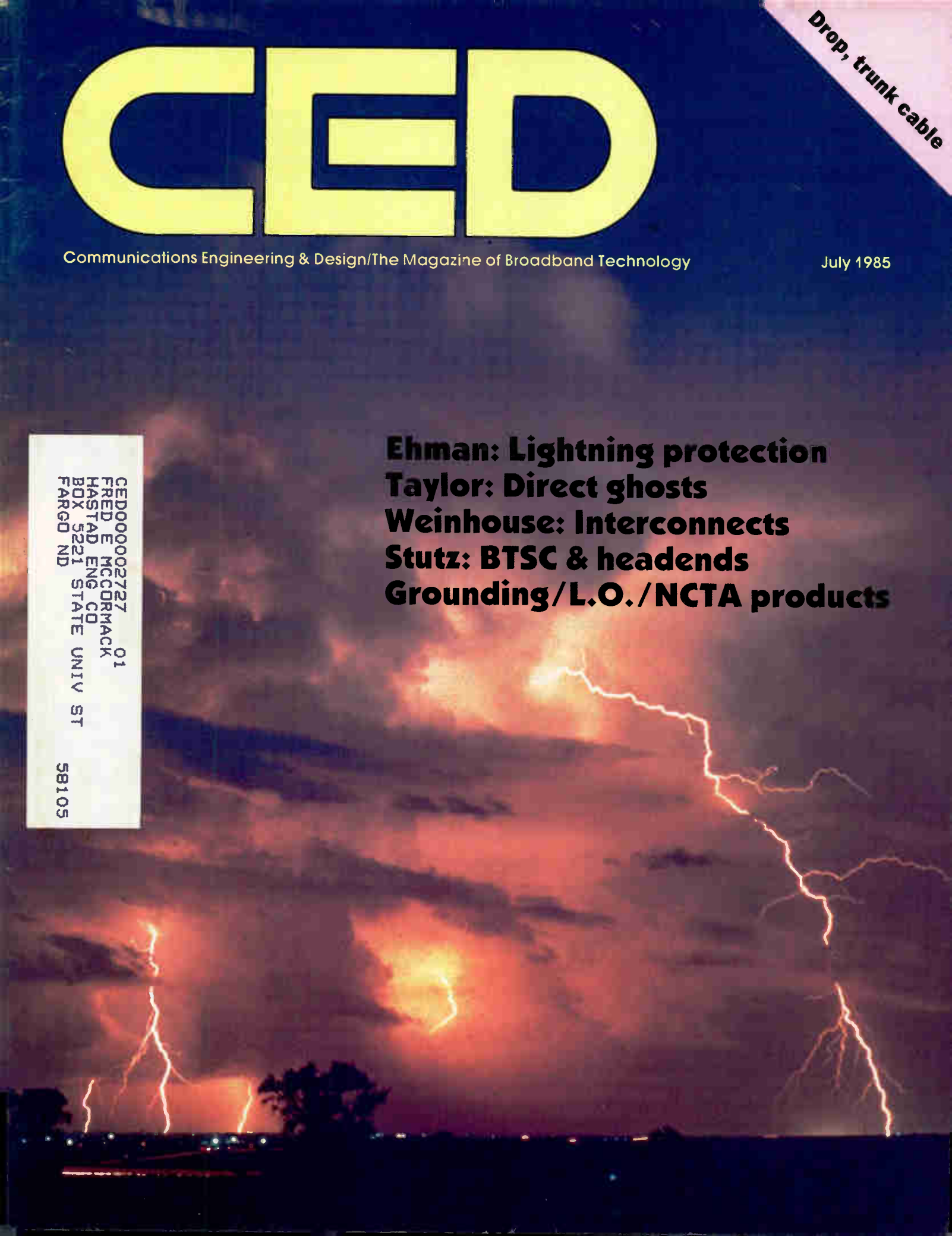
CED

Communications Engineering & Design/The Magazine of Broadband Technology

July 1985

Drop, trunk cable

Ehman: Lightning protection
Taylor: Direct ghosts
Weinhouse: Interconnects
Stutz: BTSC & headends
Grounding/L.O./NCTA products



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I

Demand High Sensitivity.
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II

Demand Ease-of-Use.
Make sure it's lightweight and portable. With simple controls. And no separate transmitter required for operation.

III

Demand Quality.
With proven reliability. Documented field success. Plus support from a major US CATV/electronics company.

IV

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Be sure you can choose a detector for *any* channel frequency—from 54-300 MHz.

V

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For quantifiable results and measurements—not just basic "leakage/no leakage" indications.

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VII

Demand Audible Tone Alarms.
For fast tracking and location-sensing. With a pleasant, non-abrasive tone.

VIII

Demand "Standards," not "Accessories."
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Demand Quick Delivery.
Be sure you can get your detectors in a matter of weeks—not months.

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Reader Service Number 2

CED™

July 1985

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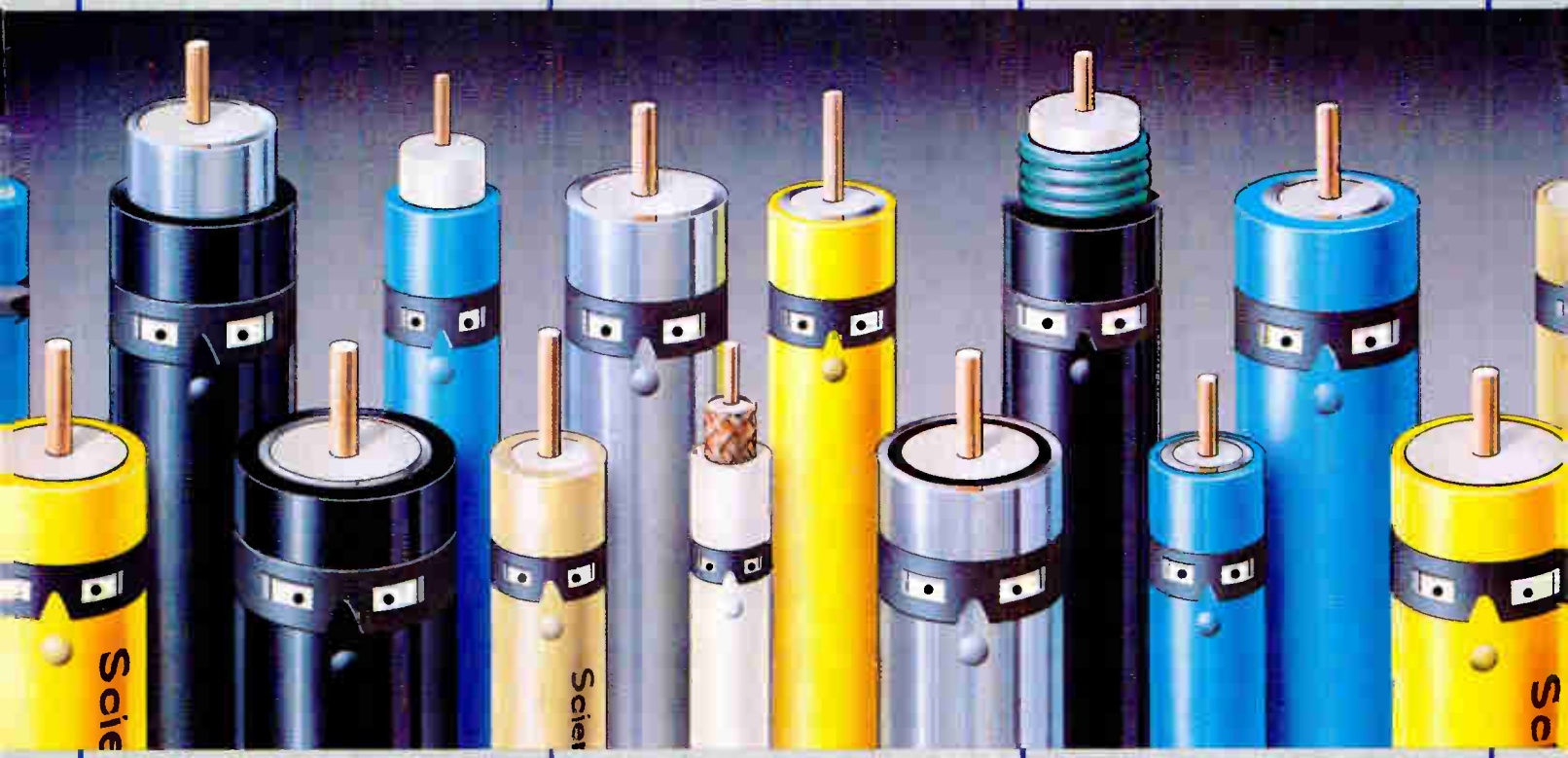

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Reader Service Number 3

Katherine Rutkowski

While attending the technical sessions at the NCTA this year, you may have wondered who organized and arranged them. Katherine Rutkowski, director of technical services, NCTA, is one of those responsible—not only for the organization of the sessions, but for the technical papers as well.

Rutkowski began with the NCTA as assistant director, technical research, science and technology department. After holding the position for five years, she had a good idea of the job and working technology when promoted to director last year. It's a pretty diverse job," said Rutkowski. "I try to divide it into segments but they all kind of swim together after awhile."

Rutkowski is responsible for coordination of the technical program at the annual convention. She also publishes the technical papers and writes the NCTA monthly newsletter, Techline, and works on the Recommended Practices text.

Compiling information, editing and organizing are, perhaps, a few of Rutkowski's strong points. After obtaining her master's degree in library services from Columbia University, she worked as an information specialist/librarian for various universities. Five years later, she landed a job with ABC.

"I wanted to break into a steady job doing documentary research, but they were hard to come by. I began in the ABC news library and moved on to corporate research. That's where I became interested in communications, in new technology research.

As assistant to Wendell Bailey, vice president of technology, Rutkowski is involved with new technology. She also is involved in the engineering committee or its subcommittees. Whenever there's an engineering aspect that the NCTA as a trade association has to handle, Rutkowski is usually there with Bailey.

"Where my strengths come into play is in advance planning and follow through," said Rutkowski. "I'm sort of in the background but making sure that a lot of ongoing projects actually get completed. As for the technical side, I've created my own niche so that I respond more in a sort of reference capacity. I might not know everything about the nuts and bolts of how it's put together, but I've developed an expertise in telling people who can answer the questions. Where to find the information is a large part of the job—connecting people with the right source."

Her sources? Research from one of the publications. Or perhaps something picked up at the bimonthly engineering committee meeting. "I hate to use the word nag," said Rutkowski, "but I do. I try to remind people that interesting statements were made and that it would be in everyone's interest if they did follow up on them."

As for the future of the cable industry, Rutkowski has an unusual view of the industry. "I think my bias is always to see the industry from standing on the shoulders of engineers. I think the technical architects are going to continue to save the industry—the engineers are going to keep everything moving and right now, at the NCTA, we're doing the background work to make sure the industry continues to be a success.

"I really have a lot of confidence in the engineering community and its creative solutions. Alex Best, Joe Van Loan and others like them are out there and have invested a lifetime in this industry and their work. I'm seeing their optimism and their kind of practical solutions—the short and long term. It makes me think we haven't stopped at all, we've just started."

—Kathy Berlin

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Belden's drop cable with DUOBOND PLUS™ shield helps you prevent costly call-backs. It's also the most shield-effective drop cable in the CATV industry.

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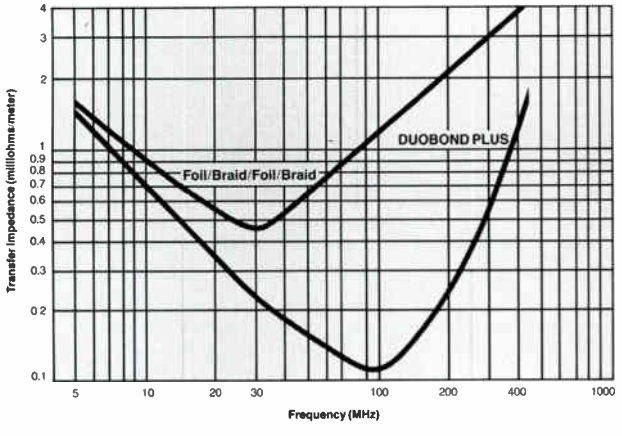
Cables with the DUOBOND PLUS shield require only half the steps for termination than 4-shield cables. Because it's less bulky, more flexible and its outer foil is bonded to the jacket, stripping and connectorizing are much simpler tasks. You can minimize your connector inventory to one size connector and one crimp tool.



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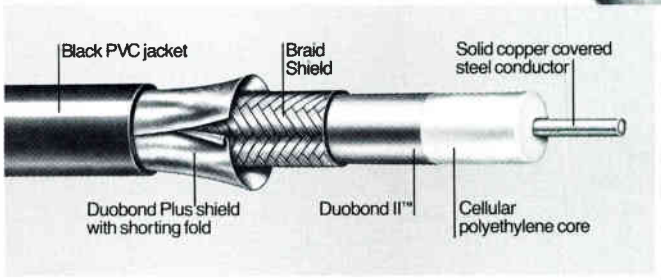

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Reader Service Number 4

BELDEN

COOPER INDUSTRIES

Close ghosts

By Archer Taylor
Malarkey-Taylor Associates

Many years ago, as part of a due diligence technical inspection for the prospective purchaser of a cable system in the Northwest, I cited what I called an annoying "close ghost," which I interpreted as a system defect. I am not sure the broker, Bill Daniels, has ever forgiven me for nearly blowing the deal.

However, I had been concerned about the same condition in my own system and spent a great deal of time and worry trying to determine the cause. Gradually, I discovered that this defect was not unique to cable networks. A TV station chief engineer blamed it on his monitor, insisting the broadcast signal was okay. The TV repair shop manager said he was just too busy to correct the defective antenna installed on his roof. The department store manager said he had complained repeatedly to the MATV shop, but they never did anything about it. Everywhere we went, we saw the same thing, without any cable system. Because at that time (20 years ago) it seemed to be worse on NBC affiliates, it was widely identified as the "NBC halo."

It was not until 10 or 12 years later that a paper by Tom Gluyas of RCA provided a rational explanation for this long-standing mystery. (T.M. Gluyas, "TV Transmitter Transient Response," IEEE Transactions on Broadcasting, March 1974, pages 1-11). In his conclusion Gluyas says " . . . the problem [of picture edge transients and low frequency ringing] cannot be ascribed to transmitters alone. It depends on the combined attenuation characteristics of transmitter and receiver." Tom Gluyas kindly refrained from implicating cable systems, which at that time boasted fewer than 8 million subscribers.

Briefly (read the Gluyas paper for a fuller explanation), the problem is caused by phase errors in the lower, or vestigial, sideband signal when it reaches the final detector in the TV set.

In those days, the lower transmitter sideband was filtered at the output of the final high-power stage with what RCA designated a "filterplexer." Measurements of the characteristics of the filterplexer revealed very large phase errors in the cutoff region at about 1 MHz below visual carrier. At this frequency, sideband amplitude was attenuated only a couple of dB.

Before the arrival of SAW filters, TV receiver IF response curves also exhibited rather large phase errors, although the amplitude might be attenuated 10 to 30 dB below the visual carrier.

Gluyas also " . . . found that commonly used demodulators vary widely in presenting transmitter system response." In other words, the demodulators commonly used for testing and adjusting transmitters might actually cause misadjustments, making the problem even worse.

What Gluyas did not say, but must be inferred, is that CATV demodulators, processors and possibly even modulators also suffered similar phase errors in the vestigial sideband region.

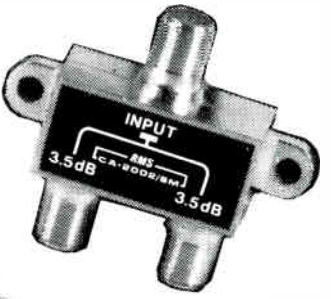
Thus, the unfortunate detector in the home TV set had to deal with two sidebands that were neither equal in amplitude nor opposite in phase, as any proper AM double sideband should be. The detector interprets phase errors as group delay, causing what appears to be a reflection or "ghost" of the luminance signal. Actually, Gluyas considers this to be one cycle of ringing caused by the transient response.

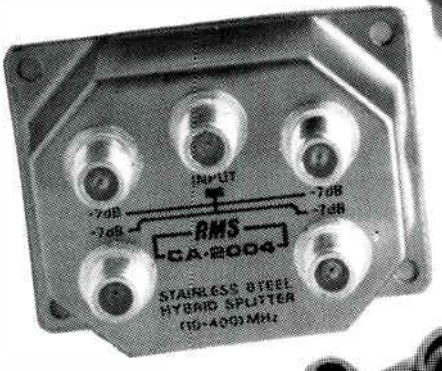
Since vestigial lower sideband phase errors may occur in transmitter filters, in cable TV processors, demodulators, or modulators, and in TV receiver IF filters, it is not possible to point the finger conclusively at any one of the three independent parties. However, there is reason to believe that less phase error exists in modern TV transmitters using SAW filters at low power stages. The recent models of cable TV headend equipment appear to be much better than they were 20 years ago. But so far, at least, my own experience indicates a wide variation in receiver performance with respect to this trailing edge effect. Certain major brands, even of recent vintage, display considerable edge effect on all channels regardless of the transmission source. Other brands, connected to the same cable TV system, display little or no such effect on most channels, and even the worst case is much less severe.

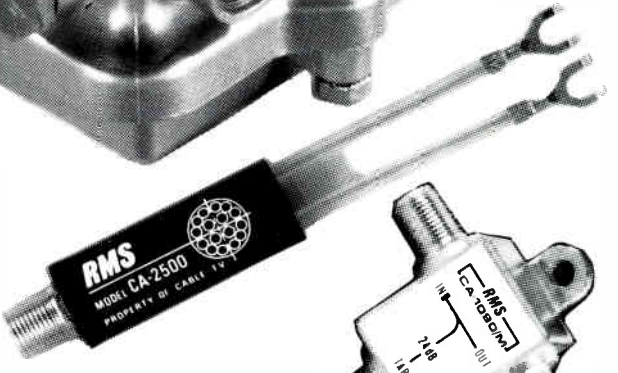
The matter is further complicated by the possibility that the phase errors in the three systems could be compensatory in some cases and additive in others.

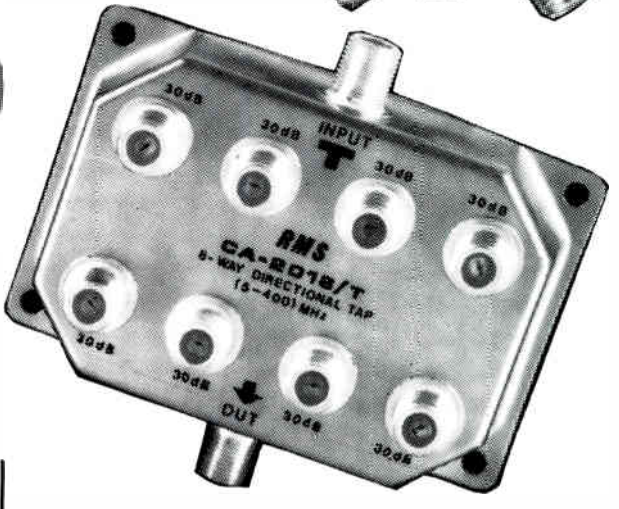
Unfortunately, I have no handy-dandy solution. If we could abandon vestigial sideband AM for FM transmission, as Sruki Switzer suggests, we would avoid the problem. Digitizing the detected signal offers realistic prospects for corrective surgery. But for the immediate future, we can only try to maintain our own single channel headend facilities with as little phase error as possible. The best test for this is the 2T sine-squared pulse. If your headend can pass a 2T pulse with no trailing overshoot or ring, you are probably safe to blame the TV station or the customer's receiver. However the problem cannot be corrected either by a TV repairman or the chief engineer of the station. Therefore, the 2T pulse may be more useful in easing your own mind than in convincing irate customers it is not the fault of the cable system. CED

YOU CAN'T AFFORD LESS!









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Reader Service Number 23

Volume 11, No. 7

In Perspective

CED

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Do your duty, he said

"Do your duty, and leave the rest to Heaven." That's one of the lines in the play "Horace," penned in 1639 by French dramatist Pierre Corneille.

About the same time, Yamaga Soko wrote about the way of the samurai. The business of the samurai? Reflection on your life, loyal service to your master, deeper fidelity with your friends, but above all, duty.

Fine, and still useful, words of wisdom. The occasion summoning these perhaps dusty quotations? No anniversary certain to be recorded in the history books, perhaps, but unquestionably an important point for *CED*. A time to take stock. A time to look at where we've been and figure out where we're going.

A bit over a year ago, at the 1984 NCTA convention, I had a chance conversation with a member of our present editorial board. It was a very short encounter, no more than a few minutes as we were passing in one of the convention halls. But one question he asked me has guided our efforts at *CED* in the time since.

The question? "When are you guys gonna do something?" Seven words. Stinging, perhaps, but honestly conveyed at a time when we needed to hear it from a friend.

That's where the duty part comes in because, since then, we have considered it a matter of the highest importance to serve this industry and our friends in it. As you might have noticed, I've talked a lot about devotion, excellence and winning over the past half year or so. That's no accident.

CED 's our business. But it's more than that. *CED* is about our ability to give this industry something to be proud of. It's about our honor, our integrity, our intelligence, our commitment and our skill, as well.

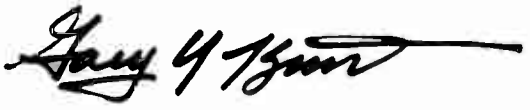
We learned something valuable during that brief seven-word encounter. The lesson? Without fidelity to our readers, we don't deserve to be in business. Our duty is to serve this industry faithfully and respectfully.

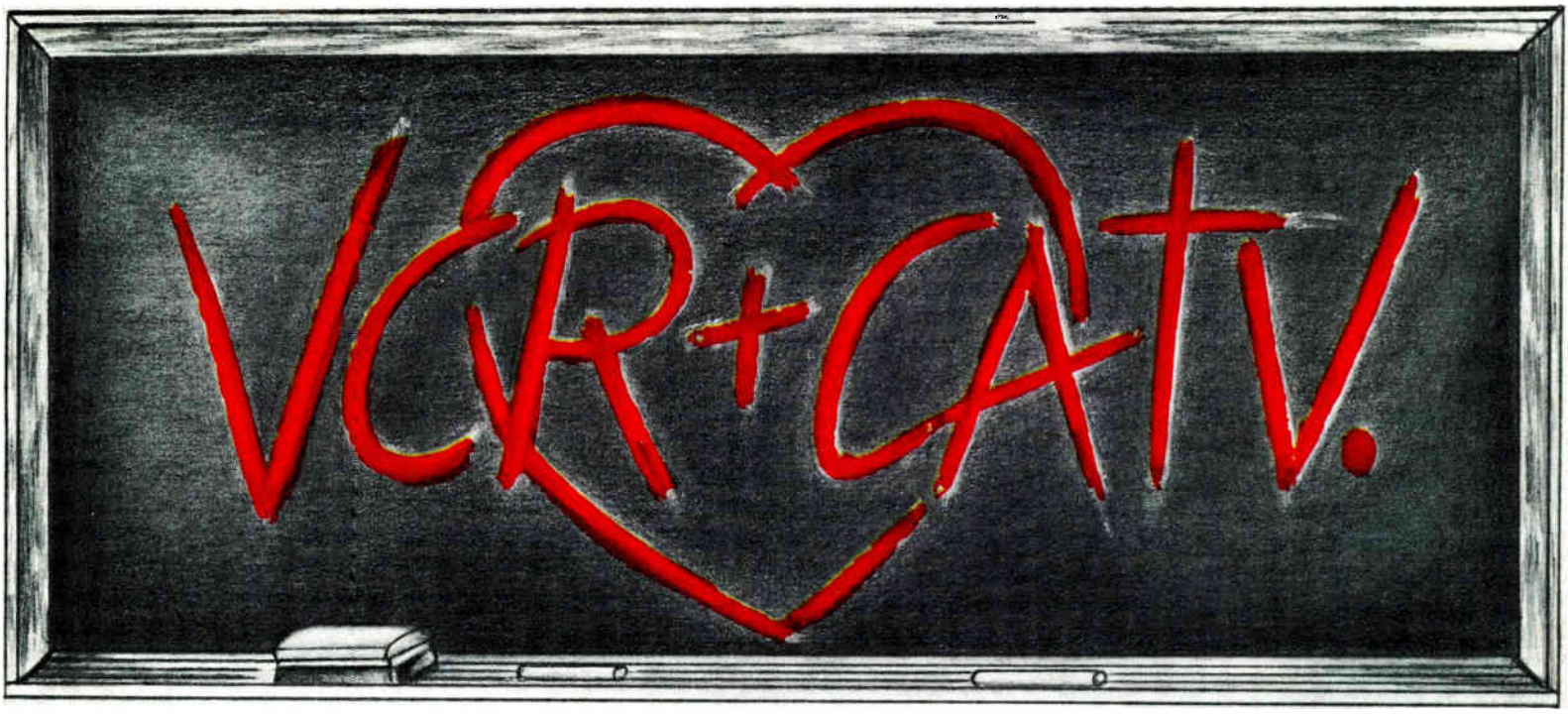
We're not stopping now, either. But taking stock of how the year has gone, we're very pleased. This year's NCTA was great for us—the best trade show I've been to in my admittedly short time in the industry.

We've learned to listen to you. And we hope we can keep giving you what you want, and what the industry needs. It's a tall order and a heavy responsibility.

But as Mr. Corneille said so long ago, "Do your duty and leave the rest to Heaven."

We will.





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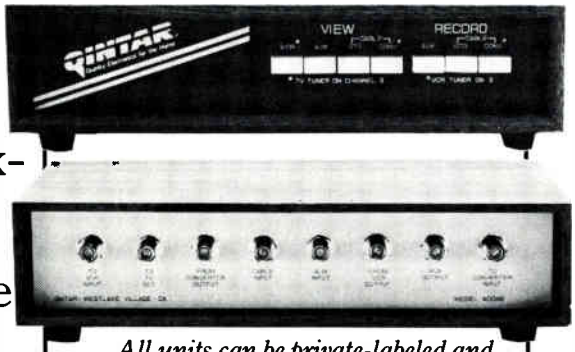

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LIGHTNING ELIMINATION

By Roy Ehman,
Director of Technical Services,
Storer Cable Communications

When I first heard the term "lightning elimination" in 1976, I smiled thinking it was a joke. After all, "It's not nice to fool with Mother Nature." But lightning strikes and the ability to prevent them are both very real.

Each year, lightning causes millions of dollars damage to installations and surrounding facilities in spite of the fact that every possible precaution was taken—including efficient grounding. At least one well-known MSO drills a well at its major tower sites, thereby achieving a ground connection of substantially less than one ohm!

That's fine, as far as it goes, but the better your tower is grounded, whether by a well, a counterpoise or radial array of ground wires and ground rods, the bigger the current pulse will be when it is struck. It is not the current through the tower, per se, that does the damage but the electromagnetic pulse generated and propagated by that current. Think of the tower as an enormous one-turn transformer, and the picture becomes clear. Now, imagine the equipment at your headend being placed alongside or "inside" the transformer. Each piece of conducting material in the neighborhood will have an EMF induced in it. It is this, when strong enough, that blows out modems, CRTs, PC boards and other vital electronic equipment.

That's why it is important to prevent the strike rather than rely only on grounding it. The extent and nature of the damage is, of course, unpredictable —like the lightning itself—and depends to a great extent on the grounding practices followed in the rest of the installation, the length and exposure of wiring runs and the availability of any ground loops.

Understanding lightning

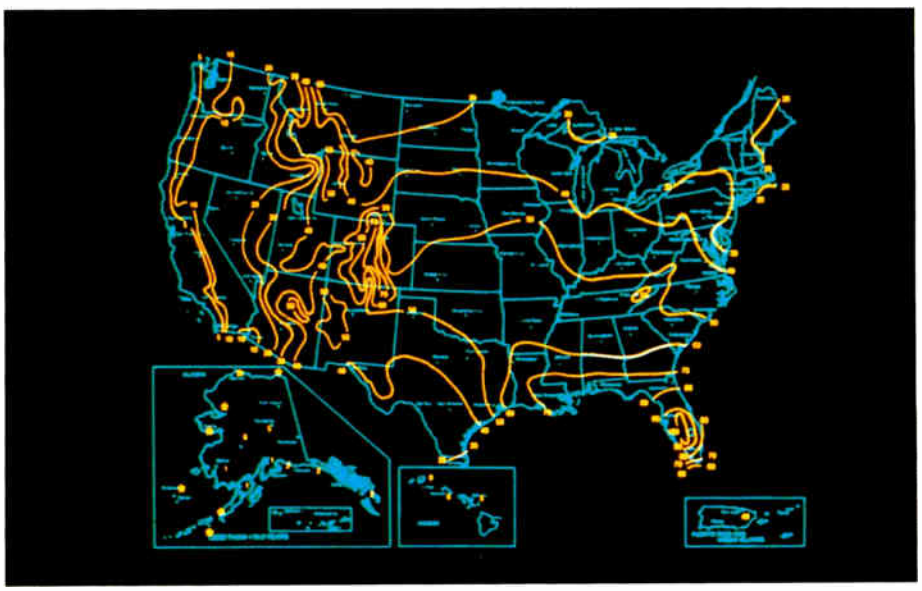
Storm clouds (thunderheads) are electrically charged bodies suspended in the atmosphere. The air is the insulator that separates the electrical charge of the cloud from the ground and other clouds. This situation can be likened to a giant capacitor. During a storm the charges continue to build and induce a similar, but opposite, potential into the earth.

The charge induced into the earth is concentrated at the surface just under the cloud and is roughly the same size and shape as the cloud. A strong field is established between the cloud and ground. (See Figure 1.) If there are headends, microwave buildings, towers, trees or other objects (including people) in this area, they also become charged. These high-points reduce the gap between the cloud and ground, and there is a greater likelihood of a lightning strike to them.

The exposure hazard

The danger of a strike to a tower or facility depends principally on its height but also on its size and location relative to the surrounding terrain. The danger also depends on the part of the country in which you are located. A quick look at the Iso-Keraunic map of the United States (see below) gives some idea of what we are up against. The higher the number, the greater the lightning activity.

In the United States the Keraunic number ranges between 1 and 100. In some tropical areas of the world, it can



Iso-Keraunic map of the U.S. shows mean annual number of days with thunderstorms.

System Grounding

Broadband systems, just as all other electromagnetic systems, must be grounded. Grounding is important for protecting individuals from shock hazard while using or working on the system and for proper operation of the active components of the system.

A basic broadband system is grounded at the headend by attaching its power supply to the building's ground. This establishes the initial ground potential of the cable's shield throughout the system.

In all broadband systems, it is recommended that an attachment from each amplifier be made to the ground grid. This minimizes the possible effects of shield currents on power supplies. When this ground attachment is made with hanger clamps to the structural steel, ensure that the paint has been adequately cleaned to make a good metal-to-metal contact.

Grounding individual taps from the trunk cable is not necessary, but can improve power line isolation for the device at the end of the drop. This technique is suggested only for environments where the ground grid is readily accessbile and can be used as the mechanical support for the device.

Annual inspection of the trunk cable can identify potential ground failures caused by corrosion, physical damage or vandalism.

Grounding between sites

Broadband systems often connect more than one building or site, and significant ground potential problems might exist. A large difference can cause shield currents on the cable that could degrade the performance of the amplifiers in that area of the system. Reduce these intersite potential differences as much as possible.

♦ Grounding individual amplifiers reduces this problem.

♦ Installing suitable earth rods at the exit and entry points of each site also helps. However, ensure that these earth rod grounds do not function as overall grounds for the entire site.

Above-ground exposed trunks

Intersite trunks that run above ground are exposed to natural energies not normally encountered inside a facility. CATV equipment is designed specifically for this environment. Surge protectors in the amplifiers protect the internal circuitry from this type of overload.

♦ Ground every eighth or twelfth support pole with a good earth rod ground to protect the system from the energy transmitted by these forces.

♦ Ground all amplifiers.

♦ Establish a preventive maintenance program to replace the surge protectors annually, especially in areas of high electrical activity.

♦ Periodically inspect the grounds for such problems as corrosion, physical damage and vandalism.

Ground loops

Even with a properly designed system using good ground techniques, ground loop problems might occur. These problems often are the result of an inadequate ground grid at the site. The first point of attack should be a thorough survey of the current ground system and of the methods for reducing or eliminating any ground potential differences at the site. If this does not solve the problem, try a sectored approach to ensure that the system ground in each area of the building is adequate. Then ensure that the power system ground potential for the attached individual devices in that area is tied together.

It is unusual for a large enough ground potential difference to exist to hamper system performance. A thorough investigation of the system should be conducted before taking these steps to ensure that ground loops are the problem.

While elimination of ground potential differences is the best approach, other techniques are available to eliminate or minimize the impact of these problems. The following list identifies the key elements in controlling ground problems in broadband systems:

♦ Ground all amplifiers either directly to the ground grid or to the nearest ground point with #6 copper ground.

♦ For between-site potential differences, first attempt to resolve them using good ground engineering techniques.

♦ When between-site potential differences are significant and cannot be eliminated, use properly selected earth grounds at exit and entry points of the sites.

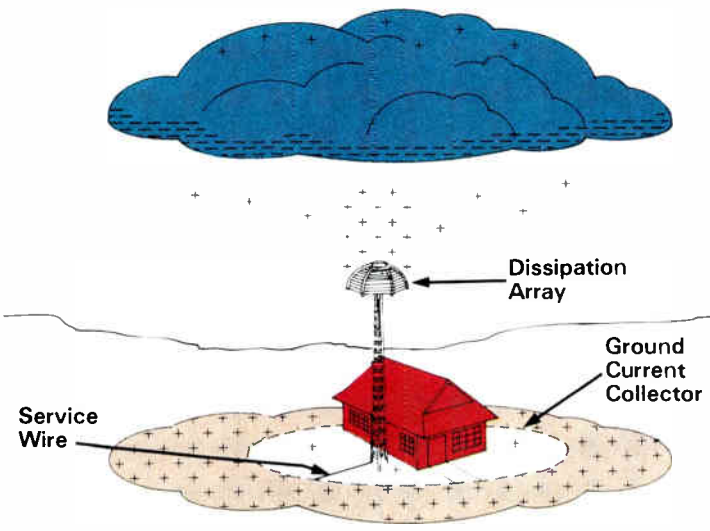
♦ Make periodic inspections of the trunk cable and amplifiers to identify potential problems.

♦ For overland trunks, use the CATV practice of grounding on every eighth or twelfth pole and institute a preventive maintenance program for surge protector replacement and cable inspection.

♦ For suspected ground loops, first test to ensure that ground loops really are the problem, and then use a sectored ground approach.

—Edward Cooper

Figure 1



reach 260. An average area within the United States can receive between eight and eleven lightning strikes per year. In central Florida the hazard increases to 28 to 37 strikes per square mile per year for flat terrain. A 50-mile stretch of A/C transmission line in this same area would anticipate as many as 1,500 strikes per year.

Point discharge principle

As operators of amateur and other radio transmitting equipment, we all are familiar with the little metal ball that manufacturers place at the tip of mobile transmitting antennas. Its electrical purpose is to avoid having a point which, under high power levels, might start severe ionization and breakdown of the air around the tip.

We also are aware of the high power lightning simulation equipment in certain laboratories and the large spheres used to enhance the build-up of several million volts before breakdown and discharge. High voltage A/C transmission lines use similar structures for the same purpose —to prevent breakdown of the surrounding air followed by the current itself.

In lightning prevention the exact opposite idea is used: the point discharge principle. A sharp point in a strong electrostatic field leaks off electrons by ionizing the adjacent air molecules, provided the point's potential is raised some 10,000 volts or more from its surroundings. Lightning dissipation arrays use this principle.

We can prevent lightning by leaking away the cloud-to-ground potential by the summation of thousands of point discharges. Let's take some hypothetical numbers for illustration. Suppose we had a group of 3,000 points discharging only two micro-Amperes each for a period of three minutes (180 seconds). This would come to over one ampere-second. Compare this with a potential lightning discharge of 100,000 amperes for ten microseconds. The result is almost the same at one ampere-second. The cloud has been discharged harmlessly at low current over a period of time rather than through one large strike.

The current leaked off by a lightning dissipation array can, in fact, be measured as a storm approaches. The story goes that an innovative TV transmitter engineer in Eastern Canada monitors this current. When it reaches a certain preset level, the current runs up his standby generator in case the approaching storm knocks out his primary city power!

Try it yourself

Here's a fascinating experiment you can probably do right now. Take a digital DC voltmeter and attach a 10 or 15 foot "antenna" on the hot side of the input terminal and run the cold side to any sort of a ground. This set-up will clearly indicate the approach of a storm. It works well indoors, and that's the best place to do it. You will see the reading rise randomly up to a point. This indicates the charge building up. It will collapse when the discharge takes place and then this cycle will repeat over and over. Dispatchers might find such a set-up handy for predicting or evaluating conditions out in a large plant.

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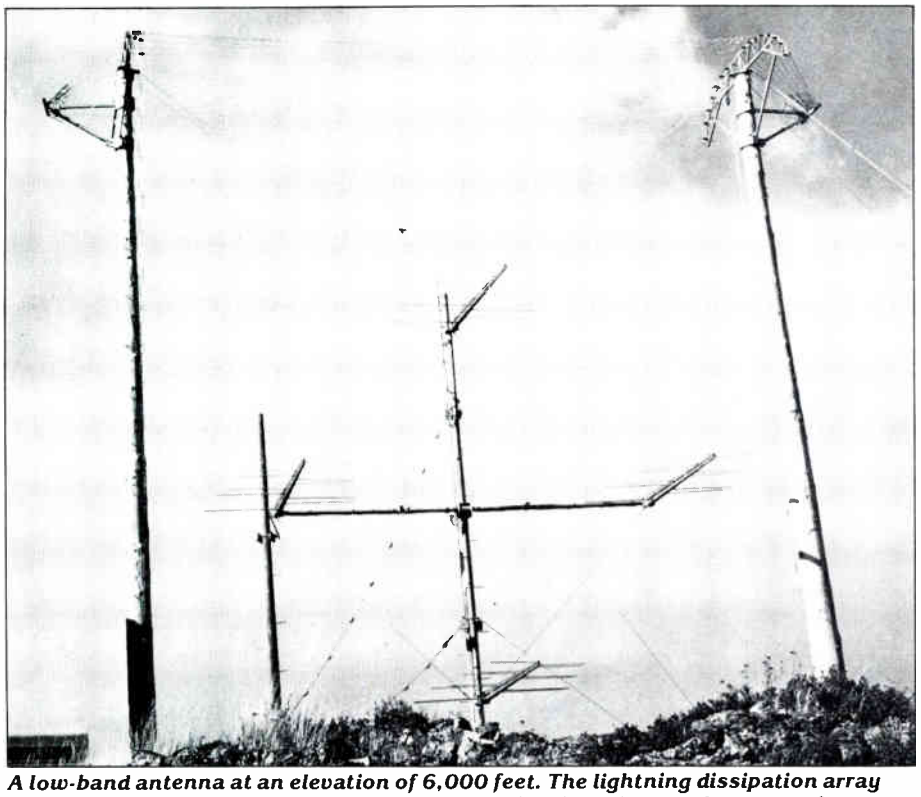
Reader Service Number 9

Figure 2



A low-band antenna at an elevation of 6,000 feet. The lightning dissipation array is in the last stage of construction. The ineffective lightning conductor can be seen on the main antenna support pole. The headend also is protected by an array not visible from this angle.

An installation erected atop 6,000 foot Mount Kelly in British Columbia had damage to microwave and receiving equipment and was getting a unique type of picture interference. This interference built up two or three times a week during the summer, usually in the midafternoon, and consisted of numerous very short fine lines, one line high and about ¼ inch long on a 12 inch screen. These lines would cycle from clear screen, steadily getting worse and then suddenly clearing. Eventually, video clampers had to be taken out of circuit, as they could not function and caused further impairment. The interference increased with static charge build-up caused by an impending storm, and the clearing was in step with the discharge of these fields when lightning struck.

A lightning dissipation array was commissioned and designed specifically for the antenna and the nearby building. (See Figure 2.) It consisted of a stainless steel wire much like barbed wire, except the barbs were thinner and sharper. (See artist's rendition Figure 3.) The array was very difficult to erect but well worth the trouble because it cured both the lightning and the interference.

Joe Huser, who looked after the receiving station on a daily basis,

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frequently has been on site during an approaching storm. He vouches for the fact that *the lightning actually stops* as the storm passes over the antennas and headend, and it resumes again after the storm has passed by.

To the best of my knowledge, that installation is still standing after eight years and has not been struck again. A strike received before the array was put up actually vaporized 5/16 stranded copper ground wire in two places, leaving one-foot-wide holes in the ground!

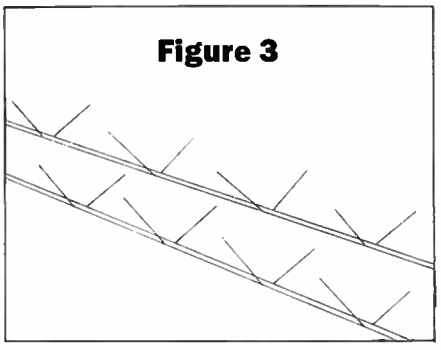
A fine opportunity to verify the efficacy of lightning elimination arrays presented itself when both towers of the World Trade Center in New York City were completed. One tower was protected; the other was not. One tower was struck repeatedly; the other went unscathed. Now, both are protected.

Personal safety

Every year hundreds of people in the United States are killed by lightning, either by a direct hit or from the side effects. Most are killed at home because that's where most people are during a storm.

Try to turn off or disconnect your TV, computer and other sensitive equipment *well before* the storm hits.

Figure 3



Once it starts, stay away from all conductors such as telephones, electrical machinery, switches and even the kitchen sink and other plumbing.

Outside domestic TV antennas do not protect a house, but rather become targets for lightning which they cannot handle. Cable customers need to be made aware of this and if an antenna is a "must," it should be put *inside* the roof or attic and very well grounded. A professional lightning protection job with proper conductors, thick wire and grounding can ensure the safety of a home.

Being caught out in the open is a different matter. People out on fairly flat terrain are prime targets. Golfers carrying metal clubs out in the open are in especially great danger.

Lightning generally strikes the highest object in the area, so don't go under a solitary tree or the tallest clump since they are the most likely targets. You may be severly injured or killed if that tree or trees is struck. Shelter nearby, but *not under*, trees.

If necessary, lie down in a ditch or culvert. Better to lose your diginity than your life! If you feel a tingling sensation or your hair starts to stand on end, lie down as low as you can *quickly*. You are being "set-up" for a strike.

In and around the cable plant there isn't much danger thanks to the protective shielding provided by the power primary and secondary, the strand, the telephone and, of course, the cable itself. Keep away from any conductors, grounded or otherwise, while lightning is about. You are safe inside a metal car or truck, but extremely vulnerable at the moment of entering or leaving it.

A metal pole or short tower tends to protect everything enclosed in the triangle formed by the top and 45° angles from direct hits.

And as for the old tale about lightning never striking in the same place twice, be advised. It not only can but invariably does. The damage done to cable plant itself often is severe, extensive and costly. Fortunately, it can be handled—but that's another story.

CED

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Unlike some other choices, Alpha maintains the Good Name of Standby Power by offering a reliable and failsafe approach—as we have right from the start. We call it the **"single ferro transformer"** concept.

This design concept leaves the ferroresonant transformer always connected to your Cable plant, regardless of power failures or other disturbances, and does away with the need for a second transformer.

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This concept needs fewer components which translates into **higher reliability**. Because the inverter cannot be activated, even with the line relay contact "stuck", this concept also gave us the fail-safe feature that helped us to obtain both **UL** and **CSA** approvals. And that gives a good product a good name.

Of course there are more reasons for Alpha's leadership and good name in Standby Power. Features such as **Temperature Compensated Charging** matched to the battery type and **Automatic Selftest** and **Equalizing**, to name just two.

Alpha was the **first** to offer **Remote Status Monitoring** for it's power supplies on a stand-alone basis.

And now Alpha has introduced two new State-of-the-Art Standby Power product lines. The **FT** series, a fast transfer type for critical loads up to 500VA, and the **APCG** series for true UPS performance up to 1500VA at Standby prices. Our ongoing efforts to give you the best engineered products will continue to give Standby Power a good name...**ALPHA.**

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Reader Service Number 14

NCTA tech review

By Kathy Berlin

You had to walk away from Cable '85 knowing a few things. The industry has to do a better job interfacing with consumer electronic devices. It has to get ready for pay-per-view and local advertising as well. Those were some of the messages pitched to attendees, and industry vendors were ready with answers.

The VCR and stereo-compatibility products were there. So were PPV systems, new insertion gear and options, data transmitters and receivers. Better signal and terminal security, easier terminal reprogramming and connector corrosion were some of the problems manufacturers had answers for.

Distribution gear for higher bandwidths and easier maintenance also were featured. Perhaps a few bells and whistles. But mostly just better gear to solve everyday problems. The bottom-line stuff. Here's a run-down on it.

Consumer electronic devices

Times Fiber Communications Inc. added a Programmable Remote Control Unit (PRCU) to Mini-Hub II. The PRCU allows subscribers programming of Mini-Hub II in-home electronics and VCR recording of a maximum of eight events over a 14-day period. It is compatible with the basic remote control unit so both units can be integrated throughout the system to meet all subscriber needs.

Scientific-Atlanta Inc. introduced the C*DATA receiver and transmitter. Designed to work with X-PRESS, a new data service soon to be offered by X-PRESS Information Services Inc. of Denver, Colo., these products permit the CATV operator to distribute and control computer data to subscribers in the same manner as premium TV programming. Local data-generation services and delivery of future services also are possible with the products.

S-A also pushed its BTSC compatible equipment for cable operators. The equipment consists of the Model 6380 stereo headend encoder and Series 8500 set-top terminals. The system is compatible with sync-suppression scrambling.

TOCOM demonstrated a new VCR-compatible model of its 5503 baseband addressable converter. The Model 5503-VR incorporates an integral VCR timer.

TOCOM also showed its VCR interconnect kit, the VCR-Mate, which enables subscribers to easily connect the 5503-VR converter to the VCR unit.

Jerrold exhibited its BTSC stereo-compatible converter products. All Jerrold converters are compatible with the

NCTA awards

The National Cable Television Association presented its National Awards, the industry's top honors for individuals, in a program concluding its 34th annual convention.

John Levergood, president and chief operating officer of Scientific-Atlanta Inc., received the Associates Award, which recognizes the contributions of programmers and equipment suppliers.

The Science and Technology Award was presented to Abe Sonnenschein, AML product manager, Microwave Products Division, Hughes Aircraft Co. This award honors individuals who have been active in product improvement, design and development of engineering techniques.

SCTE news

The SCTE announced it will award four scholarships for technical education to deserving members of the cable TV industry. One award will be made at the national level, with three smaller awards determined by the three official Chapters of the SCTE. A total of $1,000 in awards will be granted in 1985.

Also announced by the SCTE is a national membership drive designed to benefit the SCTE's local Chapters and Meeting Groups. Rebates are being offered for each national member recruited by a SCTE Chapter or Meeting Group.

The SCTE appointed committee chairmen for its BCT/E certification program. The six categories and their chairmen are:

- Alex Best, Scientific-Atlanta, Signal Processing Centers
- Paul Beeman, MTV Networks, Video and Audio Signals and Systems
- Abe Sonnenschein, Hughes Microwave Products, Transportation Systems
- Ernie Tunmann, Tele-Engineering Corp., Data Networking and Architecture
- Bud Campbell, ATC, Terminal Devices
- Wendell Bailey, NCTA, Management, Professional Ethics

Vacancies exist in some committees for additional members. Please contact the chairman listed above or SCTE National Headquarters at 215/692-7870 for details.

The SCTE Rocky Mountain Meeting Group will sponsor a technical seminar on September 10 and 11, 1985, in Denver, Colo. For more information, contact SCTE Regional Director, Sally Kinsman, at 303/696-0380.

The Technology of TOMORROW

from the Innovators – LRC Electronics

LRC Electronics introduces its latest connector engineering innovation—the "K" Series. Designed for ease of installation and total reliability in future systems, the "K" Series features:

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BTSC stereo format.

Jerrold also demonstrated STAR-SOUND, the stereo adapter unit designed to bring stereo sound into the homes of cable TV subscribers with non-stereo TV sets.

Zenith demonstrated a VCR interface device that allows customers to simultaneously record a pay channel and watch a network channel, without complicated connections or A/B switches. The interface works with any VCR and with any type of cable converter system and can be installed simply by the subscriber.

Zenith also showed its TAC-Timer, a remote control transmitter that programs the Z-TAC decoder to change channels automatically when the subscriber is not at home. The TAC-Timer uses a new Z-TAC remote control transmitter with a built-in programmable event timer and channel selector.

Pay-per-view

Scientific-Atlanta announced the Series 2400 PPV Entertainment System to help hotel/motel operators market premium programming services to their guests. The system consists of set-top terminals, a system manager computer and a two-way addressable transmitter and is capable of delivering programming from several media: video tape format, off-cable or directly from the satellite when configured with SMATV headend receiver equipment.

Zenith Electronics Corp. unveiled Phonevision, a telephone-based PPV ordering system that offers one-way addressable cable systems a cost-effective way to deliver IPPV. Phonevision is built around the Z-TAC addressable decoder system and special hardware and software at the headend. It requires no additional hardware in the home.

Jerrold demonstrated its STARFONE IPPV product for one-way cable systems. For two-way addressable systems, Jerrold also demonstrated its STARVUE IPPV transmitter. Both STARFONE and STARVUE add-on units are compatible with Jerrold's STARCOM 450 and STARCOM VI family of converters.

Converters/descramblers

Magnavox CATV announced a new leasing plan for its addressable equipment. The program makes it possible to lease addressable converters, associated headend equipment and remote control units. For more information, contact Eric Rowland at 800/448-5171 (in New York, 800/522-7464).

Scientific-Atlanta showed a new Model 8555 addressable set-top terminal for operation in expanded bandwidth (550 MHz) CATV systems. It is capable of handling up to 80 channels.

Scientific-Atlanta's Model 8525

S-A also expanded its Series 8500 product line with the Model 8525, an advanced programmable unit. The Model 8525 features a unique method of programming service authorizations, utilizing the unit's infrared remote-control receiver to configure the set-top's non-volatile memory. There is no PROM used. The unit need never be opened by the operator.

Intercept Corp. introduced its System 330 addressable descrambler. The system incorporates the DEC Model 350. A software package provides the operator with completely detailed bill-

ing data for all levels of service, including pay-per-view.

Jerrold showed its handheld remote control units, Models SRC-1 and SRC-2. The SCR-1 is designed to work with all Jerrold STARCOM 450 addressable converters, and the SRC-2 is compatible with all models of the STARCOM VI converter line.

The Model SRC-3 also was displayed. It provides all normal handheld functions in addition to featuring both last channel and favorite channel recall.

Oak Communications introduced a master/slave decoder system for its SIGMA product line. The concept provides a system of control for addressable cable systems whereby slave (secondary) decoders must be operated in the presence of an in-residence master (primary) decoder. A high level of security is achieved without the requirement for complex data communications between the two decoders.

Texscan announced the availability of the 4070 two-way interactive addressable converter system. The 4070 system provides independent control of video services to each subscriber in a hotel, resort or small community environment. Reverse path data communication is provided to allow premium program authorization on an impulse basis for pay-per-view or pay-per-day services.

Also introduced was a new version of TRACS 1.5. The new product allows up to 16 subscribers to be served from the same housing that previously served eight. Utilizing high density packaging, Texscan has incorporated two subscriber tuners on one subscriber card.

Pioneer introduced several new products including the BA-5000 addressable system, which will operate at 550 MHz. The converter has Pioneer's own variable-video coded-key scrambling (VCS) and is compatible with Oak, Jerrold and Hamlin systems. Options to the BA-5000 include a parental control feature, a timer function for VCR compatibility and an IR remote.

As an add-on to the BA-5000, Pioneer introduced PULSE. PULSE upgrades the BA-5000 from one-way to two-way addressable through phone or cable lines. As part of the BA-5000 family, Pioneer demonstrated the Cradle, which will upgrade any standard converter to an addressable converter.

Jerrold unveiled its expanded series of STARCOM VI advanced RF addressable converters. The new version, DP-5, includes two-way upgradeability for IPPV, downloadable channel mapping and multiple barker channels. Operators interested in gaining revenue through IPPV can achieve this by adding one of Jerrold's sidecar units. To implement IPPV in one-way cable systems, using a telephone return path, Jerrold offers the STARFONE add-on unit; the STARVUE IPPV unit is offered for two-way active plant.

TOCOM announced an Oak-compatible model of its 5503 baseband addressable converter. The new converter, the TOCOM PLUS 5503-OC, contains all the features of the TOCOM PLUS 5503 and descrambles the Oak 1H scrambling technique.

Headend

Channel Master introduced additions in their Series 7600 with an audio/video modulator, a single-channel AGC amplifier and a channel rejection filter. These products highlight the revamping of the company's SMATV line.

Adams-Russell showed its ARVIS-7740 remote switch providing a method of interconnecting two cable systems. It makes possible the insertion of commercials originating from an ARVIS insertion system to distant locations via a

two-channel communication link.

The ARVIS-7904 interface to IBM mainframe computer allows for the interface of the ARVIS-7550 workstation with any mainframe computer by making an RS-232 circuit emulate an IBM 3780 Bisync terminal.

TOCOM displayed its new IBM PC-based headend control system. Dubbed the Micro-ACS, the computer is designed to bring affordable baseband addressability to all cable systems, regardless of size.

Texscan expanded its ComSerter line of random-access commercial insertion equipment. The Model CSR-94 is a microprocessor-based random access controller designed to program and switch local video cassette advertisements into satellite programs.

Also introduced by Texscan was its new graphics display system. The Model TMS-1, called the Cable News Illustrator, brings high resolution videotex graphics to cable TV.

Texscan's Model PB-1 is a new videotape playback system for use in broadcast or institutional video studios. The PB-1 can control program playback of up to six videocassette players, and up to fourteen with an optional expansion card.

Also unveiled by Texscan was a new interactive cable access option to their SpectraGen character generator. The model IPA-1 can turn a one-way cable system into an interactive information source using a SpectraGen Model SG-3, SG-4 or CDD-45 character generator and a telephone line. Sporting many of the features of the SpectraGen 3 and 4, Texscan's MSI-Compuvid division introduced the SpectraGen-e, Model SG-e, the economy character generator. The SG-e includes a low profile keyboard and non-volatile CMOS memories.

Blonder-Tongue Laboratories introduced the SAVM and CAVM, which provide a modulated visual and aural RF carrier output on any single VHF, midband or superband channel.

Scientific-Atlanta introduced Autoserter, a commercial insertion system that can be upgraded from sequential to random access, depending upon cable system needs.

S-A also introduced an advanced 4.5 meter earth station antenna designed for receive-only applications in the C- and Ku-bands. The new antenna, called the Series 8345, is especially well-suited for CATV operations using satellite video programming. The parabolic reflector is made of 12 precision stretch-formed aluminum panels for better surface tolerance.

Amplifiers and distribution gear

Times Fiber Communications announced the addition of a new semiflex cable product—the TX Series. The cable provides low loss characteristics, moisture resistance and electrical specifications demanded by the 550-MHz CATV systems.

Also announced was the addition of a new drop cable product called RG-611. RG-611 is a new cable size, between RG-6 and RG-11, that provides the benefits of both cables.

Times Fiber also introduced a drop powering method for the Mini-Hub II product line. With drop powering, a power supply inside the subscriber's home powers the off-premises tuner.

Jerrold developed a computer program that allows cable operators to input the parameters of their existing systems. They then are able to receive recommendations for equipment needed to bring those systems to the desired channel capacity and bandwidth.

Scientific-Atlanta introduced a Series 6500 parallel hybrid (PHD) distribution amplifier. The new PHD products include a 32 dB gain bridging amplifier and a 32 dB gain line extender.

Also announced was the RG-59 type coaxial cable manufactured exclusively for use in CATV headend applications.

Channel Master announced two new CARS-band multichannel microwave systems. The new Micro-Beam products for cable plant expansion include a 300 MHz (36 channel) receiver, plus a 450 MHz transmit/receive system capable of sending 60 channels up to 14 miles in one direction.

Channel Master's new 50 dB wideband distribution amplifier incorporates hybrid ICs to provide high output and low distortion.

A new digital system sentry with analog functions was introduced by Magnavox. The DSS/A is a comprehensive monitoring system.

Also unveiled by Magnavox was ISIS, the new integrated subscriber/institutional system. ISIS uses 550 MHz and 600 MHz gear for a unique application: carrying both subscriber and institutional services on one cable.

Magnavox announced the release of a new product: the WP-900 standby power supply. It uses a ferro-resonant transformer in both the utility and battery modes.

Texscan announced the TS-PS switching power supply for use in any trunk

Continued on page 49

Behind every Panasonic® cable converter lies 25 years of cable know-how.

Cameras. Switchers. Monitors. Video recorders. You name it. For over two decades Panasonic has been supplying high-quality video components to both the broadcast and cable industries. In fact, we've been supplying CATV converter components for years.

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For more information, call Panasonic at (201) 392-4109 or contact one of these Panasonic CATV distributors.

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Reader Service Number 44

CONNECTING FOR PROFIT

THERE IS A BEST WAY

By Norman Weinhouse,
Norman Weinhouse Associates

Interconnects between cable systems have been around almost as long as cable systems themselves. Neighboring systems have found many reasons for the interchange of programs—reasons that work to the benefit of all concerned. In recent years, advertising availabilities from satellite programmers have created a revenue potential for cable systems. This revenue potential has developed slowly despite an active effort on the part of the cable industry both locally and nationally. This article investigates the reason for this slow growth and suggests a cost effective technical approach and a business structure to manage an interconnect.

Soft vs. hard interconnect

A soft interconnect in which tapes are duplicated and "bicycled" to various headends is a classic case of very low initial capital cost being overwhelmed by ongoing operational costs. This approach can be cost effective if *only* large systems are included. Carried to its logical conclusion, if the systems are large enough to economically support a soft interconnect, they probably are large enough to support an independent effort by the system.

A soft interconnect can create more problems than it solves. Unless all systems in an urban area or region participate, decent rates and revenues will not be realized. Management of a soft interconnect can be a nightmare. Twenty-five satellite programs provide commercial availabilities.[1] Deciding which system(s) receives which tape(s) and ensuring that the ads are run at the appropriate time(s) on the appropriate channel(s) are tasks that give heartburn to cable systems and interconnect operators.

The proper approach is a hard interconnect with a high level of automation. The initial capital cost must be low enough to accommodate even the smallest system, on a pro-rata basis.

A hard interconnect also can offer benefits beyond advertising revenue. In those cities where franchise requirements demand an interconnect for an institutional net, the ad revenue can provide the financial justification. There are any number of "blue sky" uses. These include: 1) regional narrowcasting such as local origination, education, etc., and 2) a link whereby each cable system provides "the last mile" in an extended area network of data and/or other communication services.[2,3,4]

These benefits should come later; the ad interconnect first should stand on its own. If properly designed, the interconnect can grow as the other business opportunities mature.

Operational considerations

The figure below is an overview diagram of the basic interconnect for ad distribution and overall system management. Some important features should be noted:

- The cable system headend is totally unattended for the ad insertion function. Tape loading and control is accomplished at the control center, run by the interconnect operator. A minimum of operating labor is required by the interconnect operator.
- Only commercials (spots) are transmitted to the headends. Transmitting entire programs with commercials inserted at the interconnect's operator facility is a waste of resource (spectrum and equipment) if a multiplicity of programs is involved. Most cable systems have their own satellite earth stations or receive feeds directly from one.
- A control channel with addressability is sent along with the spots. This channel, if properly designated, can provide a great deal of flexibility. It could be sent on a separate carrier, a subcarrier (if microwave is used), or be in the VBI. This control channel could work to the benefit of the cable system operator if for some reason he does not want to accept certain ads. Off-the-shelf hardware and software exists for this control function.
- A return path called "Status" is shown but is not absolutely necessary. The return path can check the status of the ad insertion equipment and provide verification of inserts for business purposes. This return path need not be through the same transmission system

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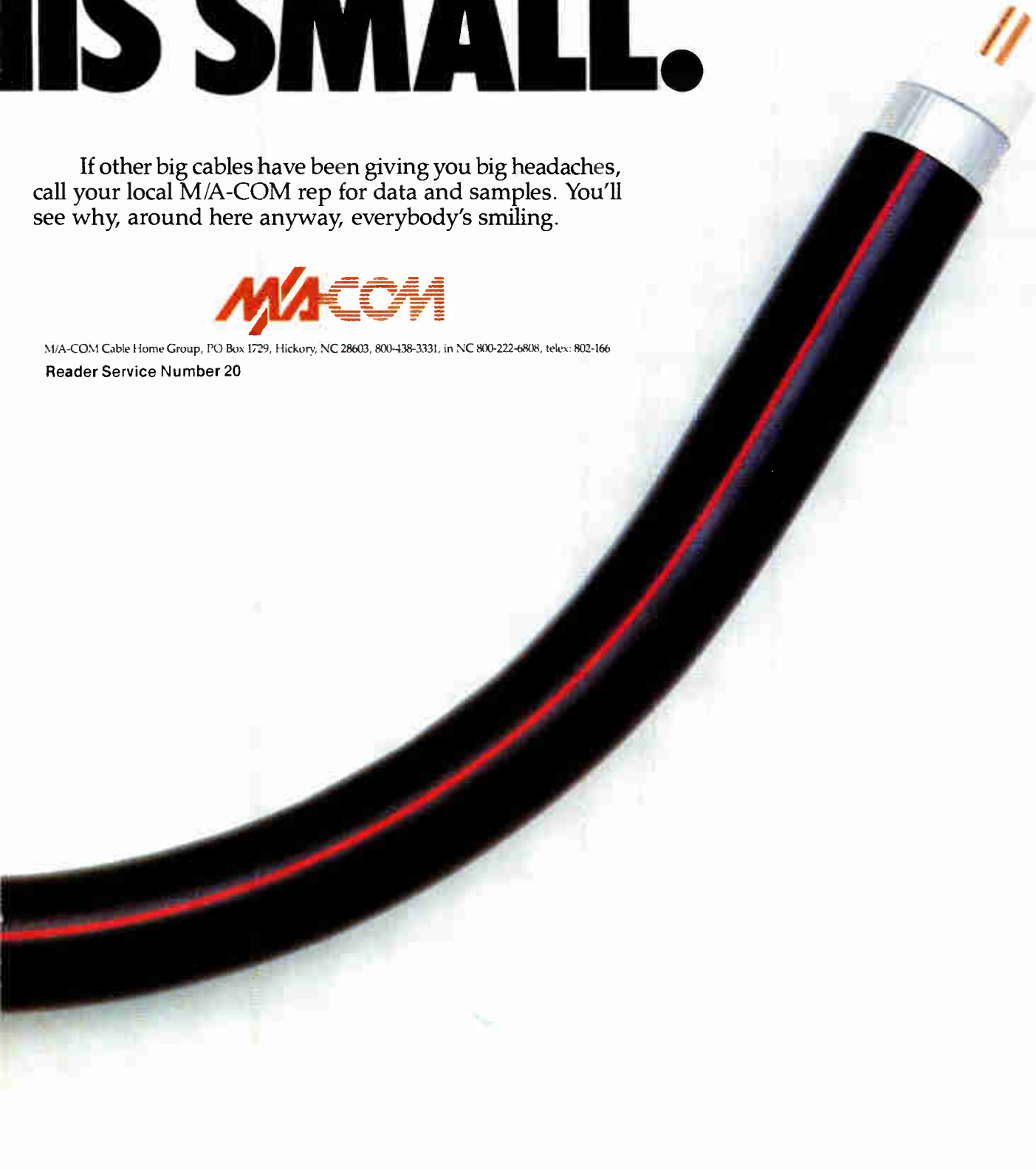

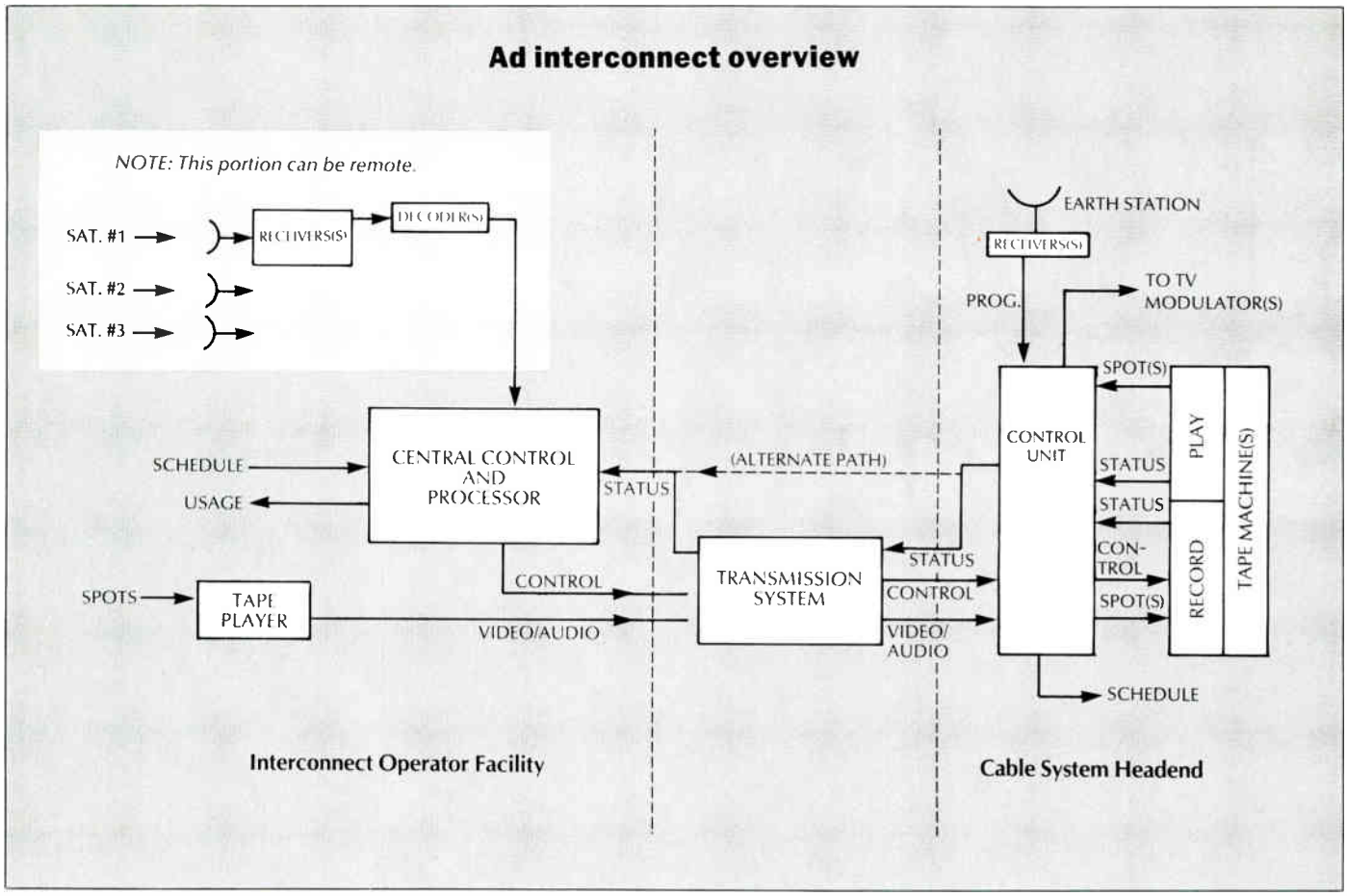

as the downstream information. It could be through dial-up telephone lines.

■ Virtually all operations are off-line or "non-realtime." This reduces the need for backup or standby equipment in the transmission system, which will reduce initial capital cost.

Transmission medium

The choice of the medium for transmission depends to a large extent on the geographic situation. In almost all situations, it is hard to visualize the exclusive use of coaxial cable because of the distances involved. Portions of the system could be coax for short runs where microwave radio is not practical because of terrain.

Usually, microwave radio is a natural choice. Initial capital costs could be reduced if the interconnect is truly a cooperative one by using existing towers at the headend sites. If terrain or frequency congestion precludes colocation with the headend, the cable system should be willing to pay for coax construction to some point in its franchise that will clear.

The configuration of the transmission system also depends on the geographical situation. The most efficient configuration is probably a single site broadcasting to a multiplicity of receiving sites. For an extended area, several such sites tied together by a backbone network is desirable. Such an arrangement may not be proper for a two-way wideband requirement, however. Each interconnect should be carefully studied and the requirements beyond ad insertion considered before a final design is chosen.

For a two-way interconnect, a ring configuration has some merit (if it can be accomplished) because if one link goes down, traffic can be reversed so that continuity is maintained. This ring configuration generally eliminates the need for redundancy.

Recommendations

Technology is not a limiting factor in the establishment of effective interconnects for ad insertion of availabilities. Bare-bones microwave and simple control systems can provide the plant to produce a viable business. The real problems are: Who will operate the interconnect? Will there be a decent return to all parties? There are many ways to approach these decisions, but there is a "best" business structure to operate such a system.

This "best" structure currently exists in New Jersey, where a very extensive system is in operation. The system is run by an autonomous, closed corporation whose stock ownership is in the hands of the cable systems it serves and is based on the number of subscribers in each system. The motivation for forming this network was not revenue from advertising availabilities. However, the network became self-sustaining within two years with a mixture of public service and local origination commercial programming on a single-channel system. The only revenue comes from advertising on the commercial channel, which is shared roughly half the time with the public service channel. In the beginning, virtually all of the programming was public service with no revenue.

It's time for cable operators to work in their own best interests by cooperating with all of their neighbors—including other cable systems. CED

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Reader Service Number 6

BTSC-compatible signal processing

By Thomas Stutz,
Product Manager,
Jerrold Distribution Systems Division,
General Instrument Corp.

Although the Federal Communications Commission did not rule on a multichannel television sound (MTS) standard, they did protect the Electronic Industry Association's (EIA) recommended system. As such, the FCC has created a de facto standard for the transmission and reception of MTS.

This article summarizes the effect of the MTS de facto standard on the cable system's headend equipment. Although other cable carriage schemes are in use today to supply satellite stereo services, this article will consider only in-band carriage of the MTS signal. No judgments will be made concerning the audio performance of the MTS signal. Also discussed will be an overview of the modifications and equipment necessary for upgrading the headend to accommodate the MTS signal.

Since the FCC recently decided to indefinitely delay the decision to impose cable must-carry for MTS, no attempt will be made in this article to anticipate any future FCC decision concerning this issue.

History of MTS

In 1961 the FCC decided on and approved a single stereo transmission system for FM radio. More than two decades later, when federal intervention was being downplayed, the FCC approved the use of sub-carriers for AM stereo but did not choose a single AM stereo radio transmission system. Rather, they allowed the marketplace to decide.

On March 29, 1984, the FCC approved the expanded use of the TV aural baseband for stereo, second language service and any other broadcast or non-broadcast purpose and also, like AM stereo radio, did not decide on a particular transmission system. To avoid a repeat of the present AM stereo radio controversy, however, the FCC protected the EIA's recommended MTS system and, in effect, created a de facto standard.

All problems solved, right? Not quite. During the decades following FM stereo radio, an entire cable TV industry devel-

Figure 1 The BTSC MTS system

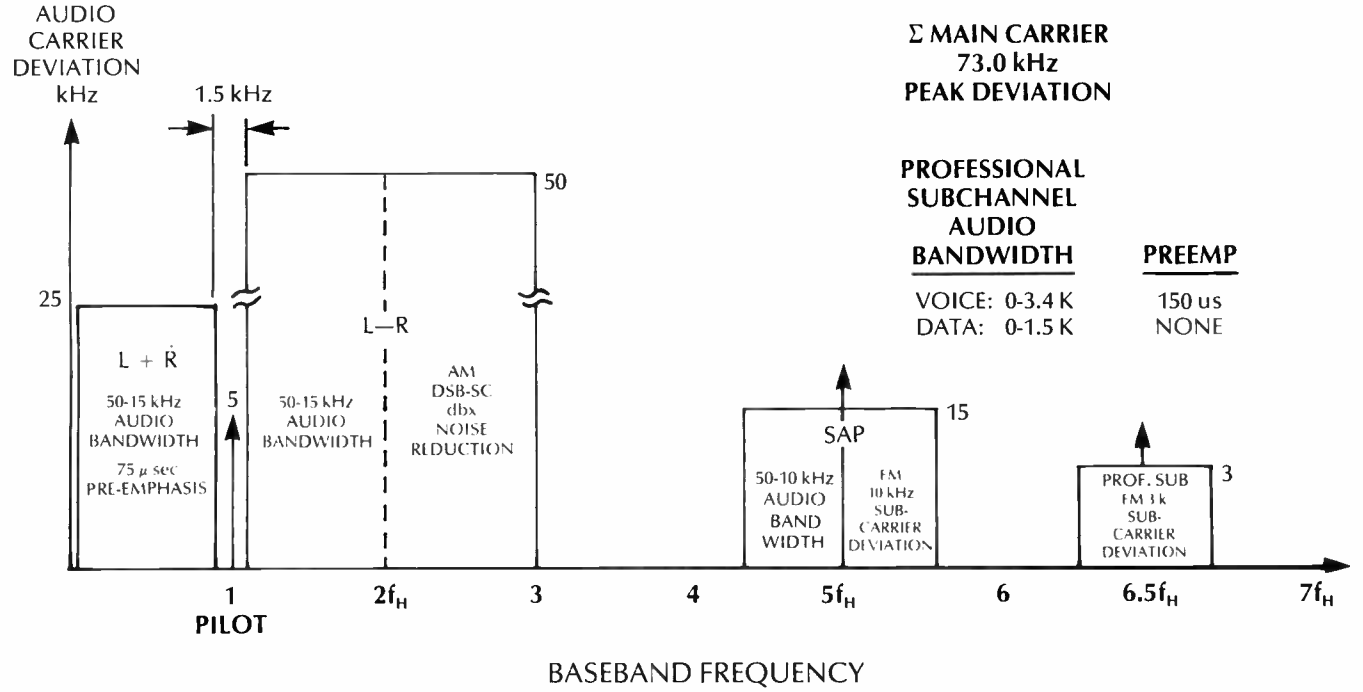

Figure 2 MTS headend impact

Headend Processing Method	Sound Trap Bandwidth Modification	Sound IF Bandwidth Modification	Audio Modulation Bandwidth Modification	Audio Discriminator Bandwidth Modification	Pre-emphasis Disable	De-emphasis Disable
Strip Amplifier	X	N/A	N/A	N/A	N/A	N/A
Baseband Demodulator-Modulator	X (Demod. only)	X	X (Mod. only)	X (Demod. only)	X (Mod. only)	X (Demod. only)
Heterodyne Processor	X	X	N/A	N/A	N/A	N/A

oped. By 1984 over 7,000 cable systems were serving more than 30 million subscribers throughout the nation. These systems employ various generations of equipment and technology. Many are small 12-channel systems with limited bandwidth and outdated technology, while others have excess capacity and utilize state-of-the-art technology.

Regardless of the available bandwidth or the technology employed, these systems will have to deal with the issue of MTS. The driving forces behind cable system implementation of MTS could be any or all of the following:

1. A future must-carry mandate from the FCC
2. Subscriber demand
3. Revenue generation
4. Franchise requirement

The decision whether cable systems should be forced to carry the MTS signal, and in what format, was indefinitely delayed recently by the FCC. The cable industry strongly argued against must-carry on the grounds of system incompatibility and resultant high cost to upgrade. The broadcast industry, on the other hand, argued that copyright laws prohibit the modification of protected programs and, therefore, cable systems should be required to supply the MTS signal to subscribers.

The FCC compromised by directing its Mass Media Bureau (MMB) to annually monitor market penetration of MTS broadcasts and MTS-compatible receivers. The MMB also was directed to monitor the voluntary implementation of MTS by cable systems. In the meantime, the must-carry issue will re-

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main open until the FCC solicits a new round of comments on the subject. Cable operators, therefore, should not overlook the possibility of a future must-carry mandate from the FCC.

Most TV receiver manufacturers recently announced the availability of multichannel sets. Some consumer electronics manufacturers also announced availability of MTS adaptors to convert monophonic sets to stereo. These announcements undoubtedly help create a consumer awareness of MTS, and with this awareness comes unrealistic expectations from cable subscribers that they soon will be receiving MTS via cable. Subscriber demand for MTS, whether founded or unfounded, will be a factor which cannot be overlooked by the industry.

Revenue generation

MTS consumer awareness and the resultant demand have created an opportunity for operators to generate additional revenue. Broadcasters are well aware that advertising revenues can be increased when native language programming is accompanied by native language commercials. Cable operators serving non-English-speaking communities could increase their advertising revenues by utilizing the second language program of the MTS standard. Major networks already test-marketed bilingual broadcasts in non-English-speaking markets with excellent results.

Those ignored stereo satellite services also could be offered in- or out-of-band for additional revenue. For the consumer not sold on cable, these expanded audio services could help add subscribers and increase penetration.

Although program material with bilingual audio is limited in its availability at present, in the future franchising authorities may require major city systems to carry second language service for non-English-speaking residents. The transmission of MTS will proliferate the availability of bilingual programming as broadcasters seek to expand their market penetration and advertising revenues.

The MTS system

The objective of the EIA's Broadcast Television Systems Committee (BTSC) was to arrive at a single MTS transmission standard which would incorporate a compatible main channel, a full quality stereo sub-channel, a lesser quality separate audio program (SAP) sub-channel and the potential for a professional sub-channel for telemetry purposes. Following initial testing, it was determined that some form of noise reduction was necessary to compensate for the lower signal-to-noise ratio associated with the wider audio bandwidth of the MTS signal.

Of the three proposed transmission systems considered by the EIA, a single system was recommended which met the above objectives. As illustrated in Figure 1, the recommended BTSC MTS system consists of a main channel containing both left and right audio signals. The main channel pre-emphasis, bandwidth and audio deviation are identical to the current monophonic standard, i.e. 75 usec, 15 kHz and ±25 kHz respectively, and, therefore, are fully compatible with non-stereo TV receivers.

To separate the left and right audio signals, the stereo sub-channel contains the difference of left and right and has an effective bandwidth of 15 kHz with a sound carrier deviation of ±50 kHz. The combined audio deviation of the main and stereo sub-channel is ±50 kHz since, by definition, both signals cannot be maximum at the same time. The stereo sub-carrier uses double sideband suppressed carrier amplitude modulation with the sub-carrier locked to twice the horizontal scanning frequency. Dbx companding or noise reduction is added to this channel to improve the signal-to-noise ratio. The companding process also provides an improvement to the usual pre-emphasis technique for the stereo sub channel. A pilot signal at the horizontal scanning frequency, causing a deviation of ±5 kHz, provides the necessary reference signal

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to control the stereo decoder in the TV receiver.

The SAP sub-carrier is locked at 5 times the horizontal scanning frequency and is frequency modulated with a bandwidth of 10 kHz and audio deviation of ±15 kHz. To boost the signal-to-noise ratio of this carrier, dbx companding also is incorporated and provides an improvement to the usual pre-emphasis technique. Finally, the professional sub-channel has its sub-carrier located at 6.5 times the horizontal scanning frequency and has a bandwidth of 1.5 kHz to 3.4 kHz (depending on the type of modulating signal) and audio deviation of ±3 kHz.

MTS impact on headend

The cable system headend has experienced many technological changes over the last 25 years. From the earliest strip amplifier processing to today's surface acoustical wave (SAW) filter processing, the headend has evolved to meet the increased performance and bandwidth requirements of today's sophisticated systems. Because of the various technologies of headend systems in operation today, the BTSC MTS system will impact each in different ways. Three types of off-air headend processing currently are in use: strip amplifier processors, demodulator-modulator baseband processors and heterodyne processors. Figure 2 summarizes the impact of the MTS signal on each type of headend processing method.

Strip amplifier processors

Strip amplifier processors typically are associated with small channel systems and, over the years, gradually have been replaced by heterodyne processors. The expanded bandwidth of the BTSC MTS system may not pass the sound trap of the strip amplifier processor without distortion and, thus, only the main channel (L + R) signal would be unaffected.

Depending on the particular design of the strip amplifier processor, modification to the sound trap circuit may be possible so that both the main channel and the stereo sub-channel have acceptable distortion. Most likely it would not be possible to pass the SAP sub-channel. However, caution should be given to the effects that widening the sound trap will have on the video passband. Widening the sound trap will decrease the video passband. It is recommended that the strip amplifier processor manufacturer be consulted to determine if the design will support a modification for MTS and to what extent (main channel, stereo sub-channel and SAP or just the main channel and stereo sub-channel).

Demodulator-modulator processing

Demodulator-modulator baseband processing utilizes a demodulator to convert the received off-air signal to an intermediate frequency (IF) and then to baseband. The baseband signal then is fed to a modulator that remodulates the signal to the desired cable channel frequency. The demodulator incorporates an IF sound trap network designed to remove any residual IF sound from the IF video signal. This trap may not handle the wider bandwidth MTS signal and, therefore, may distort the video. De-emphasis also must be disabled to eliminate incompatibility with the stereo sub-channel and SAP. The audio detector and baseband circuits also must be checked for sufficient bandwidth for compatibility with the MTS signal.

Concerning the modulator, the increased bandwidth of the MTS signal will require a modification to the audio modulation circuitry. The Jerrold Commander IV modulator, model C4MS, for example, has been modified to increase the baseband audio bandwidth to accommodate the MTS signal. The pre-emphasis also was made operator selectable so it could be disabled when modulating with an MTS signal. Both the audio bandwidth and pre-emphasis modifications on the Jerrold C4MS modulator were made to the audio modulator

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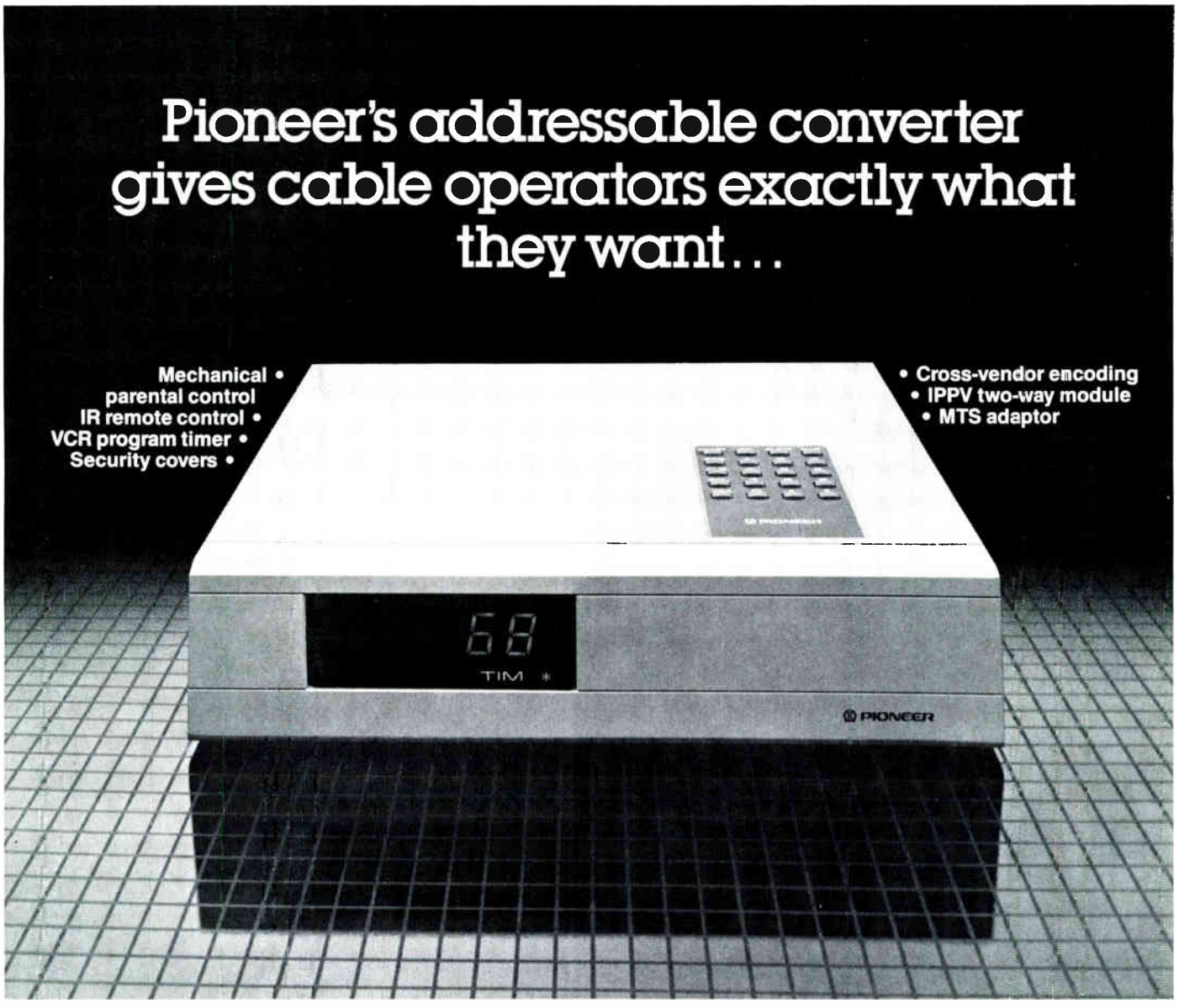

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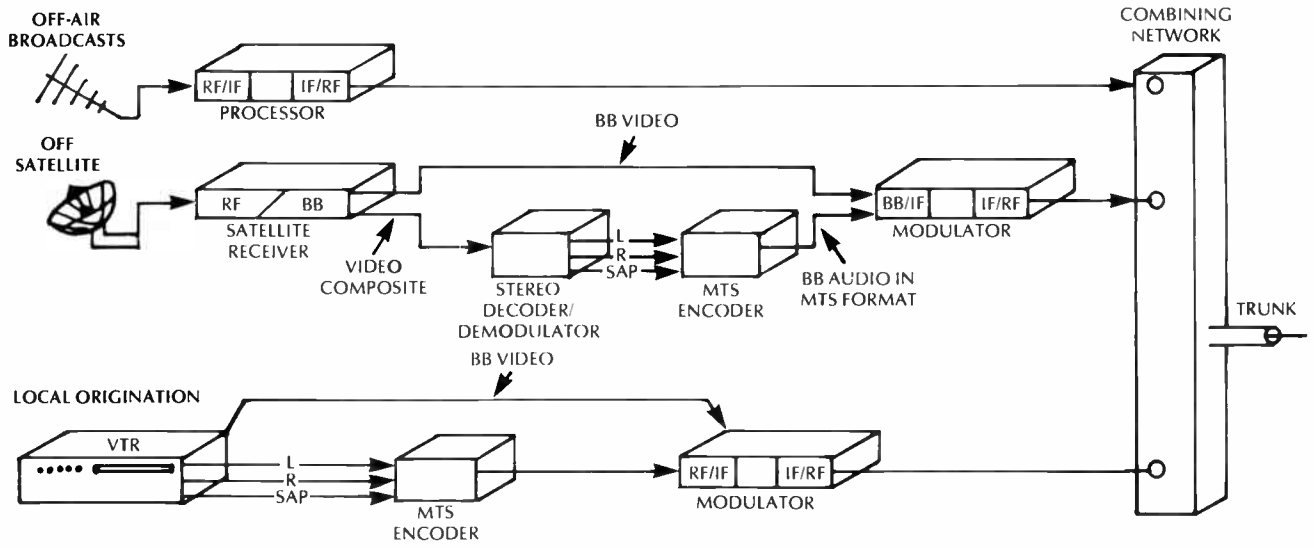
Figure 3 MTS headend system



module (CAM). This module is a plug-in type and can be quickly and easily replaced in the field with an MTS compatible version (CAMS) for Commander III and IV modulators.

The heterodyne processor is the workhorse of headend off-air signal processing. Since demodulated baseband video and audio signals typically are not utilized in the headend, the heterodyne processor can process and channel convert an off-air signal more cost effectively than a demodulator-modulator system. The heterodyne processor heterodynes or mixes the off-air signal with a signal from the local crystal-controlled oscillator to produce a stable IF. The IF then is amplified and heterodyned back to a particular cable channel frequency.

As in the case of the demodulator, the bandpass of the sound trap must be increased to accommodate the wider bandwidth MTS signal. The sound trap bandpass on the Jerrold Commander IV processor, model C4P, for example, was

increased to accommodate the MTS signal.

When the sound trap is widened to accommodate the MTS signal, the video IF passband is decreased slightly. In the case of the Jerrold Commander IV processor, the overall video IF bandwidth was reduced from approximately 4.2 MHz to 4.0 MHz relative to the picture carrier. This has no effect on subjective resolution, even on "full bandwidth" type receivers. For full compatibility with the MTS signal, Jerrold Commander III and IV processors can be field upgraded by replacing the IF amplifier module (CIA) with an MTS compatible module (CIAS). This module is located in the center slide-out drawer of the processor, and replacement easily can be accomplished without removing the unit from the cabinet or rack.

MTS-compatible headend

Figure 3 illustrates a typical headend system designed to process the MTS signal in-band. Off-air MTS signals are processed by a modified heterodyne processor. Processing satellite signals in the MTS format will be more difficult than processing off-air MTS broadcasts. Since stereo satellite services utilize various stereo transmission formats and are not expected to standardize in the near future, a compatible stereo decoder/demodulator will be necessary to provide baseband audio inputs to an MTS encoder. The MTS encoder generates the MTS baseband audio signal and incorporates the necessary dbx companding and pre-emphasis. The MTS baseband audio signal then is fed to the audio input of the modified modulator and up-converted to the particular cable channel frequency. Local origination baseband audio inputs are directly connected to the MTS encoder and then to the modified modulator. All signals then are combined, as usual, before distribution.

Regardless of any future FCC decision concerning MTS must-carry for cable systems, market demand will be a driving force in determining the cost versus technical feasibility and revenue potential of MTS. With almost 1,600 U.S. TV stations, including permittees, on record in 1984 and preliminary surveys indicating that more than 40 percent plan to add MTS, more than 600 geographic areas soon will be served by MTS broadcasts.

Taking a conservative average of five off-air channels carried per cable system, and cutting in half the industry surveys for broadcasters adding MTS, yields the fact that at least one must-carry off-air channel in every cable system soon will be broadcast in the MTS format. How soon is unknown. However, it cannot be overlooked that 1985 will begin with at least 15 TV stations regularly broadcasting MTS. These stations ultimately will affect at least one cable system in 20, or over 350 systems at the start of 1985.

As broadcasters add MTS capability and promote it accordingly, the cable subscriber will become very aware of MTS programming and the availability of MTS TV receivers. It is expected that over 2 million MTS-capable TV receivers will be sold in 1985. Some receiver manufacturers have even announced that MTS decoders may be standard in all receivers within two years.

This means that the same questions operators had to face when subscribers asked why their new "cable-ready" set could not give them premium services at basic rates or why their TV remote control became useless when they added cable must again be faced when their subscribers ask why their $1,000 stereo TV sets will not receive the stereo off-air broadcast the manufacturer promised. Even more serious will be the problem of retaining the subscriber when he reconnects his off-air antenna and enjoys the "free" stereo broadcast.

It is time that cable operators look at ways to turn the MTS "problem" into an "opportunity" for additional revenue and/or increased subscriber penetration. CED

Making L.O. pay

Part Two

By David Andis

Programming is as vital to the success of a local origination channel as staffing and equipment. While local news and sports are good basic programming staples, viewers want variety as well. And whatever programs you choose to air, viewers may never find them unless you sharpen your marketing skills.

Every community is as varied as the people that inhabit it. Therefore, programming should vary according to a system's location. But the basic direction and target of local programs should be the same everywhere.

As long as there is television, there will be news and sports. People always want to know what is going on in the world and watch their favorite teams or individuals play sports. News and sports are staples to local and national programming.

Today, cable viewers have many choices in news. They can watch national broadcast network news, cable news channels or the local broadcast station's news. A gap still exists, though, in community news. This gap is just large enough for a local cable channel to squeeze into with news of the community such as political events, community meetings, public issues, economic problems, etc. There are plenty of newsworthy issues and events in most communities to warrant local cable news.

Frequency of a newscast is relative to budget. However, developing an audience is critical to the success of any program, and no one wants to watch yesterday's news. By offering quality community news on a daily basis, a cable channel can attract a consistent audience of loyal subscribers.

Play ball

A large gap in local sports also is open for cable channels to fill. Most cable companies with production facilities own, or have access to, a mobile production vehicle. Interns and freelance production crews can meet the logistics necessary for any sporting event from football to basketball to golf. Many cable operators believe that, in producing local sports, network quality is the goal. But what viewer has ever turned off his son's high-school football game because it wasn't shot with eight cameras and slow-motion instant replay? Viewers will accept different standards in return for something novel, inventive or new.

Good results do not depend on superior quality or expense but in the approach taken in covering a game or event. An L.O. channel can imitate CBS and set up 21 cameras on 7 holes of a golf tournament and probably get great results. But how much money will be made?

Quality is relative to supply and demand and the income that can be generated. Rather than aiming for national

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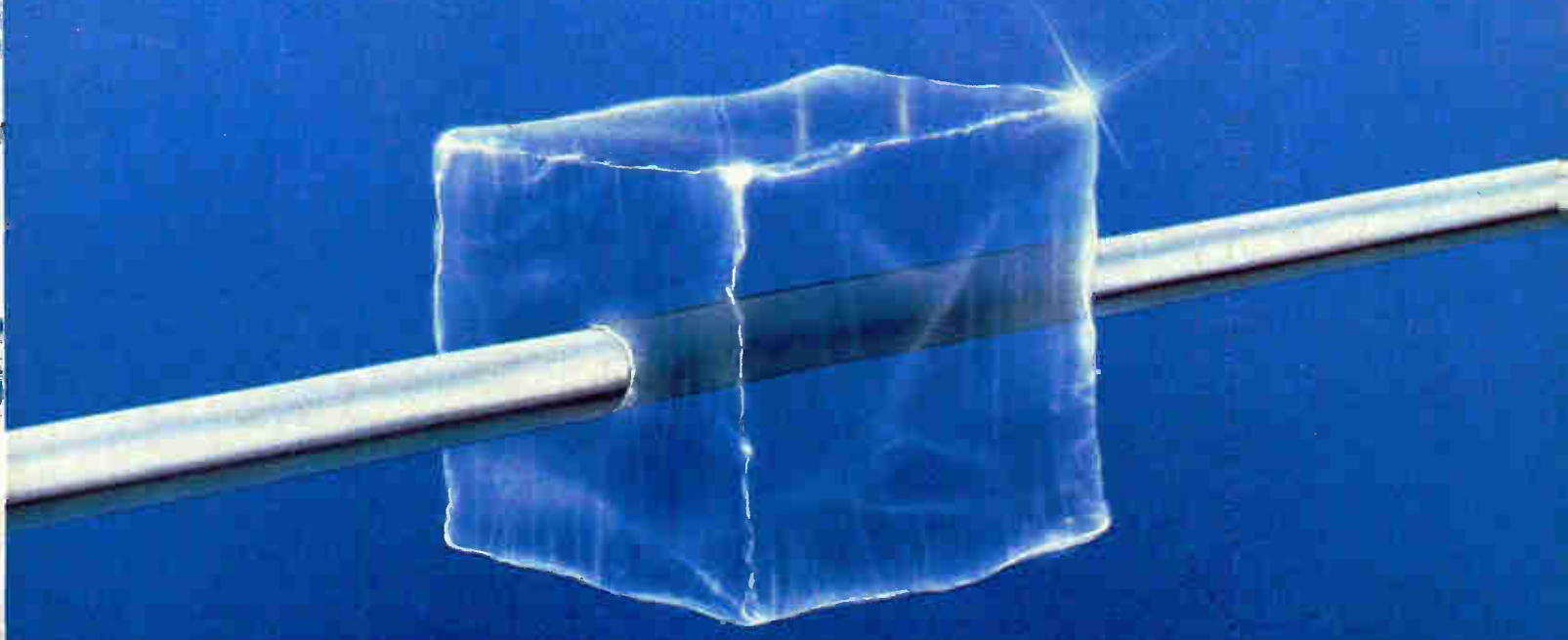

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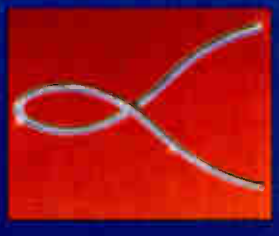

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Because MC² components are bonded together for maximum flexibility and minimum signal loss, you save more money on installation, connections, labor and on the cable itself.

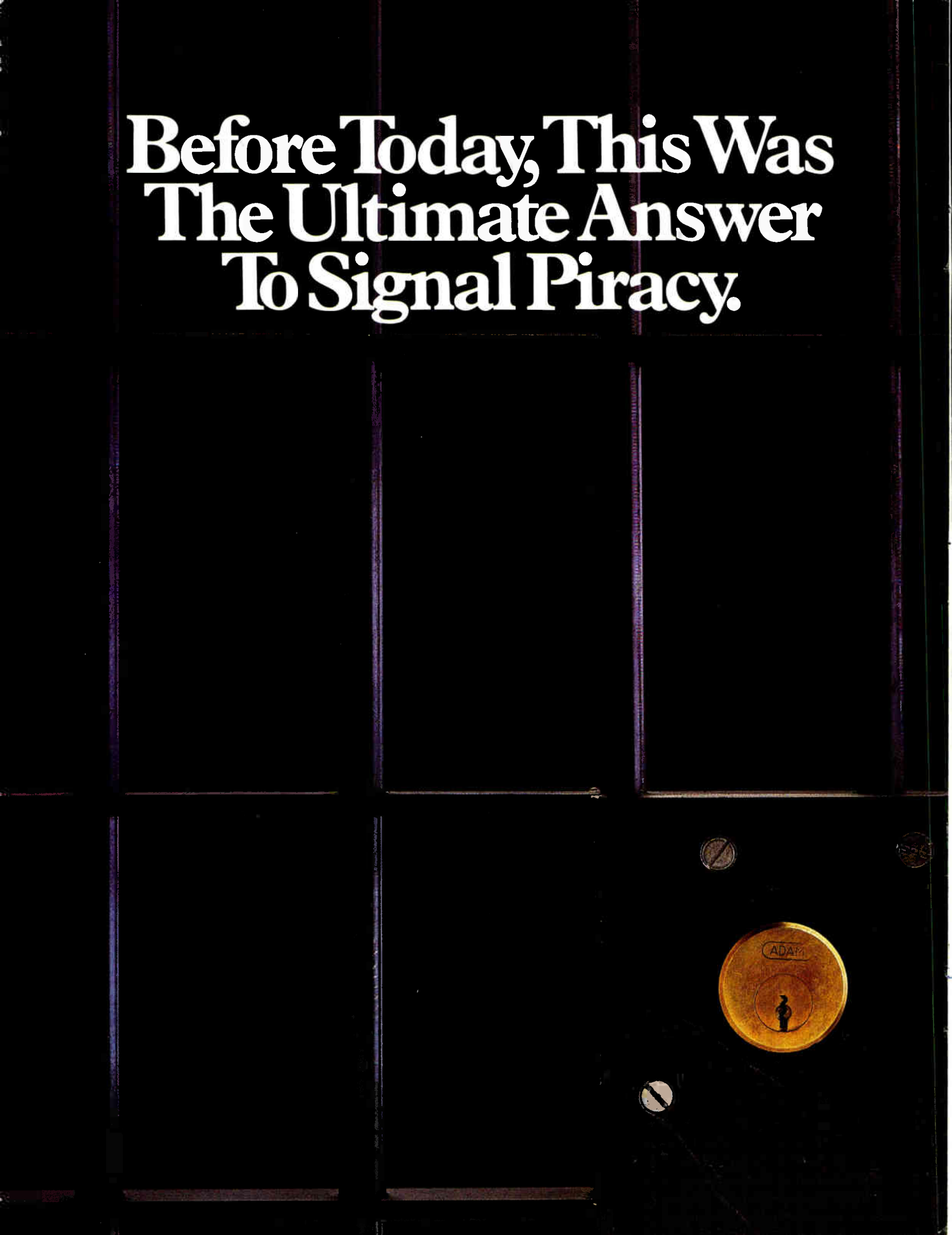
MORE economical. MORE reliable. MORE flexible. MC² outperformed the competition hands down and we'll be happy to show you the results anytime.

General Cable Company CATV DIVISION

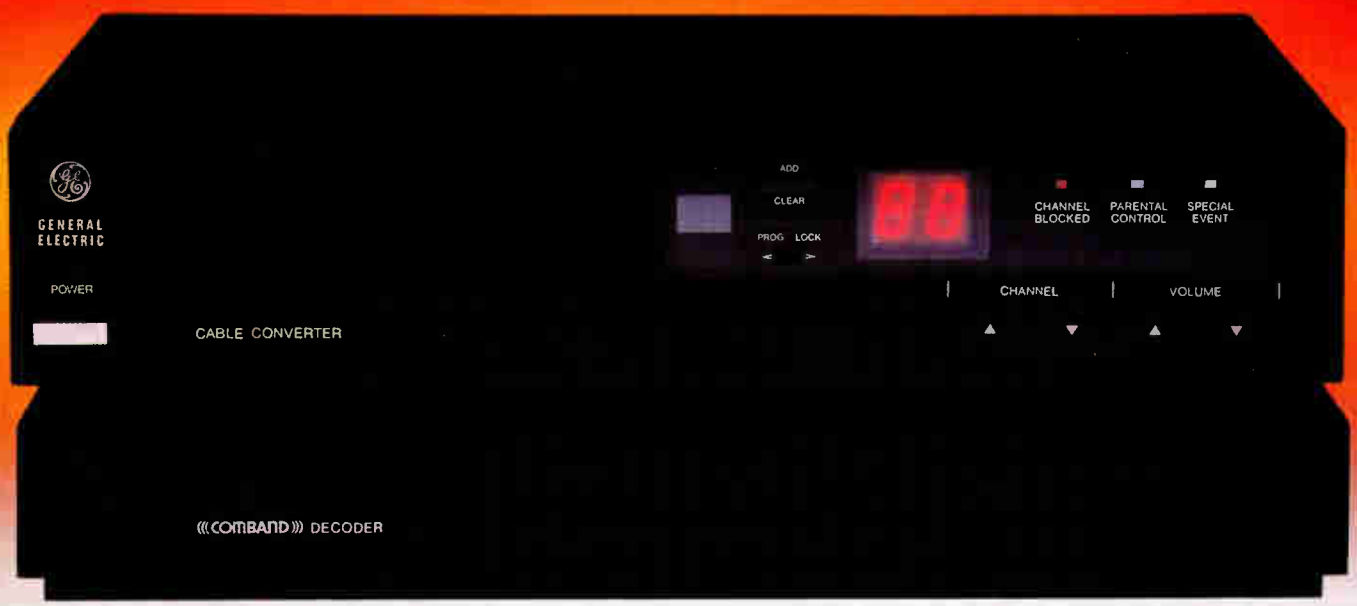
A Unit of The Penn Central Corporation

Reader Service Number 18

Before Today, This Was The Ultimate Answer To Signal Piracy.



Introducing The Secure System From General Electric.



The Comband™ System.

Cable operators lose an estimated 700 million dollars every year because of signal theft. Now, the best weapon in the war against signal piracy is here. It's Comband,™ the most secure system in the cable industry.

Modular in design, the Comband™ system gives you the features you've asked for. It's a one-way addressable baseband converter that's competitive with any product on the market. It gives you control, flexibility and tamper-proof security in one stereo-ready package.

Add the Comband decoder and the inherent scrambling of the bandwidth compression process makes signal theft virtually impossible. With Comband, unauthorized programs cannot be seen or heard.

We've also added other security features such as the Technician's Set-Up Unit. This is a portable device that assigns the address code and initial authorization parameters, machine to machine. It puts dishonest installers out of business.

The design of the Comband system allows you to control when, and to what extent, you upgrade your operation. You satisfy yourself, your franchising authorities and your subscribers in a matter of weeks or months. You increase your revenues, lower your operating expenses and get a faster return on your investment.

To fully appreciate the Comband system's advantage, you have to see it in operation. For a Comband Express demonstration, call Ron Polomsky at 1-800-GE-CABLE.

Call for the Comband system today. And see how to lock out signal pirates before you have to lock them up.

Reader Service Number 35

quality, events should be approached efficiently. Just the final hole of the golf tournament could be covered with behind-the-scenes interviews and stories on how the event was put together. A football game can be adequately covered with two cameras by showing lots of peoples' faces and children. L.O. channels should avoid over-doing it and focus on what can be done with the resources available.

The importance of developing staple programming should never be underrated, but viewers want more than news and sports. The ability of an L.O. station to generate appealing product is wide open. The flexibility of L.O. over access channels provides the maximum profit potential of any medium.

Every viewer has different tastes and preferences, but many will enjoy cooking programs, interviews with local politicians and personalities, home and car repair tips, legal advice, entertainment-oriented programs, restaurant reviews, movie reviews, music videos, local theater productions, etc.

Another programming source is outside producers who market their programs on a barter basis. A barter agreement allows the cable system to acquire a program without paying for it. Most barter agreements exchange commercial airtime on a 50/50 basis for the producer and distributor. Each party's income is limited solely by the amount of airtime they can sell. Not all barter agreements are created equal, so careful investigation is recommended. Barter can reward cable cannels with quality programming at minimal cost while generating revenue in ad sales.

Marketing and promotion

An inexpensive form of self-promotion is satellite avails on channels like MTV, USA, CNN, etc. Cross promotion is targetable to each demographic group within your subscriber base. In-house promotional material easily can be generated to reach the viewers through 30- and 60-second spots. The National Federation of Local Cable Programmers sponsors an annual contest which awards, among other things, a system's ability to generate local promotions. Try to gain access to the winners on NFLCPs "bicycle tour" and view how other systems cross-promote.

Call-in promotions that reward viewers with gift certificates and prizes from local merchants are highly effective and easy to organize. An L.O. newscast can be used as a vehicle for these types of promotions. Equipment labeled with station logos or channel numbers also keeps visibility high. Special monthly or quarterly programs on issues of controversy or high community involvement and interest attract new viewers.

Tomorrow looks very bright for cable, especially L.O., provided we understand the direction of our industry. As the full effects of de-regulation take effect, communities will look elsewhere to regulate cable franchises. One area falling under new scrutiny will be those L.O./access channels promised during the height of the franchise acquisition wars.

L.O./access doesn't have to mean instant loss or tax write-off. It can and should be profitable. Any local channel must be extremely community oriented with its feet firmly planted in the area it serves. Open lines of communication between the viewers and the programmers are a must. Active community involvement is key to a station's identity. Without the community, the channel is nothing. In order to increase sales on local channels, cable must increase its professionalism. The novelty of the channel will wear off soon if that is its only appeal. Program formating and approach will win over viewers and ad support if directed to the community.

Local channels benefit both large MSOs and small independent cable systems. Given some thought, insight and common sense, a local channel can be not only an excellent torch of the community with which to lead the way in securing franchise stability, but a revenue generator as well. CED

Continued from page 26
amplifier configuration that has an XR2-AH housing.

Also introduced was an enhancement to conventional trunk amplifier architecture called the Trunkmaker and Combo Bridger Trunkmaker. These new modules plug into the bridger slot to provide additional trunk outputs.

CWY introduced a new amplifier that eliminates the need for an outboard equalizer or pad.

Two-Way

Packet Technologies announced PacketCable, an integrated network service provider. The key to Packet's integrated service is the high-speed backbone data network, which is capable of upstream data transmission at rates of 1.544 Mbits/second.

Software

INTEC Systems demonstrated a new integrated software package. With VS/Cable, operators can generate reports that will help them increase market penetration, improve customer service, reduce costs and enhance overall management control.

Business Systems announced the integration of their cable TV management system (CTMS) with the A-to-Z office automation system from Digital Equipment Corp. The integration system places additional management tools in the hands of the operator and provides information in an effective format for evaluation and decision making.

Business Systems also announced a stand-alone system for the automatic authorization and billing of pay-per-view premium TV for the lodging industry. BSI's telephone entry system is the cornerstone for this product offering.

Business Systems unveiled the integration of their telephone entry system with a multi-lingual language processor offered by Digital Equipment Corp. The unit demonstrated was a Spanish-speaking version of the system initially introduced in mid-1984.

Test Equipment

CWY featured an easy-to-use cable length checker that locates cable problems for the CATV/SMATV industries. The Model 1500 checker can be used to locate opens and shorts in any cable with a constant velocity of propagation.

CWY also previewed the new Model CWY-550 six-function auto range digital multimeter. The CWY-550 features right-angle leads that help prevent breakage and disconnection.

Passives

Anixter Communications introduced Raychem's F-connector line, named the EZF. The EZF connector reduces RF leakage and moisture penetration. The EZF line consists of two types of connectors, EZF 59, which fits all RG59 cable, and EZF 6, which fits all RG6 cable.

CWY introduced an alternative to silicon grease. The new product, manufactured by Synco Chemical Corp., is fiber optic/CATV splice and connector gel designed to protect splices, connectors, terminations and closures.

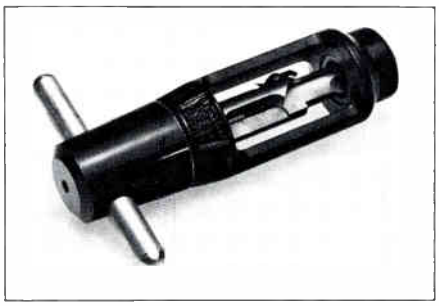
Also highlighted by CWY was the new Model CC16 connector cover. The new cover fits RG59 and RG6 connectors and is an alternative to heat shrink or other messy covers when splicing or connecting drop cable.

Times Fiber introduced the addition of an exclusive lifeTime protectant. The protectant retards corrosion of the cable and attached connector and provides three times the corrosion resistance of other aerial drop cables.

Tools

CWY introduced mounting accessories that make cable equipment racks more versatile. Accessories include an equipment shelf, a roll base, blank panels in 12 sizes and punched panels for patching—all designed to enhance the CWY model RR72 equipment rack.

Times Fiber announced the addition of two new products, the eight- and sixteen-unit strand mount enclosures, to Mini-Hub II. The new lightweight enclosures can be used with all powering methods—60 VAC, 110 VAC and drop power.



Lemco Tool Corp. introduced a coring/stripping tool. Both drill and hand operation, no jamming of the dielectric guaranteed, tapered stripping blade and adjustable center conductor stop are a few of the features available with the new product.

Business announcements

Pirelli Optronic Systems demonstrated its newest fiber optic supertrunk. It is capable of carrying 16 channels over 12 miles on one single mode fiber, with better than a 53 dB S/N.

RF Analysts of Fenton, Mich. and Superior Electronics Center of Sarasota, Fla. have combined to form a Multiple Service Organization. RF Analysts brings extensive converter repair experience while Superior Electronics brings experience in design and repair of line and test equipment. The new company will retain the RF Analysts name and will be headquartered in Fenton, Mich. The RF/superior division will remain in Sarasota.

Cable Operators Protection Services Inc. (C.O.P.S.) opened this month offering cable system operators a comprehensive program for ending revenue-draining cable theft. The program provides assistance in detection of illegal connections, conversion of subscribers receiving the service illegally, retention of those converted, prevention of further theft and education of system employees in methods of theft prevention.

Jones Intercable Inc. is receiving active response to the recently initiated VCR/cable offer to test market subscribers. Subscribers in the cable/VCR test markets have the option to purchase the GE-VCR on a payment plan in addition to basic cable service and premium channels. Aggregate monthly cost to subscribers is approximately $44.95.

CED

Last Laugh

"Sorry to bring you all the way out here for nothin', young fella, but all day yesterday the channel on the TV kept changing every three or four seconds. 'Bout drove me crazy! Then, this morning Martha found the remote control underneath my rocker. . ."

Product Profile

Coaxial cable

Aerial drop cable (RG59)

Company/ Model	Tested for SRL to	Dielectric	Attenuation @ 350 & 450 MHz	Capacitance	Velocity of propagation	Bend radius	Other features	For more info. contact
Belden/ Duobond Plus	450 MHz	Foam polyethylene	4.6 dB/100 ft. 5.8 dB/100 ft.	17.3 pF/ft.	78%	N/A	Fuzz-free center conductor, 100% sweep tested	317/983-5200
Capscan	550 MHz	Foam polyethylene	4.33 dB/100 ft. 5.40 dB/100 ft.	16.2 pF/ft.	82%	10X diam.	N/A	800/222-5388
Channel Master/ Color Duct	900 MHz	Foam or standard polyethylene	3.8 dB/100 ft. @ 250 5.9 dB/100 ft. @ 500	N/A	N/A	N/A	Avail in U.L. flame test approved	919/934-9711
CZ Labs	1500 MHz	Foam polyethylene	4.45 dB/100 ft. 5.40 dB/100 ft.	16.2 pF/ft.	82%	N/A	N/A	800/423-2322
MA/COM Comm Scope	550 MHz	Foam polyethylene	4.45 dB/100 ft. 5.40 dB/100 ft.	16.2 pF/ft.	82%	N/A	Avail in standard, tri- and quad-shield	800/438-3331
Scientific Atlanta	550 MHz	Foam polyethylene	4.43 dB/100 ft. 5.46 dB/100 ft.	17 pF/ft.	81 ± 3%	N/A	U.L. listed, many shields, jackets avail.	404/449-2000
Times Fiber/ T4 Drop	550 MHz	Foam polyethylene	4.32 dB/100 ft. 5.29 dB/100 ft.	16.5 pF/ft.	83%	N/A	lifeTime corrosion protectant available	800/TFC-CATV

Trunk cable (½″)

Capscan/ CC500	550 MHz	Foam polyethylene	1.33 dB/100 ft. 1.65 dB/100 ft.	15.3 pF/ft.	87%	14X diam.	N/A	800/222-5388
General Cable/ MC²	550 MHz	Air	1.14 dB/100 ft. 1.40 db/100 ft.	14.7 pF/ft.	93%	16X diam.	Longer lengths, easy coring	800/526-4385
MA/COM Comm Scope/ P3-500	550 MHz	Foam polyethylene	1.31 dB/100 ft. 1.63 dB/100 ft.	15.3 pF/ft.	87%	8X diam.	"Double-Clad" center conductor adhesion	800/438-3331
Scientific Atlanta	550 MHz	Foam polyethylene	1.32 dB/100 ft. 1.65 dB/100 ft.	15.5 pF/ft.	87%	16X diam.	U.L. listed	404/449-2000
Times Fiber/ TR Plus	550 MHz	Foam polyethylene	1.32 dB/100 ft. 1.65 dB/100 ft.	15.3 pF/ft.	87%	8X diam.	Bonded alum. sheath protects against temps (+140°F to −40°F)	800/TFC-CATV

Flexible trunk cable (½″)

MA-COM Comm Scope/ QR500	550 MHz	Foam polyethylene	1.25 dB/100 ft. 1.55 dB/100 ft.	15.3 pF/ft.	88%	10X diam.	Low flexural stiffness, "Double-Clad" adhesion system	800/438-3331
Scientific Atlanta/ CableFlex	450 MHz	Foam polyethylene	1.30 dB/100 ft. 1.62 dB/100 ft.	15.3 pF/ft.	87%	5X diam.	U.L. listed	404/449-2000

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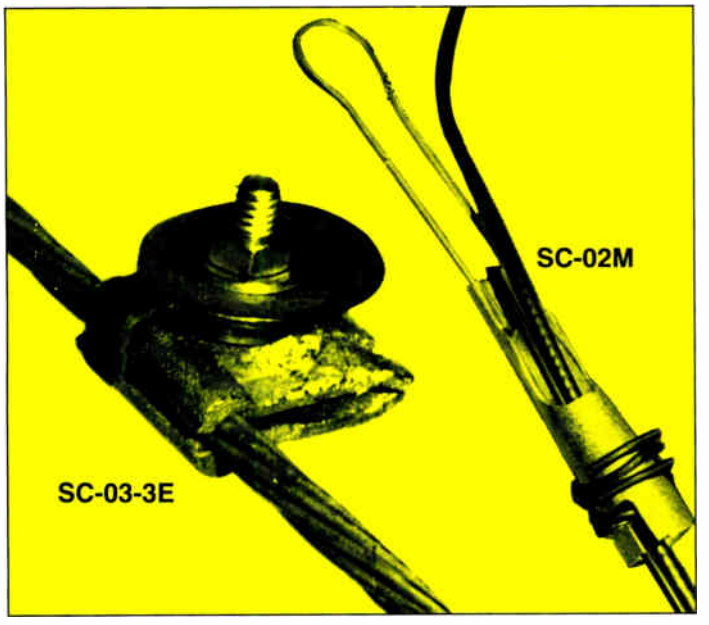

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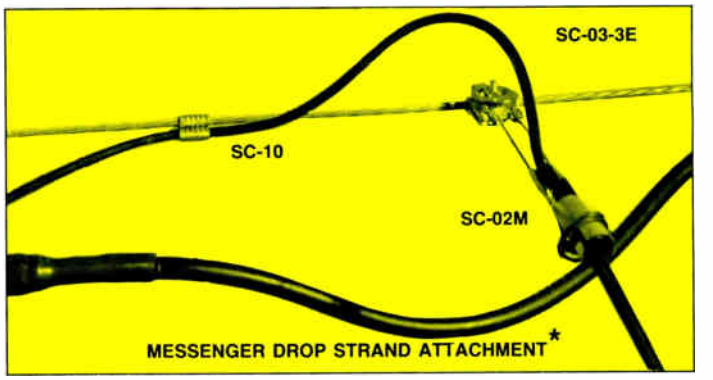

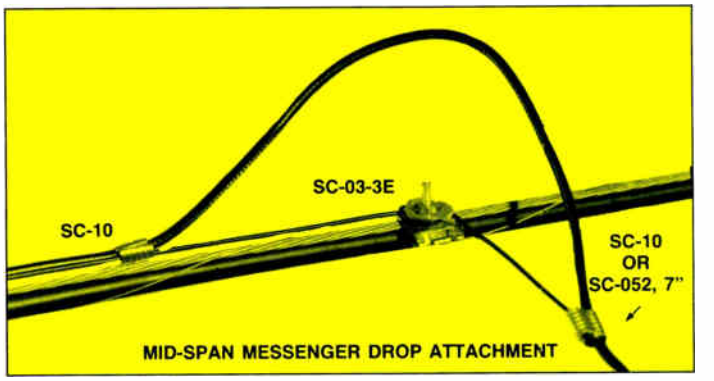

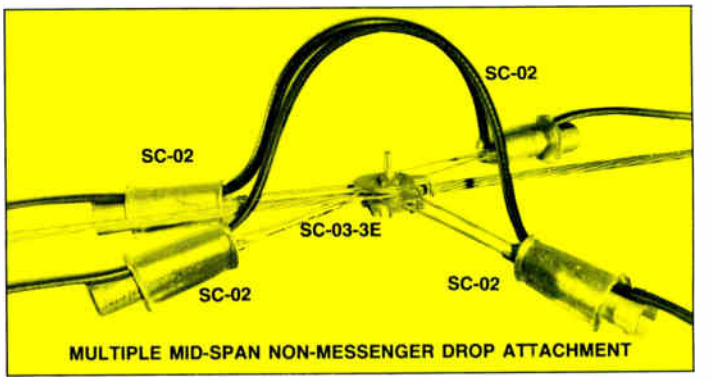

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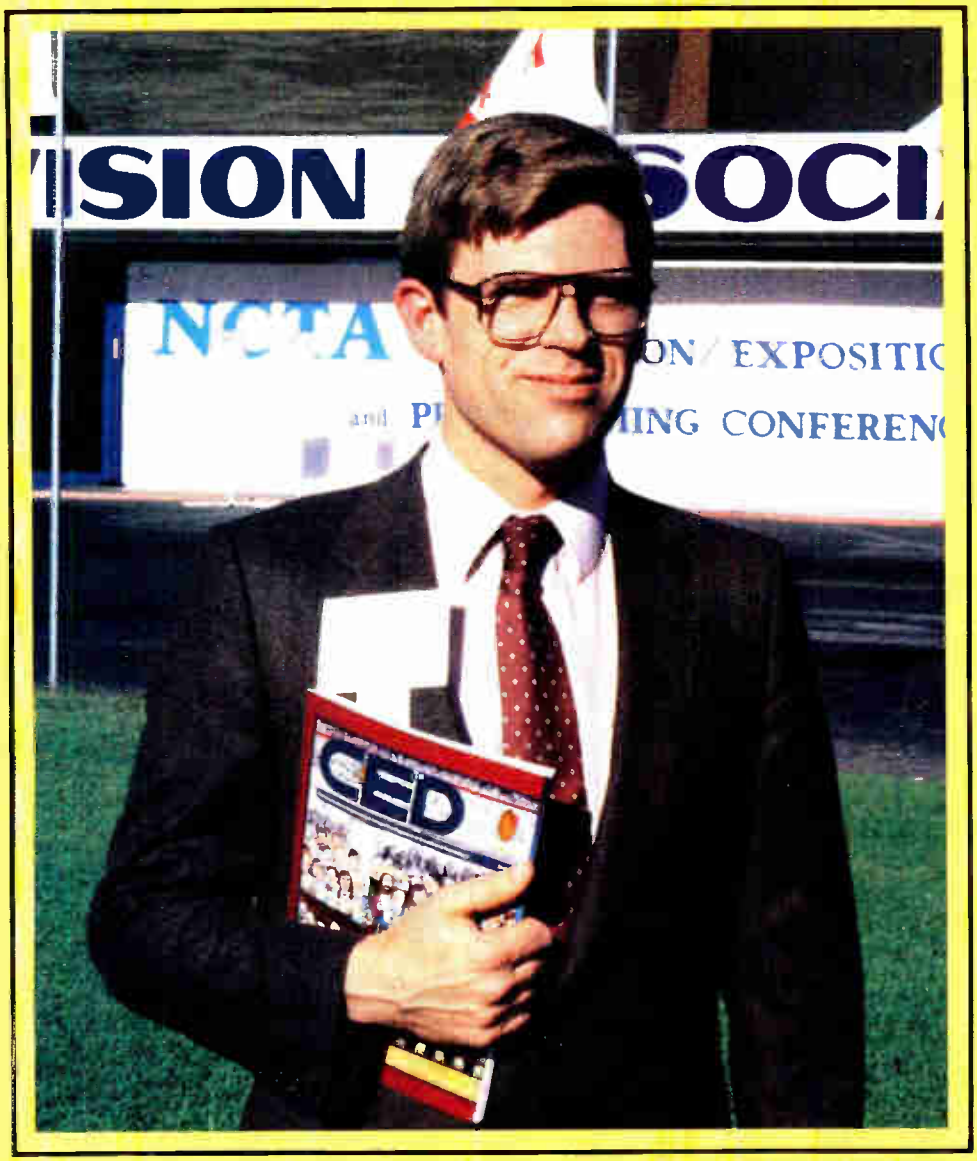

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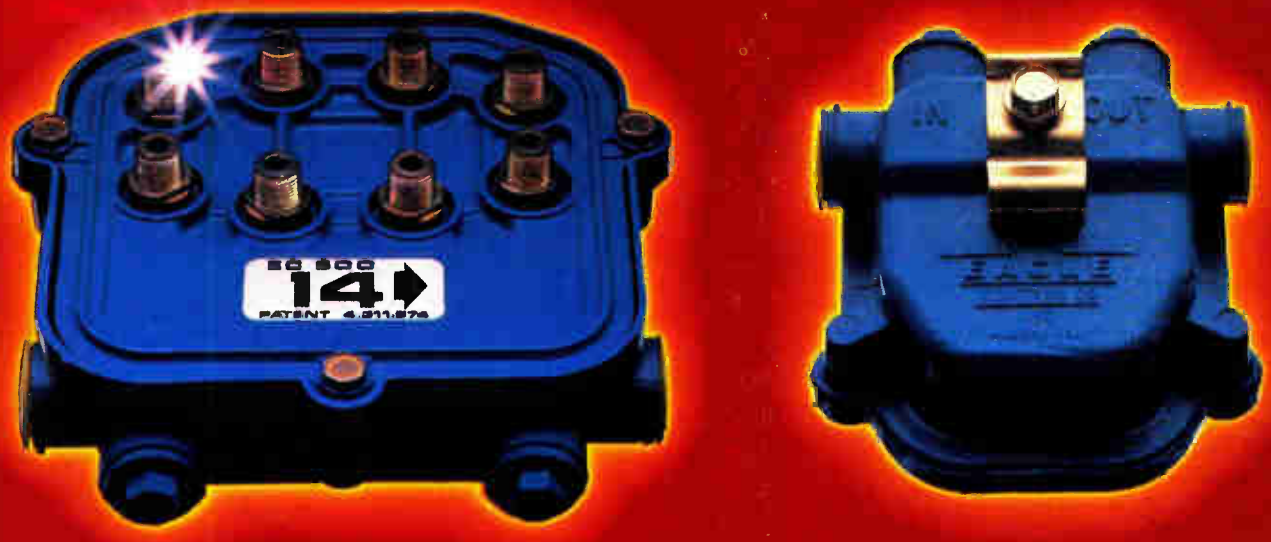

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