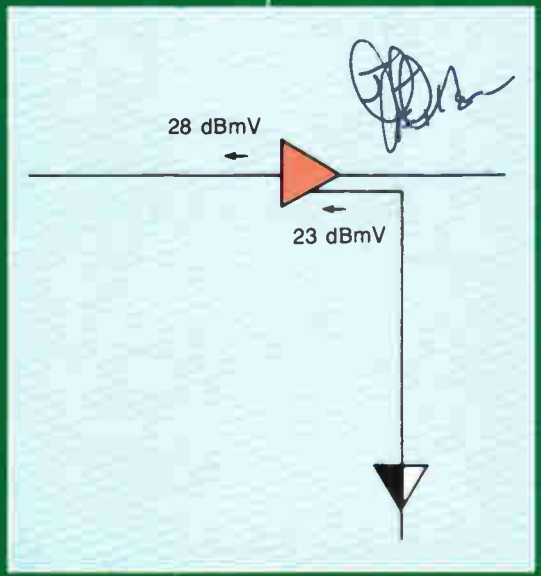
COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers

Focusing in on SCTE's Tec Expo

Wide area networking



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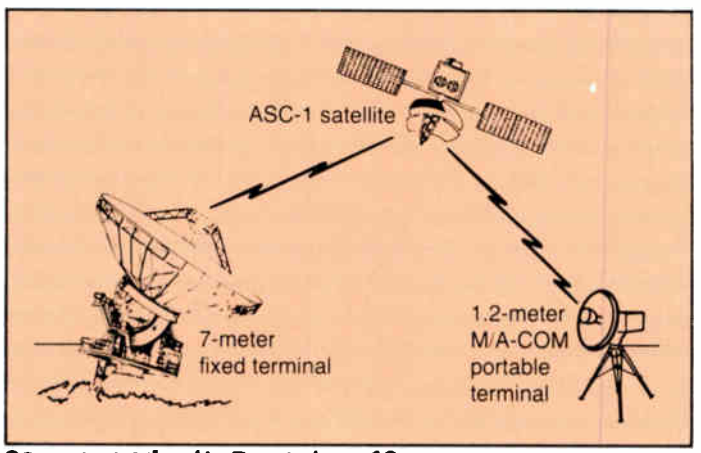

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GENERAL INSTRUMENT

A rose in the desert

Any technical person in the cable television industry who could not attend this year's SCTE Cable-Tec Expo in Phoenix, Ariz., missed a rare opportunity. It was similar to other trade shows in that it was sales oriented, but the similarity stopped there.

The "sales" I'm referring to is selling concepts, training and education. The annual Engineering Conference featured sessions on pay-per-view, developing technical management skills, improving communications between engineering and management, and new technologies in cable system powering. Expo workshops ran the gamut from CPR and first aid to developing a preventive maintenance program, to implementing stereo headend equipment, RF field strength measurement principles and practices, commercial insertion equipment, system sweep and analysis, and how to deal with the FCC.

The luncheon, successfully hosted by Bill Riker, recapped the results from the membership meeting conducted in March at the NCTA show. Everyone cheered the presentation of the Member of the Year Award to Sally Kinsman of Kinsman Design Associates. Congratulations Sally. (For more about the awards, see "News" on page 12, our photo wrap on page 24 and *The Interval*.)

The SCTE realized that the majority of the cable industry technical personnel aren't able to attend each national conference. Hence, it decided to bring educational opportunities to the local system level through its chapter development programs. According to Riker, "When I joined SCTE just a year and a half ago, we had two chapters and seven meeting groups. I'm pleased to announce that we now have nine chapters and 13 meeting groups — a total of 22 meeting groups across the country, each holding bimonthly training sessions for industry personnel."

The keynote speaker was James Mooney, president and CEO of the National Cable Television Association. Aside from the regulatory matters affecting the technical performance of cable systems, Mooney's speech also pinpointed maintenance and service problems.

On-the-floor activities

The exhibit floor was another learning environment for the engineers. More than 90 exhibitors offered technical advice on how to use their products. Apart from the workshops and exhibits, active technical demonstrations were in high gear.

Magnavox occupied a good deal of space with its ever-present mobile training van. Trilogy Communications presented a one-hour demonstration starting with a videotape covering the manufacturing processes utilized for its MC² coaxial cables.

Sachs Communications provided an interesting workshop on grounding drop lines and how to ground. It also conducted a drawing for a Seiko watch; the lucky winner was Kevin Walker, regional engineer for Metrovision in Palos Hills, Ill.

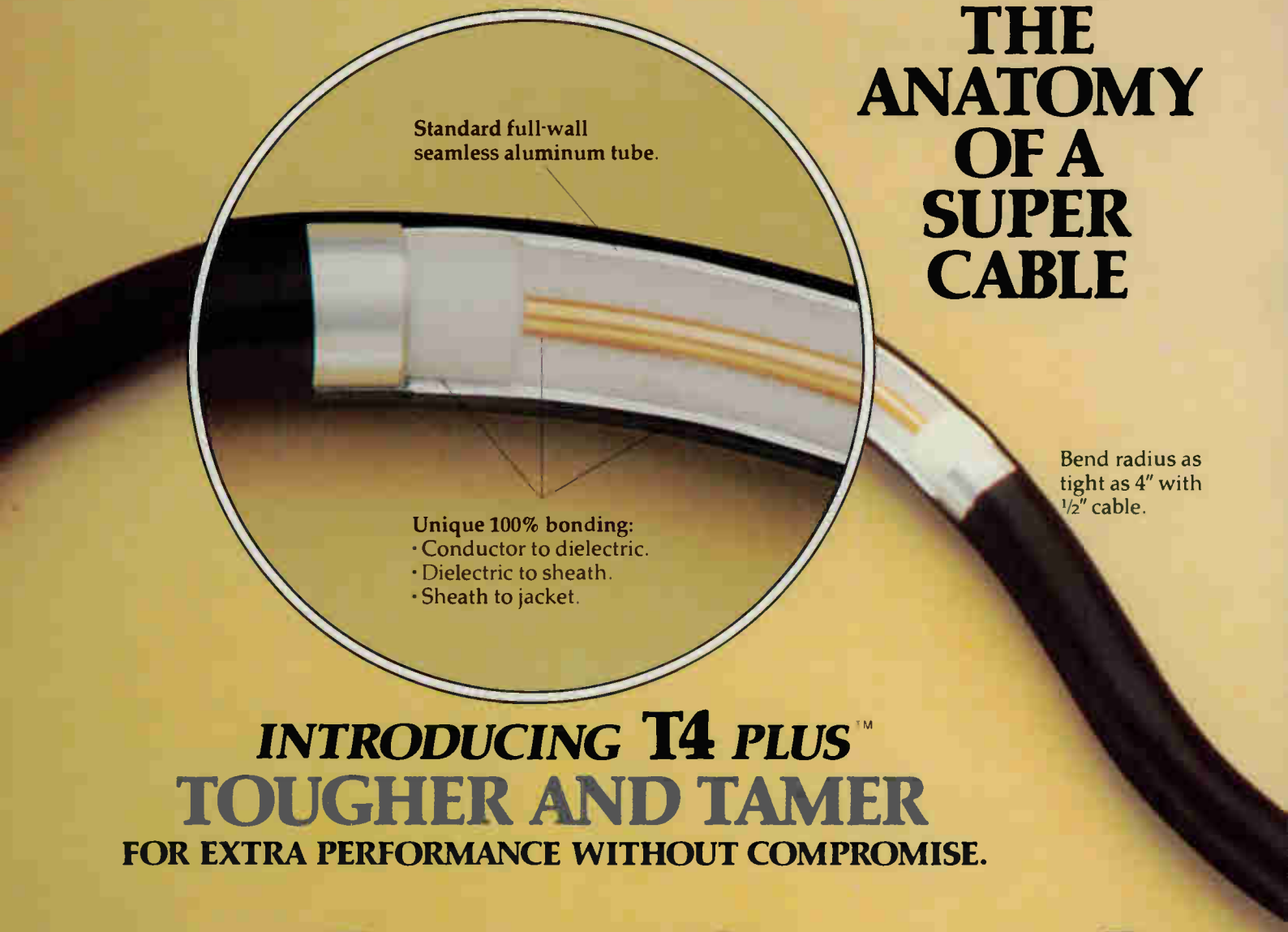
RF Superior demonstrated a computerized, on-line system performance measurement of a remote headend, using its CAT system. During live demonstrations from the exhibit floor, the headend of Dimension Cable in Phoenix was accessed and measured via telephone modem. The parameters measured during the demonstration were levels, frequency and temperature.

A sour note. One of the least attended but perhaps most important of the workshops was the CPR and industrial first aid session. Only a handful showed up when Bob Luff, John Kurpinski and I went, but I assume the other CPR classes were equally as poorly attended. Let's face it, people: Technical personnel work in hazardous surroundings daily, being close to power lines and transformers. CPR is a skill *everyone* should learn. Or to put it another way, wouldn't you prefer to work with someone who would know how to react if you were injured or suffered a heart attack on the job? In any case, in an upcoming issue of *CT* the full text of this workshop will be reprinted; at least take the time to read it.

Without a doubt, this was one of the best technical shows the SCTE ever presented. Kudos go out to Bill Riker, his staff and everyone involved in making the expo the best event of the year for the technical community.

Tom J. Barnett

THE ANATOMY OF A SUPER CABLE



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Bob Luff, Society of Cable Television Engineers president, and Jim Mooney, National Cable Television Association president, during the awards ceremony at the Cable-Tec Expo.

Cable-Tec Expo blooms in Phoenix

PHOENIX, Ariz. — This year marked the Society of Cable Television Engineers' (SCTE) 10th annual Engineering Conference and fourth annual Cable-Tec Expo. In a nutshell, the conference and expo were an unqualified success. According to William Riker, SCTE's executive vice president, "There were 750 paid attendees (up 100 from last year), and we had 90 exhibitors (1985 had only 75)."

This unique trade show was 100 percent technically oriented, featured extensive hands-on instruction, provided greater interaction between attendees and instructors via breakout workshops, and featured a non-commercial exhibit area of hardware vendors offering equipment demonstrations.

On June 12, the Engineering Conference launched the expo activities at the Phoenix Hyatt Regency Hotel. The conference, featuring the upper echelon of the engineering community, is a forum for technical personnel to present papers and discuss methodology with their peers. This year featured industry experts like Robert Luff, Jim Chiddix, Dave Archer, Fred Rogers and Dan Pike, to name a few. Sessions targeted pay-per-view, improving communications, and new technologies in system powering.

The first item of business at the expo awards luncheon was the presentation of the Member of the Year Award, given to Sally Kinsman, the Society's Western vice president and president of Kinsman Design Associates. Her many credits include evaluating the SCTE's 1984 membership questionnaire, guiding the Rocky Mountain Meeting Group to chapter status, assisting in that chapter's presentation of a two-day technical seminar on signal leakage, and researching the restructuring of the SCTE's regional borders. She also is chairperson of the senior member committee.

Kinsman then presented a certificate to Ron Hranac, a corporate engineer at Jones Intercable. Hranac was the only person in 1985 to be approved as a senior member. One of the founders of the Rocky Mountain Chapter, Hranac currently is its president.

Tom Polis, SCTE president in 1985, made special presentations to members of Showtime/The Movie Channel for their work with the Satellite Tele-Seminar Program. Accepting the award were Mike Aloisi, Lynn Watson, Joe Girard and Joe Bonomolo.

Introducing the keynote speaker, Riker said, "The NCTA plays a major role in the evolution of our industry. The staff works very hard representing our industry on Capitol Hill, as well as at the FCC. For that reason, we have asked James P. Mooney, president and CEO of the National Cable Television Association, to speak at our luncheon today."

In his speech, Mooney described the "more than usually exciting time" in the cable industry. "We are coming out of the end of our great construction period. By the end of this year we'll have approximately 41 million subscribers and passed 76 percent of American homes.

"Moreover, we stand today only seven months from complete deregulation of subscriber fees. As of Dec. 29, a system will be free to operate as a business and not have to ask the politicians for permission to change out a channel or to adjust rates.

"And there is more good news on top of that. The FCC has pre-empted state and local governments from establishing their own technical standards. From now on, only the FCC will have the authority to devise picture quality tests and signal carriage standards. Must-carry is out.

"And finally, at long last, the Supreme Court has gotten around to recognizing cable's First Amendment rights. All these represent heady achievements. When you combine them with the fact that we seem these days to be the favorites on Wall Street and the investment community you might even worry a little bit that we're getting too fat and happy. And maybe even a little complacent.

"That isn't the way I see the industry going these days. In fact, rather than being complacent, the industry has been reinvigorated and is tending to regard its achievements not as establishing a plateau but providing a springboard for the future."

Mooney's speech also pinpointed maintenance and service problems: "Sometimes I think that while it's exciting to be involved in congressional issues, maybe the cause will be helped if CEOs or the kinds of guys who sit on my board get a little more involved in thinking what is going on at the system level. To consider the value of putting some more resources in maintenance, education and training of technical personnel, answering the phones, and things like that.

"If I hear anything that is consistently and forcefully expressed . . . it is not only that we have got to drive hard toward increased penetration, but that improved customer service and improved image of the cable industry in the customer service area is essential to that goal.

"What I am getting around to saying, I guess, is that there are some problems like deregulation, First Amendment rights and large-scale investments in programming for which solutions come from the top down. But there are some problems whose solutions must come from the system level up . . . I think the future of this industry is wide open. Cable's growth over the past 10 years is now merely legendary. We have gone from being an antenna service, merely ancillary to broadcasting, to being a full-fledged television medium in our own right.

"And while I certainly can't predict with any certainty what the television world is going to look like 20 years from now, I do know what it looked like 20 years ago. But success doesn't come to those who merely stand around and wait for it to fall on them. We've got a lot of work to do."

For more on the Cable-Tec Expo, see this issue's *Interval*, as well as the photo wrap-up, beginning on page 24.

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The Greening of America

By Isaac S. Blonder
Chairman, Blonder-Tongue Laboratories Inc.

What is your reaction to the above title? Do visions of clean rivers filled with healthy fish, lakes free of acid rain and birds singing in the meadows swarming with insects dance in your mind like sugar plums in holiday puddings? If so, you certainly qualify as a member of the environmental majority now dictating the laws, the mores and the science of America. Long gone is our free society, free enterprise and the scientific method. Emotion, not reason, guides the hand in the voting booth. In my view, today's mistakes will impoverish the citizens of tomorrow.

Sounds like the rantings and ravings of an obsolete physicist and frustrated capitalist? Maybe so, but here is the other side:

When Europeans landed in New Jersey, they encountered a Stone Age tribe of Indians, the Lenni Lenapes ("real men"). Their society, like most of the North American natives, was in full harmony with the environment, neither contributing nor detracting from nature what it possessed without their presence. If a family group took up their abode on one side of a stream, this settlement lasted until the area was so filthy with human waste that they finally moved on to the other bank until nature, in due course, had cleansed the old site so that they could reoccupy it.

The living quarters consisted of lean-tos constructed of brush and leaves fabricated without tools. Clothing was composed of a single layer of leather pieces that could cover the entire body in winter. I was personally acquainted with a modern Lenape who declared he was never cold and wore the same shirt and jeans winter and summer! Following this regime and lifestyle, Indian America probably contained the maximum population the land could support — about 5 million. The median life span was in the mid-30s.

During the '20s, I spent a summer with relatives who owned a chicken farm in rural Connecticut. This farm demanded almost as little from the land as did the Indians. While they did have a truck to bring chickens and produce to market, they had no electricity, central heating, running water, chemicals or machinery in the farm proper. The sanitary facilities were superior to the Indians, however; there was a well and an outhouse. The outhouse was typical of its kind, well-stocked with buzzing bees and a Sears catalog. Since we went barefoot and the chickens and other farm animals were everywhere, we and the Lenapes were brothers below the knees. No one ever called for a doctor and on occasion we even pulled out a sore tooth with a string tied to a doorknob.

Modern problems

Some years ago, I was involved with real estate originally zoned for heavy industry, for which the local moguls refused to issue permits for industrial buildings on the thesis that those dirty manufacturers should conduct their filthy business in somebody else's town. Finally, the zoning board held a hearing to consider a housing package for the property. The environmental engineer testified that forest land generates about 1/100 of the acceptable pollution level but that housing would increase the amount of pollution by 10 percent.

Two hours later they still couldn't fathom the simple mathematics, whereupon they demanded that the builder bring forth the local university professor of forestry to endure their barbecue before they would grant a building permit. Manufacturers, employing even the simple chemicals found in every household, are unwelcome in New Jersey and, I suspect, endure a similar discrimination in every other state. Officers of polluting companies now are subject to prison terms on a retroactive basis for previously legal manufacturing techniques.

The safety levels of chemicals, radiation and industrial pollution are set by emotion, not logic. A coal-burning power plant kills 50 miners a year contrasted with the zero technicians killed in nuclear plants (the American experience). Nonionizing radiation (TV and microwave) is not harmful even in large doses — the probability of third and fourth generation damage is damned low. Laboratory animal cancer studies are not statistically valid on humans in a real-life situation. Fossil fuel is not renewable and cannot be replaced by known renewable resources — scratch the windpower and sunpower as grossly expensive and inadequate.

One last tale, perhaps the most revealing on the stranglehold that environmentalists have secured on our society: There is not a legal waste dump in New Jersey for petrochemicals. To dispose of a barrel (55 gallons) of waste oil, the charge is upward of $200 to dump it somewhere in northern New York state (site unknown). Years ago such waste simply was mixed into fuel oil and usefully burned without harm to ourselves and the cost of goods.

My anguished outrage at "the greening of America" will not be heard or believed. Perhaps if the environmentalist had has sore tooth yanked with a string, or shredded his Sears catalog in my cousin's outhouse, our present "polluted" society would rank higher than the Indian encampment on the banks of the Shrewsbury River and we could appreciate the quality of life afforded by a nuclear plant that should be operating there today.

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Reader Service Number 12.

Notes from the AFCEA show

By Lawrence W. Lockwood
East Coast Correspondent

The Armed Forces Communications and Electronics Association (AFCEA) has a huge yearly show in Washington, D.C., exhibiting the latest military electronics equipment. At its most recent convention, several companies joined together to show a communications capability that may well have extensive commercial applications in addition to the military ones pitched at the show. The companies—American Satellite Co., M/A-COM, Compression Labs Inc. (CLI), PicTel and Vertex—put together a satellite communications system that demonstrated video teleconferencing and/or data networking.

There were two very interesting aspects of the demonstration: the use of very small aperture terminal (VSAT) technology and video bandwidth compression. The VSAT uses the Ku-band and therefore can provide both uplink and downlink capabilities with antennas as small as 1.2 meters. Both CLI and PicTel produce equipment that enables video transmission at reduced rates. The transmission rate capabilities of both companies' equipment are capable of being varied but the CLI rate is higher (T1 = 1.544 MBPS) and PicTel is lower (56 kBPS).

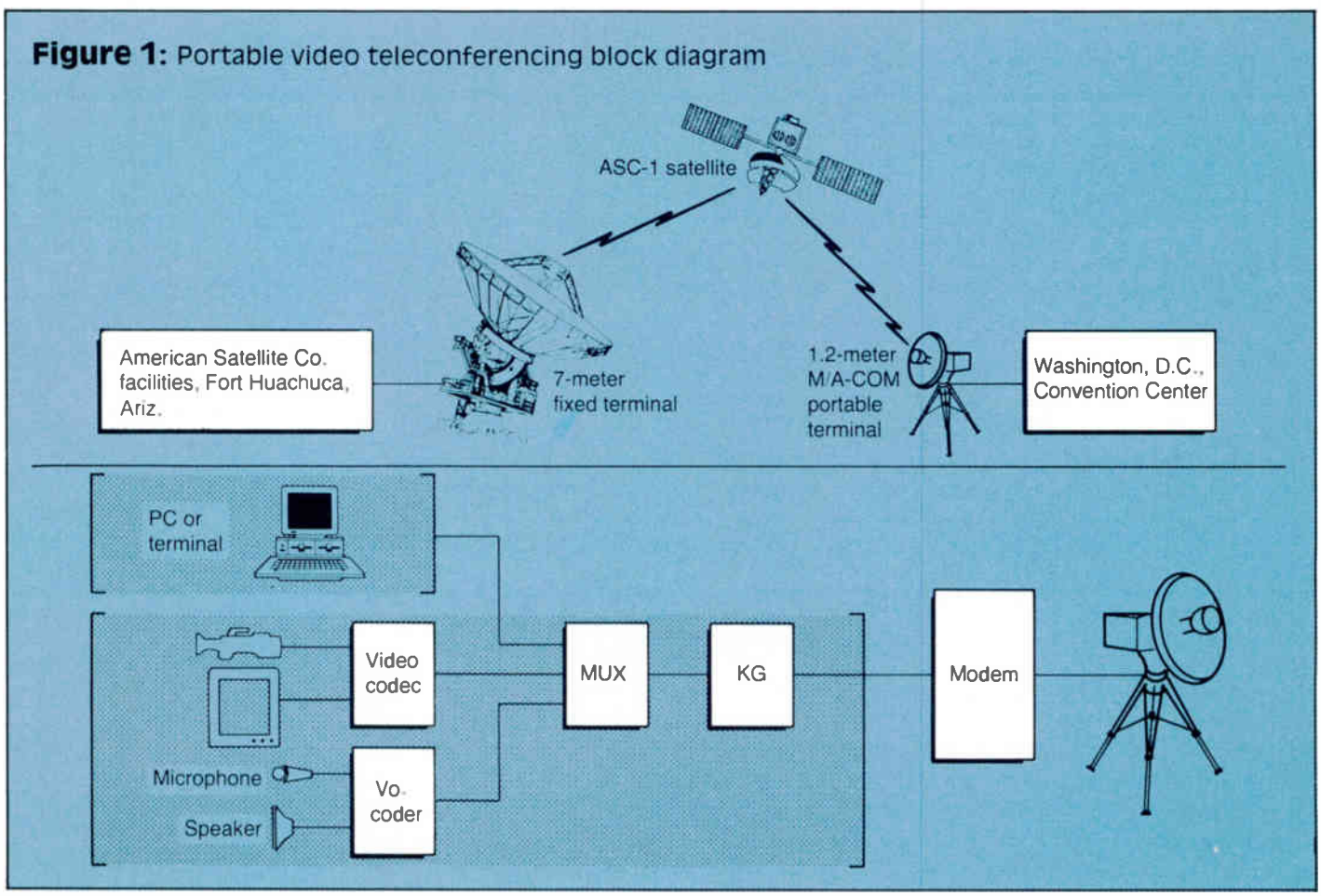
American Satellite hooked all this equipment together to make a demonstration via its satellite. A block diagram of the teleconferencing exhibit at AFCEA is shown in Figure 1. The transmission link was between American Satellite's booth and an American Satellite facility in Fort Huachuca, Ariz. The video coder/decoder (codec) was a PicTel and the teleconference was done at a 56 kBPS rate.

Digital video data rates, compression

A word about digital video data rates. The Nyquist theory states that in analog-to-digital (A/D) conversion the sampling rate must be at least twice the highest analog frequency being sampled. In practice, for color video transmission the sample rate often is taken at three times the color subcarrier rate, i.e., 3 × 3.58 MHz = 10.74 million samples per second. It generally is recognized that a quantization of 8 bits per sample (256 levels in the video signal) is required for good signal reconstruction. Therefore, 10.74 × 8 = 85.92, or approximately 90 MBPS, is a commonly accepted rate for an uncompressed digital video transmission. In broadcast studio equipment, where there is no requirement for long transmission paths, a higher data rate often is used—a sample rate of four times the color subcarrier, yielding a data rate of approximately 115 MBPS.

To reduce these rates to either T1 or to 56 kBPS requires extensive technology. A complete description of these systems is beyond the scope of this column. However, a general outline of compression functions can be given. Although the demonstration was done with a PicTel codec at 56 kBPS, American Satellite also uses CLI equipment at higher data rates as required. CLI has been adopted

Figure 1: Portable video teleconferencing block diagram



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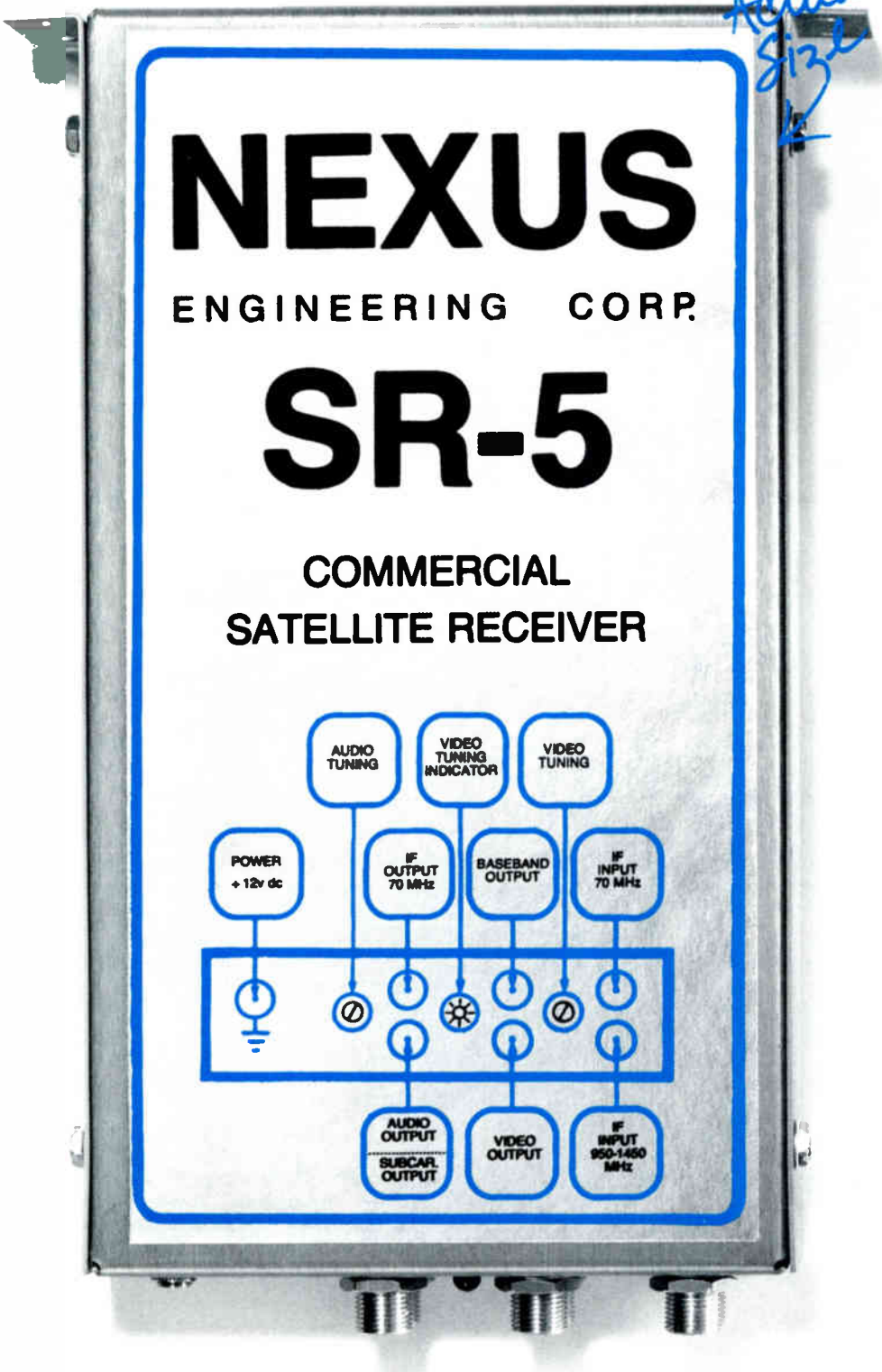

actual size

There are commercial satellite receivers that are all gizmos and no guts.

The design engineers at Nexus wanted to build a satellite receiver that did away with all the expensive and cumbersome "bells and whistles" that had long been a part of traditional receiver designs.

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Reader Service Number 13.

CLI's Rembrandt video compressor.

by AT&T for its own teleconferencing uses and had a booth demonstrating its equipment.

The first work by CLI in video data rate compression used *interframe* coding, which measures and transmits the differences from frame-to-frame, a procedure that has limitations producing possible blurring or jerkiness in scenes with significant motion.

CLI's next step in development was the use of *intraframe* coding. No frame-to-frame comparison is made here. Instead, each frame is broken down into approximately 690 blocks of 16 x 16 picture elements or pixels. The codec assigns bits to each block based on the complexity of the scene in that block, with the bland, less detailed blocks assigned fewer bits and the busy, more detailed blocks assigned more bits. Information then is transmitted in digital form and decoded at the receiving site. Although intraframe coding causes a slight degradation of detail resolution in a picture, it maintains picture quality relatively independent of the amount of motion in the picture.

In 1983 the company announced a newer version of its product, which employs a proprietary technology called DXC or differential transform coding. DXC combines the positive aspects of both interframe and intraframe coding, using interframe coding for blocks with little or no motion and intraframe coding for blocks with high motion. This device further added the capability for selectable bandwidth transmission at rates less than 1.544 MBPS.

In 1985 CLI introduced its latest video compressor, the Rembrandt, shown in the accompanying photo. This system can facilitate international video teleconferencing through conversion of NTSC video, used in the United States and Japan, to PAL, used in Europe, South America and the Middle and Far East. Additionally, this model provides a great range of user-selectable transmission bandwidths—from 384 kBPS to 3.136 MBPS, which offers users the choice of picture quality and transmission cost best suited to their own video teleconferencing needs. The PicTel equipment carries this reduction further; it can transmit at user-selectable transmission rates from 9.6 to 128 kBPS. The costs of both devices are comparable—depending on the configuration, quantity, etc. The CLI Rem-

brandt is approximately $85,000 and the PicTel is $65,000-$70,000.

Since there is no free lunch, one cannot expect broadcast quality from any of these systems. However, in a subjective evaluation, their performances are remarkable. With no motion, they both produce pictures with good color and resolution, comparable to an average off-the-air home TV receiver. With motion, the differences become apparent. With little motion (e.g., talking heads), the CLI at T1 is not broadcast quality, but if one were not aware that the system was in use it would probably pass for average video. It is interesting to note that at about one-half the T1 rate, i.e., 760 kBPS, the subjective quality of the CLI holds up quite well.

It is difficult to tell when the T1 and when the 760 kBPS rate is in use. However, the PicTel at 56 kBPS with a talking head produces a type of blurring motion (lips, etc.) that initially is distracting and requires an adjustment by the observer for acceptance to the point where it can almost be ignored. Where all the data compression schemes become less than acceptable is when the camera moves or pans. Here, the data compression algorithms just have more new data all over the picture at once for them to function efficiently. Subjectively, when camera motion occurs the picture tends to substantial jerkiness.

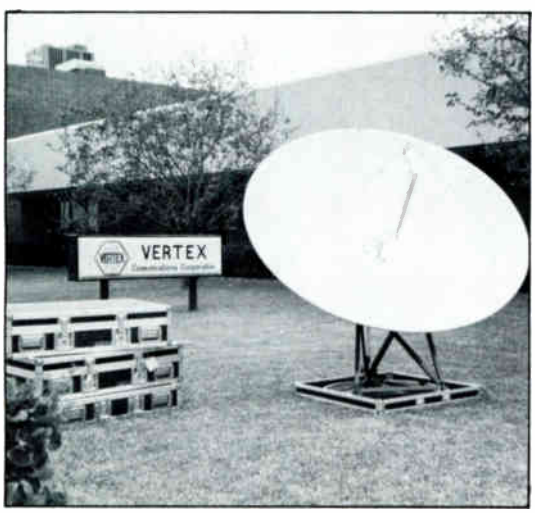
VSAT antennas and added data services

As noted previously, this communications arrangement using the Ku-band permits the use of small aperture antennas. The size of the antennas—as small as 1.2 meters—permits their use in a much wider selection of locations, e.g., buildings on which larger antennas might not be placed. This in turn enlarges the possible market choices where these services might be sold. Two typical antennas made by Vertex, both 1.8 meters, are shown in the accompanying photos. The portable is center fed and can be transported in the cases shown. The mobile configuration with an offset feed folds down into the roof of the van.

American Satellite offers an interesting combination of services. As noted previously, the video transmission rate may be reduced from T1 to 760 kBPS with little additional subjective picture degradation. This frees 760 kBPS for use by phones, computer data, etc., as needed. A configuration to accomplish this can be seen in Figure 1 if the PC is replaced by a multiple data source.

New markets

Business use of video teleconferencing has not progressed at the rate many have projected. However, the combination of VSAT technology and variable rate video transmitted with data may open markets as yet uneconomical for just video teleconferencing or just data transmission that currently use larger satellite earth installations. Of course, as more fiber-optic transmission becomes available from the phone companies and other common carriers, this same variable rate video and data service may use these facilities for communications.



Center fed VSAT portable antenna from Vertex.

The offset VSAT mobile antenna.

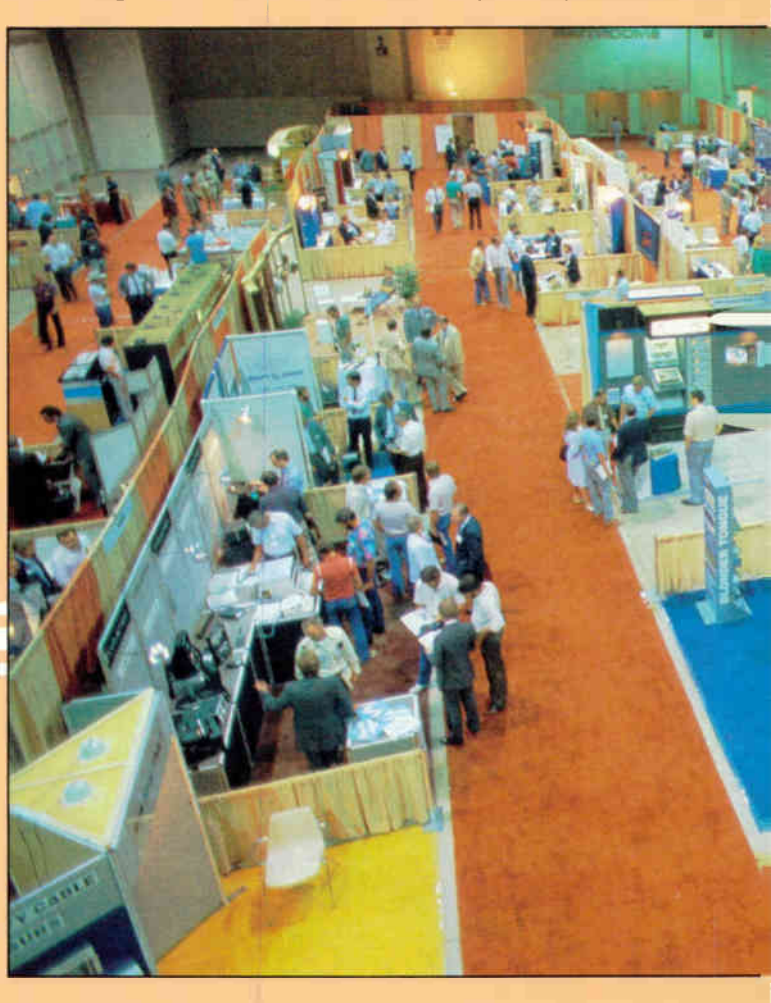
Cable-Tec Expo:

(Clockwise from above) Flanked by SCTE Executive Vice President Bill Riker and Tom Polis, past president of the Society, Sally Kinsman receives the Member of the Year Award. NCTA President Jim Mooney provided an upbeat picture of the industry during his keynote speech. Ninety exhibitors were on hand with their wares, some offering technical demonstrations for attendees.

At the SCTE Cable-Tec Expo, unlike other trade shows, most of the floor exhibitors provided educational and hands-on experience with their products, rather than just trying to sell them to the attendees. Most of the companies also had staff engineers available to explain how their technologies worked.

Special technical demonstrations by some exhibitors were set up at the rear of the exhibit hall, offering formal presentations of the products and related technologies. These companies included Northeast Filter Co. (updating CATV trap technology), Alpha Technologies (status monitoring on one-way cable), Zenith Electronics (in-band addressing) and Sachs Communications Inc. (aerial installation practices and grounding).

For example, the Sachs demonstration touched on the controversial nature of grounding and some reasons why the procedure is



Actively-working

necessary in protecting persons and property from electrical hazards. Various methods of grounding were covered, as well as the best locations for installing grounds.

By far the most effective way of disseminating information during the expo was the workshop. Nine different workshops were held six times during the expo. Topics ranged from industrial first aid to FCC regulatory changes. Perhaps the most popular workshop was "Developing a Preventive Maintenance Program," delivered by Ron Hranac. The corporate engineer from Jones Intercable presented general guidelines to aid in developing a PM program: setting goals, putting a program together and documenting it.

The accompanying photos taken at the expo by Bob Sullivan reveal even further the desire of the Society to help improve its members' experiences in the industry.

SCTE Society of Cable Television Engineers

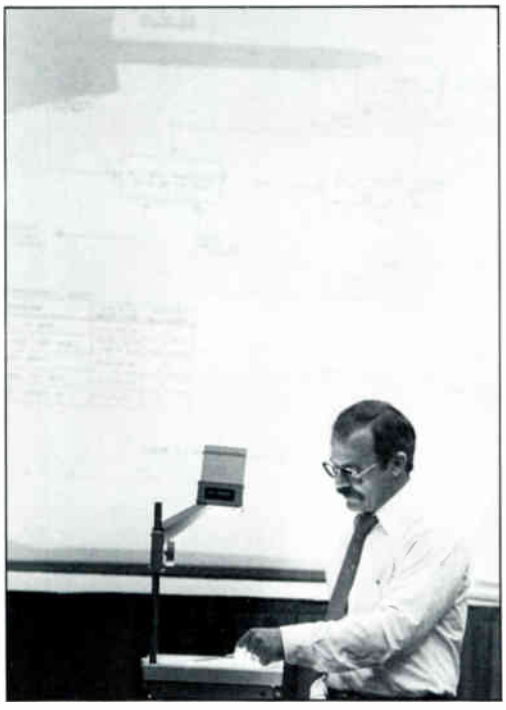
CABLE-TEC EXPO '86

June 12-15, 1986

Phoenix Convention Center
Phoenix, Arizona

The cumulative leakage index and other topics are handled by Cliff Paul of RT/Katek and Syd Bradfield of the FCC in an expo workshop.

Technical demonstrations at the Exhibitor Training Center included an update on CATV trap technology with Tim Holdsworth of Northeast Filter Co.



The latest technology in commercial insertion is illustrated by Allen Kirby, national sales manager at Falcone International.

Bill Riker congratulates achievement award winner Ralph Haimowitz of American Cablesystems, as Awards Chairman Jim Stilwell looks on.

SCTE Regional Director Steve Bell and President Bob Luff helped man the SCTE membership booth during expo registration.

Steve Windle, Wavetek, highlights 'System Sweep and Analysis' during an expo workshop.

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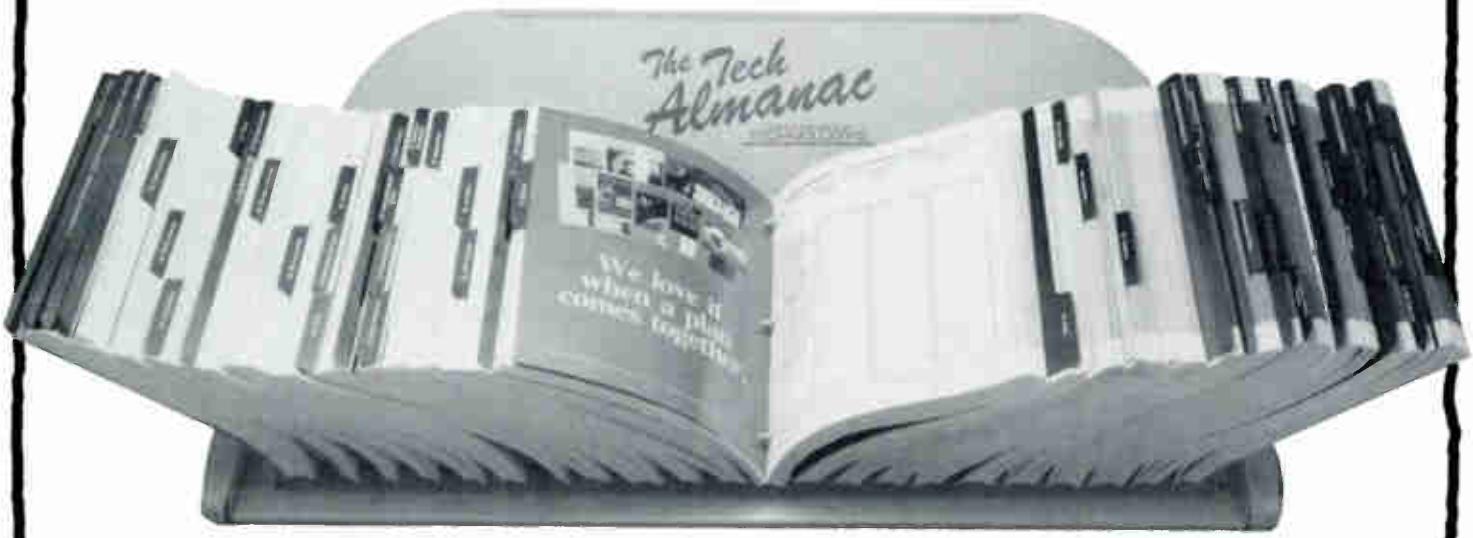

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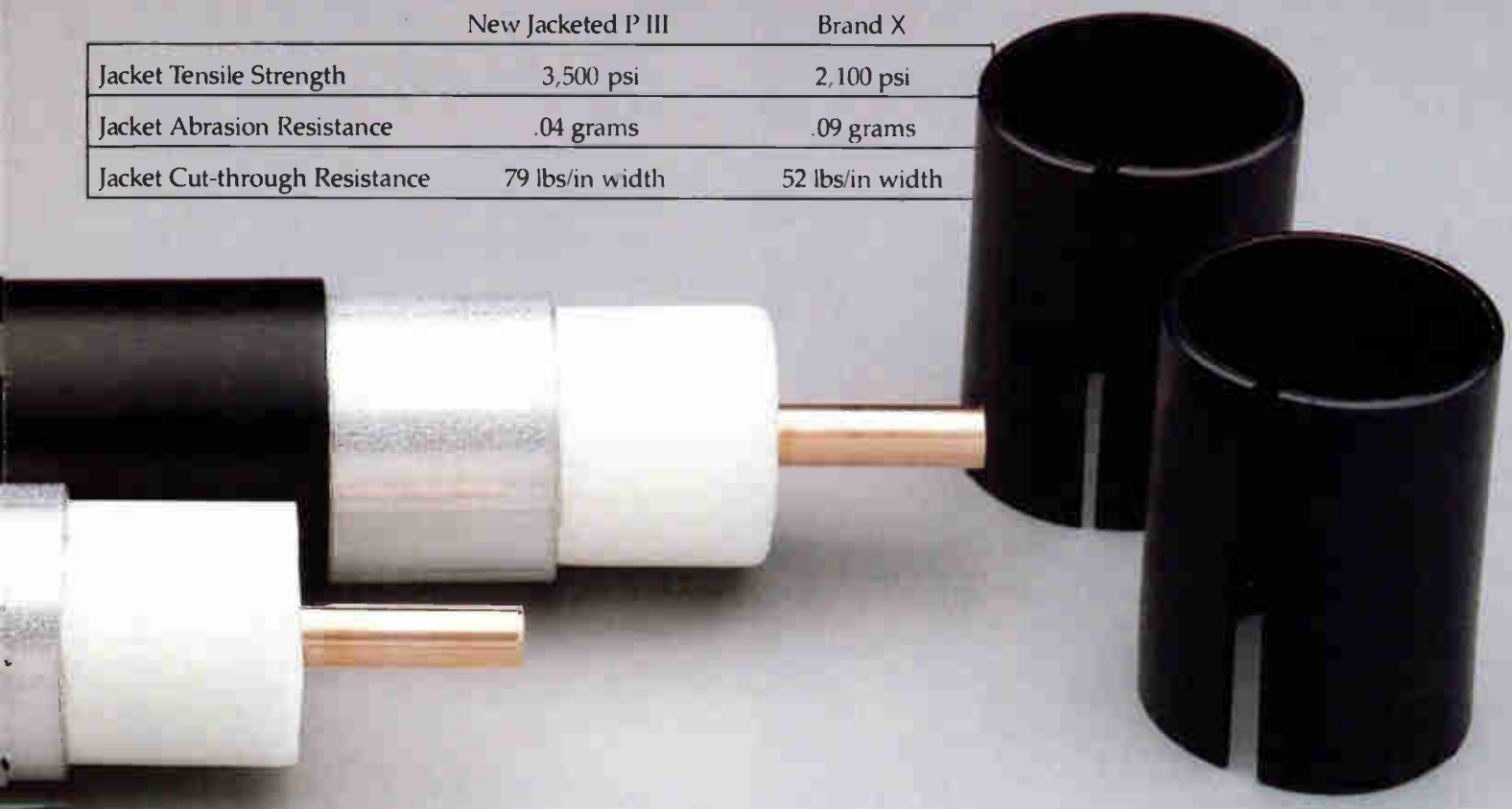

Each workshop was held six times during the expo and ranged from CPR and first aid to system sweep and analysis.

Projecting a cross section of coax cable is Ron Adamson of Texscan in a workshop on 'RF Field Strength Measurement Principles and Practices.'

Richard Citta of Zenith answers a pertinent question during the technical demo, 'In-Band Addressing.'

Bill Gilbert instructs a technical demonstration on 'Status Monitoring on One-Way Cable' for Alpha Technologies.

Receiving an award for outstanding achievement is Mike Smith of Warner Cable. SCTE Executive Vice President Bill Riker (left) and Technical Awards Committee Chairman Jim Stilwell presented the award.

Jones Intercable's Ron Hranac leads a workshop on developing a preventive maintenance program.

Paul Beeman, director of field engineering at MTV Networks, explains video and audio signals and systems at a BCT/E review workshop.

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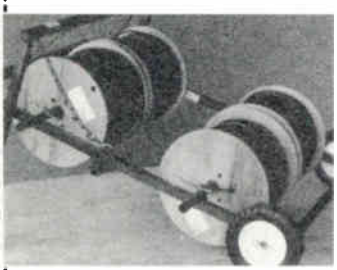

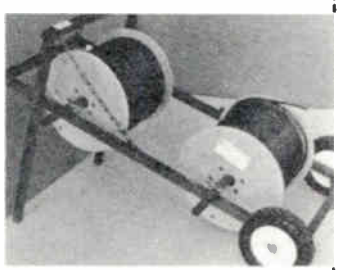

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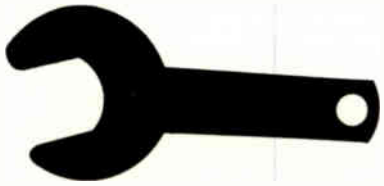

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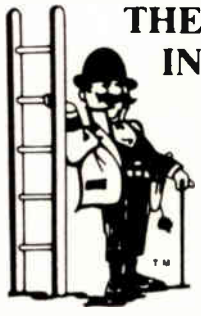

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NOMINATION/APPLICATION FORMS

OBJECTIVE: To recognize outstanding individuals involved in all levels and job categories in their relationship to the technical requirements of the CATV industry.

Striving for excellence is what the 1986 SCTE Achievement Awards are all about and they will honor those specific individuals for taking that extra effort to be the best.

ELIGIBILITY: All current SCTE National members are eligible to submit an award application or be nominated without limitation as to their job categories. Nominations may be made only by SCTE National, Chapter or Meeting Group members. For these national awards, there is no filing fee required for either applications or nominations.

CRITERIA: The awards committee will evaluate the applicants and nominees to ensure the recognition of Awardees from the fullest possible scope of job categories and responsibilities. Multiple Awards are planned, based upon demonstrated individual personal achievements.

DEADLINE: All entries must be received by Monday.October 27, 1986, at the SCTE national office so as to be considered for the 1986 National Achievement Awards.

ENTRY PROCEDURE

1) Applicants may file the "Application For Award Form" directly, noting the required listing of two individual references. The "Reference Form," as provided, should be submitted with the Application Form, if possible. Both must be received by the Deadline Date.

2) "Nomination Forms" may be submitted directly in behalf of Nominees, or may be directed to Nominee for enclosure with Nominee's "Application Form." It is obvious that the use of this form will provide the necessary information for the Committee's use in consideration of the Nomination.

3) All entries are to be mailed to:
Attn: 1986 Awards Committee
Society of Cable Television Engineers
P.O. Box 2389
West Chester, PA 19380

4) The forms as published in *Communications Technology* are to be used for entries or may be copied as required.

5) Please call the SCTE office at (215) 363-6888 for further information.

NOMINATION/REFERENCE FORM 1986 SCTE ACHIEVEMENT AWARD

(This form is to be used for the nomination of any National SCTE member and is also to be used by persons submitting reference material in support of any SCTE member's individual application for award.)

File No. _____
Date Recv'd. ___/___/___
Category _____

Above for office use

Nominee
Name _____
Phone _____
Address _____

Submitted by
Name _____
Phone _____
Address _____

Please provide brief outline of your reasons for support of the nominee such as the following:
Years known, work habits or dedication, advancement protential, customer/employer relations, achievements on job, or involvement in outside activities.
(Use additional sheets if necessary)

_____

_____

_____

Reader Service Number 1.

APPLICATION FORM FOR 1986 SCTE ACHIEVEMENT AWARD

☐ Self Nomination
☐ Nominee Reference
(Please check one.)

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___ System Tech
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___ Corporate Management

Equipment/Services Supplier
___ Field Eng'r Tech
___ Field Sales Rep
___ Equipment/System Designer
___ System Const. ___ Foreman ___ Mng'r
___ Chief Engineer
___ Corporate Management

Please answer the following (Use additional sheet if necessary):

1) Describe what you like about your work activity in the CATV Field.

_____
_____
_____

2) What contributions have you made to improve the service provided by your company?

_____
_____
_____

3) What do you wish to achieve in career future?

_____
_____
_____

4) What do you feel the SCTE can provide to improve yourself and/or your work activity?

_____
_____
_____

5) List two references below, one of whom should be a SCTE member.

Name _____
Phone (_____) _____
Address _____
_____
SCTE Member ☐ Yes ☐ No

Name _____
Phone (_____) _____
Address _____
_____
SCTE Member ☐ Yes ☐ No

Wide area network implementation

There's been a lot of interest in local area networks (LANs) recently. Cable operators are investigating applications and manufacturers are rolling out new products. But what happens when the application is beyond the product's scope?

By Michael T. Dawson
Vice President, Coastside Cable TV Inc.

When we were asked to build a LAN using our cable TV system as a backbone, we were excited by the challenge. We could envision a cable system with data services sharing bandwidth with entertainment, generating a new revenue stream to amortise all the new equipment and improvements we wanted to make to the cable system. Preliminary studies of two-way equipment and standby systems showed we were on the right track. When we surveyed the LAN equipment market, we discovered that there is a vast difference between LAN systems, which we *thought* we were building, and wide area network (WAN) systems, which we really *were* building.

The classic LAN interconnects devices in the same building or group of buildings in, for example, an industrial park or college campus. Provision can be made to link a remote building (or buildings) to the core LAN with phone modems or other long-haul data devices.

Most LAN designs require a dedicated cable or cables and carry only data. At least one vendor insists on a separate cable for forward and another for reverse transmission. A system using a dedicated cable can be designed for consistent output and input levels for the transmitter side of the modem. →

Figure 1: Distribution

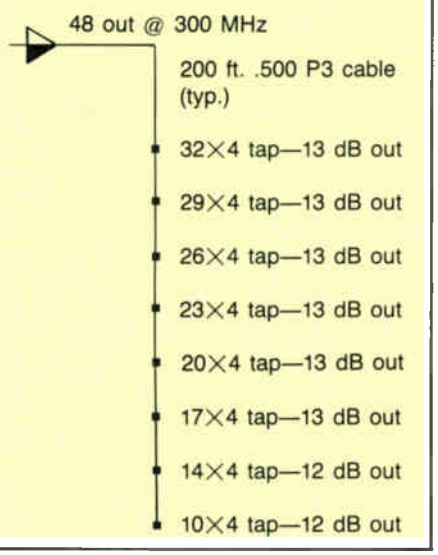
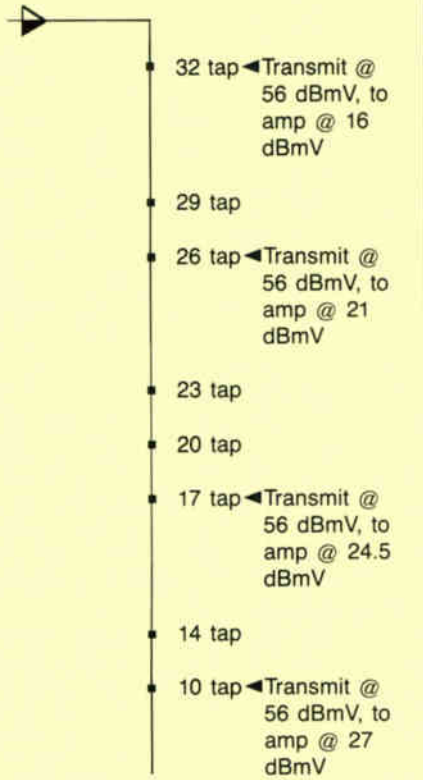
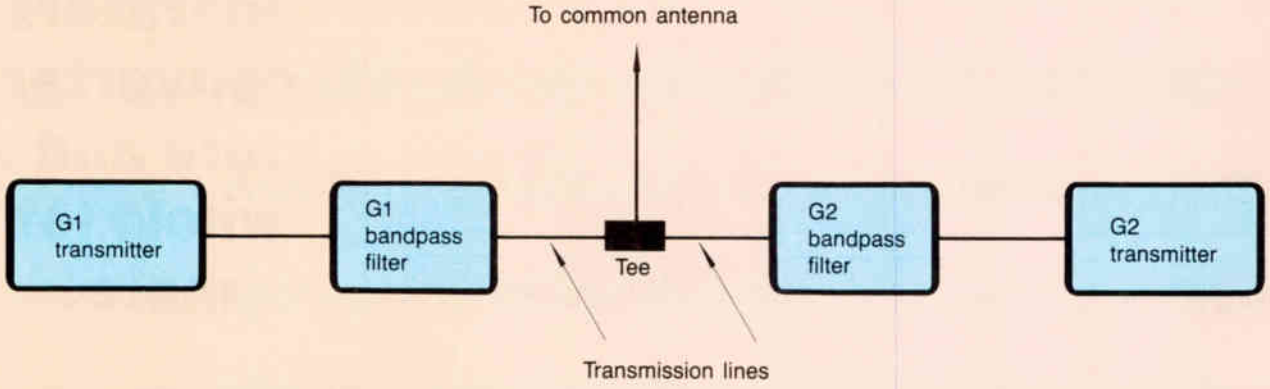


Figure 2: Reverse levels



Notes: 7 dBmV of splitter and drop loss factored in. Actual carrier levels are derated from shown levels.

Figure 1: Diplexing via the 'conjugate tee' method



Antenna sharing by MDS, MMDS and ITFS

By Glyn Bostick and David Tagg
Microwave Filter Co Inc

With the allocation of part of the instructional television fixed services (ITFS) band to multichannel multipoint distribution systems (MMDS), both these services and MDS (multipoint distribution systems) now occupy a relatively narrow frequency spectrum centered at about 2,300 MHz. Standard filtering techniques peculiar to this frequency permit these three services to use a common transmitter antenna facility. The technique is flexible enough to allow "add on" of a new service to an old facility. This sharing reduces the capital expense for each individual service.

Table 1 shows the allocation for ITFS channels. MMDS now co-occupies this band. The older MDS band occupies the band 2,150-2,162 MHz.

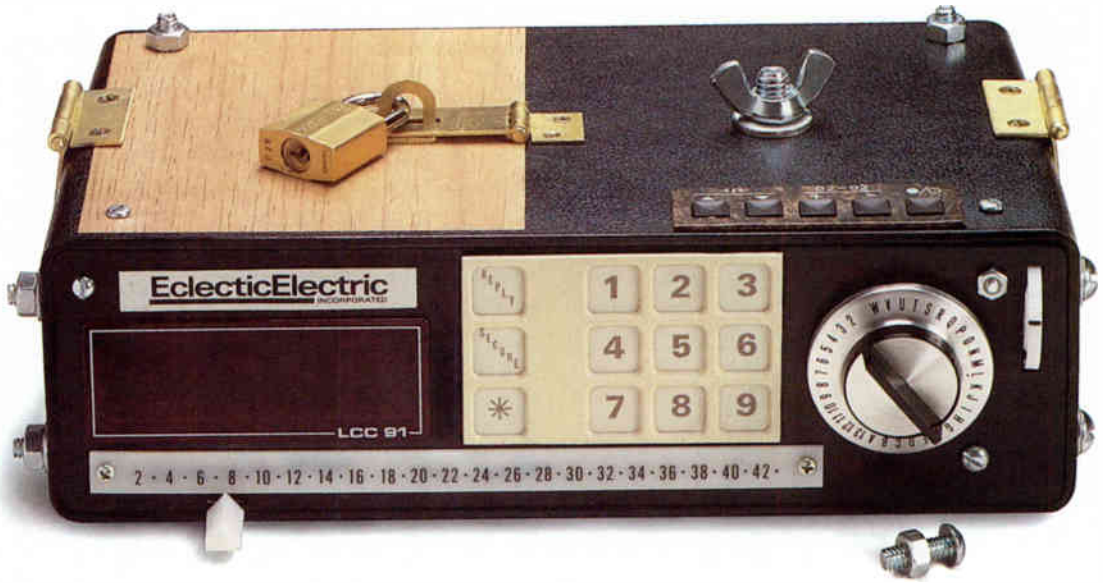
Multichannel ITFS

Two non-adjacent ITFS channel transmitters may be diplexed to a common antenna output by the "conjugate tee" approach illustrated in Figure 1. This is done by bandpassing each channel and connecting both output ports to a common tee through appropriate lengths of transmission line. Considering that G1 is trans-

'With the advent of the group combiner, the number of channels that can be combined is increased to eight'

Table 1: Instructional TV fixed service allocation

Group	Channel Number	Band Limit MHz	Visual Carrier Frequency MHz	Aural Carrier Frequency MHz
A	A-1	2500-2506	2501.25	2505.75
	A-2	2512-2518	2513.25	2517.75
	A-3	2524-2530	2525.25	2529.75
	A-4	2536-2542	2537.25	2541.75
B	B-1	2506-2512	2507.25	2511.75
	B-2	2518-2524	2519.25	2523.75
	B-3	2530-2536	2531.25	2535.75
	B-4	2542-2548	2543.25	2547.75
C	C-1	2548-2554	2549.25	2553.75
	C-2	2560-2566	2561.25	2565.75
	C-3	2572-2578	2573.25	2577.75
	C-4	2584-2590	2585.25	2589.75
D	D-1	2554-2560	2555.25	2559.75
	D-2	2566-2572	2567.25	2571.75
	D-3	2578-2584	2579.25	2583.75
	D-4	2590-2596	2591.25	2595.75
E	E-1	2596-2602	2597.25	2601.75
	E-2	2608-2614	2609.25	2613.75
	E-3	2620-2626	2621.25	2625.75
	E-4	2632-2638	2633.25	2637.75
F	F-1	2602-2608	2603.25	2607.75
	F-2	2614-2620	2615.25	2619.75
	F-3	2626-2632	2627.25	2631.75
	F-4	2638-2644	2639.25	2643.75
G	G-1	2644-2650	2645.25	2649.75
	G-2	2656-2662	2657.25	2661.75
	G-3	2668-2674	2669.25	2673.75
	G-4	2680-2686	2681.25	2685.75
H	H-1	2650-2656	2651.25	2655.75
	H-2	2662-2666	2663.25	2667.75
	H-3	2674-2680	2675.25	2679.75
	H-4 Not Assigned	–	–	–



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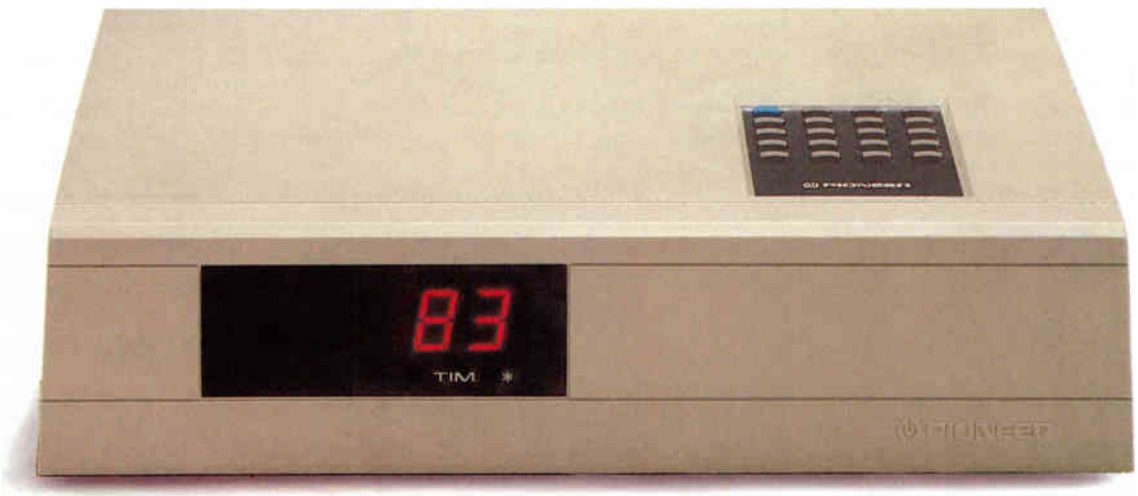

Incompatible scrambling between different brands of converters creates operational headaches. Just ask anyone who's trapped by one scrambling method. Or locked into one source of supply.

At times you feel like you're forced to haphazardly "patch" together several types of obsolete converters — just to offer your system the necessary functionality and scrambling compatibility.

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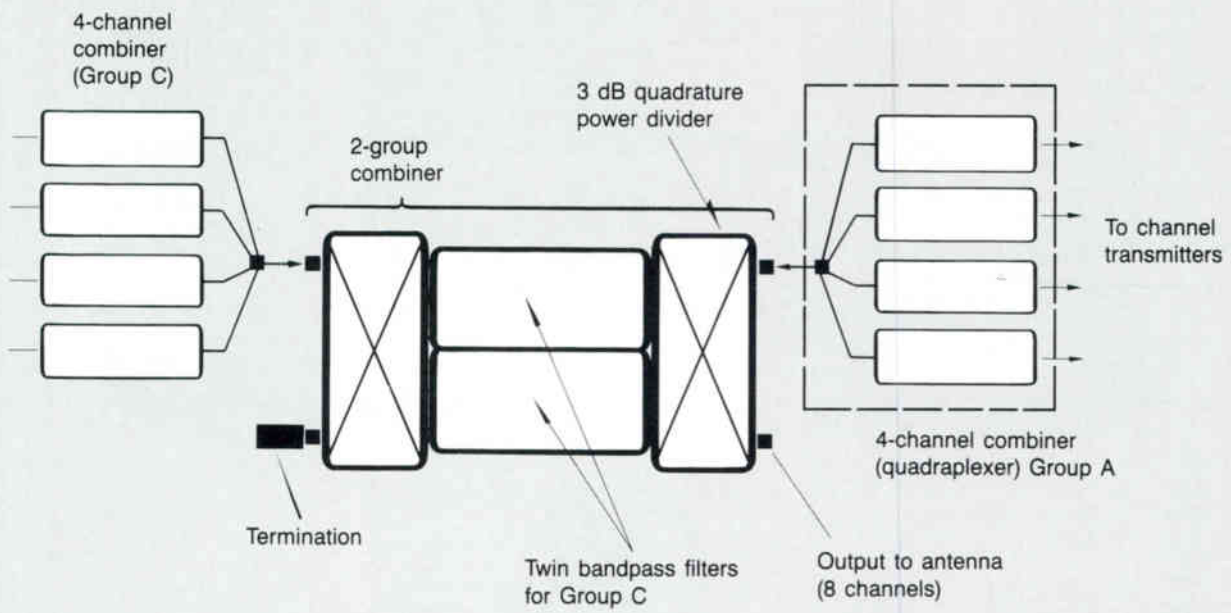
Reader Service Number 22.

Figure 2: Combining eight ITFS/MMDS channels



mitting, for instance, the line length from the tee to a G2 filter transforms the off-band reactive impedance of the G2 filter transforms the off-band reactive impedance of the G2 filter to an open circuit at the tee, so that good impedance match from the G1 transmitter to the antenna is preserved. This technique is repeated to find the proper length of the line from G1 to the common tee. Because of the high frequency (approximately 2,500 MHz) and the narrow bandwidth (6 MHz or 0.24 percent of the transmit frequency) the filter must be constructed of high-Q waveguide cavities to ensure a low throughloss of approximately 0.5 dB. Up to four ITFS channels may be combined in this way. Beyond four channels, the design of the necessary tee becomes electrically complicated and a mechanical difficulty is

encountered in keeping the tee lines electrically short while connecting the fifth channel filter to the tee. However, another diplexing technique described next permits combining two "quads," or four-channel combinations, to combine up to eight channels.

Combining MMDS and ITFS channels

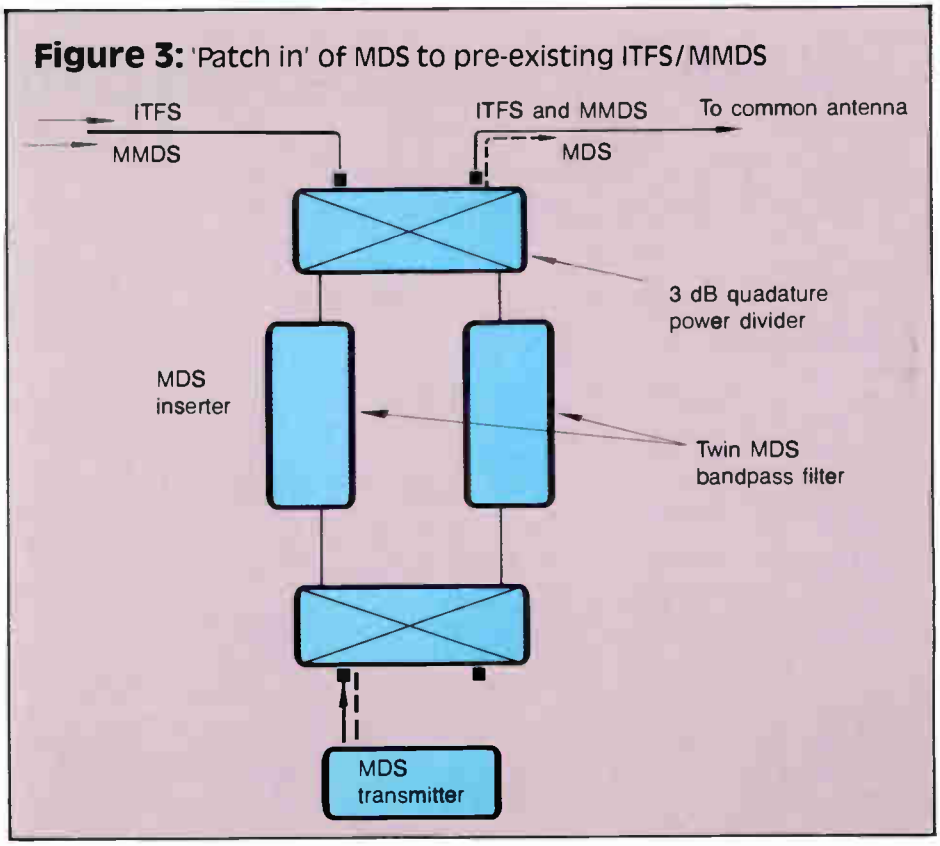
With the allocation of some ITFS channels to the MMDS service, it becomes more feasible to combine channels from these two services to the same antenna, because their bandpass filter requirements are identical. The quadraplexer can be used to combine any mix of channels within an ITFS group or from non-adjacent groups. With the advent of the group combiner, the number of channels that can be combined is increased to eight: two groups of ITFS channels, MMDS channels or four from each service, for example.

The group combiner technique uses two identical bandpass filters, bracketed between two quadrature 3 dB power splitters. Both bandpass filters will pass the same group and reject the other group. As shown in Figure 2, this allows connecting the combined outputs of the two quadraplexers to the group combiner and to realize a combination of both groups (eight channels) to the common antenna output.

Combining MDS, MMDS and ITFS

The older MDS band (2,150-2,162 MHz) cannot conveniently be included in the quadraplexer scheme due to its significant frequency separation from the ITFS band. However, by use of a special combiner operating on the principles of the group combiner previously described, it can be "patched into" the antenna transmission line (Figure 3) without disturbance to the pre-existing ITFS and MMDS channels.

Figure 3: 'Patch in' of MDS to pre-existing ITFS/MMDS



Video teleconferencing

By John Tyson
President and CEO, Compression Labs Inc

Video teleconferencing was once mostly the promise of a "brave new world" in business communication. Like the video telephone and the eagerly anticipated office of the future, the ability to hold group meetings via video was often more theory than reality.

Today, for an increasing number of innovative companies and their professional and support employees, video teleconferencing (VT) is a reality, reducing travel costs, boosting productivity and improving the quality of management decision-making. According to a 1983 Quantum Science report, over 210 video teleconferencing systems are currently in active use in the United States by some 75 companies, of which 30 are among the Fortune 1,000.

Corporations pioneering in video meetings during the 1960s employed the same basic technology — analog TV transmission — used then and now by broadcast television. Analog transmits quality pictures and sound, but the transmission cost between two or more meeting locations can add up to thousands of dollars an hour because of transmission bandwidths of 90 MBPS.

To drive down costs of televised meetings, some companies were willing to experiment in trading off televised picture quality for more acceptable transmission costs. The solution: a VT technique called *still* or *freeze frame video* that transmits slow-motion TV pictures. Using such freeze-frame systems, teleconferencers hear each other normally, but the TV picture is typically delayed 10 to 30 seconds behind the audio portion of the program. Freeze-frame video proved adequate for the transmission of photos, charts and other graphics but disappointed hopes that VT would prove truly effective for people-oriented meetings.

Video compression

The ability to compress high-quality video signals (see accompanying article) into digital data, by reducing bandwidths to 1/80th of analog transmission, dramatically lowered the cost of teleconferencing from thousands to hundreds of dollars per hour. San Francisco-to-New York video transmission costs have dropped to $750 an hour, compared to a $900 peak business hours round-trip airline ticket. Projections of transmission rates as low as $100 per hour between these two key geographic points are being predicted by industry observers.

According to *Marketing Communications*, a trade publication serving marketing professionals, over 20 million business meetings are held in the United States daily at a cost of over $250 billion annually! The publication reports that over one-half of the airline tickets sold in this country are for business trips.

Not only are America's large corporations literally spending millions of dollars flying, feeding and housing thousands of their employees, the increasingly stag-

Video compression

Every commercial broadcast television system produces a composite analog television signal with a bandwidth of 6 MHz. Even if the screen displays a still-frame graphic, that TV transmitter uses its maximum bandwidth. Video compression techniques have been developed to tailor the bandwidth to the degree of image motion, however. For images that are motionless, much less than 6 MHz will suffice to transmit that image clearly.

Video compression is well-suited for teleconferencing applications, in which two-way, full-motion video provides conference participants with sight and sound communication. Unlike commercial television systems, which convert the images and sound into analog signals then transmit them in analog formats, teleconferencing systems convert the image and sound information into digital pulses. These digital bits are transmitted, and upon reception must be decoded to produce the analog signals needed to drive the CRT displays and speakers. The video compression algorithms are applied during the process of coding and decoding.

Interframe coding

The oldest form of video compression is differential pulse-coded modulation (DPCM), or interframe coding. In this type of coding, the value of each pixel of succeeding frames is compared, pixel for pixel, with preceding frames. Only the differences in value are then transmitted. Thus, in the case of a still-frame sequence, virtually no changes would be detected and the transmission bandwidth required would be low. But as motion increases, and more and more

gering cost of business travel does not begin to reflect the additional cost of lost, unproductive time spent by professionals in the air between meetings and away from their desks. Mounting travel and psychological costs of travel are a real concern for American General Corp. and its leading group of insurance company subsidiaries utilizing teleconferencing.

"A long distance meeting between two of our offices lasting about one hour costs us between $600 and $1,200 for the transmission," explains Tim Schade, assistant vice president and director of communications services for American General Life Insurance Co., Houston. "With an average of six participants we save $6,000

techniques

pixels undergo value changes, the differences increase in number and bandwidth requirements also increase. At a certain point, sufficient scene changes will overcome the interframe bandwidth capacity, and scenes could appear jerky or parts of scenes could momentarily blur.

Intraframe coding

Intraframe techniques apply their processing to each frame rather than to the differences between frames. Groups of pixels in rectangular clusters, called "segments" or "cells," are scanned and the digital values encoded. The intraframe algorithm then uses high-speed multiplication to process this pixel segment, compress the digital data and transmit these compressed digital results, segment by segment. Since the compression is applied to each frame irrespective of scene changes, intraframe coding is comparatively motion independent. Intraframe picture qualities remain stable at much higher levels of motion than comparable interframe images. Because the compression is applied to each frame, picture quality will be somewhat less crisp than an interframe system's display of a low-motion scene, however.

Differential transform coding

An improved process that uses intraframe and interframe coding techniques is now available. Called differential transform coding (DXC), the technique begins by applying CLI's patented intraframe scene-adaptive coding and then interframe DPCM coding from one frame to another.

By taking advantage of this combination, the DXC technique achieves up to three times more compression, depending on scene content. The combination of techniques produces results with the advantages of each individual technique. For example, the picture quality already available at 1.544 megabits per second (MBPS), can be met by using DXC at 768 kilobits per second. And a better picture quality is obtained than with intraframe techniques exclusively. As scene motion increases, picture stability is maintained by intraframe coding. The picture does not become jerky or blur image portions as it might if solely using interframe techniques.

For users of systems that employ it, DXC can mean greater choice. Video teleconference participants have the option of maintaining present intraframe picture quality and cut transmission rate and cost. They can maintain current transmission rate and obtain much improved picture quality. Or, they can do either, selectively, depending on their specific needs at any particular time.

in travel costs, plus considerably reducing wear and tear on our people."

Often, teleconferencing can do away with the necessity to travel altogether. In a move undertaken by American General to centralize all data processing in one location, managers were able to decommission their decentralized system and replace it with one main computer through a series of VTs lasting over a period of three months. As many as 20 people at different American General offices participated in the elaborate data processing switch. At no time in the process was a non-televised meeting ever held.

Additional benefits

Video meetings are better structured, agendas are more carefully prepared and adhered to and, in fact, VTs, measured minute-by-minute, are invariably shorter in length than are traditional non-video meetings.

Video teleconferencing of space shuttle flight readiness reviews at NASA has reduced meeting time from two days to five hours. The end result of better prepared, better executed and shorter meetings is not only time saved but noticeably higher quality decisions being arrived at in a more timely fashion.

"We've seen that decisions and solutions to problems happen during the teleconferences, not afterward at a second or third meeting as was the case before video," says Joe Sobala, NASA's communications program manager.

Video teleconferencing at NASA sometimes involves hundreds of people at scores of locations in meetings often lasting up to six hours in length. It is significant to point out that such large meetings even for a well-funded government agency are not practical except through the use of VT.

"We simply did not have the input of so many of our engineers and other professionals when we had to pick and choose who would fly to distant meetings as we do when using a video format," explains Sobala.

NASA's experience demonstrates the value of bringing together people who might not otherwise become involved in the decision-making process. Video meetings not only can mean more people involved, it can shorten the time a production team needs to do the job.

A group of engineers at Rockwell International Corp.'s Commercial Electronics Operations (CEO) used the company's teleconferencing system to help shorten design time.

Jim Kerr, director of material and business systems for CEO, says one product was introduced 30 days ahead of schedule, partially as a result of teleconferencing between engineers at Rockwell's facilities in Texas and California.

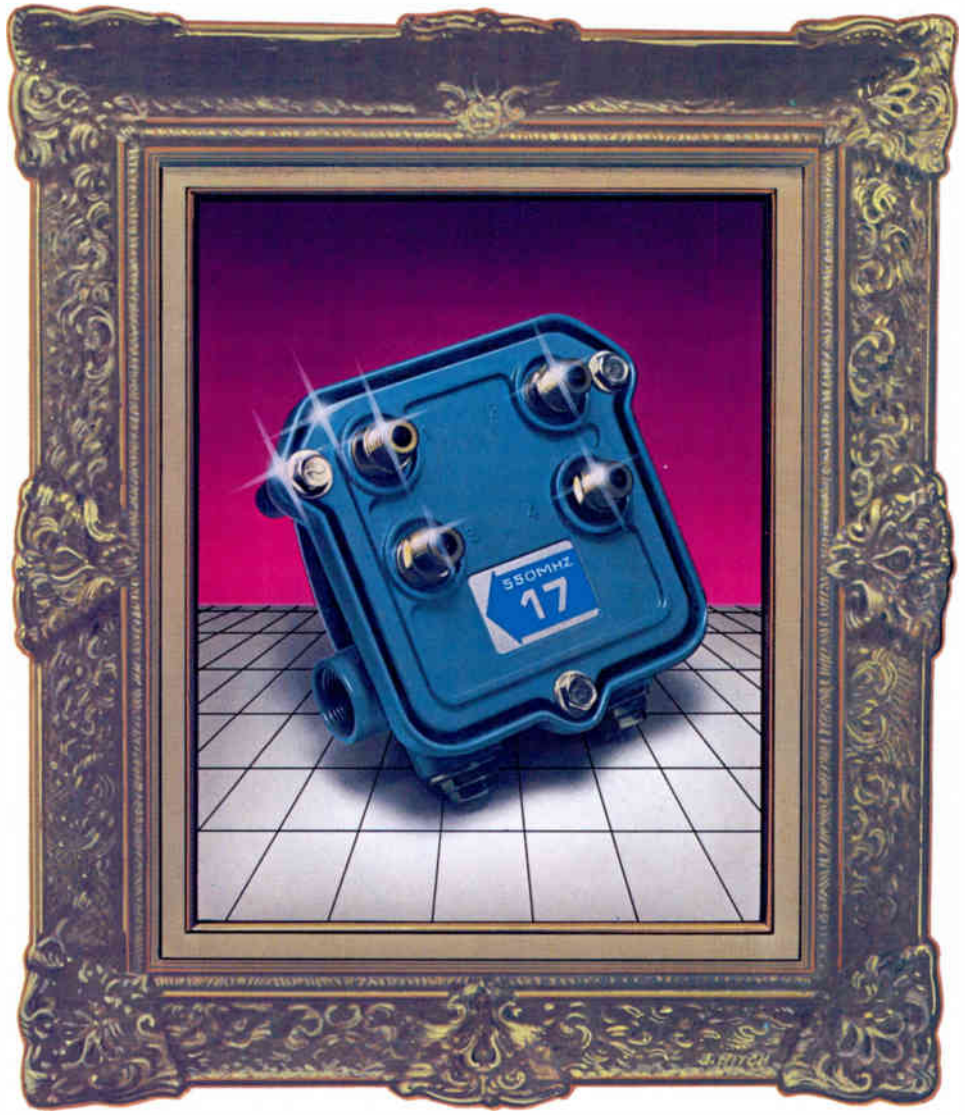
An American General subsidiary, Maryland Casualty Co., previously flew trainers from headquarters in Baltimore to various branch locations for intensive two-week instruction of company underwriters and claims adjusters at a typical monthly cost exceeding $14,000.

The company found it could enhance its training program by introducing new material incrementally in quantities that could be assimilated more readily. Training programs now are teleconferenced from Baltimore to branch offices in four-hour sessions every other day.

Results from American General indicate that trainees absorb more information with higher retention as participants in video training.

Future trends

The ability to initiate video teleconferences from actual offices and other real-life work locations is now available through the use of portable teleconferencing systems that do not require the use of an elaborate teleconferencing room. With teleconferencing equipment and operational costs being reduced by a factor of 10 every seven years, the current $1,600 an hour New York-to-London transmission cost will become insignificant compared to the fare for jetting across the Atlantic.



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Power passing:	6 Amp AC/DC	Subscriber ports:	F-Type female (brass)

Reader Service Number 29.

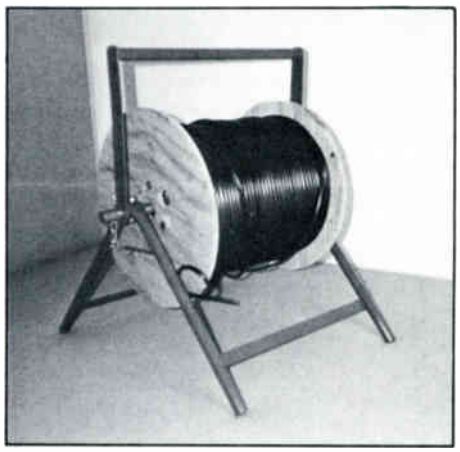
Power supply

Power Guard has announced its 30 and 60 volt AC non-standby power supply designed to be used in CATV test bench operation. Model TB-6005-0 has a 5 amp and Model TB-6010-0 has a 10 amp load capacity. Both models feature a front panel selectable 30 or 60 volt AC output, a separate on/off circuit-breaker switch for the 115 volt AC input and the 30/60 volt AC output, separate status lights for both voltages, and an ammeter for output measurement.

For more details, contact Power Guard Inc., P.O. Box 549, Hull, Ga. 30646, (404) 354-8129; or circle #94 on the reader service card.

Cable caddy

Wyecliffe Products has introduced its portable cable caddy PDC2, capable of handling reels weighing up to 200 pounds, with a maximum 24-inch diameter and 15-inch width. According to the company, the frame is made of tubular, all-welded construction and the mandril and carrying handle lock together to give increased strength and security.



For more details, contact Wyecliffe Products and Services, P.O. Box 2032, Wapakoneta, Ohio 45895, (419) 738-8577; or circle #100 on the reader service card.

Modem guide

Howard W. Sams & Co., a division of Macmillan Inc., has published its *Modem Communications Bible*. The book contains a collection of drawings of the RS-232-C interfaces on a number of popular microcomputers, the interfaces on the modems and the cables that connect the two. According to Sams, the guide is written to provide prospective buyers with purchase information, and for present users who are either seeking additional data or would like to combine various microcomputers and modems into a central system.

For more information, contact Howard W. Sams & Co., Dept. R43, 4300 W. 62nd St., Indianapolis, Ind. 46268, (317) 298-5723; or circle #99 on the reader service card.

Addressable switch

Applied Instruments Inc. is offering a quad AB switch for CATV headend applications. The Model RPS-4 is enclosed in a 19-inch by 1.5-inch standard rack mount and contains four AB configured switch modules, which may be ordered as RF or video switches or both. The unit has provisions for manual or RS-232-C control, with an auxiliary RS-232-C port for equipment "daisy chain."

The switch modules utilized in the product are said to be based on solid-state technology, providing high reliability and fast switching times. The RF modules are usable to 800 MHz, with response characteristics to 500 MHz. The unused ports are automatically terminated with a 75 ohm load impedance.

For more details, contact Applied Instruments Inc., 51 S. 16th Ave., Beech Grove, Ind. 46107, (317) 782-4331; or circle #96 on the reader service card.

Installing and proofing LANs

By Thomas Bennett
Strategic Communications Inc.

Companies entering the race for success in the broadband LAN industry must face some extremely frightening facts. CATV practices cannot be adhered to in the installation and certification of the network. The types of construction necessary for the most part have been untouched by the CATV industry. For example, the construction within a normal manufacturing or process plant requires that the inside cable be supported every five feet by some form of physical attachment. This attachment takes place in the form of I-beam, strap or one-hole clamps. Unistrut construction is necessary at times to ensure meeting the purchaser's attachment specifications. A contractor's bid for the project must take into account the extra parts and labor necessary for this process.

Another consideration for this nontypical broadband installation is the need for well-trained LAN installers to build the network. Although the majority of all LAN installer personnel have evolved from the ranks of the CATV industry, experience has proven that even the most experienced construction or technical people require a period of specialized training and experience before stepping into an active LAN project.

The timing schedule of a LAN project is one of the most important factors to be considered. Like any system, project milestone dates for various stages of completion exist, but other factors also affect progress. Purchaser quality assurance personnel normally require complete approval of work completed at various stages of the project, from initial cable, time domain reflectometry (TDR) and structural return loss measurements at the start of construction to the photographic documentation of all system proof of performance results.

The exact construction schedule to be followed must be given to the purchaser's designated project manager prior to the start of each week's construction. Any untimely occurrence of factors affecting the project will cause the contractor-designated project manager to submit scheduling changes with a report of justification. Planning carefully all phases of the network often will mean the difference between a successful completion and a poor profit margin.

Safety requirements in an industrial environment are the most rigorous to be encountered anywhere. Spotless corporate safety records are put on the line when a contractor is invited on the premises. For this reason the safety policy enforced upon a contractor far exceeds Occupational Safety and Health Administration (OSHA) requirements and is monitored closely. Liability insurance coverage is considered mandatory and its cost should be included in the initial bid.

Technical requirement factors differentiate greatly from standard CATV specs. Carrier-to-noise, composite triple beat, as well as all other distortion factors, are specified at a narrow tolerance within the LAN system. Since the size of the industrial LANs are limited (typically 5-20 miles), distortion and noise levels have not been a problem thus far. Proper alignment and operating levels are crucial to the network's operating efficiency.

The unity gain concept is stretched to the maximum within a broadband LAN. Since many RF modems do not contain separate RF transmit/receive level adjustments, the LAN must be designed in a tight manner to ensure the same RF levels systemwide at every outlet for the forward bandpass. This also applies to the reverse spectrum, where the headend or central retransmission facility (CRF) must see the same RF levels at the translator input from all points in the system. This is to prevent any CSMA/CD (carrier sense multiple access with collision detection) carrier domination problems that could occur.

Carrier domination is a phenomenon that occurs when the RF transmit levels between any

two modems differ in amplitude enough that the stronger modem's carrier will overpower the weaker unit to the extent that it does not get proper access to the same slice of bandwidth. In a large LAN utilizing a CSMA/CD access scheme with many modems and heavy traffic flow on the system, a 10-12 dBmV RF level differential can be disastrous.

This can happen without cancelling out current sessions or virtual connections, thereby giving the appearance, with the exception of speed, of a normally operating LAN. Therefore, if one distribution branch's return system is operating higher than all of the others in the system, problems will result. This alone necessitates the use of system design techniques based upon the unity concept.

Most industrial LANs presently exist in IEEE (Institute of Electrical and Electronic Engineers) mid-split configuration (5-116 MHz reverse, 150-450 MHz forward). This configuration presently supports the majority of all broadband data circuit-termination equipment (DCE) for systems such as MAP, CSMA/CD and point-to-point applications. It is projected that most LANs to be constructed within the majority of the market growth will be specified mid-split. Later, as hardware manufacturers begin making more products with the greater IEEE offset, high-split (5-172 MHz reverse, 222-450 MHz forward) LANs will become more prominent.

The availability of technically advanced and superior broadband LAN hardware will affect the market in terms of vendor selection. Fail-safe amplifiers, bridger switching and tremendous status monitoring capabilities are among the top priorities for consideration by strategic corporate planners entering the LAN market. Maintainability and system support also are viewed as important, since many corporations plan on maintaining their own networks.

Improvements still need to be made to existing equipment in order to meet oncoming demands by the industrial market. Amplifiers with independent bridger switching (6 dB, open) for multiple output housings will allow a streaming modem to be localized and isolated without disconnecting all feeder legs emanating from the amplifier station.

In LAN plant applications where no system downtime is acceptable, yet there are potential outage risks in existence (such as assembly line or tow motor traffic) near the system, redundant trunk lines are necessary. Dual armored trunk cable may be routed so that physical separation between amplifiers can be 20 to 30 feet. However, with the fail-safe technology presently available for trunk and bridger modules, a single housing can provide adequate reliability for each spacing. This dictates that a single intelligent switch (with redundant circuitry) can be used inside the amplifier housing to automatically choose between the best cable. Hysteresis makes this possible without a toggling effect between cables.

Following proper procedures

The majority of corporations planning LAN installations have hired consultants to assist them in directing their energy and scope. The following steps are those that normally take place after the LAN approach is accepted and a consultant is acquired.

All considerations and objectives are examined and defined. Design topology and equipment types are decided upon before selecting vendors and product. At this point the company's own people are assigned the task of choosing maintainable amplifier closet locations as well as the headend (CRF) facility. With these tasks completed, the installation specification must be written defining all location specific procedures and factors related to system installation, certification and LAN acceptance. The overall system design now is completed, including a set of design prints, specifications and a tabular listing of all reverse headend and forward outlet levels. The bid process for system construction and certification begins and the project is off and rolling.

System completion normally requires that corporate quality assurance personnel be present to witness the entire proof of performance certification procedure. This allows a sign-off procedure to release the contractor from each leg of the system as it is certified. Photographs also are a necessary part of the certification. Sweep response, outlet levels across the entire bandwidth, carrier-to-noise, as well as all distortion products, should be measured and documented with a photograph. The noise floor for the forward and return bandwidths also should be noted and photographed to provide a reference for later use in noise and ingress diagnosis.

Typical specifications for an industrial LAN across the forward bandwidth measured at the

RF signal reflection and return loss

By Ron Hranac and Bruce Catter
Jones Intercable Inc.

All RF circuits consist of three fundamental parts: a signal source, the transmission medium and a load. Under ideal circumstances, that is, when the impedance of all three components is identical, maximum signal energy travels from the source to the load.

In practice, some slight impedance variations always exist in an RF circuit. This causes part of the signal to be reflected back to the source. For example, when you measure the return loss of an amplifier, you are using one way to determine the magnitude of that reflected signal.

The interaction of the forward and reflected signals produces a distribution of energy in the RF circuit known as standing waves. The measurement of standing waves is another way to determine the amount of reflected signal.

The return loss conversion chart on the next page is useful for relating some of the quantities used to express the magnitude of signal reflections.

Return loss (RL) — the ratio, in decibels, between the power in the forward signal and the power in the reflected signal.

$$RL = 10 \log_{10}\left(\frac{\text{forward signal power}}{\text{reflected signal power}}\right)$$

or

$$RL = 20 \log_{10}\left(\frac{1}{\text{absolute magnitude of reflection coefficient}}\right)$$

Reflection coefficient (RC) — the ratio of the reflected signal voltage to the forward signal voltage.

$$RC = \frac{\text{reflected signal voltage}}{\text{forward signal voltage}}$$

or

$$RC = \frac{1}{10^{\left(\frac{RL}{20}\right)}}$$

Reflection percentage (RP) — the reflection coefficient expressed as a percentage.

$$RP = \text{reflection coefficient} \times 100$$

Voltage standing wave ratio (VSWR) — the ratio of maximum to minimum standing wave voltage.

$$VSWR = \frac{1 + \left(\text{absolute magnitude of reflection coefficient}\right)}{1 - \left(\text{absolute magnitude of reflection coefficient}\right)}$$

Reflection loss — loss in signal power, expressed in decibels, due to reflection (sometimes called transmission loss).

$$\text{Reflection loss} = 10 \log_{10}\left(\frac{\text{forward power}}{\text{power absorbed by load}}\right)$$

$$\text{Reflection loss} = 10 \log_{10}\left[\frac{1}{1 - \left(\text{absolute magnitude of reflection coefficient}\right)^2}\right]$$

Return loss conversion chart

Return loss (dB)	Reflection coefficient	Reflection percentage	VSWR	Reflection loss (dB)
0	1.0000	100.00	∞	∞
1	.8913	89.13	17.39	6.8701
2	.7943	79.43	8.72	4.3287
3	.7079	70.79	5.85	3.0201
4	.6309	63.09	4.42	2.2043
5	.5623	56.23	3.57	1.6506
6	.5012	50.12	3.01	1.2563
7	.4467	44.67	2.61	0.9666
8	.3981	39.81	2.32	0.7494
9	.3548	35.48	2.09	0.5843
10	.3162	31.62	1.92	0.4575
11	.2818	28.18	1.78	0.3593
12	.2512	25.12	1.67	0.2831
13	.2239	22.39	1.58	0.2234
14	.1995	19.95	1.49	0.1764
15	.1778	17.78	1.43	0.1395
16	.1585	15.85	1.38	0.1105
17	.1413	14.13	1.33	0.0876
18	.1259	12.59	1.29	0.0694
19	.1122	11.22	1.25	0.0550
20	.1000	10.00	1.22	0.0436
21	.0891	8.91	1.19	0.0346
22	.0794	7.94	1.17	0.0275
23	.0708	7.08	1.15	0.0218
24	.0631	6.31	1.13	0.0173
25	.0562	5.62	1.12	0.0137
26	.0501	5.01	1.105	0.0109
27	.0447	4.47	1.094	0.0087
28	.0398	3.98	1.083	0.0069
29	.0355	3.55	1.074	0.0055
30	.0316	3.16	1.065	0.0043
31	.0282	2.82	1.058	0.0035
32	.0251	2.51	1.051	0.0027
33	.0224	2.24	1.046	0.0022
34	.0199	1.99	1.041	0.0017
35	.0178	1.78	1.036	0.0014
36	.0158	1.58	1.032	0.00108
37	.0141	1.41	1.029	0.00086
38	.0126	1.26	1.026	0.00069
39	.0112	1.12	1.023	0.00054
40	.0100	1.00	1.020	0.00043
41	.0089	.89	1.018	0.00034
42	.0079	.79	1.016	0.00027
43	.0071	.71	1.014	0.00022
44	.0063	.63	1.013	0.00017
45	.0056	.56	1.011	0.00014
46	.0050	.50	1.010	0.000108
47	.0045	.45	1.009	0.000088
48	.0039	.39	1.008	0.000066
49	.0035	.35	1.007	0.000053
50	.0032	.32	1.006	0.000044

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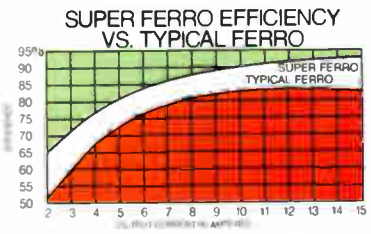

Super Ferro Outperforms The Average Power Supply At Every Load Factor

THE NEW SUPER FERRO BY LECTRO

A Burnup & Sims Cable Products Group Company

Reader Service Number 33.

user outlet are 6 dBmV ±2 from 150-450 MHz. Typical specifications for an industrial LAN across the reverse bandwidth measured at the headend are 10 dBmV ±2 from 5-116 MHz at the translator input. With this type of narrow specification, system alignment and balancing becomes very important.

Although there are many different techniques for balancing a trunk and distribution system, the easiest and most effective way to achieve the accuracy required is to use a sweep system in a continuous sweep mode. By injecting a flat sweep from 150-450 MHz at the appropriate level into the headend combiner port, the entire trunk and distribution system may be aligned while enabling the technician to monitor the frequency response as the alignment process is completed. This prevents the technician from overlooking any frequency response problems built in to any newly activated amplifiers or newly spliced passives. After the trunk is aligned, all end-user outlets may be monitored by the sweep receiver while the bridger amplifiers are brought into adjustment to meet the specification. All photographs may then be taken and verified prior to official certification.

By injecting the sweep transmitter into end-user outlets, the reverse (5-116 MHz) bandwidth may be monitored at the headend translator input so that all trunk and bridger amplifiers can be properly brought into adjustment. This also gives the technician the opportunity to observe low frequency characteristics of all active and passive devices. It has been proven that these low frequency measurements are the hardest specifications to meet. The alignment process takes two people with constant radio contact to be completed properly. All photographs may then be taken and verified prior to official certification.

Fine tuning

Experience with installing and certifying industrial LANs will sharpen the skills of any construction and technical crew. The fact that the industrial marketplace broadband LAN requirements are tougher to meet will benefit the entire CATV and broadband industry.

QRF UPGRADE MODULES*

JERROLD COMPATIBLE

REPROGRAMMING YOUR JERROLD SLE WITH QRF-QLE

With one complete module you can REPROGRAM your Jerrold SLE-1, SLE-20, SLE-2P, SLE-300, or SLR-300.

Select the features your system presently needs. For the future, we provide you with the option to take advantage of new technology by simply adding a second HYBRID IC and REPROGRAM for ADDITIONAL CHANNELS. (QLE-P² only)

The module also has the option of plug-in BI-DIRECTIONAL filters allowing you to buy down-stream now and ADD BI-DIRECTIONAL LATER by plugging in two small boards.(QLE-30/60 and QLE-P²)

With the 22 to 66 volts A.C. input, you have the option to operate in EITHER a 30 OR 60 VOLT system without any modifications. (QLE-30/60 only)

The QRF-QLE comes with provisions for a plug in equalizer, (standard 0 dB) thus allowing you to SELECT the proper EQUALIZATION VALUE and desired BAND-WIDTH. (All models)

The MOV's act as a SURGE PROTECTION for regulated and unregulated AC voltage in the amplifier. The hybrid is protected (if power pack fails with hi-voltage) by the transzorb D.C. OVERVOLTAGE PROTECTION. To avoid surge outrages and burned P.C. boards, we utilize 500 or 1000 volt by-pass capacitors throughout. (All models)

The unit comes with provisions for plug-in attenuators in various values (0 dB standard) and a circuit breaker to contend with over current problems. The breaker automatically resumes the load, which virtually eliminates nuisance trips. There is never the need to replace a fuse, saves you down time. (All models). The QRF-QLE should be the LAST LINE EXTENDER YOU EVER HAVE TO BUY!

• PRICES FROM $105.00 TO $125.00 •

	300 MHz		330 MHz		400 MHz		450 MHz	
MODULE DESCRIPTION	QRF-QLE-P² 300		QRF-QLE-P² 330		QRF-QLE-P² 400		QRF-QLE-P² 450	
	PARALLEL	CONVENTIONAL	PARALLEL	CONVENTIONAL	PARALLEL	CONVENTIONAL	PARALLEL	CONVENTIONAL
Passband MHz	50-300	50-300	50-330	50-330	50-400	50-400	50-450	50-450
Flatness ±dB	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Min. Full Gain dB	28	29	28	29	28	29	28	29
Gain Control Range dB	9	9	9	9	9	9	9	9
Slope Control Range dB	7	7	7	7	7	7	7	7
Control Pilots ASC: Turned to Ch.	—	—	—	—	—	—	—	—
Oper. Range dB	—	—	—	—	—	—	—	—
AGC: Turned to Ch.	—	—	—	—	—	—	—	—
Oper. Range dB	—	—	—	—	—	—	—	—
Return Loss dB	16	16	16	16	16	16	16	16
Noise Figure dB	9	9	9	9	9.5	9.5	10	10
Typical Oper. Level dBmV	49/42	49/42	49/42	49/42	49/42	49/42	48/42	48/42
Distortion at C/CTB	-70dB	-65dB	-69dB	-64dB	-65dB	-60dB	-62dB	-57dB
Typical Oper. XMod	-70dB	-65dB	-69dB	-64dB	-65dB	-60dB	-62dB	-57dB
levels 2nd order	-72dB	-69dB	-72dB	-69dB	-70dB	-67dB	-71dB	-68dB
AC Requirement 66 VAC mA	.505	.286	.505	.286	.505	.286	.505	.286
to 48 VAC mA	.575	.393	.575	.393	.575	.393	.575	.393

(Quality RF Services is not a sales agent for Jerrold Electronics) **ALSO AVAILABLE**

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Reader Service Number 35.

CALENDAR

August

Aug. 11-13: Magnavox CATV training seminar, Detroit, Mich. Contact Amy Costello, (800) 448-5171.

Aug. 13-14: Trellis Communications' seminar on fiber-optic information transport, Red Lion Inn, San Jose, Calif. Contact (603) 898-3434.

Aug. 16: SCTE Golden Gate Chapter BCT/E preparation seminar for Category II (Audio and Video), Diablo Valley College, Pleasant Hills, Calif. Contact Steve Allen, (415) 463-0870.

Aug. 19-21: C-COR Electronics technical seminar, Hartford, Conn. Contact Debra Cree, (800) 233-2267 or (814) 238-2461.

Aug. 19-21: Florida Cable Television Association annual convention, Marriott Hotel, Marco Island, Fla. Contact Bob Brilliante, (904) 681-1990.

Aug. 20: SCTE Delaware Valley Chapter meeting on distribution systems and BCT/E exam for signal processing centers, Williamson Restaurant, Horsham, Pa. Contact Bev Zane, (215) 674-4800.

Aug. 20-22: Rocky Mountain and New Mexico Cable Television Association combined annual convention, Santa Fe Hilton, Santa Fe, N.M. Contact Ray Davenport, (505) 983-5885.

Aug. 23: SCTE Golden Gate Chapter BCT/E exams on Categories II and IV, Viacom Cablevision, Pleasanton, Calif. Contact Steve Allen, (415) 463-0870.

Aug. 26: SCTE Satellite Teleseminar, cable preparation and connector installation (produced by LRC) and SCTE promotional videotape, 1-2 p.m. (EDT) over Transponder 7 of Satcom IIIR. Contact (215) 363-6888.

Aug. 27: SCTE Greater Chicago Meeting Group seminar on FCC requirements and compliance, Arlington Park Hilton, Arlington Heights, Ill. Contact William Gutknecht, (312) 577-1818.

Planning ahead

Sept. 23-25: Great Lakes Cable Expo, Hyatt Convention Center, Columbus, Ohio.

Oct. 28-30: Atlantic Show, Convention Hall, Atlantic City, N.J.

Dec. 3-5: Western Show, Convention Center, Anaheim, Calif.

Feb. 18-20: Texas Show, San Antonio, Texas.

April 2-5: Cable-Tec Expo '87, Hyatt Hotel, Orlando, Fla.

May 17-20: NCTA annual convention, Las Vegas, Nev.

September

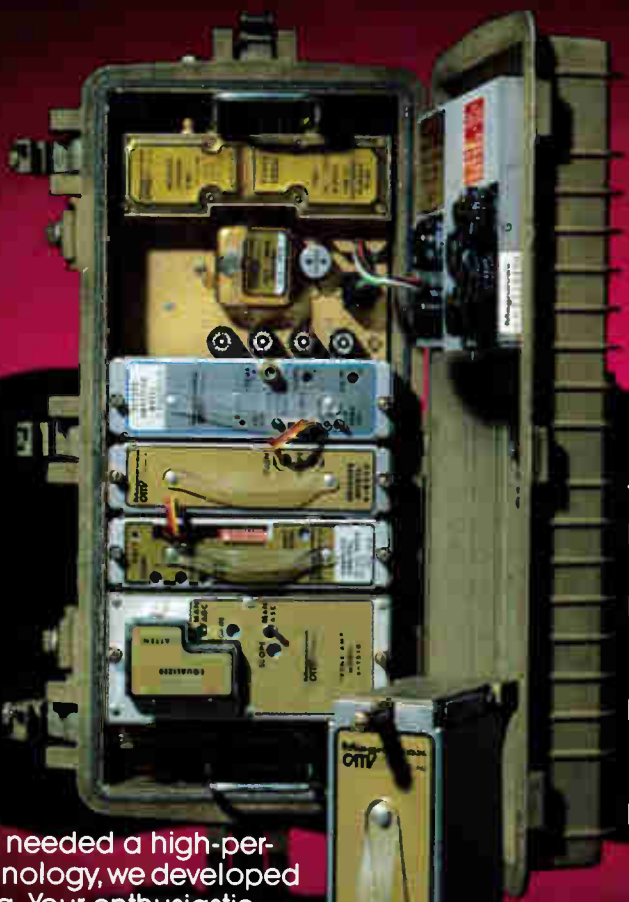
Sept. 8-9: Wisconsin Cable Communications Association annual fall convention, Radisson Hotel LaCrosse, Wis. Contact Lynne Walrath, (608) 256-1683.

Sept. 9-11: Jerrold technical seminar, Columbus, Ohio. Contact Joan Thielen, (215) 674-4800.

AD INDEX

POWERDOUBLING™ FROM MAGNAVOX

First and still the best



When you needed a high-performance technology, we developed PowerDoubling. Your enthusiastic response has made PowerDoubling so successful others have tried to copy it. But they can't match our equipment's performance.

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More bandwidth lets you offer customers more choice, including 550/600 MHz. And our bypass option ensures signal reliability.

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- Often no need to change trunk spacings or move amplifiers.
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- Compatible with most existing systems, so you can upgrade economically.
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Magnavox CATV SYSTEMS, INC.

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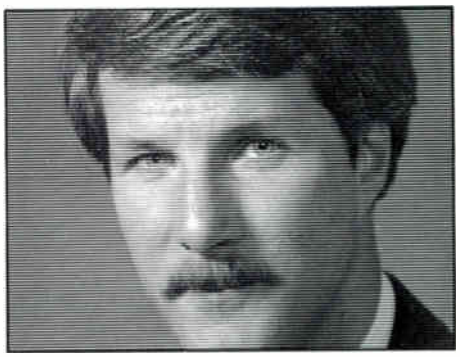
Reader Service Number 37.

Part II: Improving communications



In Part I last issue, Luff discussed setting goals and writing descriptions and performance evaluations. Part II continues with visual aids.

By Robert A. Luff
Senior Vice President, Engineering
United Artists Cablesystems Corp.

"A picture is worth a thousand words." And if you are trying to communicate with technical people, you can at least double that. Taking pictures of good and not-so-good examples of various drops, warehouse storage, headends, spectrum analyzers or sweep CRTs will communicate your message very effectively with few necessary words or memos. By tacking the photo on the bulletin board or headend wall, you will keep communicating your message as long as it is there without further follow-up effort.

Photographs also can compare or trace long-term improvement or problems better than words. Showing a series of sweep locations down the trunk effectively depicts the degree and location of problems. Taking a shot of the parking lot every month shows needed clean-up assignments, holes in the fence or inefficient space usage.

Closely related to photographs are graphs and charts. Graphs show at a glance the progress or level of achievement of some simply stated goal or performance level. They can make goal and objective attainment almost fun by watching the line get closer and closer each day. Graph meanings and the represented degree of closing the gap or being out of control are understood more easily than any other communications method.

With most of the staff in the office for a very small portion of the work day, such quick and relatable methods to show at a glance improvement, slippage or important items — as employees pass along the hall on the way for coffee or out to a vehicle — are very important.

Graphs and charts are very easy to construct, either by manual ruler and graph paper or new automatic plot functions of most computers. Updating is just as easy. Most supervisors would rather show their department's measurable performance by 100 charts and graphs than a single written report. I don't blame them: Someday *I* would like to submit a graph instead of a written article.

Incentive programs

Incentive programs are perhaps one of the best methods to clearly and positively communicate your department's job priorities to technical employees who are often beyond the physical reach of repetitive memos, meetings, and one-on-one meetings most of their work time. Incentives should be positive — that is, rewards for good performance. Negative incentives for sub-level achievements are not as effective and produce bad relations and morale; although, in the worst of situations, it may be a useful option.

For positive (or negative) incentives to produce the greatest effectiveness, they quickly must follow the event or period they are directed toward; that is, a weekly or monthly reward vs. a lump sum end-of-the-year bonus. The incentives should be well defined and automatic to avoid confusion, misunderstandings or doubts that the incentive program really will "pay out" as advertised by management.

One of the possible reasons incentive programs are not used more often is that many technical managers assume that an incentive program must involve money and goes beyond their authority, or would require a hopelessly complex approval process from management. Actually, money is only one, and probably not the best, incentive device. Items as simple as wearing a special color hat or shirt, a pin or patch, plaque or trophy, a picture displayed in a special location, extra time off, permission to attend a forthcoming local SCTE meeting, or a symbolic six pack, all have worked very well as incentives and are well within the flexibility of most managers to set up and administer.

To effectively use an incentive program to better communicate desired department practices and goals, you first must clearly define what these practices and goals are. There is then a close relationship between an incentive program and written goals and procedure handbooks (mentioned in Part I).

Weekly meetings

Meetings fall more under the traditional means to communicate. However, *weekly* meetings add a significant amount of non-traditional elements of communication with your staff. If there are sporadic ad hoc meetings, your staff comes, listens and — hopefully — follows through with the subject of the meeting. And that's the end of it.

But if you have regular weekly meetings with your staff, there is the added benefit of continuing follow-up on meeting topics from week to week, which not only improves the actual alertness and participation of the meeting discussion and resolution itself, but also automatically assists your communicating the contents of these meetings *between* the meetings.

It is of vital importance always to have a prepared written agenda, preferably posted on the bulletin board, a day or two before the meeting. This promotes better decisions through discussions and allows, in some cases, for extra data or analysis to be prepared. It reduces the chances of omitting important items, promotes "carry forward" of past meeting follow-up items, and allows a better assessment of how much time should be scheduled and which items must be moved to another future weekly meeting.

And finally, encourage your staff to speak up. Generally, managers don't need another one-way communication option — memos and bulletins do that better. A meeting is inherently a two-way communication tool and is not being wisely used if it is not working out that way. Generally, technical staffs have a lot to say if the invitation is genuinely perceived.

Bulletins

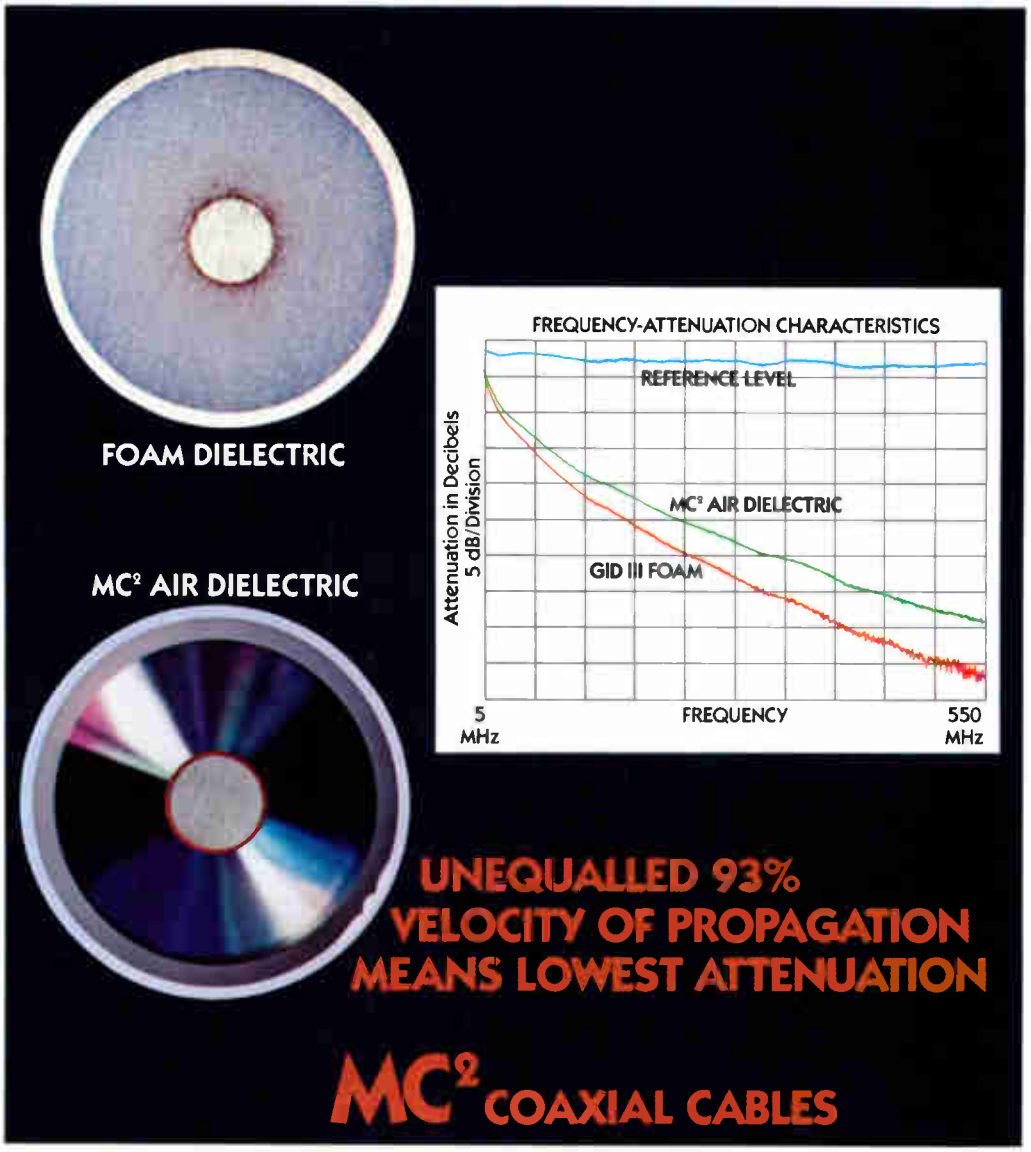
Technical bulletins are a special form of the classic written memo. It is their specialness as seen by your staff that makes bulletins such an excellent communication device. A bulletin is, by its very nature, understood by all to be very important. Accordingly, it will be read and probably retained with much more attention than the same message in regular memo format.

Generally, there is not a special difference between writing a bulletin and writing a memo, except that the "To:," "From:" and "Subject:" lines are substituted for the word "Bulletin" in the boldest typeface your typewriter supports. Some technical managers have special bulletin letterheads preprinted with the word "Bulletin" in red or another bold color. This adds to the visual impact and assists in drawing attention to the special content of its body message.

Quite often, it is advisable to hold a meeting with your team as the bulletin is released to discuss its meaning and answer questions you may not have thought of. Many important problems have continued after release of countless memos or bulletins because the technical manager believed the message was so clear as not to need two-way discussions with the staff. Generally, if it is an important enough issue to write a bulletin, it is important enough to hold a specific staff meeting on the topic.

After a bulletin has been released, it should be posted in a general location, such as in the coffee room or by the warehouse pickup cage, where it will be seen every day. Some systems have installed a bulletin board at eye level in the bathroom, which assures nearly undivided attention several times a day! And finally, all bulletins should be saved in an official notebook or file for easy reference by you or new employees.

TRILOGY LEADS IN TECHNOLOGY:



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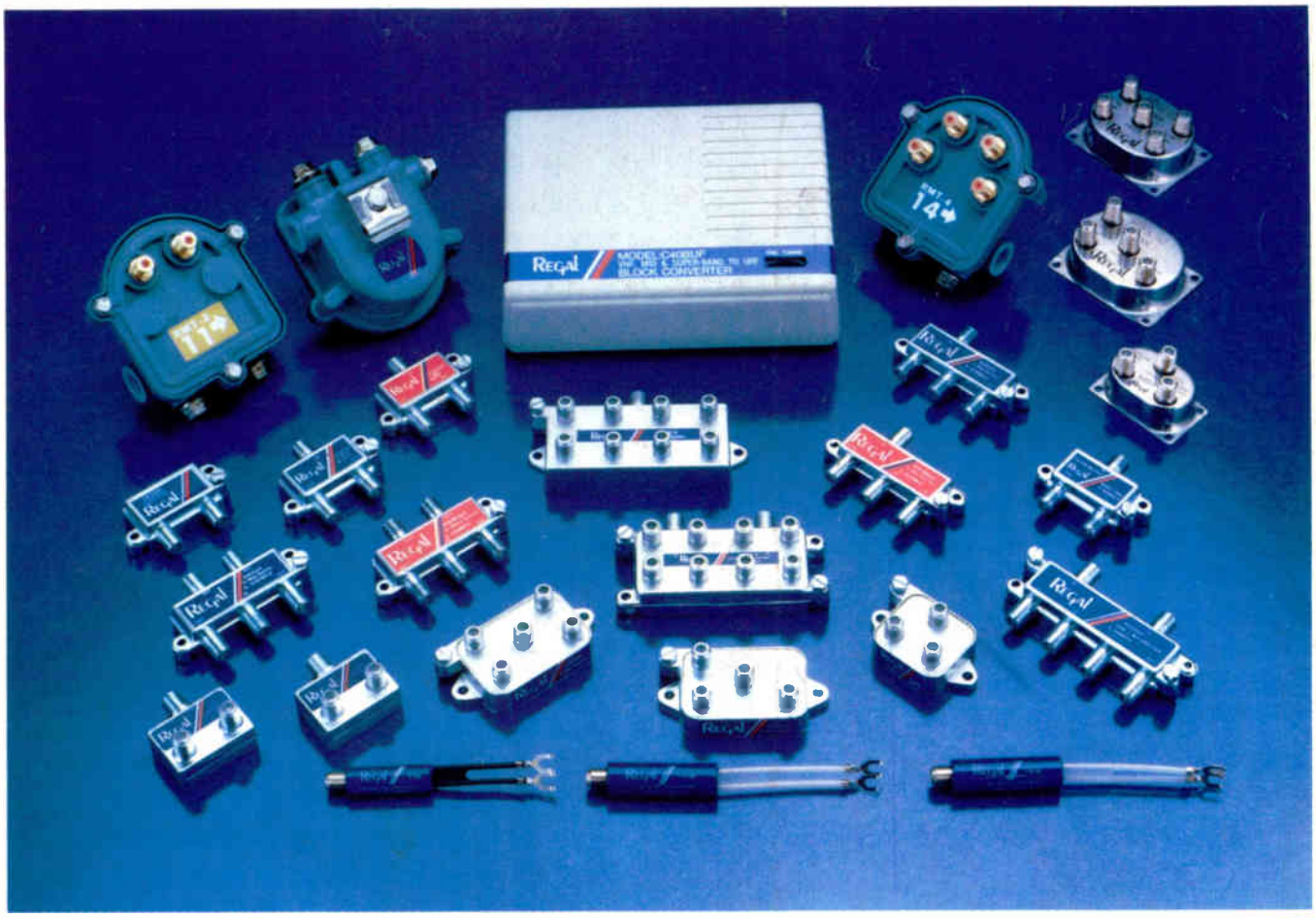

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