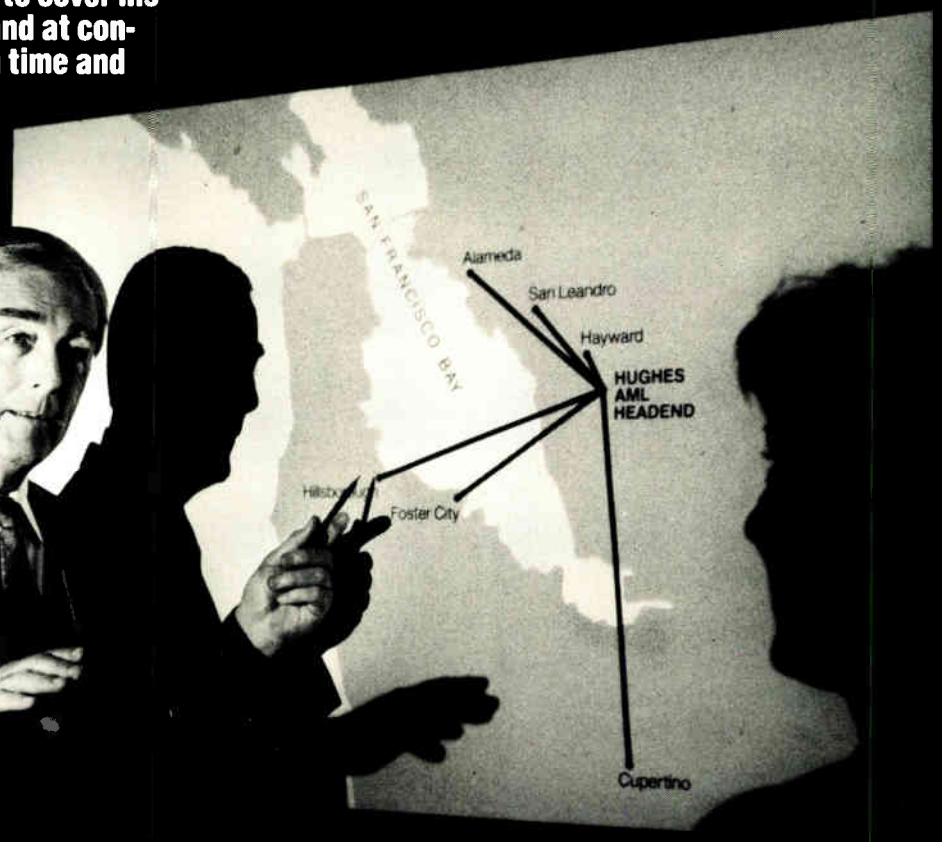

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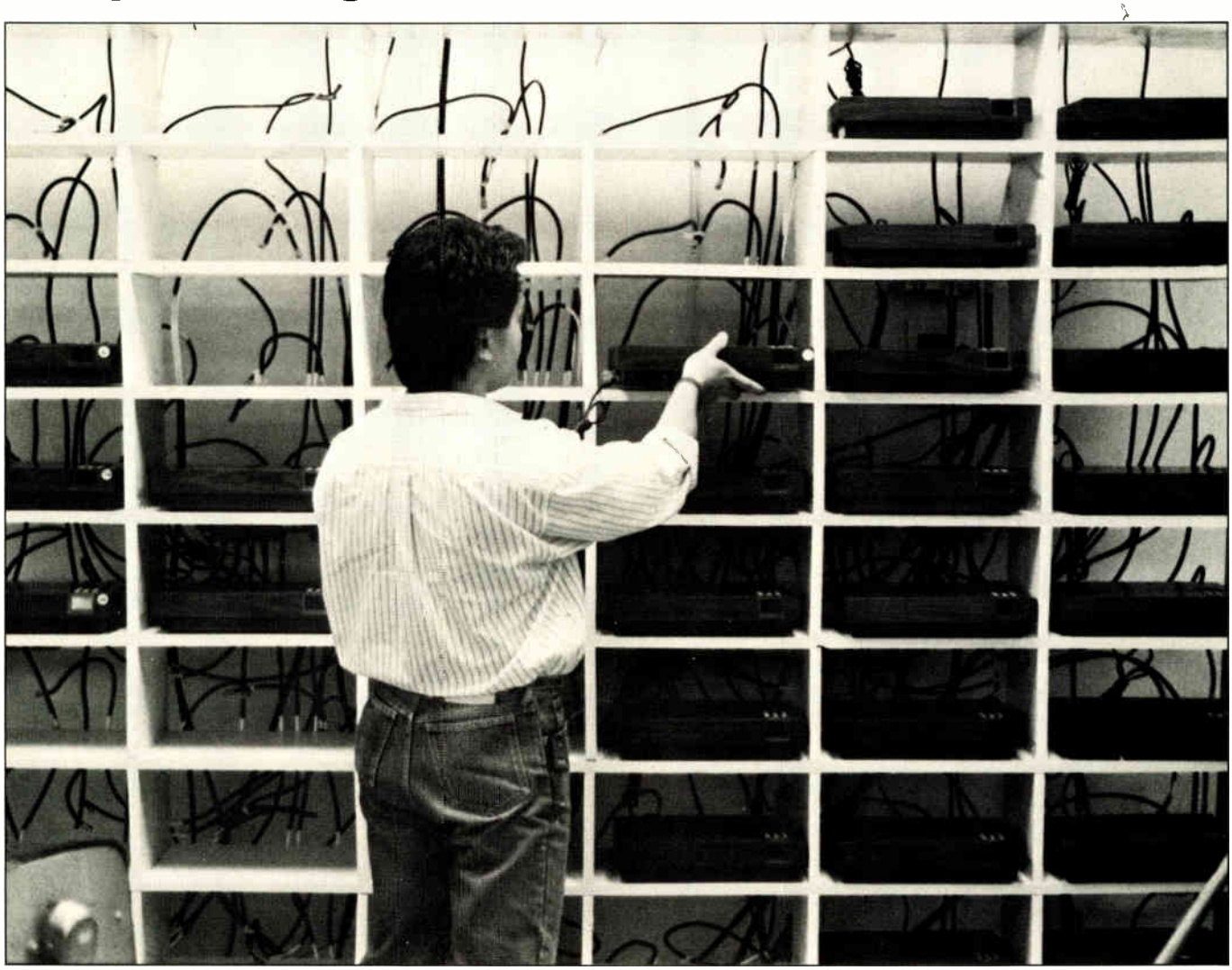
Reader Service Number 73

Converter repair: getting them back on line



Zenith Z-TAC converters repaired by EF Industries undergo thorough environmental "burn-in."

Cable converter boxes are one of the least expensive, most abused, and most often faulted portion of the revenue producing hardware in a cable system. And getting them repaired and back in service is a top priority for most MSOs.

"Basically, cable converters are probably the least expensive of any cable operator's equipment. It is probably the least respected part of any system. And, it is subjected to the most undesireable conditions that exist. With the abuse and misuse by a subscriber, nevertheless the fickle finger is pointed to the box. And, that shouldn't always be the case. A revenue producing box is very important to a cable operator. The longer it is out of service, the greater amount of loss the cable operator encures," says Bob Kohler, plant manager for the Zenith converter repair facility in Chihuahua City, Mexico.

By George Sell, Contributing Editor

However, converter repair turnaround time, costs and quality of service is often less than optimum. While the manufacturers' repair facilities, if they operate them, give the highest consistant quality of service, they often have the longest turnaround time. Most independent service centers offer quality service and the quicker turnaround time, but some offer little more than cosmetic repair. In terms of costs, most operators walk a fine line between having converters repaired and tossing them out in favor of brand new replacements.

Outside vs. in-house repair

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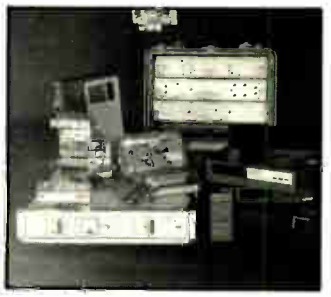

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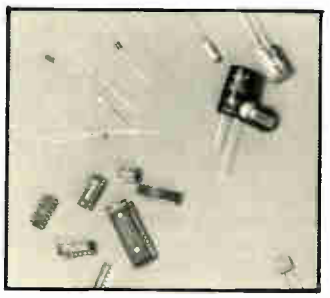

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has operated it's own repair facility in Syracuse. According to Mandel Robinson, who heads up the facility, "It all depends on what you are going to get out of it. Our turnaround time is much faster than any of the outside sources. The markup on repair is not there with an in-house operation."

Pride of workmanship is another factor. "When a person is working on a box, he understands that that could actually be coming to his home. These people live and work in our system and they take a lot of pride in what they do," Robinson adds.

The cost of repair varies but cosmetics has the highest markup. "The internals are not that hard and that's usually covered in the base price," says Robinson. "but when people start adding on cosmetic costs, it's quite expensive. Many times you're just better off just scrapping that box and getting another one."

At Jones Intercable's Albuquerque system, Keith Mercer manages a small three-person repair shop that handles more than 400 units per week, but does little more than improve cosmetics and perform some part changeout. "We clean them and check them out to make sure they are serviceable. (If there are) any major repairs, we send them out to local shops."

Mercer avoids sending converters to the manufacturers unless they are still under factory warranty, because of turnaround time. "In the past, it's been anywhere from 30 to 60 days turnaround time. With the independents, we get them in four or five days."

In and out of warranty

Converter manufacturers offer extensive factory warranties on new units, some as much as five years as in the case of Panasonic's TZ-PC 140/170 series. During the duration of the warranty, factory service centers will refurbish converters and complete engineering updates as specified by the manufacturer. When out of warranty, the factory service centers will charge a variety of fees for repair. "When it's out of warranty, we go on the premise of $35 an hour, and most repairs will only take one hour," advises Chris Groeschke at Panasonic's repair facility. "If the parts go bad, for example, if the MPU goes bad in the main brain of the converter, it's automatically, forget it, $50, and the box only costs $70. Judgmental decisions like that need to take place between the customer and the factory service or whoever," he says.

"When we find something, it averages around $25" to fix it, says Larry Neblett, the head of Tocom's Matamoros, Mexico service center. If no repairs are required, "There's a 'no problem found' charge, which can be $12.50." But, even if nothing is found, they still treat the unit as though there were something wrong. It goes through all the same testing and processing that a faulty unit does.

Magnavox, which stopped manufacturing converters two years ago, still operates a repair facility to meet its obligations to support their products. "Normally, there is a flat fee not to exceed 50 percent of unit cost, if it's a repair that has to take in a lot of parts and components, etc. The flat fee is normally $15," reports Vince Raisa of Magnavox.

Turnaround time is down time

The most often-heard complaint from MSOs concerning factory repairs is turnaround time. For some it can take over a month, while independent shops count their turnaround time in days.

"Normally, it runs around 30 days," advises Jerrold's Mike Kraus. "This time of the year it starts getting a little longer, between 30 and 45 days. The goal is to get down to two weeks at some time." At Zenith it's 25 to 35 days wait to get your converter back.

Neblett with Tocom says, "Depending on the model and type of product, some (turnaround times are quoted) well under 30 days, and others it's right at 30 days." Magnavox reports that it performs repairs "within two weeks."

Clearly, even those turnaround times are less than ideal for a lot of MSOs. The manufacturers all say they'd like to improve the situation.

Panasonic's Groeschke suggests, "We like to say ideally the turnaround time should be between 10 and 15 working days. We are pretty close." But Groeschke complains, "There are some cable companies that have our converters and horde them until they are ready for repair, so they can get this free train full. And, by that time it just throws (our schedule) down the toilet. But we manage to be able to work with that and figure out what we can do."

A sampling of independent repair facilities indicates quicker turnaround time. Phil Bychowski, vice president of engineering and quality control at E.F. Industries, an established computer repair facility with locations in Hawthorne, Calif. and Lawrence, Mass., but a newcomer to cable converter repair, reports, "We routinely offer on all of our products 30 days turnaround, but as supplied routinely, five-day turnarounds, even one-day turnarounds. We are used to supplying an industry that requires service. I think we can do the same thing in this industry (cable). We have different arrangements set up with each customer. Some of them, we just supply what they need. They say, 'I'll send you 200,000 boxes a year, just send me back 200 a week.' It really depends."

According to Robert Price, senior vice president with BradPTS, the largest of the independents with 14 locations, they offer a one- to three-week

Technicians at EF Industries depot repair Z-TAC converters from cable companies.

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The S1450R-VCII, C/Ku Switchable Satellite Receiver integrates a unique modular VideoCipher (t.m.) descrambling module that eliminates up to 7" of rack space. Switchable to either C or Ku band, the S1450R accepts signals from 950 to 1450 MHz. Jerrold's S1450R offers the premium performance required for large cable TV systems while offering affordability for small systems.

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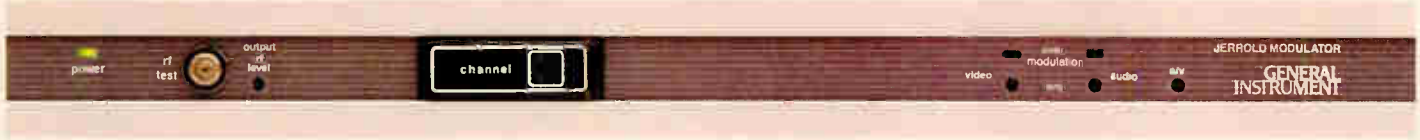

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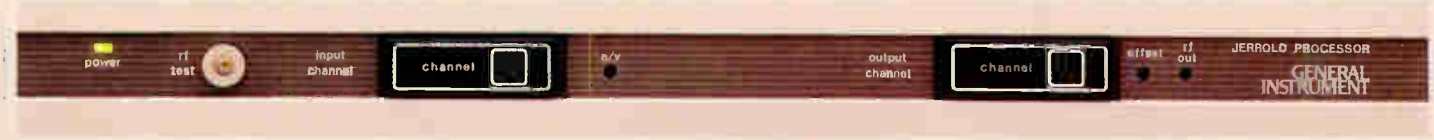

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turnaround time for converter repair. BradPTS processes approximately 65,000 units per month.

Cable Link, with one location in Columbus, Ohio, processes 25,000 units per month with 20 percent needing actual repair. According to Bill Holehouse, vice president of sales, "Generally, we try to average between a two-and four-week turnaround time."

At E.F. Industries, repairs are done by separate catagories beyond basic servicing such as replacement of minor parts, re-alignment of crystal-controls and burn-in. They will also repair, for additional fees, IF subassemblies, power supplies, decoder subassemblies, modulator subassemblies, tuner control assemblies and the tuners themselves.

Reverse engineering

E.F. Industries also employs "reverse engineering" when necessary to perform a repair. Circuit boards are repaired and upgraded, rather than merely replaced. This reduces costs and eliminates the need to find a source for the boards, according to Bychowski.

Price of BradPTS says, "We repair down to the component level. We are not parts changers. We actually go down to identifying a component in a particular part and repair parts."

The same holds for Cable Link. "We do component-level repair," Holehouse says. "For instance, an RF module may need repair, but we won't just swap out the RF. We will go in and actually repair the RF."

Factory service centers usually conform to the same level of repair. Kohler at Zenith advises, "Normally, what we do is, if we have a suspected module, we will take it out and test it on an automatic in-circuit tester and take it down to the component level."

Jerrold's Krause says, "We troubleshoot down to the component level, in most cases. Sometimes we change out a subassembly, but normally we go to the component level."

At Panasonic, repair is done at the component level for economic reasons. "In a converter, there's basically only two or three boards. So, for us to go board level, it's the cost of the unit," says Groeschke, "keeping in mind that the unit, if repair costs exceed 50 percent, once it's in and out of warranty, we just tell the customer it's just uneconomical to repair."

Documentation and schematics

A complaint often expressed by independent service centers is that some manufacturers withhold information necessary for doing repairs, such as manuals and schematics. Says Bychowski at E.F. Industries, "The converter/descrambler manufacturers are unwilling to share the documentation needed by third-party service companies, so they have almost a monopoly position."

While Bychowski's experience may be partly explained as a result of being new to the cable industry, having been at it less than two years, proprietary information is rarely dispensed even to a manufacturer's own facility. Panasonic's Kraus states, "Information in itself has always been limited, even for us." Is that because of the piracy question? "That's part of it," he says.

Holehouse at Cable Link recommends working with the manufacturer to overcome the confidentiality stumbling block. "For instance, Jerrold or

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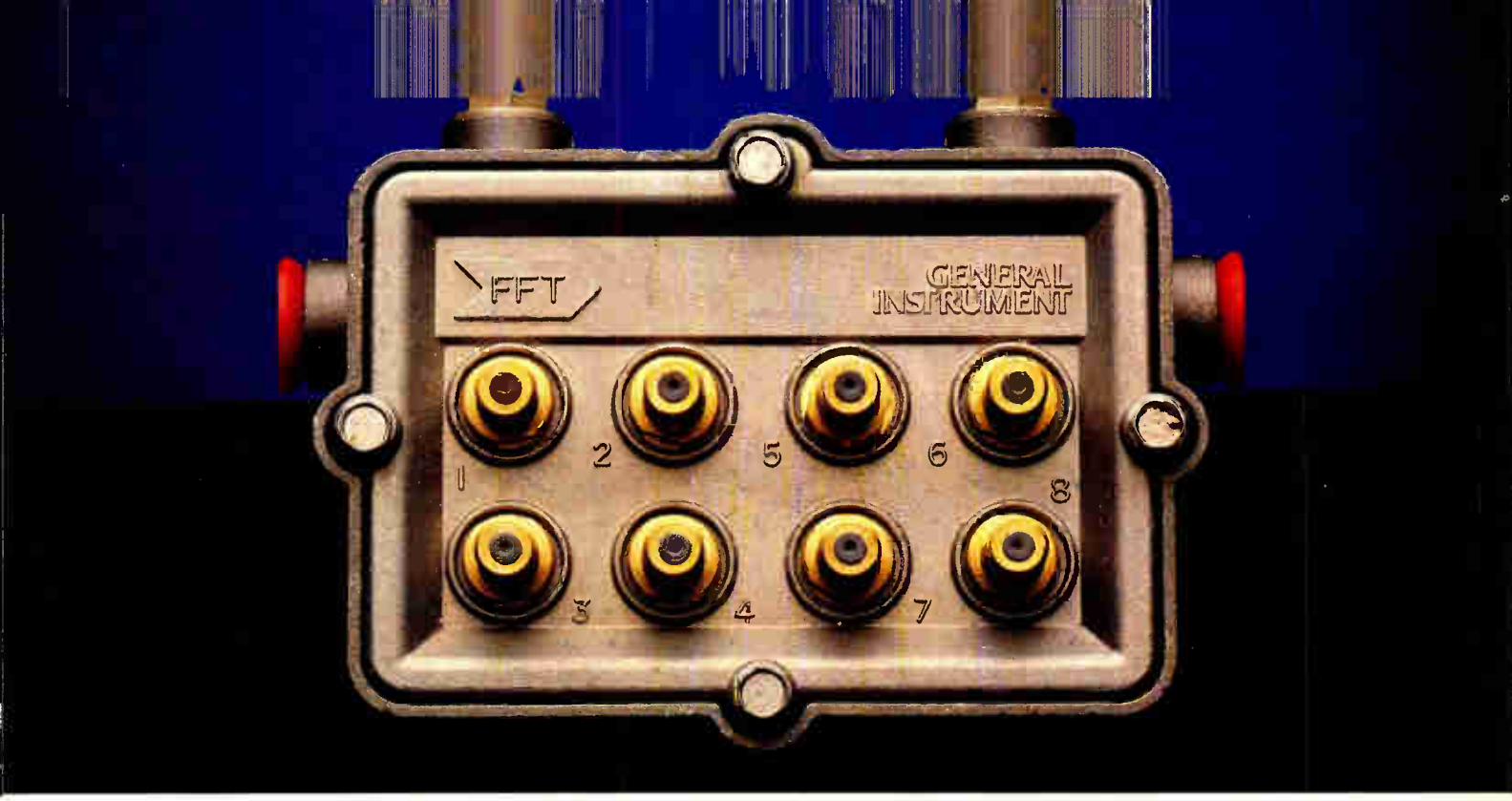

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For almost 15 years, Jerrold's FFT line of taps has been the standard by which all other taps are measured. With the introduction of the new "J" series of taps with brass ports, the standards just got tougher.

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So why settle for less? For more information on Jerrold's new line of brass port taps, get in touch with your Jerrold Account Representative or contact Jerrold Division, General Instrument Corporation, 2200 Byberry Road, Hatboro, PA 19040, (215) 674-4800.

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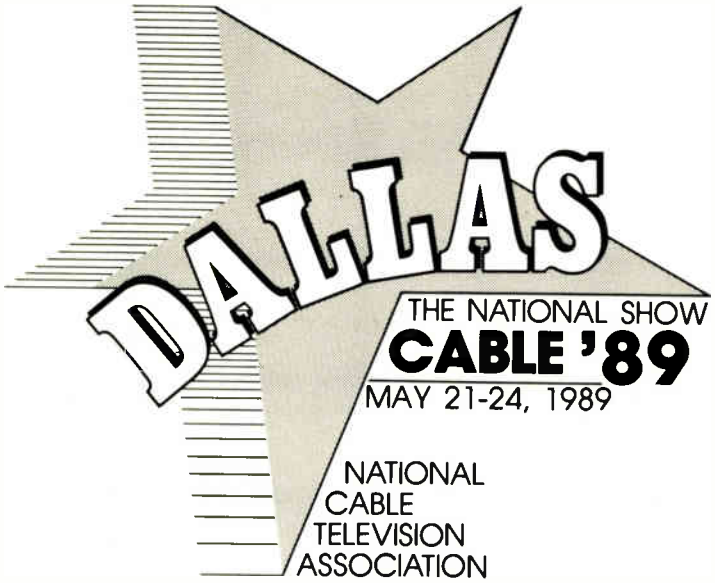


CALL FOR TECHNICAL PAPERS

Synopses for planned papers due by

JANUARY 16th 1989

NCTA invites readers to submit one-page synopses of planned technical papers—on any communications engineering topic of interest to the cable television industry—for consideration by the Cable '89 technical paper selection subcommittee. Forty to fifty paper ideas will be selected in late January for placement in ten technical sessions. Judges look for reference value and originality (although updated works are acceptable) in papers that solve engineering problems through new designs or improved operations. **Product pitches are not acceptable and will not be judged.**

To qualify for the paper jurying and consideration as a technical session speaker, send a one-page synopsis of your paper/speech idea to:

Katherine Rutkowski
Director, Technical Services
National Cable Television Association
1724 Massachusetts Ave., NW
Telecopier: 202/775-3675
or 202/775-3604
Telephone: 202/775-3637

With your synopsis include a draft paper title, complete name, job title, work address, and telephone number for the primary author and any co-authors. Provide the judges with enough specifics about the planned (never before published) paper to show its reference value.

S-A will say, 'Look, give us (a letter from your customer) on their letterhead saying you are doing their repair and we will release the information to you." Holehouse feels it is better to have the manufacturers know what they are doing so everything remains above board. But even that won't get the manufacturer to release all the information. "When it comes to proprietary information, that has never been released to us," says Holehouse.

While Tocom states it never release schematics to outside repair house, others will. Raisa at Magnavox recommends repair houses look for documentation they can buy. "They can purchase manuals that most manufacturers produce with their products which have parts lists, schematics and theory of operation."

Frank Pappas, senior field operations engineer with Zenith, claims, "There really shouldn't be any problem with documentation. The independent operations, there are certain numbers that have gone through Zenith and have signed a non-disclosure agreement, that they will not make any of this information available to anyone other than people within their company. Those individuals are able to go through our company and obtain as much documentation as we have available. We make schematics available to them. There is a training program for how to repair decoders and what updates are required in order to bring them up to our present standards."

In all cases with Zenith, however, the non-disclosure agreement must be inked between the parties involved.

Factory authorized

Panasonic, Jerrold, Oak and other manufacturers offer independent repair houses the opportunity to obtain special status for doing warranty repairs on converters.

For Panasonic, an independent must write to the person in charge of the specific region where they are located. They must meet stringent criteria, says Groeschke. "First of all, we have to make sure they are reputable, somebody we would like representing us. We also need to know that they have certain insurance information and that they are bonded to a certain degree," he says.

Jerrold changed from offering repair houses a "factory authorized service center" status to a "factory qualified service center" status about two years ago. According to Kraus, "We have some that are qualified to do warranty work when we ask them to do it for an individual cable system or a special project." But this status is conferred only when work is farmed out by the factory.

"It's a matter of time and confidence in performance as much as anything else," says Price at BradPTS. "It's not the type of thing where you open your door one day and the next day you approach a manufacturer and say, 'I would like to do your equipment under warranty.' They have to know that you have a proven track record and that you are respected and approved by MSOs in the industry. They have to know that the quality is going to be there and, so, it's a rather complex situation in terms of getting approved."

BradPTS should know. They are an Oak Factory Authorized Service Center and a Jerrold Factory Qualified Service Center in all 14 locations. ■

Broadband MAP and the Enterprise Network Event '88

In recent months, those connected with the U.S. manufacturing industries have probably heard the buzzwords "broadband" and "MAP," and may have wondered what they really mean. Those involved in communication networks have been hearing these terms for several years now. Actually, broadband has been with us since the mid-'50s, albeit not in its present form, and is well known for its capabilities. But the real discussion has been centering around the Manufacturers Automated Protocol (MAP), which represents General Motors' (and others) answer to competitive, global manufacturing techniques, or standard connectivity between non-standard devices on an enterprisewide basis. I was involved in the most recent MAP showcase: Enterprise '88 International, and would like to share some background on this subject and the current state-of-the art.

Demonstration of technology

The Enterprise Network Event '88, held in June of this year, represented a demonstration of the MAP 3.0 environment in action. Technically speaking, it consisted of a IEEE, 802.4 10-mb (megabyte) broadband network, a 802.3 10-mb CSMA/CD network, and several 802.4 5-mb carrierband segments. The goal of Enterprise was to illustrate the reality of utilizing MAP/TOP, based on the Open Systems International (OSI) model, to integrate every aspect of today's enterprise—from order entry, to design and machining, to assembly and corporate information management. This is actually quite a task, considering the many non-standard network protocols and devices used in industry today.

The significance of the Enterprise event might be placed in context if some of the history of MAP development is understood. The following briefly outlines the events leading up to this unique exhibition.

The need for standard protocol technology was apparent as early as 1978, when the General Motors Broadband Users Group produced the Broadband Specification Manual. The manual contained concepts of broadband networking and expressed a need for uniform specifications. This was the first writing that referred to a need for network protocol, and sparked General Motors' interest in developing such a protocol.

By Daniel L. Carnicom, Clover Electronics, Inc.

Discussions continued

During the next two years, discussions regarding broadband and its various aspects continued; it wasn't until 1980, however, that the concept of a universal protocol received an official handle. A seminar participant stood up at a seminar at the GM Training Center and announced that what the Users Group really needed was a "Manufacturing Automation Protocol;" thus, the MAP term was coined. Knowing what to call the standard, however, was a far cry from determining the parameters that would define such a standard.

At first many people within the industry were skeptical about ever implementing communication standards on an enterprise-wide basis. In fact, although they believed the concept had merit, initially many computer manufacturers would not even support the concept. Eventually, however, the initiative gained momentum with a general push toward communication standards by various industry groups, such as the Automotive Industry Action Group (AIAG). The AIAG's membership is comprised of the leading companies in automotive manufacturing, and was originally formed to combat offshore threats to the US competitive edge in manufacturing, particularly in the automotive market. This generally cooperative environment added greatly to the move toward communications standards.

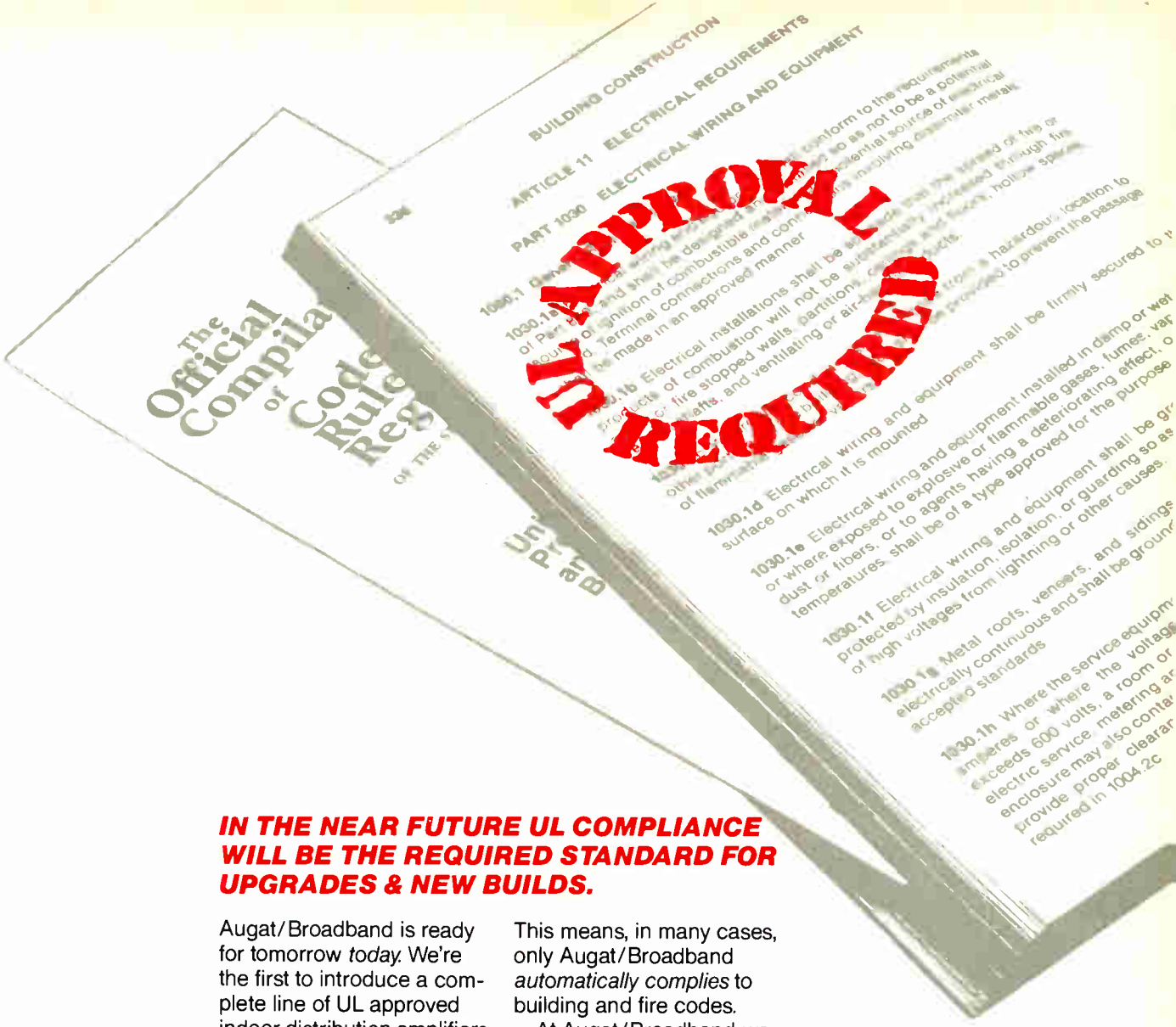
In the fall of 1980, the Users Group formed a committee to investigate MAP's possibilities. By 1981 the first document for MAP was introduced. This report initiated GM's political support, and moved MAP from low key exposure to a topic of high visibility.

In 1982, MAP moved into the international and multi-user scene, and it was from here that GM finally decided to test the MAP hypothesis in a facility. Beginning in 1983, plans for the MAP Lab began and several decisions were made; for example the location for the testing, the network media specifications, MAP compatible products, and a dependable company to design and install the network system.

The first two objectives to be met were network media positioning and location. The testing would be held at the GM Technical Center in Warren, Mich. in the newly created MAP Lab; the network media used would be broadband because of its noise immunity level, and its ability to host a variety of communicatioin applications. Due to the scope of the project, General Motors knew it had to choose a company with extensive broadband experience. Clover Electronics, experienced in broadband integration since the 1970s and a leader in networking solutions, was chosen to design and install the first MAP Lab. The only decision left was which MAP-compatible products to test, and because Concord had the only products available which met MAP specifications, Concord became the prime project hardware vendor.

Standard emerging

Since those early days of being a virtually unknown and unaccepted idea, MAP is emerging as the standard manufacturing networking protocol. Having witnessed growth through such industrial shows as the National Computer Conference of '84 (NCC '84) and AutoFact '85 networking systems, MAP is once again on the move. Enterprise '88 International represented the first time that major names in the computer industry have been linked together by MAP/TOP/OSI standards. While this should say lot about the future of MAP 3.0, only time will tell. I feel that MAP has arrived, with the emergence of OSI standards and the industry interest shown at the Enterprise show. And I am proud to say that Clover has continued to be a part of the MAP movement, by designing, installing



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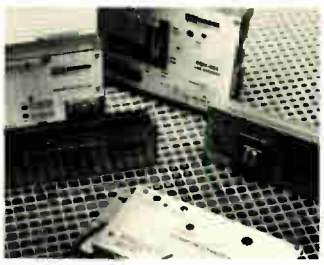

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Reader Service Number 40

and certifying the Enterprise Networking System, among other large networks engineered by our firm.

Of course, the network proved to be a technical success, and I would like to share some of the effort that went into accomplishing this. The real idea behind Enterprise was the exhibit of enterprise-wide communications, which represented the recent industry-wide push for interoperable information systems. This meant that the MAP/TOP/OSI environment became more than a concept—it became a reality.

For Clover, however, the effort really started many months earlier during the design phases of the project and ran right on through to network certification. In the early months of planning, the coordination of many agencies and companies had to be worked out. Because the real issue of standards for the MAP topology was at hand, cooperation between possible competitors was necessary. Each participant in this process deserves credit for his cooperation and the open exchange of technical information that followed. On the Clover side, Leonard Kruszewski (Clover general manager) was instrumental in Enterprise project management and the network's success.

Design team formed

A network design team was formed consisting primarily of individuals from Clover, General Motors, Belden Wire and Cable, and the Society of Manufacturing Engineers (SME). This team actually made the network planning and installation happen. The IEEE 802.4 network involved anywhere from 15 to 23 network interface devices (NID) to be active at any given time, while the IEEE 802.3 subnetwork supported upward of 75 NID's.

From the installation standpoint, all the planning came together just four days before Enterprise opened its doors. Thirty-two hours after the Clover installation crew started construction, the IEEE 802.4 MAP and 802.3 TOP networks were in operation.

Once the main network was operational, many vendors received help from Clover technical and engineering teams to bring their subnetworks up to operational levels. The Clover staffs were on duty 14 to 18 hours daily to oversee the basic network, including two-way video and telephone applications. Video programming was available on nine channels to and from each of the sponsored booths. Clover also provided support of telephone communications via broadband to outside central office lines.

Both show sponsors and participating vendors alike offered many MAP products. Concord supported the majority of the network with 802.4 communication devices; Concord Series 4200 bridges provided the necessary connectivity between the broadband backbone and various carrierband subnetworks. MiCom/Interian's LAN Detector 802.3 Packet Monitor with diagnostic and monitoring capabilities also proved to be very useful.

Video connectivity was provided by General Instrument's new line of frequency agile modulators. New MAP/TOP specification RG6 and RG11 coaxial cables were introduced at the show by Belden Wire and Cable, and utilized in the Enterprise network.

The Baltimore Enterprise network proved that technically it is possible; the real test for MAP is whether U.S. industry will embrace the technology. As we look at the wide range of applications, and the flexibility of both MAP 3.0 and broadband, we see a bright future for MAP and TOP. ■


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Reader Service Number 42

C-COR displays broadband LAN control system

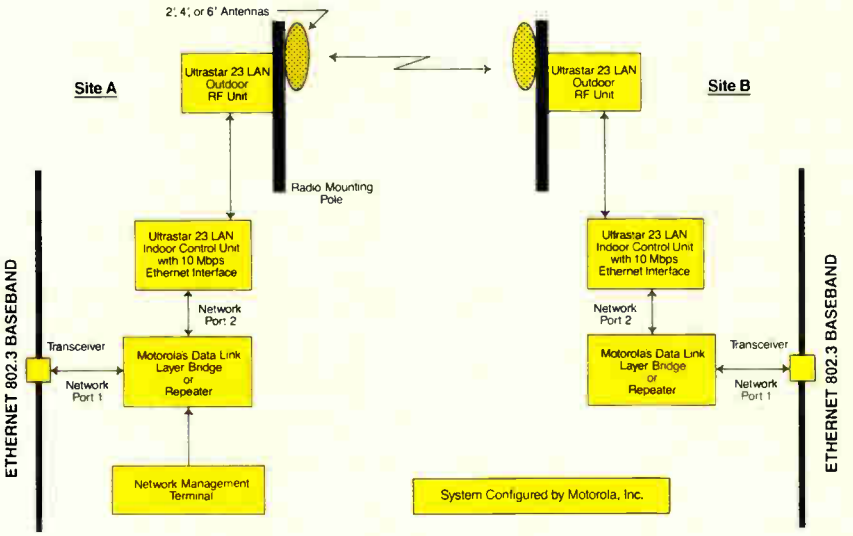
C-COR Electronics has introduced a new broadband LAN camera control system at the Autofact '88 trade show in Chicago. The Local Area Network Camera Control System (LANCC) can view and control up to 225 video cameras over the broadband MAP system. The system is designed to maximize the cameras' pan, tilt, zoom and focus capabilities in a variety of situations, including: area surveillance, automation surveillance, manufacturing process monitoring, hazardous area monitoring, highway traffic monitoring and access control of institutions and hazardous materials areas.

The unit consists of three basic components: the Quickview software, LANCC Pod and Master Modem. Through the keyboard and/or mouse, the operator can select areas to be viewed or controlled via software menus. The commands are then relayed to the LANCC Pod, stationed at each camera location, and the selected areas are displayed on video monitors.

The LANCC will be available the first quarter of 1989. For more information call C-COR, (814) 238-2461.

Halley Systems of San Jose has announced the addition of a new broadband modem, the Z2000, a the latest member of the "Z" family of products. The new units are designed for applica-

Sample microwave system design



tions requiring high-speed, point-to-point transmission, including PBX-to-PBX and CAD/CAM workstation-to-mainframe links. They can also be used to link Halley's ConnectLAN Brouters for high-speed, transparent LAN-to-LAN communications. In addition they can be connected to wide-area network T-1 facilities to extend links over facilitywide broadband backbone networks.

The Z2000 is ready for immediate delivery and is priced at $3,950. Call Halley Systems, (408) 432-2600.

Halley has also recently introduced new members to the ConnectLAN remote Ethernet Brouter (smart routing bridge) product line. The new ConnectLAN 100 Brouters combine a wide range of advanced routing functions with the performance and protocol independence of network bridges, providing more cost effective LAN-to-LAN internetworking under the remote control of a network management system.

The ConnectLAN Brouter Control System is available immediately for use with previously available ConnectLAN brouters. The ConnectLAN 100 Brouters will be available in the first quarter of 1989.

Alantec recently announced a new higher performance version of its MAC Layer bridge. The SMARTbridge 2000 allows extended transmission of Ethernet LAN protocols beyond the traditional 2.5 kilometer distance.

The new bridge also features router pass-through capability. By implementing the UDP/IP subset fo the TCP/IP protocol the bridge control commands and responses can "pass-through" routers.

In addition, the unit features an enhanced graphic display output of network statistics and selective filtering to manage data by packet type, source address, destination address, packet length and broadcast packets.

The company also recently introduced a fault-tolerant Ethernet LAN (FTEL). It consists of a dual-port, Ethernet adapter card running fault-tolerant driver software mounted in a PC/AT-compatible computer. It provides redundant Ethernet connectivity for personal computers in the event of a transceiver or cable fault.

For additional information, call Alantec, (415) 770-1050.

Fibronics announced immediate delivery of its KNET communications software for Siemens, BS/3000, Hitachi VOS3 and Fujitsu F4 mainframe computers to run the TCP/IP protocol.

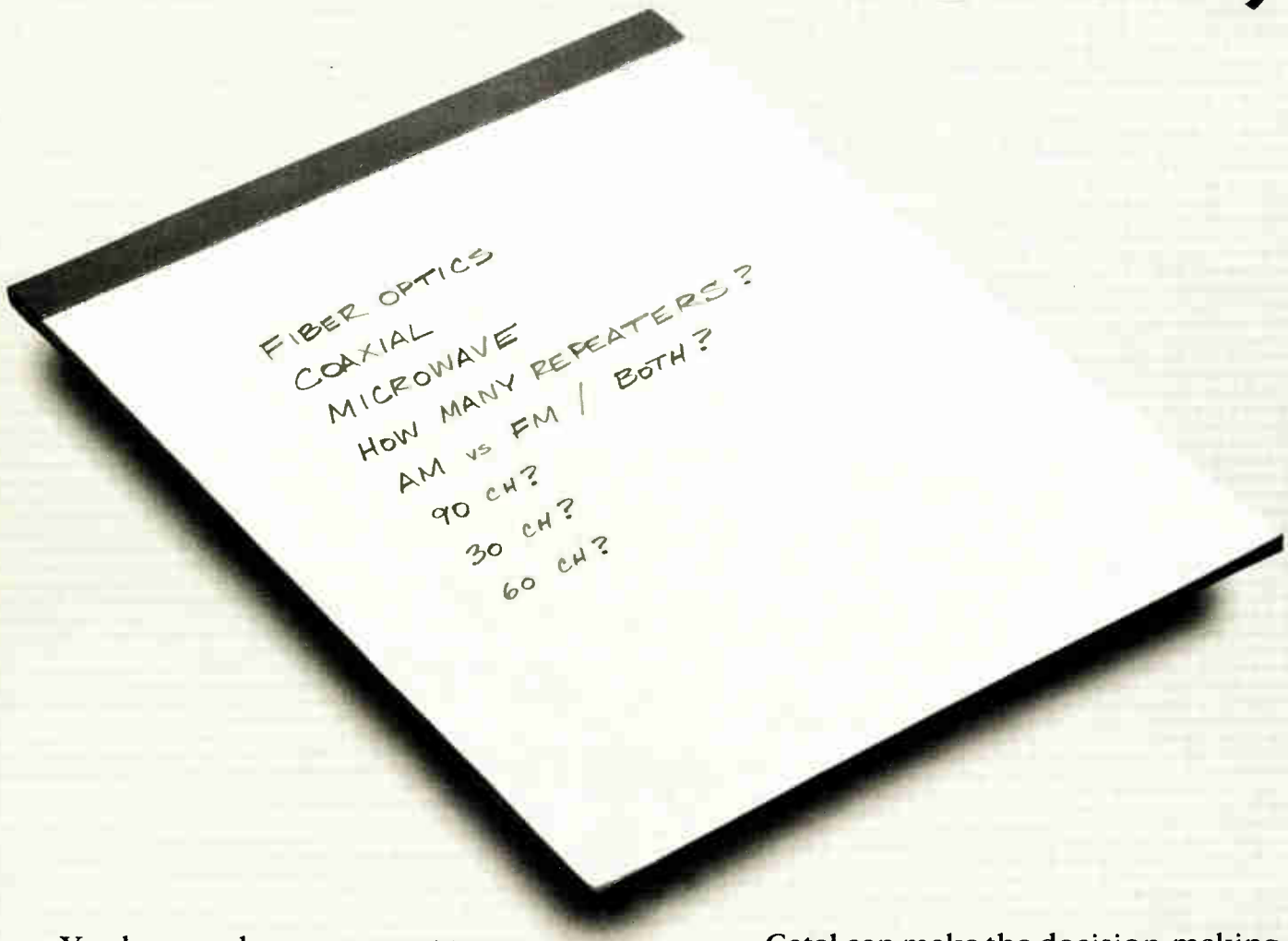
KNET uses standard TCP/IP protocols and permits the mainframe's resources to be utilized by a wider base of users. When used in conjunction with the company's communications controllers it allows access to the mainframe via Ethernet LANs, T-1 (1.54 Mbps) or M-1 (2.048 Mbps) circuits. Call (212) 889-1200 for information.

Motorola has a new microwave support commitment. What that means is the company will now manufacture and support all system components involved intransmitting Ethernet over microwave at 10 Mbps. The comapny's new Ultrastar 3 LAN microwave system includes a microwave radio, a buffered repeater and data link layer Ethernet bridge, to provide 10 Mbps extension of standard IEEE 802.3 Ethernet network transmissions to users in worldwide markets with multi-LAN facilities.

The system will allow LANs located up to five miles apart to be supported in a single transmission without exceeding Ethernet propagation delay specifications. Repeaters can be installed to extend segments beyond the 5-mile range.

—Greg Packer

KNOWING WHERE YOU WANT TO GO,



You know where you want to go.

You want to stay competitive. And in the cable television industry, that means using the best, most cost-efficient technology. Maybe a new build is in order. Perhaps a system upgrade. Either way, you face a perplexing situation.

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At Catel, we realize that finding the answer isn't easy. There's a lot of talk and a great deal of confusion regarding CATV technologies—fiber optics, microwave, and coaxial.

Catel can make the decision-making process easier by examining your specific network requirements. Together, we can determine your cost, network distribution, and overall system objectives.

Then—and only then—can a particular technology be considered.

The Best Route

Oftentimes, the best route may consist of more than one technology. Eventually you'll realize that Catel's fiber optic technology has several distinct advantages over the others—superior quality, future expandability, and maximum channel capacity, to name a few.

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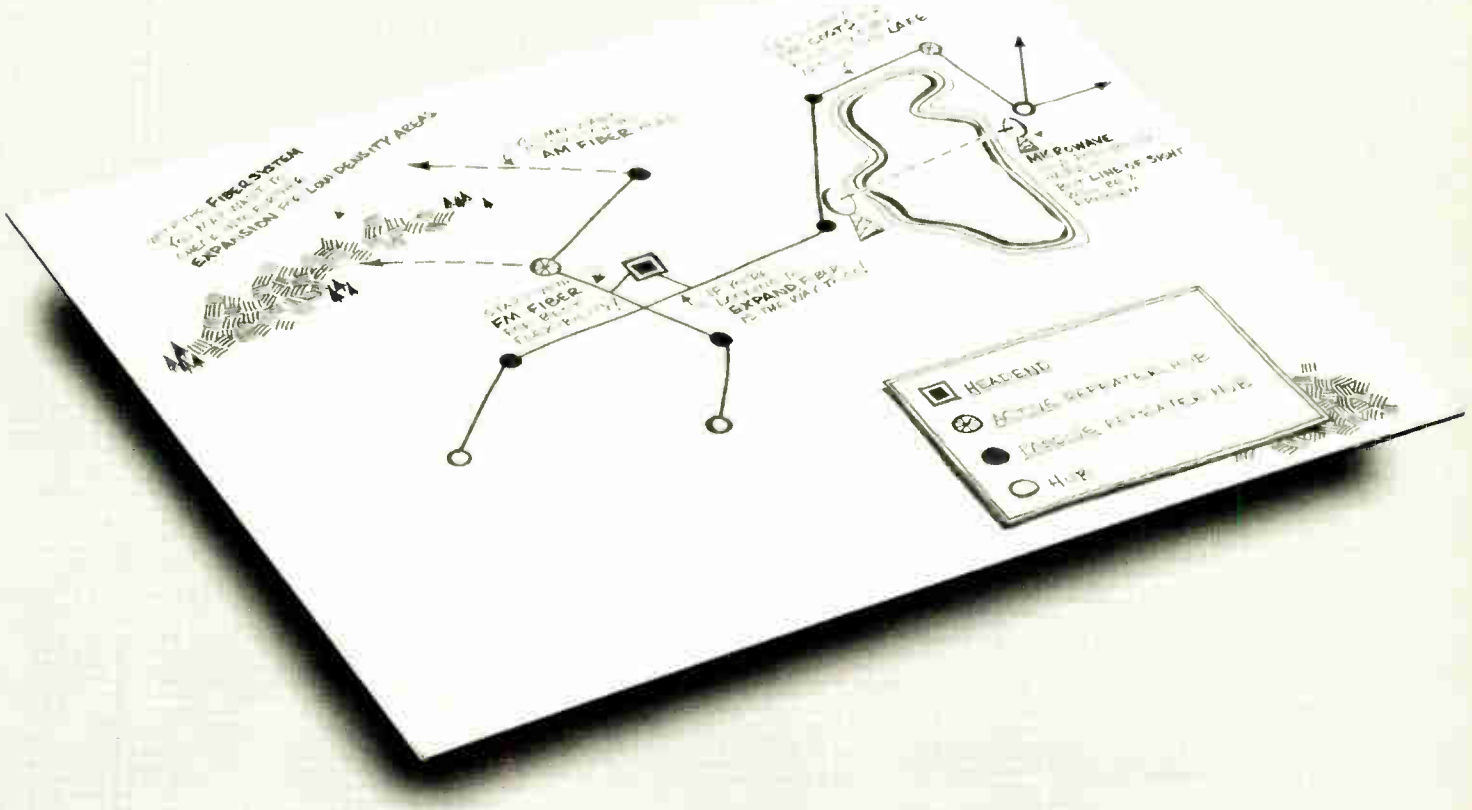

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Reader Service Number 45

Premium channel positive trapping and tiering

Glyn Bostick and Steve Shafer of Microwave Filter Co. discuss how and why to use positive traps.

Last month, negative pay-TV security was discussed. Video traps or tiering filters suppress the video of denied channels and the filter is mounted at an inaccessible point in the subscriber's drop—usually on the pole at the tap. The term "negative" is apt since the investment in traps is inverse to premium revenue.

The positive security system

Figure 1 illustrates the positive security system. At the headend, an RF generator injects a carrier at mid channel: 2.25 MHz above the video carrier (in a standard format channel). This scrambles the picture and the sound. The carrier is inserted at the headend combiner, so the picture is scrambled for all subscribers. For paid subscribers a decoding trap is installed at the TV set. The decoding trap is very similar to a negative trap, except that it is tuned to the scrambling carrier frequency and suppresses it to unscramble the picture and sound.

As for the negative system, the term "positive" has economic connotations: the operator's investment in traps is *proportional* to premium revenue.

The positive system was invented and patented by Test Inc. in approximately 1975 and several licensed manufacturers produce their own branded version.

Comparison of economics

In negative systems, at premium start-up, all but advanced paid subscribers are trapped. Hence, if entry penetration is, say 10 percent, then traps must be purchased and installed for 90 percent of subscribers. As penetration is increased, traps are removed from new customers.

In the positive system, only enough traps to service the premium paid subscribers are required and more are procured and installed as sales penetration increases.

The negative traps removed as pay penetration increases become surplus, to be used as replacements for failures or to be utilized in another system. Positive traps remain in service until the premium sub disconnects.

From the above, it is clear that use of the positive system is more economical for premium start-ups where initial penetration is expected to be low or is uncertain; whereas negative trapping is indicated if initial penetration is expected to be heavy. Negative and positive traps are about equal in cost, with positives being slightly more expensive. Therefore, if trap cost were the only expense, then the trade-off point would be about 50 percent penetration. However, the higher cost of installing negative traps probably favors using the positive system up to an initial penetration rate of about 67 percent.

Channel 8—no scrambling.

Channel 8 scrambled with a positive encoder.

Channel 8 unscrambled with a channel 8 positive decoding trap placed ahead of the set top converter. Note the graininess due to video loss from wide trap bandwidth.

Channel 8 unscrambled with channel 8 positive decoding trap. Pre-emphasis amplification reduces graininess.

Illustration of need for pre-emphasis amplification of high band channels due to spreading trap bandwidth. Tests conducted at a drop at Newchannels CATV systems, Syracuse, N.Y. (Many thanks to originating networks.)

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Having trouble finding the dependability you need in an "F" connector? LRC has the answer.

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Positive system advantages

Many MDUs (multiple dwelling units) are easier to service with the positive system. These include hotels, apartment complexes, condos, schools and other institutions. In many of these, the installation of negative traps often entails hallway security boxes or tracing and exposing the points where traps are to be installed. This work is avoided in the positive system, where the trap is installed on the subscriber's TV set.

> A change over to the positive system could counter theft of services and improve revenue.

Negative traps attenuate the sound carrier of the lower, adjacent channel. While the TV receiver AGC can compensate for this loss, this attenuation becomes progressively greater as we position the trap on higher frequency channels. At some point on the highest feasible channel, the AGC can no longer compensate and lower sound is lost. Since the positive trap notch frequency is at mid-channel, lower adjacent sound suffers less loss. Hence, as to lower adjacent sound loss, the positive system is usable at higher frequency.

Security certainty of the two systems is comparable, with the edge probably going to the positive system. While the negative tap is mounted in an inaccessible location—on the tap—its failure or removal results in lost revenue. Needless to say, the affected subscriber will probably not report absence of the trap. The inside location of the positive trap requires less labor and its failure will be promptly reported. The rationale for inside installation is that the subscriber has no incentive for tampering. However, some positive traps relocate with the subscriber, or can be given to a neighbor. For this reason, some users of the positive system mount the trap at the tap, as in the negative system. Standard manufacturing practice is to weatherproof both positive and negative traps to provide this option.

The positive system has some advantages in initiating a premium channel. Scrambling can be turned on immediately and late delivery of traps will not result in penalty charges from the provider and fewer trap installations are needed. In the negative system, traps must be in place at premium channel turn-on. A greater number of traps must usually be installed, against a fixed time deadline.

Other applications

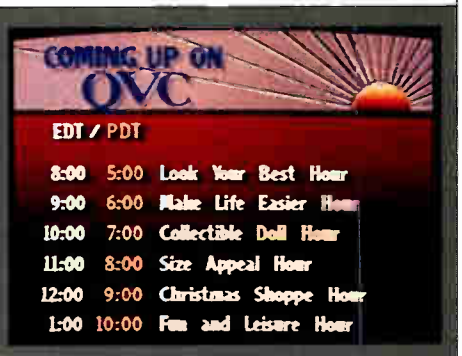
A change over to the positive system could counter theft of services and improve revenue. This is especially true if the existing negative system experiences low to moderate penetration and slow premium subscriber growth. This might indicate substantial unauthorized trap removal or failure over time. It does require advance positive trap installation at paid subscribers. Until turn-on, these traps will not interfere with the unscrambled picture.

The positive system can be used, in combination with an existing negative system, to facilitate MDU hook-ups. The negative trap is omitted at the MDU entry, the signal positive scrambled and positive traps selectively installed. This is especially applicable where a non-premium channel is objectionable to a substantial number of viewers and construction of the building and layout of the wiring makes negative trapping expensive.

The positive system facilitates promotion of the premium channel. With the encoder switched off the message can be seen by non-paid subs who would usually see a scrambled picture.

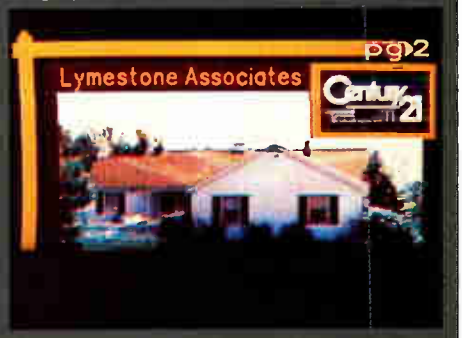
Hospitals may desire a dedicated training channel with restricted viewing. An appropriate channel is deleted

Channel 13 before scrambling (control picture).



Channel 13 scrambled with positive RF encoder and unscrambled with channel 4 (converter exit channel) positive decoding trap. Note the absence of graininess even without pre-emphasis amplification.

Channel 12 (control picture). Channel 13 scrambled with positive encoder but before installation of channel 4 decoding trap.



Channel 12 with channel 13 scrambled and with channel 4 decoding trap installed. Note that presence of decoding trap on converter exit channel has only slight effect on unscrambled channel 12.

Illustration of decoding with a low band positive trap installed between converter and TV set. Presence of decoding trap in exit channel (after converter) gives negligible degradation to unscrambled channels. Use of a sharper low band decoding traps results in better unscrambled video quality.

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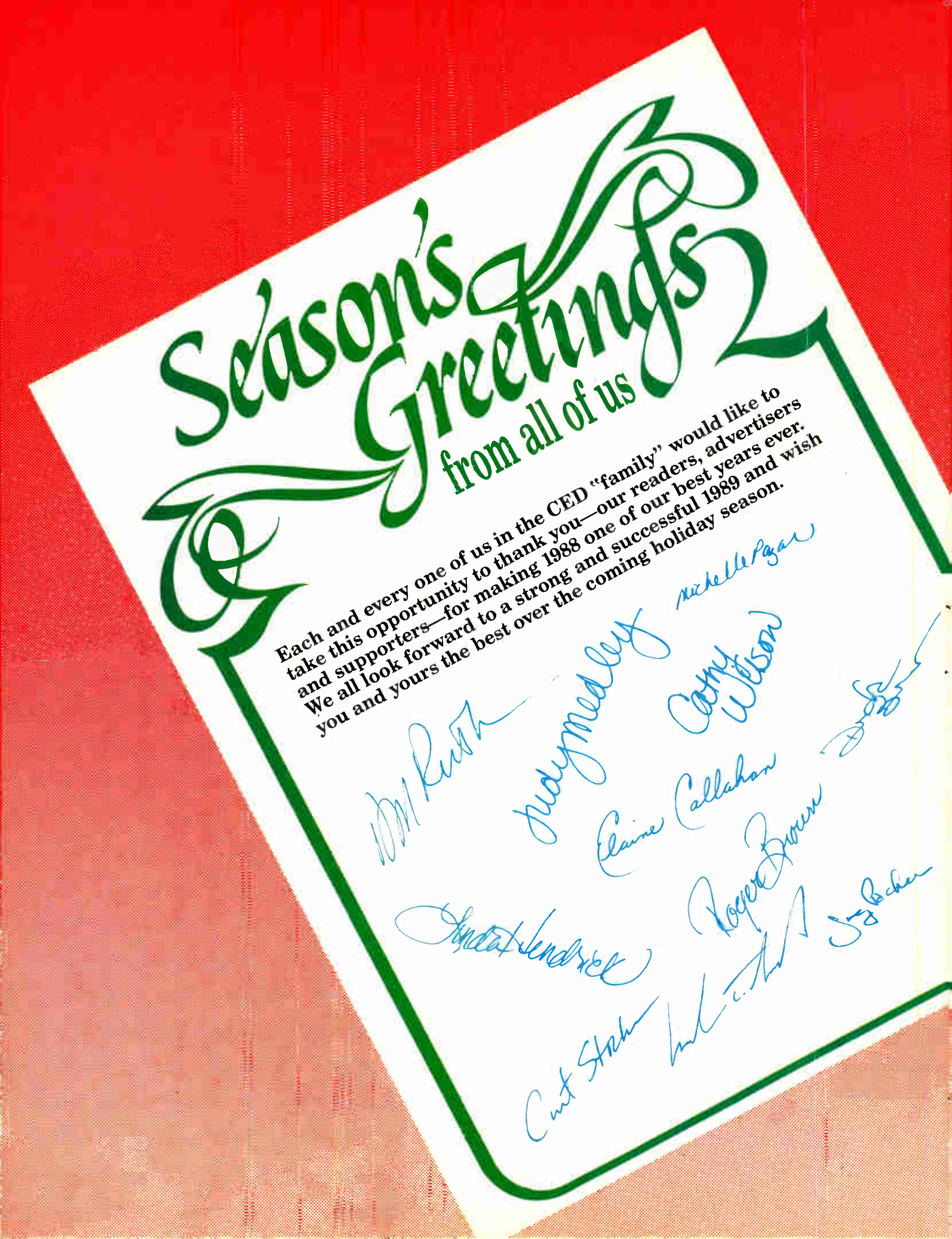
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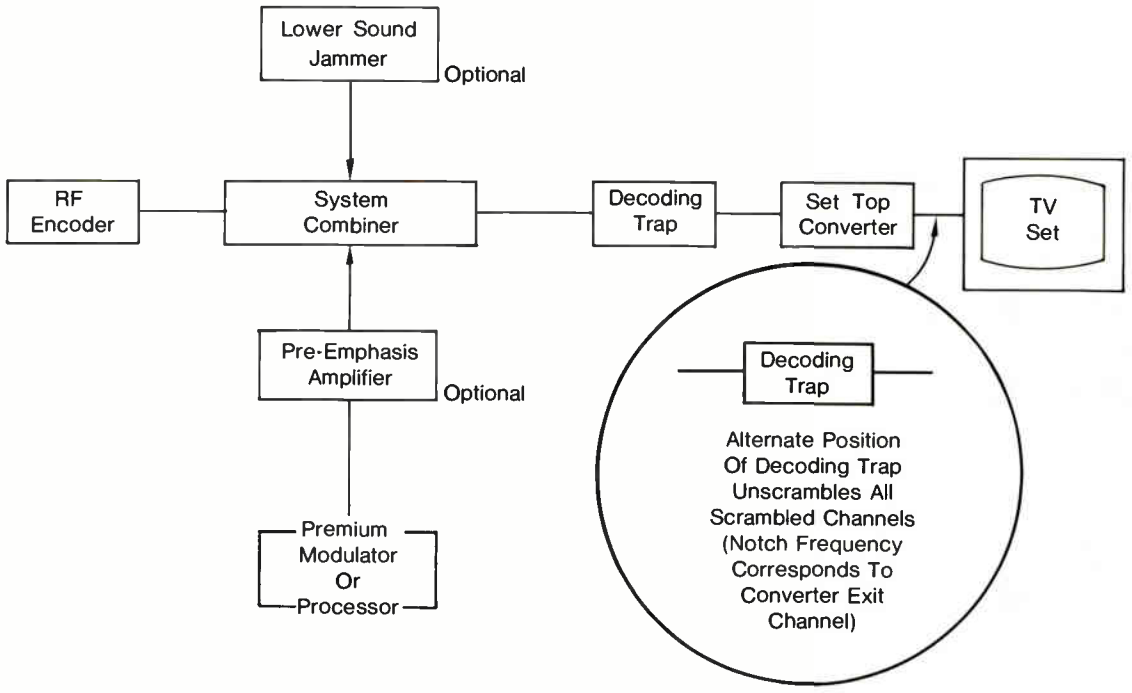
from all of us
Each and every one of us in the CED "family" would like to take this opportunity to thank you—our readers, advertisers and supporters—for making 1988 one of our best years ever. We all look forward to a strong and successful 1989 and wish you and yours the best over the coming holiday season.

Figure 1



Schematic Of Positive Scrambling System

decision to use it can be deferred until after the scrambling-descrambling trial. Need for pre-emphasis is indicated by graininess of the picture.

The lower sound security generator emits a jamming carrier at lower adjacent sound frequency to prevent subscribers with cable-ready sets from tuning the premium channel down to lower adjacent. It's use is indicated only if the lower adjacent is vacant and there are a significant number of cable-ready sets in the system. This unit connects directly to the combiner.

The decoding trap

This is installed at the subscriber's TV set. In systems using converters, it is installed before the converter. The notch is tuned to intercept and suppress the scrambling carrier (2.25 MHz above the video carrier in the case of standard channel format). Tiering can be accomplished by use of a different trap for each channel and screwing them together.

Ideally, the bandwidth of such a trap should be very narrow for minimum impact on the video carrier. In practice, the process is forgiving of bandwidth, which is usually about 4.5 MHz wide at low-band and progressively wider as channel frequency is increased.

Ideally, the bandwidth of such a trap should be very narrow for minimum impact on the video carrier. In practice, the process is forgiving of bandwidth.

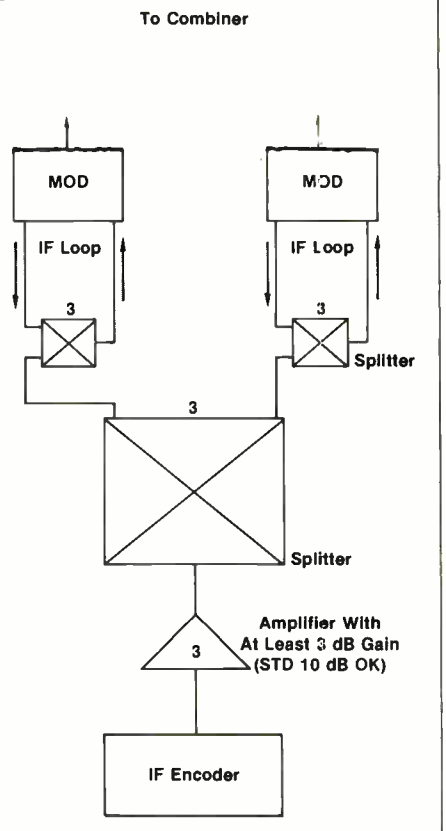
Encoders are available as standard items for all channels through at least 13, including models for midband channels. Some manufacturers can deliver them for superband as a custom product. Encoders for hyperband and UHF channels are not currently available on the market.

However, with standard IF encoders, scrambling is feasible for *any* channel, including UHF channels, provided the IF loop is available.

The decoding trap is the real limitation. Its bandwidth is somewhat proportional to trapping frequency. Above channel 13, descrambled picture quality suffers, even with the addition of a pre-emphasis amplifier.

This limitation can be overcome if one is willing to sacrifice tiering flexibility in order to utilize superband, hyperband and even UHF channels. The decoding trap is placed between the converter and the TV set. For example, if the converter exit channel is 3, then a channel 3 decoding trap is installed. In this position, it decodes all scrambled channels with little impact on the quality of unscrambled channels. ■

Next time we'll discuss suppression of terrestrial interference to CATV system TVROs.



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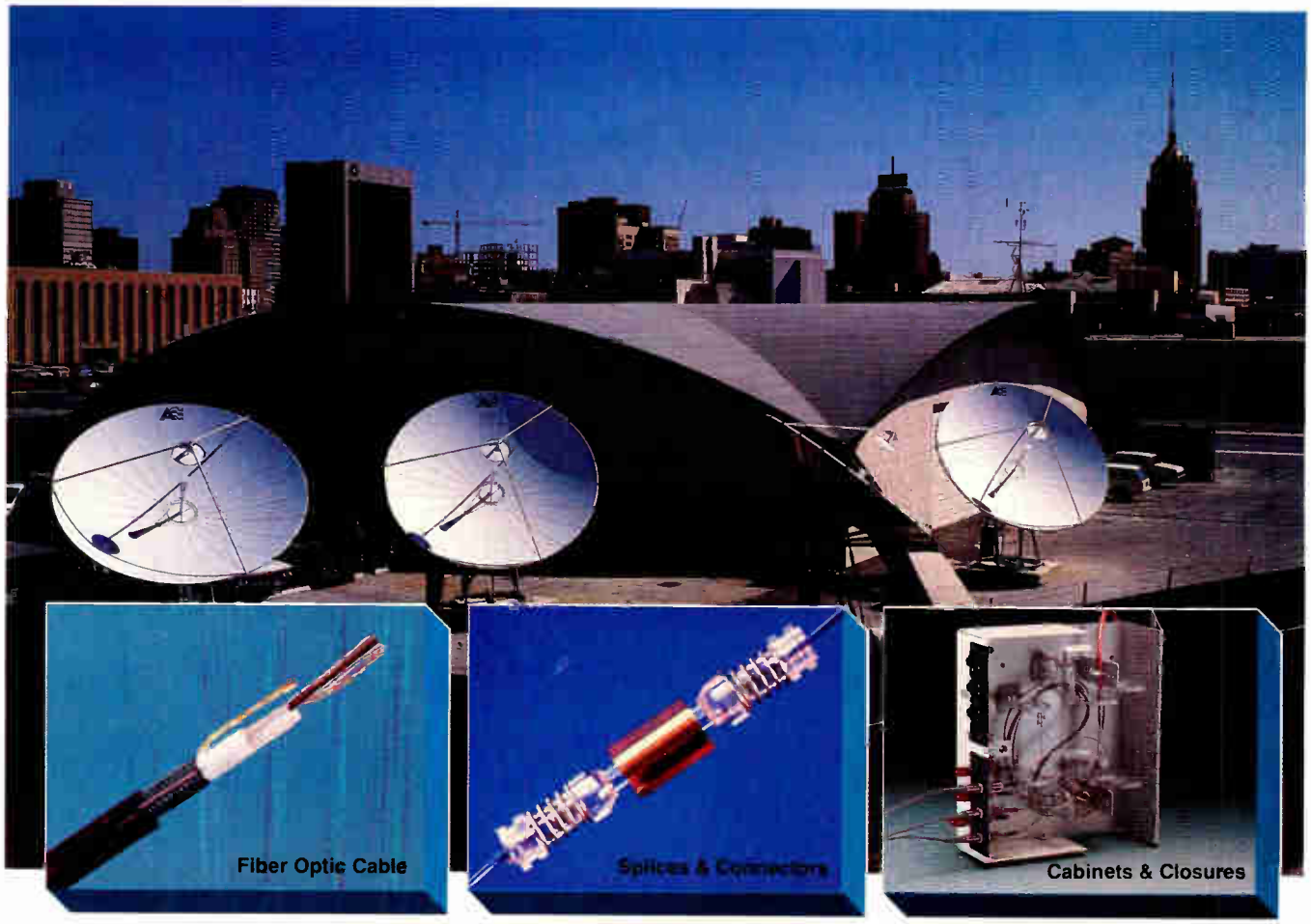

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Accuracy and the signal level meter

Signal Level Meter (SLM) "accuracy" is probably the single most inportant specification to the CATV technician/engineer. Unfortunately, it is also the most misunderstood specification on a meter's data sheet. Just what is "accuracy?" Or maybe the better question is, What are the factors that cause inaccuracies?

A working knowledge of these factors is important to the technician/engineer, because if he/she can't trust the SLM to read signal level with reasonable accuracy, then he can't be sure the CATV system is operating at its optimum potential. From a SLM manufacturer's point-of-view, there is a trade-off between meter accuracy and cost to produce the meter.

Most SLM manufacturers specify accuracy as "amplitude flatness" or "level accuracy." That's fine if you always measure signals at the same level and attenuator setting where the meter was calibrated, and only vary the frequency. But what about the accuracy at some other level and/or attenuator setting and/or frequency? To fully understand what it takes to produce an accurate SLM, let's look at those parameters that contribute to SLM inaccuracies.

What is inaccuracy? It's simply the difference between the signal level (or other measured parameter) present at the meter's input and the signal level indicated on the meter's display. This "difference" or "error" can be broken down into the following major factors (there are other, minor factors we will discuss later): Error vs. Signal Frequency ("flatness"), Error vs. Signal Level ("detector non-linearity"), Error vs. Attenuator Setting ("attenuator tracking"), and the change in these errors due to temperature.

A meter can be calibrated at a given level, frequency, attenuator setting and temperature so that its accuracy error is zero, but what happens when we change frequency, level, attenuator setting, temperature, or any combination of these factors? We can gain some insight into this problem by developing a simple model:

Total Error = ± (Actual Input Signal Level − Measured Input Signal Level) = ± Error vs. Signal Frequency (flatness) + Error vs. Signal Level (detector non-linearity) ± Error vs. Attenuator Setting (attenuator tracking) ± Errors (temperature change).

An illustration of flatness attenuator tracking errors is shown in Figure 1.

By Jay Smith, Product Development Manager, Wavetek RF Products, Inc.

Figure 1

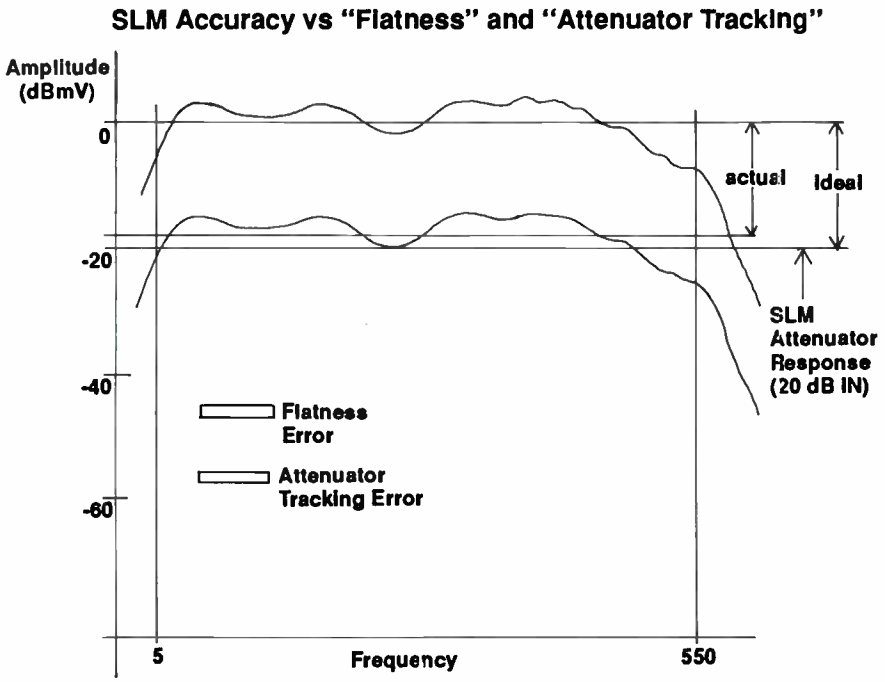
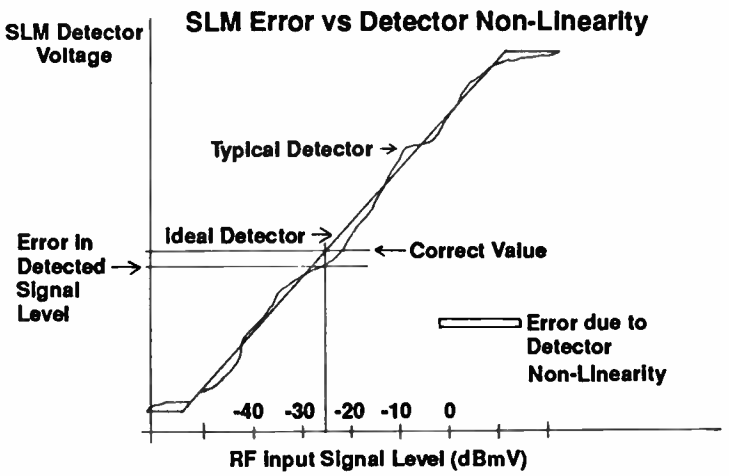


Figure 2



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These errors can be better understood if we consider an example. Suppose the SLM is connected to a "perfectly flat" signal source with an output of 0 dBmV. The SLM is then tuned to 271.25 MHz and calibrated to read exactly 0 dBmV on the meter. Now, the frequency of the source and SLM is varied, always keeping their tuned frequencies equal, from 5 MHz to 550 MHz. The change is noted in the meter reading at each frequency. These changes are the SLM's ±Error vs. Signal Frequency (flatness).

Now suppose 20 dB of attenuation is switched in. At 271.25 MHz, the meter should read exactly -20 dBmV (ideal). The difference between the -20 dBmV input level and the level shown on the meter (actual) is the Error vs. Attenuator Setting (attenuator tracking).

Now let's look at another source of error, detector non-linearity. Suppose the "perfect" signal source is again set to exactly 0 dBmV @ 271.25 MHz, the SLM is tuned to this frequency and calibrated for a reading of 0 dBmV on the meter. Now the level of the perfect signal source is raised to exactly +5 dBmV. Does the SLM's meter read exactly +5 dBmV? The difference between the new input level of +5 dBmV and the level shown on the meter is the Error vs. Signal Level (detector non-linearity). Figure 2 illustrates this parameter.

In the previous generation of SLMs, these errors were minimized by tweaking the RF tuning module and detector circuitry by hand at the factory. To put in a tweak at every combination of frequency, level and attenuator setting would be very time consuming and costly way to manufacture SLMs, therefore, SLM manufacturers had to reach some type of compromise on accuracy.

With the advent of the latest generation of SLMs, like the Wavetek SAM 1000 and SAM 2000, a new method of calibrating SLMs for a higher degree of accuracy was developed. With the incorporation of microprocessor and non-volatile memory into this new generation of meter, it is now possible for the SAM to "memorize" its error at any frequency, signal level and attenuator setting and to then apply the corresponding correction factors to minimize the error, before displaying the true signal level (or other measurement) on the meter. To illustrate how this works, let's consider a simple example:

Suppose the signal level meter is again calibrated as described earlier, with a perfectly flat signal source at an output level of exactly 0 dBmV. The SLM is tuned to 271.25 MHz and calibrated to read exactly 0 dBmV. Then the meter is tuned to another frequency and now reads -0.4 dBmV, an Error vs. Signal Frequency (flatness) of -0.4 dB. If +0.4 dB is added to the reading at this frequency, the level will again read exactly 0 dBmV.

Now suppose that the SLM could remember this, and do the addition

With the advent of the latest SLMs, a new method of calibration was developed.

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automatically, not only for flatness but also for detector non-linearity and attenuator tracking. This is exactly the technique used by these advanced SLMs.

A computer-controlled, fully automatic calibration and test system completely characterizes each SLM, then develops and stores in non-volatile memory the "correction factors" that correct for flatness, detector non-linearity and attenuator tracking errors. By individually characterizing and correcting for the errors automatically, the meters achieve a higher degree of accuracy than that of earlier generation SLMs.

Another factor that contributes to inaccuracies in SLMs is the change in temperatures. In the past, SLMs used additional temperature-compensation circuitry to minimize the inaccuracies caused by extreme temperature changes. A built-in calibration has typically been included in top-of-the-line SLMs to compensate for temperature dependant inaccuracies. New-generation SLMs add a method of temperature compensation similiar to the method previously described for flatness, detector non-linearity and attenuator tracking errors.

A large number of Wavetek SAMs were tested using a computer-controlled, automatic test system and precision temperature chamber. In each of six temperature bands from zero degree to 120 degrees Fahrenheit, complete sets of performance data were taken for each SAM and temperature band correction factors were developed through careful, statistical analysis. To correct for the change in accuracy, each SAM's microprocessor continuously reads the built-in temperature sensor, looks up the corresponding correction factors from memory and uses them correct the measurement.

In the SAM 2000 this technique is used to correct not only signal level but hum and C/N as well. In addition, it has an internal, temperature-compensated calibrator to allow for additional accuracy capabilities. There are other minor factors that contribute to SLM inaccuracies not discussed here, such as the linearity of the meter movement.

> Another factor that contributes to inaccuracies in SLMs is the change in temperatures.

In order for the CATV technician/engineer to maintain his system in peak operating condition, he must depend on the signal level meter and its accuracy. To be sure the SLM is dependable, the technician/engineer needs to understand the factors that influence accuracy and what accuracy specifications on a SLM's data sheet really mean. With a through knowledge of these specs, the technician/engineer can select the meter that is right for the application.

Next time you review the accuracy specs on an SLM, ask yourself (better yet, ask the manufacturer's salesmen) if the accuracy stated as the "total accuracy" includes flatness, detector non-linearity, attenuator tracking and temperature change. If it doesn't, you should probably keep looking. ■

The cost of owning a computer is going down

It is a fact, cable operators cannot survive without computers. Computers are needed to manage every facet of the business. From engineering to operations, from sales to installations. And now, computers are even needed to manage other computers. Computers take orders from our subscribers and complete orders for our technicians. Computers call out for us and take calls in to us. Computers are not only here to stay, but they are the only way we can successfully operate what is now a very complex business.

What used to be called billing systems are now called "subscriber management systems." What used to be convenient to farm out is more than ever too critical to management of daily activity to let out. The information contained in the subscriber files must be in constant interaction with files in other computers to provide authorizations, acknowledge changes, accept new input and alert management of potential problems. The computer that operatesthe subscriber management system is now the nerve center of cable operations.

Selecting the right computer to perform these vital tasks has become just as important as selecting the right subscriber management software.

More choices than ever

Today, the cable industry has a variety of viable choices for in-house subscriber management systems. Now that the need for computer automation has risen to prime importance, choosing a management system that operates on the latest computer technology should be a mandatory part of the selection process. And major consideration should be given to the cost of owning a computer because there are tremendous variances in ownership costs from one computer to the next.

There are several key elements to be considered in evaluating the cost of ownership. Chief among these are hardware and software acquisition and

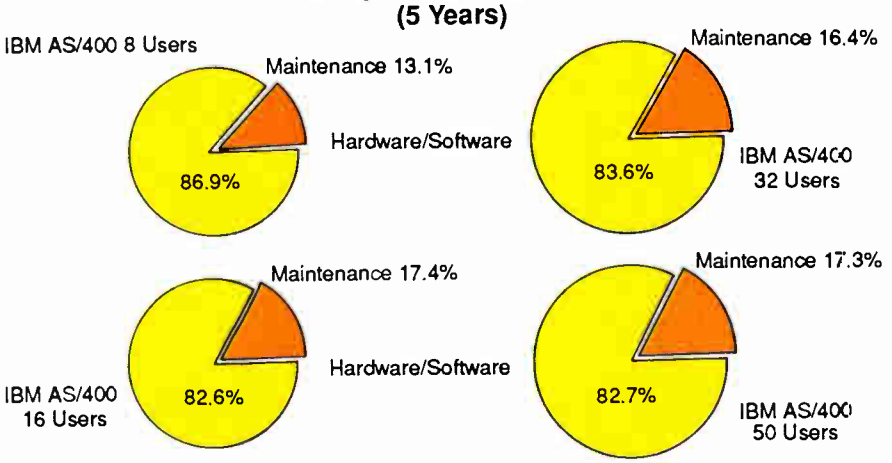
By Gil Jacobs, Vice President Sales & Marketing, Creative Management Systems

Table 1

	IBM AS/400	Others
Installation and Preparation Costs Average computer room costs range from $75 to $100 per square foot. Avg. computer room 2,000 to 3,500 square feet.	None	$150,000 to $350,000
Hardware Costs vs. Maintenance Ratio The Sierra Group Study (Exhibit A) Reported in Computerworld (8/29/88) Hardware and Software expenses as a percent of life cost over 5 years	Under 20%	30 to 45%
Reported in Tech Exec (10/88) (Exhibit B) Typical AS/400 fully configured systems		
AS/400 Model B10—Smaller Site	21%	30 to 45%
AS/400 Model B40—Medium Site	16%	
AS/400 Model B60—Larger Site	16%	
Monthly Operating Costs		
Skilled computer operators	None	Some
Programmers/DP experts	None	Some
Added environmental costs	None	Some
Modularity and Expansion Relative costs for adding CRTs, Memory, DASD and peripherals	Low	High
Residual Value		
Average value after 5 years	10 to 20%	Under 10%
Trade-in or re-sale value	High	Low

Exhibit A

IBM APPLICATION SYSTEM/400
Hardware and Software Expenses as a percent of life cost (5 Years)



Source: Computerworld, 8/29/88 and Sierra Group, Inc.

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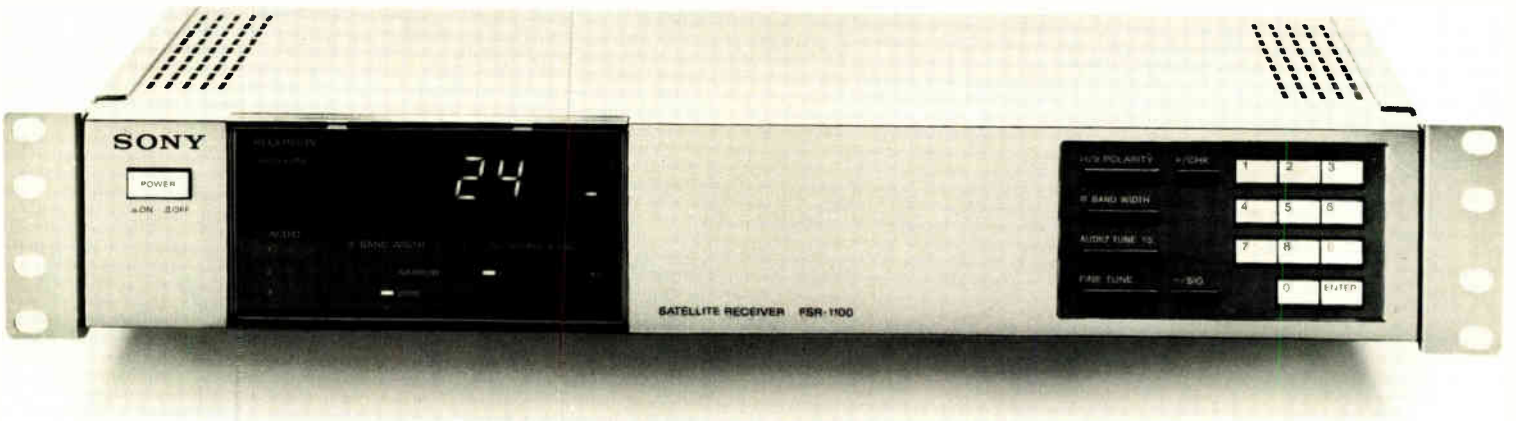

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installation costs, monthly operating expenses, modularity in design and residual value.

The acquisition costs include all computer hardware, the operating system, utilities, documentation ad software options such as report writers, electronic mail, diaries, word processing, tutorials, help facilities, graphics, modeling and training packages. The installation costs encompass any facility preparation costs such as raised flooring, air conditioning, humidity control, electrical upgrading, equipment delivery, set-up and operator training.

Operation costs include the monthly costs for air conditioning, power, delivery expenses, paper and supplies, computer operators and programmers, if required, and hardware and software maintenance.

Modularity in design provides for cable system growth at lower incremental costs. Residual value accounts for the worth of your investment and can be applied to the purchase of new equipment.

Let's compare these cost elements relative to today's latest computer technology, the IBM Application System/400, and the older generation computers that have been offered to cable operators.

The Application System/400

IBM boasts that the AS/400 delivers among the lowest cost per transaction in the industry. Properly configured, the AS/400 promises sub-second response time. There are no software maintenance charges and the hardware maintenance costs are substantially lower than those of the System/36, which was already among the lowest in the industry. The AS/400 computer is fully warranted for one year and CRT terminals are warranted for three years.

The AS/400 is a rack mounted system that takes up about 10 percent of the physical floor space that current competitive systems require. There is no need for a special computer room with raised flooring and there is no need for separate air conditioning or additional electrical power. The AS/400 is designed to operate in a typical cable office environment.

Delivery and installation costs are minimal. It arrives with a built-in electronic classroom with on-line tutorials, an electronic customer support package that can be linked to the nearest IBM office and a self-diagnostic capability that will identify its own system failures, should they occur. The AS/400 is rated as four to five times more reliable than the highly reliable System/36.

The AS/400 is easily upgradable on site with incremental costs that relate to less than a penny a subscriber over a five-year period.

Programmers and data processing experts are not required. Regular cable office personnel can be trained in a relatively short time to operate this system.

Residual value is at the highest in the industry. Typically, after five years, IBM computers retain from 10 percent to 20 percent with some peripherals retaining as much as 50 percent to 60 percent of their initial purchase price. The following provides a method for quantifying the value offered by the latest in computer technology as compared to prior generation equipment. Relate the costs you have experienced to those identified in Table 1.

Exhibit B

Purchase Prices for Typical AS/400 Configurations

	B10	B30	B60
Processor	$17,500	$57,500	$229,500
DASD	Included	70,000	150,500
Workstations & features	19,848	195,788	424,658
Total Hardware	37,348	323,288	804,658
OS/400	5,500	25,000	55,000
Other System Software	3,250	38,870	67,855
Total Software	8,750	63,870	122,855
Hardware Maintenance (5 years)	9,642	60,873	148,584
Total Cost	$55,740	$448,031	$1,076,097
Maintenance to Hardware Ratio	21%	16%	16%

Indirect benefits

The above analysis only deals with the direct cost factors relating to the cost of ownership. It does not address the indirect benefits attributed to improved user efficiency through faster response time and the increased operational efficiency emanating from a more powerful computer with the latest advances in hardware and software.

These benefits also effect the cost of ownership because they directly translate to increased employee productivity.

As depicted in Exhibit C, as response time improves, user key/think time improves as well. The total time saved is the basis for increased productivity. Based on studies reported in IBM's Systems Journal, as far back as 1981, the improvement in key/think time is proportionally much greater than the improvement in just respose time.

The AS/400 Office software package features a word processing system that can be integrated with the subscriber management system database to allow each department to create its own personalized correspondence.

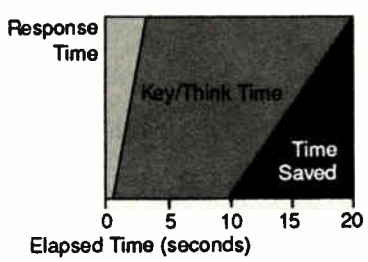
While the cost of computer ownership will continue to increase for older outdated systems, the loss in employee productivity and operating efficiency could be even costlier.

Cable operators have an opportunity to lower their base line cost for computer ownership while substantially increasing employee productivity and operating efficiency by employing the latest in computer technology. ■

Exhibit C

End-User Productivity

- As response time improves, user key/think time tends to improve also.
- The total time saved is the basis for increased user productivity.



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Static dissipation arrays: a buyer's guide

Static dissipation array is a generic description of a system using point discharge phenomenon to protect a given object or area from a lightning strike. Static dissipation arrays are available in a variety of forms and have received various marketing appelations from their manufacturers. They have been around in various forms for many years, and their most thorough early description was by J.M. Cage in his patent issued in 1930.

If you are in the market for a static dissipation array, or in the process of evaluating or specifying one for a client, it can be very confusing: akin to comparing apples to oranges because of the diversity within the promotional material and operational claims of the various manufacturers. Exactly how (and if) they provide lightning protection is a subject of disagreement, but there are several parameters which can be used to form an objective and realistic basis of comparison.

Several elements key to successful system performance are:

- Radius of dissipator electrode cross-section;
- dissipator construction material;
- number of dissipator electrodes;
- density of dissipator electrodes; and
- configuration of dissipator on structure to be protected.

Electrode radius

Static dissipation arrays work, as the name implies, by dissipating static charge. The radius of the dissipator electrode cross-section is critical because the process which enables dissipation of static ground charge to the atmosphere is related to electric field intensity (and flux density) surrounding the dissipator. Static dissipation arrays provide, in effect, a "low resistance" route for static ground charge to reach the atmosphere, thus preventing a buildup of the ground charge to the value necessary to trigger a strike.

Point discharge theory holds that electrical discharge from the point of an electrode to a surrounding medium will follow predictable rules of behavior. That discharge creates an electric field around the electrode. The theory, as it applies to this discussion, can be described by these basic formulae:

$$\mathcal{E} = \frac{Q}{4\pi\epsilon r^2} \quad \text{and} \quad D = \frac{Q}{4\pi\epsilon r}$$

where: $\mathcal{E}$ = electric field intensity
Q = charge (in coulombs)
ϵ = permittivity of medium
r = radius
D = flux density

Since the above formulae tell us that electric field intensity will increase as electrode radius decreases, it makes sense to use the smallest radius electrodes possible consistent with structural integrity. In fact, by not using the smallest possible electrode cross-section, one would entirely miss the point of point discharge. For instance, a dissipator electrode of .015 inch is not merely three times less efficient as a dissipator electrode of .005 inch. As the above formulae indicate, the radius is squared, hence the factor is not three, but nine.

> The critical qualities of the material used in static dissipation arrays are conductivity and durability.

The critical qualities of the material used in static dissipation arrays are conductivity and durability. The static dissipation array must be a good conductor to provide maximum discharge of current during normal operation, and, in the unlikely event of a direct lightning strike to the dissipator, a path for current flow in its role as a lightning rod. At the same time, the dissipator must provide a long and trouble-free service life, combining light weight and low wind resistance with durability.

Number of dissipator electrodes

Calculating the required number of dissipator points is not an exact science. One must not only dissipate the structure to be protected; one must also dissipate the round charge, a function of the point on earth upon which the structure rests. Therefore dissipation requirements are determined not only by the structure, but also by that ground charge, i.e. the absolute difference in potential which must be reduced through dissipation and the rate at which that dissipation must occur to prevent a strike.

The ground charge is a function of the strength and speed of the storm. (It is possible that an elevated structure creates somewhat of a "venturi" effect, drawing more ground charge than that which would normally occupy the point on earth upon which it rests. However, to my knowledge no one has been able to confirm or measure such an effect.)

Since a static dissipation array must provide a low resistance path to the atmosphere, it seems logical to provide as many discharge points as reasonably possible. By using a large number of points one can compensate for any loss of efficiency from a theoretical maximum, and spread the dissipator elements over more of the cross-section area of the structure.

Density of dissipator electrodes

However, one cannot emulate the patient who, upon being told that three pills was good for him, decided that 30 pills must be better. Concering the number of dissipator electrodes, there is a point at which more is less.

The density of the dissipator electrodes is critical because of the possibility of inter-point interference. If the dissipator electrodes are held too close to one another, the points interfere with one another's ability to dissipate. Experimentation indicates that the smaller the radius of the dissipator electrodes, the closer they can be arranged without interference.

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Given moderately close spacing, this interference only affects the dissipation capability of any given point: not of the system as a whole. Moderately close spacing of extremely small radius electrodes may lead to some inter-point interference and limited loss of efficiency by individual points. However, it is more than offset by providing a greater overall number of points and greater overall dissipating capacity.

At the extremes, too close spacing results in the array under heavy discharge approaching a solid surface, be it a cylinder, plane or toroid. On the other hand, if the dissipator points are too widely spaced, the result is unnecessary supporting structure with resulting excess weight, wind loading and cost. If dissipator points cease to interfere at a given distance, there is nothing to be gained by increasing that distance.

Assume, for a moment, that there is no problem of interference between dissipator points located in close proximity to one another. Another limiting factor arises; the ability of the volume of atmosphere surrounding the dissipator points to accept the charge. Therefore, the points must not only be separated to prevent interference, but also be separated to provide a sufficient volume of surrounding atmosphere to avoid "saturating" that surrounding volume of atmosphere with charge.

Of course, this does not take into account the effect of wind, usually present in abundance during the conditions under which peak dissipator discharge occurs. Wind presents constantly renewing surrounding volumes of atmosphere, and, if the dissipator electrodes are sufficiently flexible, continuous movement of the points in relation to one another providing momentar increases in spacing.

Configuration of dissipator on structure

All objects have natural dissipation points. On a structure, charge tends to gather at, and dissipate from, the top of the structure (the ultimate point) and from corners. The most effective way to mount a dissipator in terms of structure, weight, wind loading, cost and aesthetics is to enhance this natural dissipation by supporting the dissipator from the structure itself at these natural dissipation points, and to take advantage of any existing grounding and bonding provisions, particularly if the structure is a building. In other words, the dissipator should be tailored to the structure, not vice versa.

It was once believed critical to effectiveness that a dissipator be the absolute highest point on a structure. Practical experience has proven it need not be. Indeed, mounting a dissipator too high above the structure in an effort to clear all appurtenances can reduce the level of protection by allowing charge to continue to accumulate at the structure's natural dissipation points. In certain applications such as electrically floating AM broadcast towers, it is inadvisable to install anything, including a static dissipator, above the top of the tower since it necessitates costly and time-consuming re-tuning of the station.

Design flexibility crucial

A dissipator, if designed in such a way that it need be the highest point on the structure or mounted in any other specific manner, interferes with available space and, by limiting mounting flexibility, may inhibit use of the structure for its intended purposes. Therefore, dissipator design should offer maximum mounting flexibility, be adaptable to any existing structure, take advantage of existing grounding and bonding, and should not preclude any utility application of structure space.

Particularly in tower applications where weight and wind loading can be critical, any weight and wind loading contributed by a dissipator reduces the amount of capacity available for revenue producing items, i.e. antennae, etc. Therefore, it is important to keep the weight and wind loading of the dissipator as low as possible, consistent with performance.

When considering the operation of static dissipators, it is sometimes helpful to consider the nature of static charge. It is not a directional current requiring a superb conductor. It is a static field. The engine driving the system is the storm cloud charge overhead attempting to pull the static charge off the structure. One need only provide a low resistance escape for that static charge to the atmosphere. The discharge produced is in the microampere range current, typically under 100 microamps.

Performance and effectiveness

Do static dissipation arrays work? It depends on with whom you talk. In my personal observations, the scale runs from manufacturers (myself included) at one end who obviously claim they do work, to theorists with a great deal of time and reputation invested in theories which preclude their operation at the other end who claim the technology amounts to voodoo pultice.

Beware of performance guarantees or claims of 100 percent effectiveness. At our collective present state of understanding the lightning phenomenon and all of its variables, we find such hyperbole to be counterproductive and to constitute the basis for suspicion. Besides, such clams miss the point. In our opinion, the stated goal of static dissipation should be to cost-effectively reduce losses due to damage caused by lightning strikes. Claims of absolute reliability to prevent lightning strikes, claims which have historically been unfounded in reality, do nothing to encourage the legitimacy and industry perception of this application of point discharge technology.

The real issue is cost-effective protection. Assuming no injury to personnel, the real issue is the cost of lightning damage and down time. Therefore, start with inquiries to the customers of the manufacturers to gain an experience base. In addition to the effectiveness of the static dissipation array itself, other appropriate questions may relate to:

- availability and helpfulness of the manufacturer in answering questions and providing needed technical information;
- the quality of the dissipator and installation material, and availability of alternate installation material to accommodate requirements arising from the structure upon which it is to be mounted or from the surrounding environment;
- convenience and ease of installation;
- installation scheduling;
- cost of static dissipation array;
- cost of installation; and
- manufacturer service, follow-up and responsiveness to any problems.

As with any investigation, it is easier to get the right answers if one asks the right questions. The preceeding will provide at least a starting point.

In my experience and that of our customers, static dissipation arrays can be a cost-effective means of reducing expenditures for damage due to lightning. A properly designed, constructed and mounted dissipator can help save money. But, however effective static dissipation arrays may be, and whichever one you choose, it should be remembered that installation of a system is not a stand-alone solution. ■

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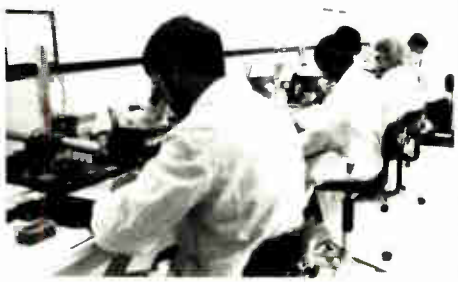

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Cherry picking for profits

Restricted access, bundling or "cherry picking" is a method that permits bulk service customers to select and pay for only those cable channels they really want to receive. It also enables cable operators to tailor-make a selective bulk service package for specific types of customers such as small hotels/motels, trailer parks, retirement homes, co-op housing units and others. These customers may only want 12 channels, for instance, simply because that is all their budget allows or because set-top converters are not economical or practical.

Many older multiple dwelling units (MDUs) are only wired with MATV cable. This system may not have adequate leakage specifications to pass all cable channels. In this case, only a restricted number of channels can be used. A cable operator can therefore add to his subscriber base by providing MDU residents with their favorite channels.

Keeping subscribers hooked up

A lack of response by cable operators to customer demands may result in these specialty groups turning to alternate sources to get the programming they desire.

For example: The cost of subscribing to the maximum complement of channels on a cable system can easily be as high as $30 or more per month per subscriber (typically $10/month for basic and $20/month for premium services). Tenants of a co-op housing facility, for example, may not be able to afford $30 per month and may therefore order only the basic service. The basic service, however, may include some channels that don't satisfy their viewing preferences or may essentially duplicate other basic service channels. This reduces their actual choice to eight or nine channels or less with impaired channels caused by locally transmitted TV stations.

A wider choice

A "cherry-picking" system gives the co-op residents a wider choice at a reduced cost. By mixing selected basic channels with selected premium channels or by selecting their own 12-channel basic service package, the subscribers can be attracted by an affordable rate. The co-op housing authority picks the number of channels and the combination of specific services they want and negotiates the price of the package with the cable operator.

Provides flexibility

This arrangement is also particularly appealing to the cable operator. It easily accommodates different service combinations for different bulk service customers. The operator has the flexibility to customize channels without having to upgrade the distribution system at a high additional cost. The other benefit of this type of system is that a cable operator doesn't have to supply set-top converters to each tenant, which is a benefit to the customer in the long run.

The cable operator, in effect, provides a "restricted access system' that converts only the requested channels, after descrambling (if required), to an appropriate channel designation for

By Altaf Alimohamed, Brent Smith and Marc Phillips, Nexus Engineering Corp.

Figure 1

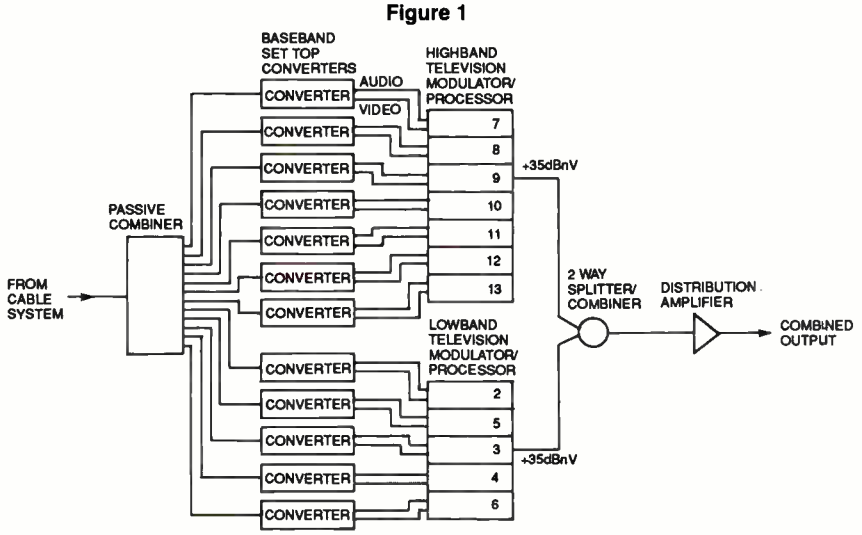
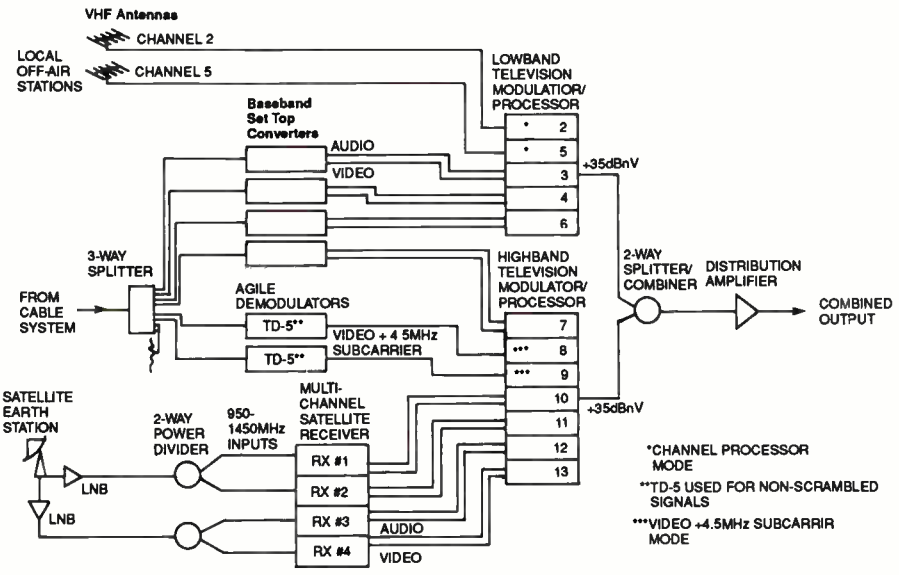


Figure 2



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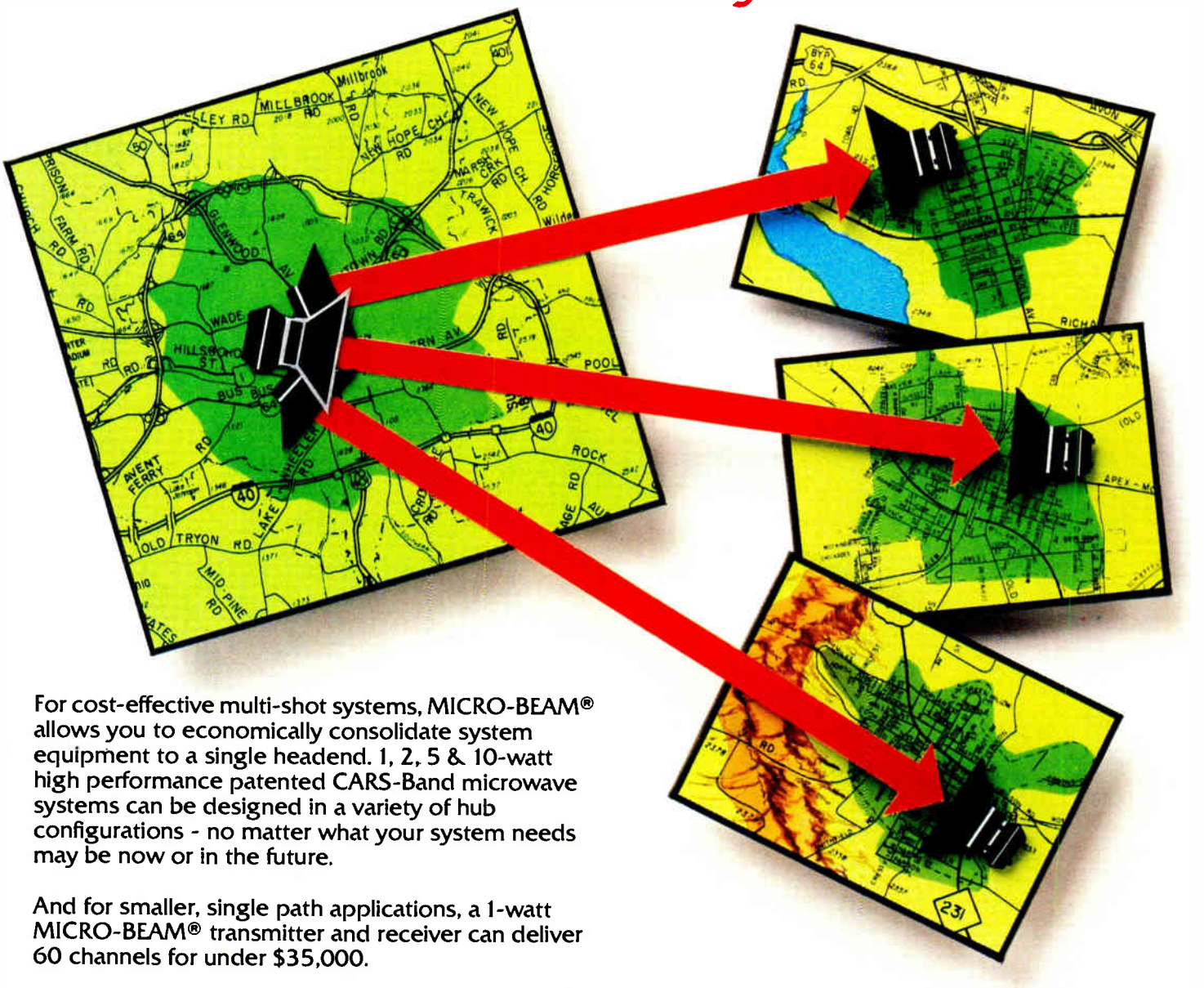

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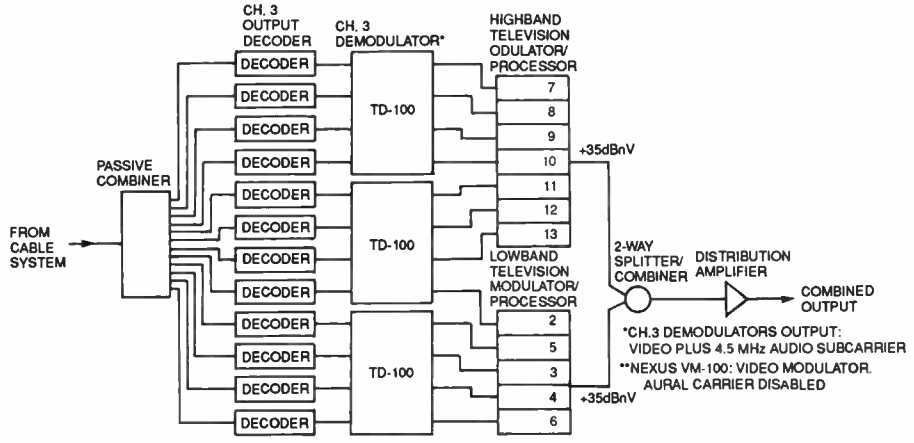
injection into the local distribution system. Figure 1 illustrates how this is achieved by a mini-headend at a customer's site.

The input from the cable system is fed into a splitter which passes all of the channels on the cable system. These are fed into 12 converters which demodulate the channels down to baseband audio and video signals. The converters are simple set-top units, similar to the type used by many people at home today. The signals are then fed into a 12 modulator system and modulated on channels 2 through 13. The 12 signals are then internally combined in the modulator, amplified and launched into the customer's distribution system.

The relative cost for this type of headend unit (including baseband set-top converters) is between $400 and $475 per channel, if the system is totally pre-racked and tested at the factory.

This type of mini-headend creates new revenue opportunities for cable operators by enabling them to pick up new bulk service subscribers and provide customized service to existing ones.

Figure 3



Restricted access plus

Another form of "cherry picking" is referred to as a "restricted access plus" system. This arrangement is similar to the restricted access system, but allows the addition of programming not carried on the cable system.

For example, a cable system may not carry, or have the capacity to carry, some satellite and off-air channels that a group of customers wants to receive (eg. Hospital Satellite Network or specific thnic programming). In such a case, the cable operator (after obtaining the programmer's permission if

necessary) installs the appropriate equipment to receive the requested programming and adds it to the "cherry-picked" cable channels.

It should be noted that in some urban areas, local off-air stations cannot be carried on-channel due to the close proximity of transmitter sites to parts of the cable system. Consequently, there may be several channels on the cable's VHF band that are impaired with co-channel interference. By inserting these local stations on-channel at the MDU site, picture impairments are greatly reduced or eliminated. This usually allows for utilization of all 12 VHF channels.

Figure 2 shows a six-channel mini-headend that is complemented by a satellite installation receiving four channels, and an MATV antenna receiving two local off-air stations. It is far easier for a cable operator to obtain distribution rights from satellite programmers than it is for anyone else. Thus, a cable operator can ensure a legal installation as well as satisfy the special needs of bulk service customers.

The mini-headend

Let's take a closer look at the type of equipment that can be used to provide restricted access programming. We must accept the fact that the cable headend scrambling system determines the most convenient method of decoding and rechannelizing the cable programming selected by the customer.

To make the restricted access mini-headend economical, it is important to use converters that demodulate the individual signal to baseband audio and video output. If the cable operator is using Channel 3 or 4 output decoders, a demodulator must be employed to provide video and audio output (see Figure 3). By utilizing composite video (i.e. baseband video and 4.5 MHz audio subcarrier) in the demodulator, BTSC stereo will be maintained throughout the system.

The flexibility of mini-headends can be improved by using agile demodulators in place of the Channel 3 converter/demodulator combination. It must be noted that the TD-5 demodulators have been designed specifically for processing non-scrambled signals.

Set-top converters must be equipped with non-volatile memory. If not, the converter will not return to the designated channel in the event of a power outage.

Compactness helps

In many situations, a bulk service customer may not have room for large equipment racks. The TD-5/VM-100 system combination is ideal, since 12 channels can occupy as little as nine inches of rack space. If the demodulator is agile, the mix of services provided by the restricted access system may be changed very easily by adjusting the demodulator channel settings.

In conclusion, there are no limits to the opportunities available to cable operators. The enterprising operator can quite easily increase subscriber penetration through the use of restricted-access mini-headends, without the need for additional and expensive distribution plants. By creatively applying the highly reliable mini-headend equipment currently available, a cable operator can increase revenue, stifle competition and earn more profit . ■

WHAT'S AHEAD

SCTE

December 1 *Cactus Chapter* will meet. Call Harold Mackey Jr., (602) 866-0072, Ext. 282 for info.

December 1 *Upstate New York Meeting Group* will gather to administer BCT/E exams in categories IV, V, VI, and VII at Greater Rochester Cablevision in Rochester. Call Ed Pickett, (716) 325-1111 for details.

December 3 *The Chaparral Meeting Group* will host a seminar on terminal devices and administer BCT/E exams in categories I and VI at the Howard Johnson Plaza-Hotel in Albuquerque. Ron Hranac of Jones Intercable will be the guest speaker. Call Bill Simons, (505) 988-9841 for info.

December 6 *SCTE Interface Practices Committee* will meet at the Western Show at the Hilton Hotel in Anaheim. Subcommittees will meet from 1 p.m. to 2:30 p.m. and the main committee will meet from 3:30 p.m. to 4 p.m. The committee is requesting participation from anyone in the industry interested in trunk and feeder interfaces, drop interfaces and testing methods. For info, call Joe Lemaire (secretary), (415) 361-5792.

December 7 *The Greater Chicago Chapter* will hold a seminar devoted to an FCC update on overall CLI regulations. Call William Gutknecht, (312) 690-3500 for location information.

December 7 *the Michiana Meeting Group* will host a technical seminar. Call Thomas White, (219) 259-8015, for details.

December 7 *The Tennessee Meeting Group* will meet for a technical seminar. Call Joe Acker, (205) 932-7264, for info.

December 10 *The Rocky Mountain Chapter* will administer BCT/E exams in all categories. Call Steve Johnson, (303) 799-1200, Ext. 621 for info.

December 14 *The Great Lakes Chapter* will meet. Call Daniel Leith, (313) 549-8288 for info.

December 14*The Wyoming Meeting Group* will administer BCT/E exams in categories I, III, IV and VI at the Holiday Inn in Casper. Call Drew Fleming, (307) 745-7333 for details.

December 14 *The Oklahoma Meeting Group* will gather. Call Herman Holland, (405) 353-2250.

December 15 *The Central Indiana Chapter* will meet at the Wavetek offices in Indianapolis to administer BCT/E exams II, IV, VI and VII. Call Steve Murray, (317) 788-5968, or Joe Shanks, (317) 649-0407, for info.

December 27 *Satellite Tele-Seminar Program* will be a review course for BCT/E certification category III (transportation systems) featuring Dr. Tom Straus of Hughes Microwave. Program will air from noon to 1 p.m. Eastern time on Satcom F3R transponder 7.

January 18 *Ohio Valley Chapter* will meet for a technical seminar. Call Robert Heim, (419) 627-0800, for info on place and subject matter.

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 $150.

January 24-26 *C-COR Electronics Technical Seminar* will be held in Los Angeles. Call Theresa Harshburger, (800) 233-2267 Ext. 326, to register or to get more info.

February 21-23 *C-COR Electronics Technical Seminar* will be held in Charlottesville, Va. Call Theresa Harshburger, (800) 233-2267 Ext. 326, for info.

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December 6-8 *Illinois Bell* will host a seminar in Orlando, Fla. on fiber optic communications systems for the local loop. The course costs $775, including lunches, refreshments and all course materials. Call (312) 655-3096 for registration information.

January 10-12 *Illinois Bell* will again offer the course on fiber optic communication systems for the local loop, this time in Phoenix, Ariz. Call (312) 655-3096 to register.

January 24-26 *Illinois Bell* will offer the fiber course for the final time in Westmont, Illinois. Call (312) 655-3096 to register.

ncta

The NCTA is sponsoring a series of free regional seminars focusing on signal leakage and cable system compliance with the FCC's CLI requirements. The seminars will focus on successful programs and techniques and vendors will have a forum to present their products and services.

January 7-8 *NCTA CLI seminar* will be held at the Airport Hilton in Albuquerque. Call (202) 775-3637 to pre-register.

February 14-15 *the NCTA CLI seminar* will be held at the Airport Hilton in Atlanta. Call (202) 775-3637 to pre-register.

Also, the seminar will be held in Philadelphia in late February.

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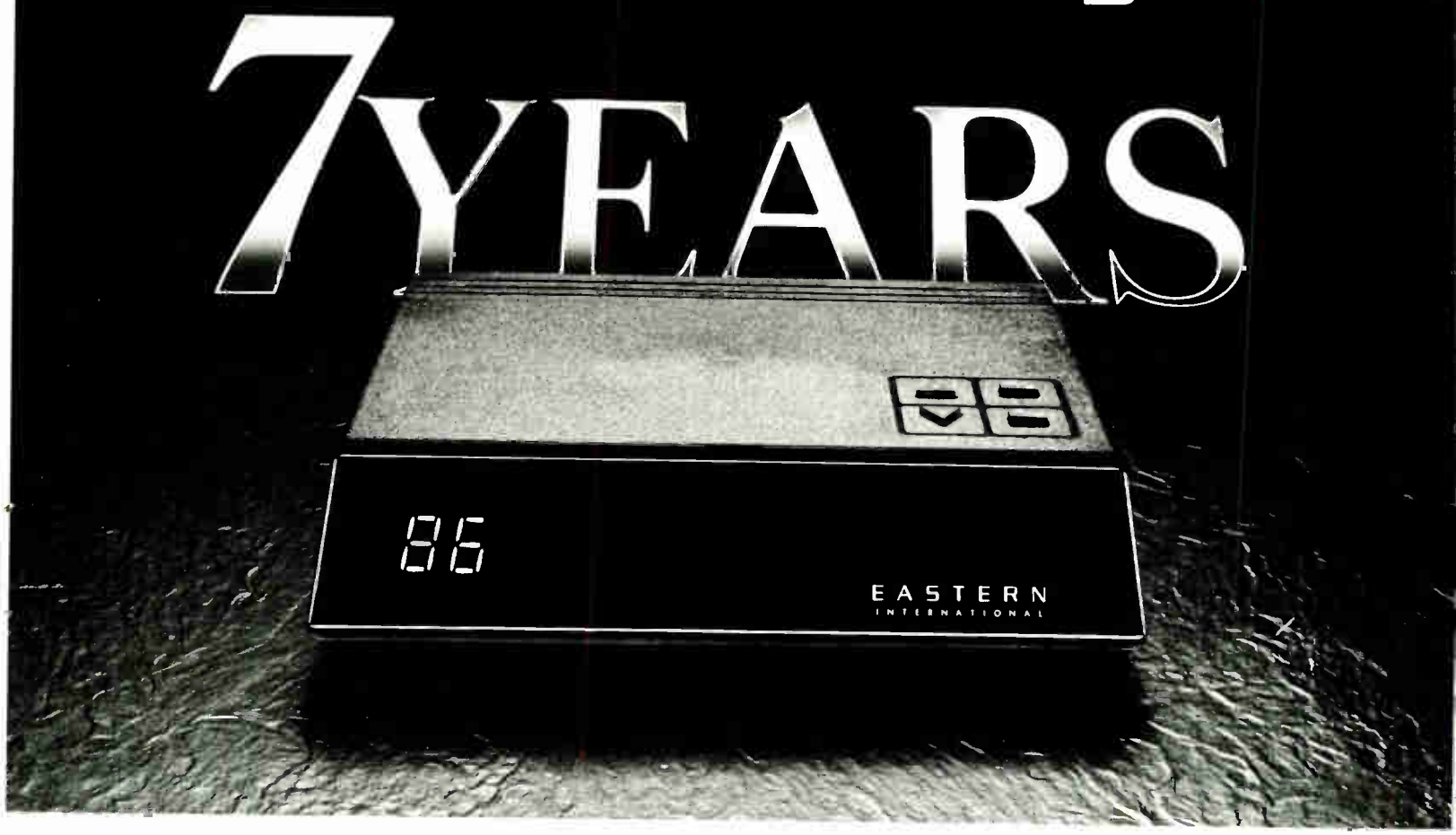

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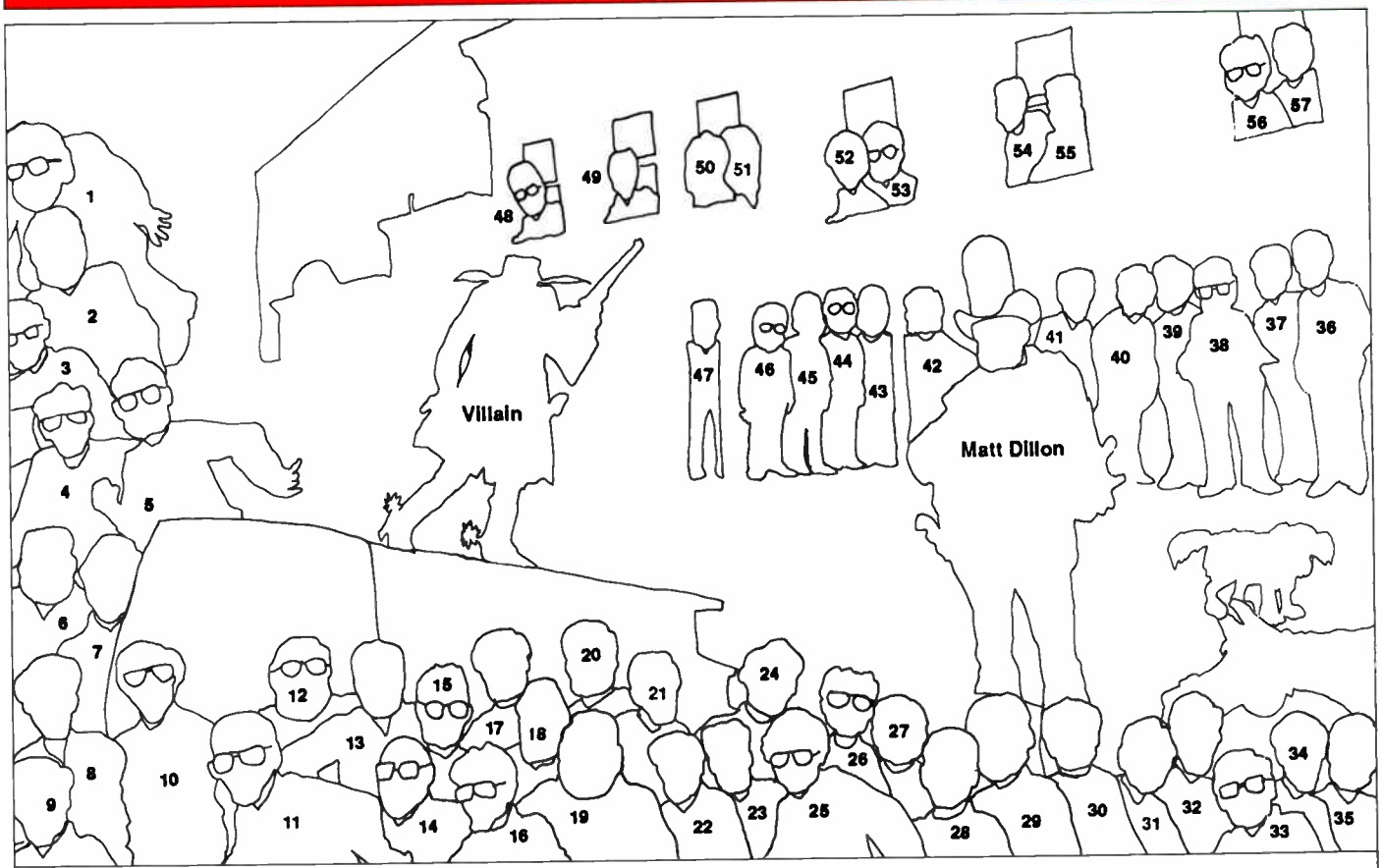

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OASIS, Oak's new PC-based control software brings all the security, features, and unbeatable value of cable's best addressable settops within reach of the small and mid-sized system. ❧ Using an IBM PC-AT personal computer, OASIS duplicates every function (including business system interface) of Oak's proven proprietary software developed for large users of its Sigma and TotalControl addressable systems. ❧ And when you couple OASIS with Oak's Sigma addressable decoders you'll open the gates to a host of new revenue opportunities: advanced store-and-forward IPPV, MTS

stereo on *all* channels, software controlled channel mapping, self diagnostics, and a myriad of user features designed to appeal to even the most jaded subscriber.

But part of what makes OASIS such good news is not what it has, but what it *doesn't* have:

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- ❧ No expensive computer maintenance contracts — it uses a PC.
- ❧ No special computer room — any office will do.
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And it's no mirage.

OASIS is available now from Oak Communications. Give us a call for a no-obligation demonstration. Let us show you how simple addressability can be.

At last.

OAK **Communications Inc.**

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Reader Service Number 67

Siecor to supply W.Va. system with 178 kms of fiber cable

In what we're sure is just the first of such announcements, **Siecor Corp.** has announced it has inked an agreement with Tele-Media Corp. to provide 178 kilometers of fiber optic cable for an all-aerial AML replacement in West Virginia. The announcement represents the largest amount of fiber used in any one CATV system to date.

Siecor will provide the system with loose tube cable, which will be co-lashed with ¾-inch coaxial cable. Catel Telecommunications will provide both its TransHub I and TransHub III hardware to the project. Fibers will be fusion spliced and housed in Siecor splice trays and closures.

The existing single-channel high power AML link will be replaced with fiber for supertrunking; while coax will continue to be used in the trunk and feeder runs. The 37-channel system will ultimately be upgraded to 54 channels, according to Siecor.

AM format used

Seven AM signals will be received off-air at the antenna site located in Cedar Grove. The signals will be transported via an AM fiber link to the headend in Chelyan, where the signals are converted to FM. Thirty more signals will be combined and sent over fiber to hub sites before being sent over the coax runs. The system is expected to be completed by the middle of 1989.

With July 1990 getting ever closer (remember, that's the CLI "deadline"), a nationwide flyover service has finally been born. Alpha Technologies and Dovetail Systems have created a joint venture, called **CableTrac**, that utilizes airborne leakage testing of CATV systems.

Joining CableTrac as operations manager is Chris Duros, formerly of Cable Check. The new company will be headquartered in the Seattle area but service will be staged from hub sites across the country. This approach will reduce transit time and will make the cost of a flyover competitive with ground-based methods, say company officials.

CableTrac's service will generate geographic plots which show the leakage levels found at every point over the cable system. Maintenance crews can often be dispatched to the general area of the leaks in order to identify and correct the located problems. Call (206) 774-2100 for details.

Training agreement reached

NaCom has agreed to offer the students and the **National Cable Television Institute** will provide the training through correspondence courses in order to better educate construction personnel.

The agreement, the first of its kind between an installation and construction company and an independent study school, calls for NCTI to offer NaCom its full range of courses, including installer, installer technician, service technician, system technician, advanced technician, CATV system overview and broadband RF technician.

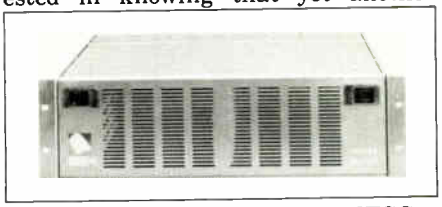
What with the shortage of qualified, good installers and technicians (see *CED*, November 1988, p.24), this type of agreement should be hailed by the industry and duplicated as often as possible.

Is HDTV implementation getting closer? You bet. Evidence to support that contention comes out of the **Hughes Communications** and **Philips Laboratories** camps, where an agreement to test Philips' HDS-NA high-def system over satellite has been reached.

The $2.5 million agreement calls for scientists and engineers at both companies to conduct tests that will result in satellite-delivery of HDTV in 1989. Results will be demonstrate in the latter half of next year and implementation could come as quickly as 1990, say company spokesmen. Hughes plans additional test agreements with other manufacturers as well.

New interactive group formed

Operators investigating interactivity through telephone lines might be interested in knowing that yet another



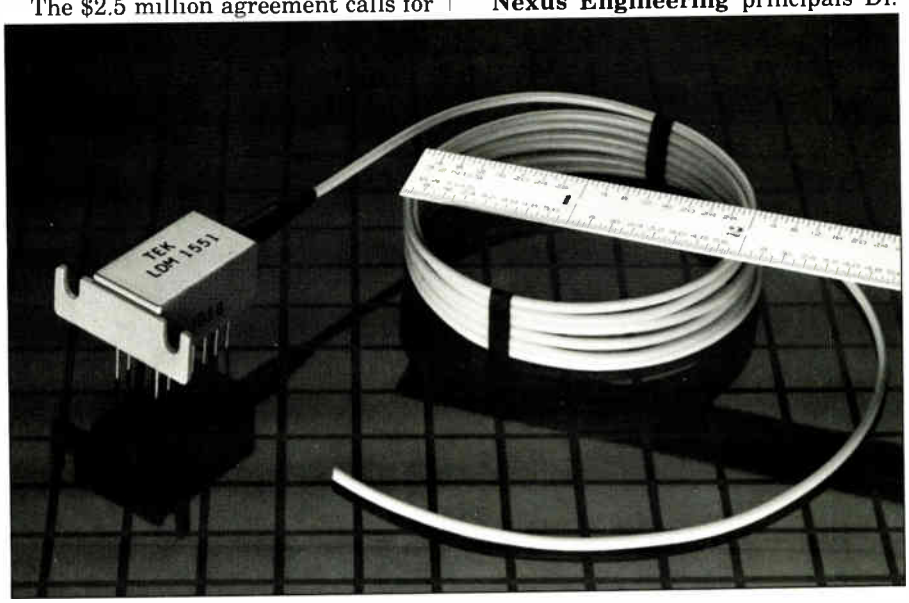
*Central Dynamic's Stage *1 E-NTSC product*

service group has been formed to bring pay-per-view, polling, rating information and interactive games to viewers.

Lo-Ad Communications has a nationwide network of call processing centers that can filter through 25,000 calls per minute or more; 976 and 900 number credit card authorization is available. Also, ANI services are available to avoid the necessity of entering an account number.

Depending upon how the network is designed, billing can be done through a cable operator or through the telephone company. For information, call (213) 626-5329.

Nexus Engineering principals Dr.



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LINDSAY SPECIALTY PRODUCTS LIMITED 50 Mary Street, Lindsay, Ont., Canada, K9V 4S7 (705) 324-2196 Telex 0-6962-860

Reader Service Number 68

J. Basil Peters and Peter van der Gracht received the 1988 British Columbia Science and Engineering Gold Medal for contributions made to industrial innovation. The two were chosen from a field of 29 nominees by a panel of past medal winners.

In other product news, **Central Dynamics** of Montreal has developed a line of video signal processors designed to enhance NTSC television images. The Stage*1 E-NTSC products include digital encoders and decoders and digital translators to convert from one digital videotape format to another.

Two-dimensional filtering techniques are used to shape the signal spectrum and separate chrominance and luminance to eliminate cross-color and cross-luminance. For details, call (514) 697-0810.

A new automated coaxial cable stripper has been announced by **Manger Electric Co.** The stripper cleanly removes braided shield without damaging the dielectric. The shield can be cut flush, combed out or bloused. For details, call (203) 348-7761.

Reduction of bend loss

One of the big problems associated with laser diode modules in the associated bend loss when the fiber optic pigtails are curved beyond a critical radius. Tektronix has largely solved the problem by enhancing its modules to include Corning's CFM-28 single mode fiber.

By improving bend loss, excess cable can be looped tighter and therefore takes up less space. For information from Tektronix, call (800) 835-9433, Ext. 100.

Speaking of bending and losses, **Pirelli Cable** has produced a new cable-in-duct system to help reduce the danger of damage to cables during handling, installation and service. The Poly Duct product utilizes a conuit loosely extruded over the conductor to provide a flexible, impact-resistant pipe.

In addition to providing protection, the system allows removal and replacement of the cable without excavating. For details, call Pirelli, (201) 687-0250.

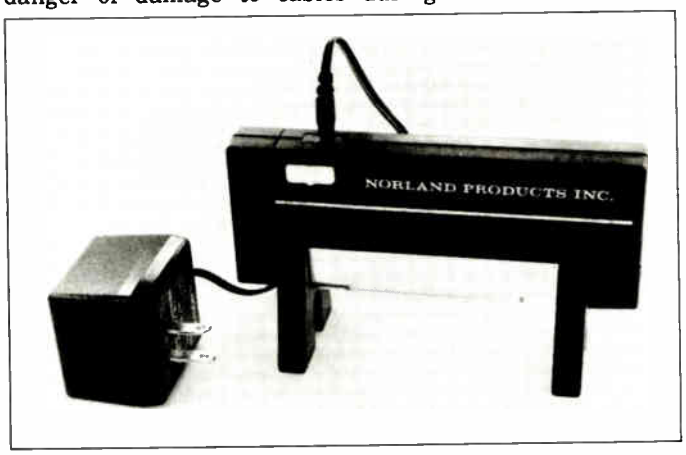
A new mini ultraviolet light source has been designed to make fiber optic splicing easier and more convenient, comes from **Norland Products Inc.** The portable, battery-operated lamp is used to permanently bond UV curing splices. Price is $225. Call (201) 545-7828 for info.

New standby power, tester

Performance Cable TV Products has developed two new products. The first is the Model SB840A standby power supply, which has been designed to offer necessary backup for cable systems using feedforward, power doubling and other advanced amplifier designs.

The unit is compatible with most existing 60-volt ferroresonant power supplies. Output is 60V RMS with a current rating of 14 amperes. The 23-pound unit has a base measurement of 11 inches by 7 inches and is 6 inches high. It is designed to retrofit existing equipment. Features include a temperature compensated battery charger to prevent overcharging and a thermal switch on the cooling fan.

Secondly, a new universal battery tester enables users to determine the condition of deep cycle, high capacity storage batteries used in CATV standby power supplies. The hand-held tester contains LED indicators to show the condition of a battery being tested. Other indicators show when the tester is connected to excessive voltage or when loads are reversed. For details call (404) 443-2788.



Norland's UV curing lamp

A new RF voltage device designed to protect all types of coaxial cable-connected equipment from damage caused by lightning has been developed by **Passive Devices Inc.** The Surgender (patent pending), is suited for protecting all CATV headend equipment, as well as a variety of consumer electronics located in subscriber homes. It works by protecting equipment from high voltage surges caused by nearby lightning strikes. Want info? Call (305) 493-5000.

New universal remote debuts

Onkyo U.S.A. has introduced its second, smaller programmable remote control to the market. The RC-AV20, which will be offered for sale at $99.95 retail, replaces the original RC-AV1 "Unifier" remote and offers simplified operation and learns up to 102 different command codes.

Each of the 51 programmable keys is controlled by a master audio/video switch for dual mode operation. Color symbols on each key makes identification and operation of the unit more straightforward. In addition, a simplified universal remote is available for $79.95.

A stand-alone second audio program (SAP) generator has been added to **Leaming Industries'** line of BTSC stereo equipment.

The SAP-1 generator encodes a monaural audio signal into the SAP format for TV transmission for such uses as second language programming transmission, local radio programs, weather reports, pay-TV promotions and FSK data. It may be used with or without the presence of a STSC stereo signal; and may be used with any BTSC encoder with a SAP carrier input.

Leaming also makes the SAP-2 generator, which was designed specifically for use with Leaming's MTS-2 and MTS-3 series of BTSC generators. For details, call (714) 979-4511.

AM Communications has developed a version of LANguard to monitor and control a broadband network powered by Alpha Technologies power supplies.

The TMC 8061 is a special-purpose transponder which monitors and controls Alpha units. Using LANguard software, AC output voltage and current, unit temperature and battery voltage, RF levels and other critical operating parameters can be monitored. Also, alarms can be set for standby status, cover tamper and 60 VAC out-of-range. Call (215) 536-1354 for information.

AML gets new player

A new player in the microwave video distribution game has entered the game with three new solid state and traveling wave tube transmitters. **AML**

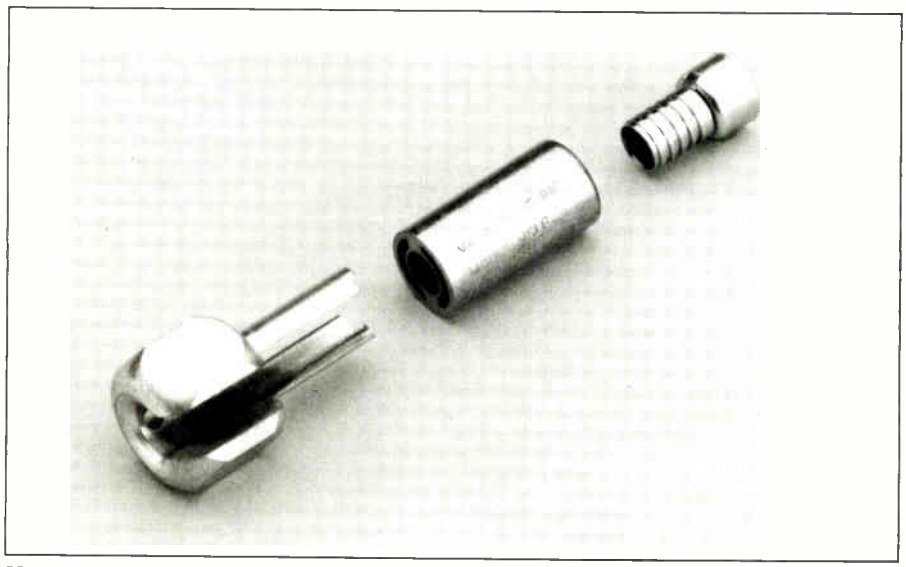
Specialties expects its new products to be available in early 1989 and the company says those products will offer the lowest composite distortions and highest power, while consuming 67 percent less energy.

AML Specialties also promises to develop and introduce other wireless and fiber distribution equipment, said a company spokesman.

Nexus Engineering has announced the addition of a satellite integrated receiver/descrambler to the company's line of headend products. The IRD-1 allows CATV operators to receive and descramble satellite signals.

The unit is housed in a standard 19-inch chassis but is only 2⅝ inches high. Features include a feedforward frequency control loop to compensate for frequency drift, a C-/Ku-band switch, and power consumption of just 4 watts. For details, call (604) 420-5322.

Viewsonics has introduced a new, patented F-connector, the "Lockin' F" connector. According tot he company, the connector is tramper proof and provides additional RFI security. The connector is part of the Lockinator Security System, can be installed with the same tool/key used for the Viewsonics locking terminator, carry a lifetime warranty and are available in R59 and R56 sizes. They cost 37 cents each. For info, call (800) 645-7600 or (516) 921-7080.



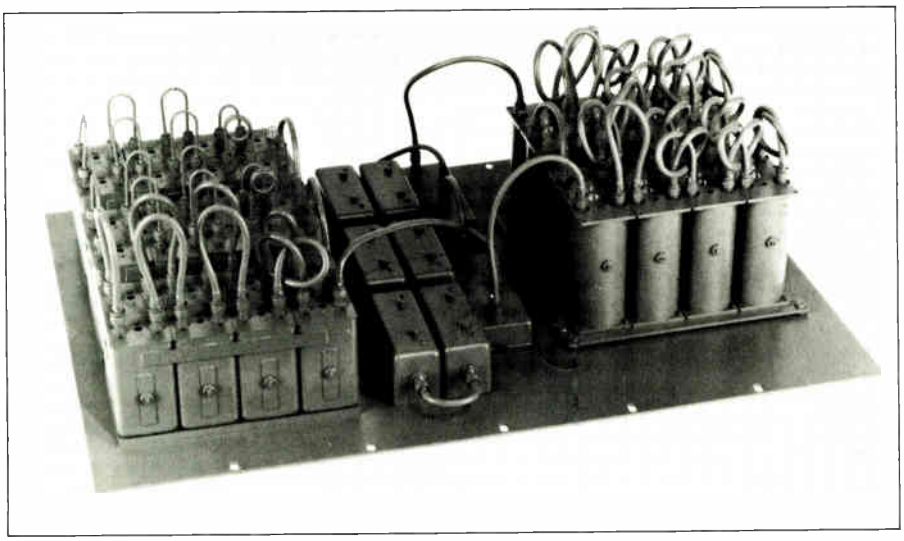
Viewsonics' Lockin' F Connector

New filters announced

Two new filters have been developed by **Microwave Filter Co.** Model 6067 is an enhanced FM bandpass filter that has sharp skirts to allow isolation of the FM band from video signals. It can be used to prevent off-air interference by adjacent channel 6 and FM modulator clean-up before mixing with video.

Passband is 89 MHz to 109 MHz with loss less than 2 dB except at 89 MHz, where loss in 5 dB max. Price is $450 and delivery is two weeks.

Model 6718B is a channel deletion



Microwave Filter Co. 6718B channel deletion network

network used in a downconverted AML recpetion to remove channels for reinsertion. The entire spectrum of seven VHF channels (50 dB) is deleted to allow insertion of new programming. Deleted channels include 4, 5, 9, 15, 16, 30 and 32. Price is $5,825 and delivery is three weeks. Call (315) 437-3953.

A new controller designed to control up to four infrared-remote controlled videocassette recorders has been unveiled by **CCI**. The controller has been designed for local origination, public access or other applications where frame accuracy is not required.

The unit is said to be low-cost and easy to use. A built-in time delay on the SVC-5 provides a smooth transition between machines and it can be programmed to repeat the same events each day or different weekly events. No tones or editing is required. Price is $1,295. Call (615) 894-2580 for information.

Connector wrench debuts

The Universal Security Wrench is now being offered through Tulsa-based **Budco**. The product is designed for working on coaxial cable connectors.

The drop-forged steel wrench is guaranteed no to split or spread and comes with a one-year replacement warranty. The wrench fits most security cups and can be used on F-series and CF-type connectors or on F-series terminators, said a company spokesman. Special sizes are also available. Budco can be reached at (800) 331-2246 or (918) 252-3420.

American Polywater has introduced two new winter grade cable pulling lubricants. Polywater F is a fiber optic cable lubricant that works well at very cold temperatures. It leaves a lubricating film after its water has evaporated for continuous lubrication during long or delayed pulls.

Likewise, Polywater J works well at very cold temperaturs and can be stored outside in normal winter weather without freezing. It offers friction reduction under high shear conditions. For details, call (800) 328-9384 or (612) 430-2270.

CableData has announced a new printing concept for subscriber statements. Called Create-A-Bill, the concept allows statements to be printed in one of four formats—Benchmark, Benchmark Plus, Spectrum and Spectrum Plus—including a third panel, custom colors and design and two-sided printing.

Benchmark is CableData's standard two-panel statement featuring 48 ledger line items, four separate message areas, PPV line item detail and custom graphics. Benchmark Plus adds a third panel, providing 60 percent more area to the ledger and message areas.

Spectrum offers the option of custom design and printing on the two-panel or three-panel stock. Systems can have up to two-color printing on the front and one-color on the back. The reverse

Comcast Cablevision of Philadelphia, with the cooperation of the city's Opportunities Industrialization Center, recently trained 40 persons in advanced CATV technology. OIC was founded in 1964 and is committed to training disadvantaged and underskilled Philadelphians. The 160-hour CATV technician training course is conducted by Temple University's Center for Social Policy and Community Development. This was the first time such a training course was undertaken under the auspices of a major university. Instructors and those receiving certificates from Temple upon completion of the course are shown above, from left to right, top row first: Barbara McLean, director Human Resources Development Center, Temple University; Jeff Hopkins, technical supervisor area III, Comcast; Willian Goetz, vice president and general manager, areas III and IV, Comcast; Richard Kirn, instructor, Temple University; Chip Crawford, general manager, area III, Comcast; Robert Nelson, executive director, OIC; Archibald Allen III, assistant director, Center for Social Policy; Prof. Seymour Rosenthal, director, Center for Social Policy; John Donahue, director of operations, Comcast; Delores Muldrew, director of human resources, Comcast; and Jarma Farishy, program coordinator, Temple University. Bottom row: Robert Hearn, service technician, area III; Dondell Jett, service technician, area III; John Manning, service technician, area IV; Eric Morton, service technician, area III; Clarence Pringle, line technician, area III; Guylend Frazier, service technician, area IV; Michael Baselice, service technician, area IV; and Alfred Santana, service technician, area III.

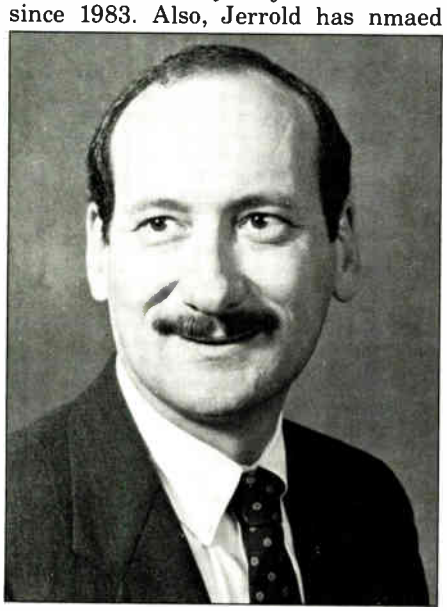
side can be used for channel line-up, customer agreement or other recurring communications. The new format will cost operators as little as one-half cent per statement. For info, call (916) 636-5631.

David Robinson

People on the move

H. Allen Ecker has been named senior vice president, technical operations and chief technical officer at **Scientific-Atlanta**. Ecker has been with S-A since 1976.

David Robinson has been named director of fiber optic programs within the **Jerrold** Distribtion Systems Division of General Instrument. Robinson has held a variety of jobs at Jerrold since 1983. Also, Jerrold has nmaed



Richard M. Lundy

Stephen Kolesar vice president of total quality and reliability. Kolesar will report to Lemuel Tarshis. Finally, **John Buckett** has joined Jerrold as director of sales, national accounts. He will oversee a staff of six persons and will report to Ed Breen.

On the corporate side, **General Instrument** has named **Matthew Miller** its vice president of technology. Miller, who comes from Viacom International, will oversee corporate technical strategic planning and coordinate long-range research and development programs.

George Fletcher has been named vice president of corporate marketing at **Texscan Corp.** Fletcher will work to assure close corporate marketing within the three product families of Texscan. He comes to Texscan from Jerrold.

Richard Lundy has been appointed vice president of engineering at **C-COR Electronics**. He comes from GTE Government Systems Corp. In other appointments, C-COR named **David Badoud** Western regional account executive and **John Pawling** was named field services manager.

Catel Telecommunications has named **Richard Green** to the position of vice president of sales and marketing. He comes to Catel from Granger Associates.

Richard Green

James Quigley has been named national sales manager for **Pico Products'** cable TV division. Quigley has been with Pico since 1983.

Thomas Brooksher has been named director of marketing at the **National Cable Television Institute.** He was

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most recently with Human Resources International. Also, NCTI has named **Howard Nuell** to the new position of instructional designer. He comes to NCTI from JRS Enterprises.

Don Foster has been appointed national accounts manager for the Baker Division of **Sonoco Products**, which specializes in supplying wood, plywood and steel reels for cable.

Anixter hires new manager

John Dellesandro has been named Northeast regional manager for **Anixter Communications**. He has been with Anixter for nine years.

Randy Carpenter has been appointed director of marketing and customer services for **NaCom**. He was formerly NaCom's area manager in the north central region.

Midwest CATV has named some new reps. **Robert Kirby** will focus on opening a new territory in New England, while **Greg Lemon** has moved from engineering to outside sales in the central region and **Wayne White** has been added as a telemarketing sales rep in the eastern region.

Richard Heffner has been added to the staff at **Channelmatic** as the new regional sales manager for the Southwest. He comes to Channelmatic from Multimedia Cablevision in Wichita, Kan.

Walter (Bill) Stockman has been named regional sales manager for **Penstock East**. He was formerly with Weinschel Engineering and Midwest Microwave.

Pioneer Communications of America has opened a new field office, transfered its service center operations and added a new account rep. The new field sales office is located in Denver and is being manned by Richard Schmeck Call (303) 740-6718 for information. Meanwhile, Pioneer's cable TV service center has been transfered to Pioneer Electronics Service Inc. The service center will remain in Columbus, Ohio but will move into a new facility. Call (614) 771-1050 for full information. Finally, **Gary Campbell** has been added to the sales staff as western account manager. He was formerly with Cooke Cablevision in Medford, Ore.

ComSonics has promoted **J. Donald Runzo** to applications engineer. He was formerly a field engineer. Also, **Katherine Harmon** has been named customer service representative.

And, in case you didn't know already, **American Television and Communications** has relocated its headquarters to Stamford, Conn. The new address is 300 First Stamford Place, Stamford, Conn. 06902-6732.

Other news bits

- In case you haven't heard yet, a portion of the Pirelli organization was purchased by the management. The part relating most closely to CATV (which provides fiber optic hardware) has been renamed Orchard Communications. The company is expected to get more heavily involved in the CATV side of things, so watch out for some new products soon, including an AM trunking system.
- Another exhibitor at the Western Show will be STC Components. Primarily a United Kingdom fiber optic hardware concern, Ken Johnsen hopes to make STC more well known in the States. The company will focus on bringing multi-channel fiber video systems and digital systems to market in the near future, if Johnsen has his way. ■

—Roger Brown

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Today's fiber systems short-term fixes

I have serious technological, economic and operational problems with the currently proposed fiber optic hub systems. AM or FM makes little difference.

First, the FM systems load a maximum 24 channels (typically 16) on a fiber. This means each hub requires two, three or four fibers per hub. For argument's sake, let's use three fibers (72 channels to a hub). Each hub serves a four-amplifier (maximum) cascade or about 8,000 feet, which equals slightly more than 80 subscribers. Again, for the sake of argument, let's be generous and say the hub serves 100 subscribers in a typical system. That means we have 10 hubs for every 1,000 subscribers...100 hubs for a 10,000 subscriber system.

The costs of fiber

At three fibers per hub this is 300 fibers. The cost of fiber cable ranges from 45 cents to 50 cents per fiber meter or about 42 cents per cable foot for a three-fiber cable. A 10,000-subscriber system can average about 100 miles of plant. While all systems vary in size, layout, etc., we will arbitrarily use one hub per mile of plant for this discussion.

The first hub (one mile from the headend) will require about $2,200 worth of fiber. Hub 2 is double that ($4,400 for fiber) and so on. This means Hub 1 costs $2,200 for fiber plus about $3,000 per fiber for electronics (the optical receiver); or about $11,200 plus a power supply and the conventional amplifiers, drops, etc., to serve those 100 subscribers—more than $112 per subscriber.

Hub 2 is two miles away from the headend. These subscribers require $4,400 worth of fiber plus the optical line electronics for a total of about $13,400. These 100 subscribers cost in excess of $134 each. If we go to Hub 100, well you can do the math.

Electronic upgrade needed

Let's say we do some fancy engineering and feed several hubs off one set of fibers. Based on the specifications I have seen for these systems, we are going to have to upgrade the electronics. For ease this discussion, I will assume the electronics are upgraded for no additional cost. This means we launch a 0 db signal from the headend laser. The receiver sensitivity is -30 dB. The final receiver in the chain must have a signal no less than -30 dB. We then have a loss budget of -30 dB.

By Gary Moore, Consultant

COMMENTARY

At Hub 1 we have a splitter loss of about 4 dB, so Hub 2 receives a -4 dB signal (we are not counting fiber loss-attenuation for this example) and we continue decreasing the signal strength at each hub by -4 dB. Using this as a guide, we can feed a seven-hub cascade and maintain video quality at each subscriber.

This reduces our fiber count to just 15 three-fiber cables ($14.29). It adds three splitters per hub (300 splitters) at a list price of $50 per splitter. So we add $1.50 per sub per hub and we have reduced the fiber count, therefore the overall system cost, assuming we can achieve the multiple hub feeds. We get into other problems, but they get too detailed to explain here.

Analog system to the home

There is an analog system proposed that carries fiber all the way to the home. It can be configured to use hubs or without them in small systems. This system uses one fiber from the hub locations to each subscriber for bi-directional traffic. It loads 15 channels per fiber for trunking to the hub locations. This can be doubled with existing Wave Domain Multiplexing (WDM) techniques, however. Still, we have four fibers per hub, plus whatever redundancy you choose.

This design has been circulating throughout the fiber industry for almost 10 years. It is a switched system, utilizing broadband switching at the hub or headend and similar in concept to the BellSouth installation near Orlando, Fla.

The signal quality at the subscriber is quite acceptable. Other than requiring telephone type "home run" architecture it provides almost every feature a system operator could desire. This system does appear to have several potentially fatal operational flaws. As soon as these are remedied this system can put the CATV operator in the fiber business, capable of competing with the phone companies when they enter the marketplace.

A qualified endorsement

Yes, even though I am the industry's loudest proponent of digital video, I am giving a qualified endorsement to this technology, once the fatal defects are overcome. In all candor, this system is almost identical to one I helped design several years ago. The flaws we detected then remain now, but the remedies are much less expensive.

I know (most of) the men who designed these systems. I respect them. I do not question the quality of their work, nor the good intentions of their respective companies. But, I feel—very strongly—that these systems are not the long-term solutions for the CATV industry.

As stated here years ago and in numerous articles in other publications since then, digital video will become the norm. The program suppliers, the PPV movies and programs will be transmitted on a terrestrial fiber network. With an analog system you will have to go to the expense of conversion plus the added potential problems with more electronics.

I am quite willing for the manufacturers or designers of these systems to prove me wrong. CED will gladly given them "equal time" to argue their case(s) and discuss their systems. To preserve an equal comparison I ask them to use the same system criteria I have used in this article:

- One headend
- 10,000 subscribers
- 100 miles of plant
- 60 subscribers (HH per mile density)
- 64 channels.

I did not include return path fibers, nor did I include any data or other services. Just getting 64 video channels to a subscriber. The audio doesn't even have to be stereo. Likewise, I did not factor in splicing or connectorization or installation costs.

Had I wanted to really get everyone screaming, I could have taken this discussion an additional step and included stereo audio with SAP and the migration into HDTV. ■

The opinions expressed here do not necessarily reflect those of CED *magazine or International Thomson. Persons with opposing viewpoints are invited to respond in writing.*

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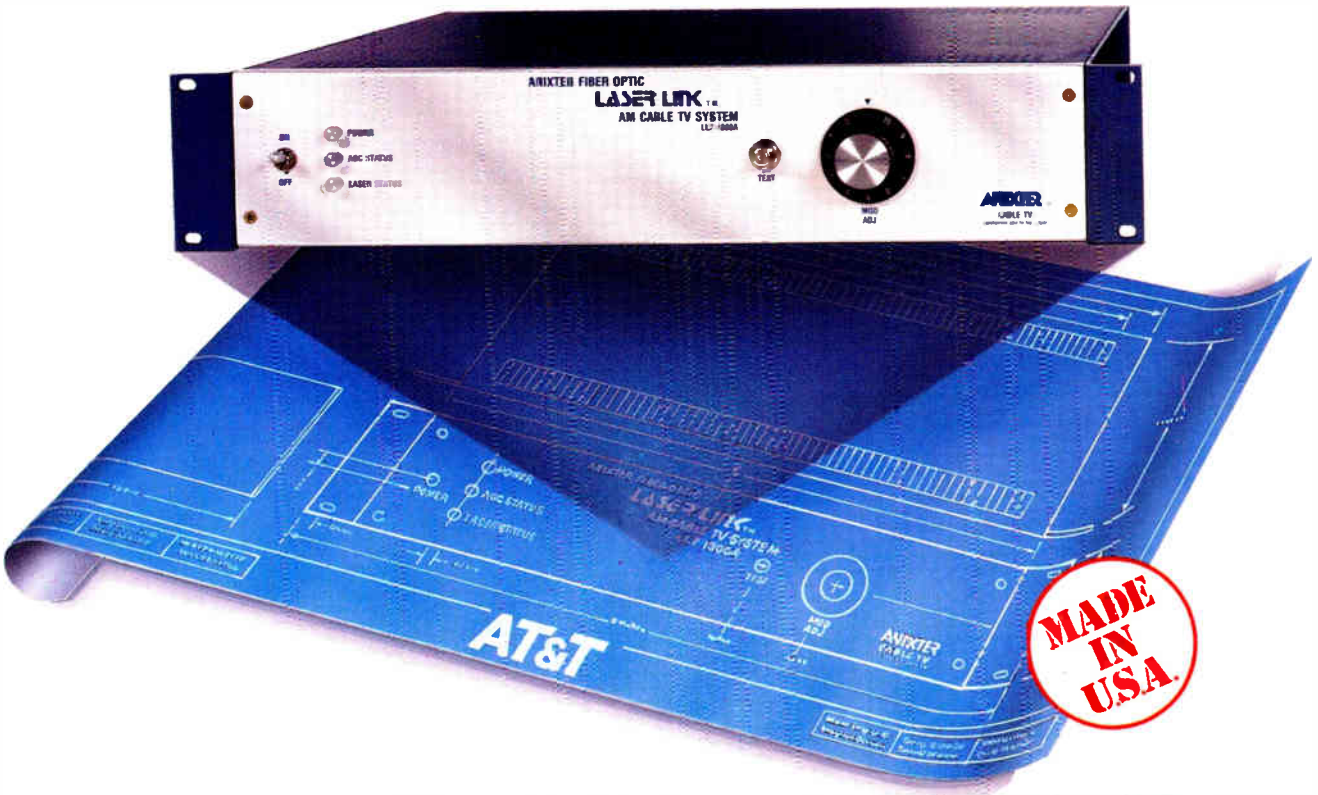

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