COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers

Training

Lab test: S-A's FAOC module

Fiber LANs

July 1990

Virtually eliminate customer calls during service interruptions.

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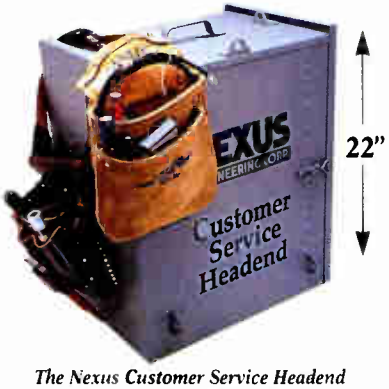
This headend and graphics generator injects channels at any point in your distribution system to advise affected customers downstream.



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- *weighs less than 50 pounds*
- *rechargeable internal battery*

The portable unit can be pole or strand mounted, and operated by a single field technician with less than 20 minutes training.

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Reader Service Number 2.

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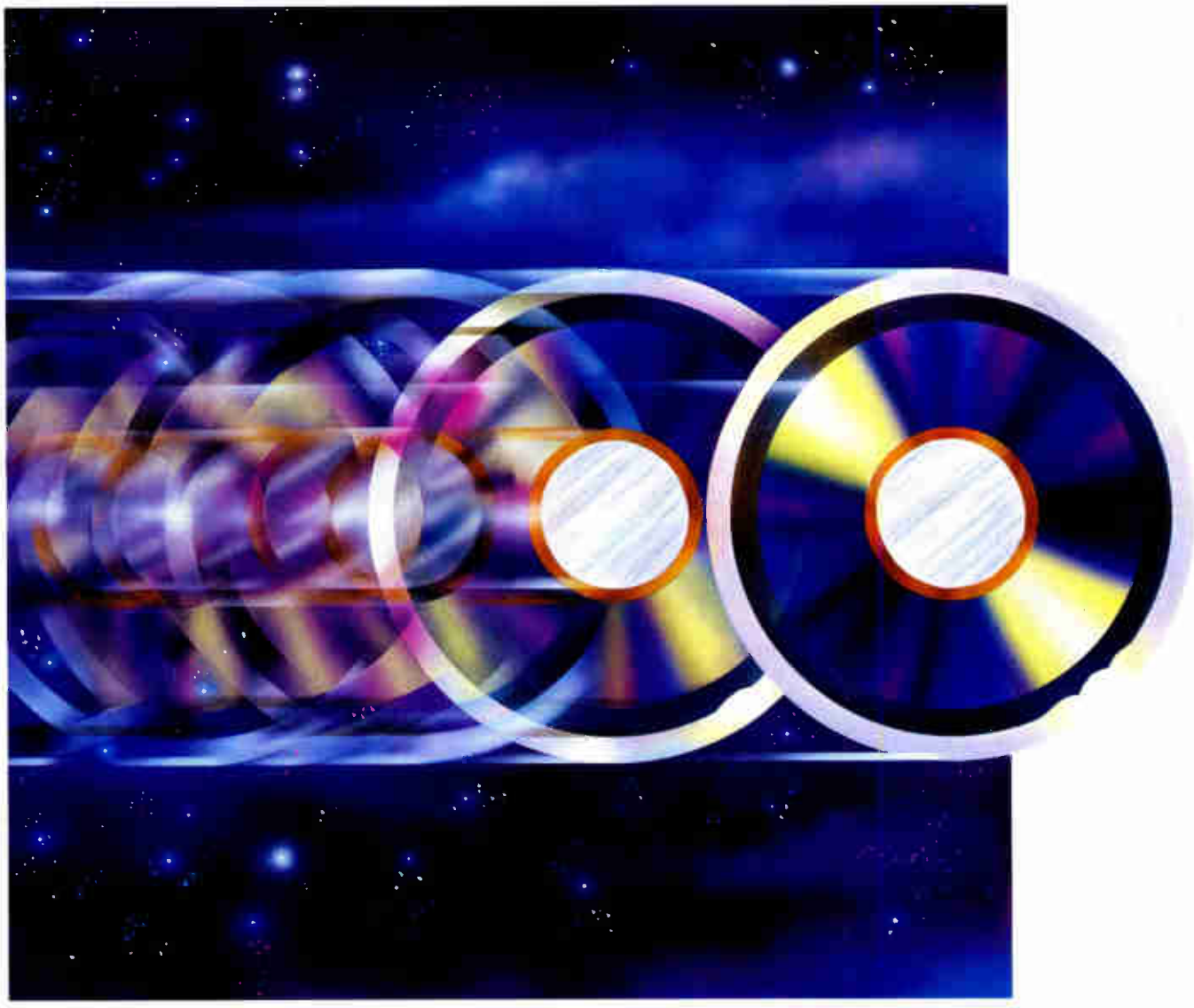

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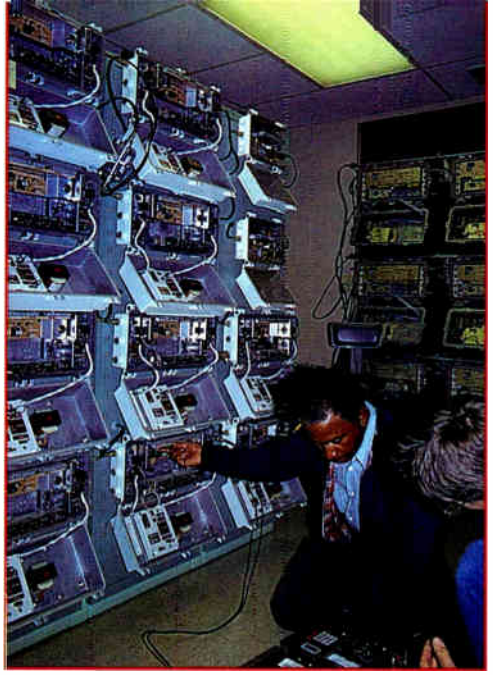

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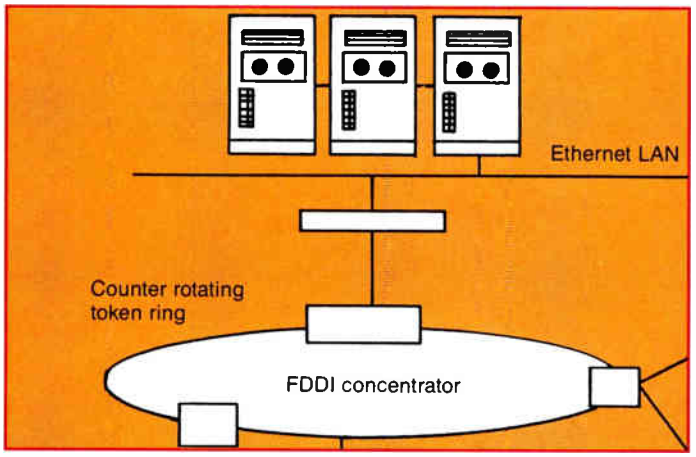

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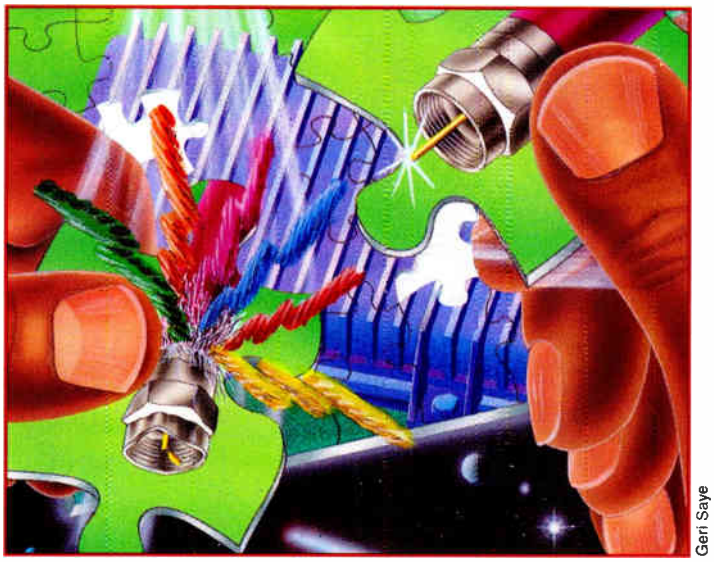

Geri Saye

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Features

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- ***Integrated VideoCipher® II Descrambling Module***
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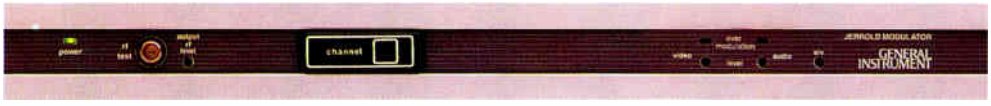
S450M Frequency Agile Modulator



- ***Frequency Agile from 50 to 450 MHz***
- ***Front Panel Controls***
- ***60 dBmV Output***
- ***BTSC Stereo Compatible***

S890D Frequency Agile Demodulator

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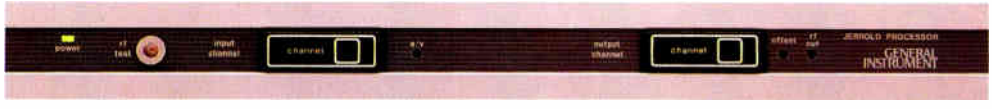
- ***Sub-Band Option Available***
- ***MPX Output for BTSC Stereo Encoded Signals***

S450P Frequency Agile Heterodyne Processor



- ***Accepts VHF, UHF and Cable Channels to 450 MHz***
- ***Front Panel Controls***
- ***60 dBmV Output***

JERROLD COMMUNICATIONS

GENERAL INSTRUMENT

Reader Service Number 4.

VideoCipher is a registered trademark of General Instrument Corporation

Giving away the farm

I just finished reading the May 29 edition of our sister publication, *CableFAX*, and the one item that really caught my attention was the $137 billion lawsuit against cable programmer ESPN. The lawsuit was filed in Denver's U.S. District Court by an MMDS operator that is accusing ESPN of monopoly practices and claims the programmer refused to grant the operator affiliate status because it is a competitor of local cable systems.

This is just one of many similar issues where the cable industry is being targeted as "bad guys" because of its reluctance to subsidize its competitors. When I started in the cable industry in 1972 there were no satellite programmers. Our system had local origination, a distant independent, a weather scan (remember the camera that panned across the dials?) and an AP news channel as the only alternatives to the regular networks. In 1975 the system installed a 10-meter TVRO to receive the first satellite-delivered service —HBO. The whole idea of the industry creating good programming services for itself and using satellites as the delivery vehicle literally revolutionized cable.

Our industry took some big financial risks to pull off what it did in the mid and late '70s. When the average consumer realized he could receive many of the cable industry's programs with a backyard dish (why pay for cable?), programmers took necessary steps to secure that programming with scrambling and thus protect their revenues. And we're still hearing about it. Now MMDS operators want us to subsidize them. Certainly if the programming that we created for ourselves is to be made available to non-CATV users, we should have the right to charge for it (fairly, of course). But at the same time, who says we have to sell it to anyone other than cable systems in the first place?

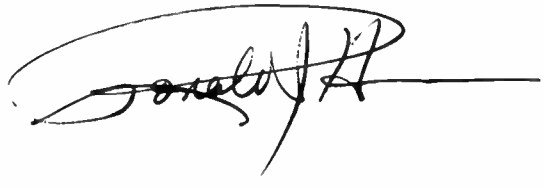
I don't recall any competing industries supporting cable's start-up efforts in programming in the '70s. Has cable programming become public domain software that is "ripe for picking" by anyone who wants to use it to do battle against us in the marketplace? Maybe I'm missing something here but providing cable programming to entities that will use that same programming to compete with us is too much like giving away the farm.

Service, part two

Last month I commented on the efforts of one of our editorial staff to get cable hooked up by Denver's Mile Hi Cablevision. The installation that was rescheduled for May 14 never happened. They were supposed to call her at the office when the installer was ready to go to her house. No one called and no door tag was left to indicate that an installer might have stopped by without calling. Her comment? "I want cable, but I don't need it that bad."

Mile Hi isn't the only Denver-area operator guilty of such problems. I disconnected my United Cable service in January partly because of a drop that remained unburied for more than three years.

The point of all this? It's simply to show that even in the cable capital of the industry, service woes exist (even with people who work in the business). The public's perception of cable TV needs to change, but that won't happen until we improve the root of the problem: customer service.



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The 9650 IRD.

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Reader Service Number 6.

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Official trade journal of the Society of Cable Television Engineers

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Reader Service Number 8.

INTEGRAL

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If your cable is going underground, it needs the ***real*** protection of Cablecon®. Integral's Cablecon series is ***guaranteed*** to protect your cable or fiber from the "crunch" of underground environments while providing you with far greater longevity in the field.

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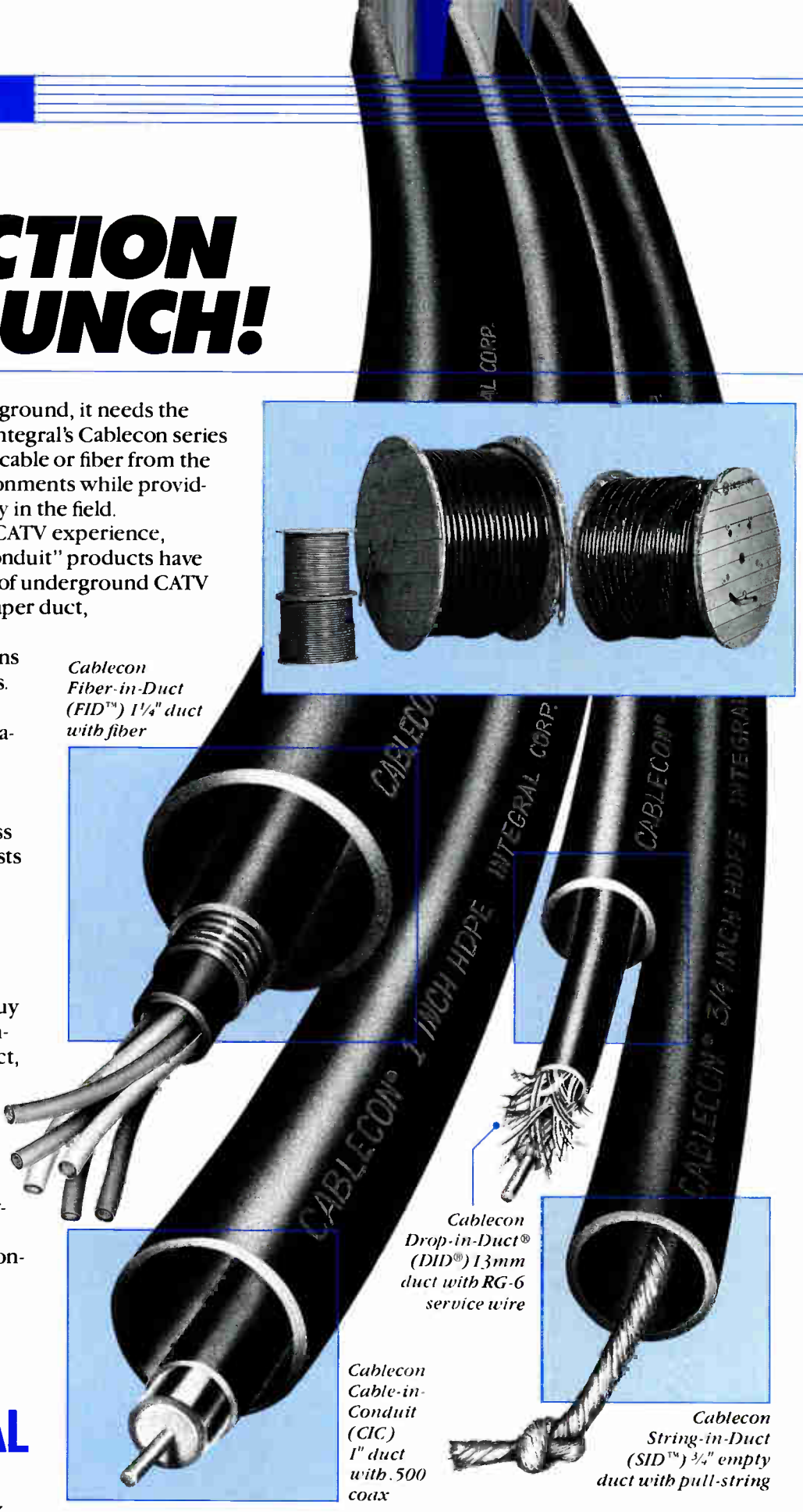
If you're building an underground CATV system, why not buy the best? Buy Cablecon...cable-in-conduit, fiber, string, drop-in-duct, or even empty duct. Dollar-for-dollar, you can expect a whole lot more over 20 years with Cablecon.

To avoid the "20 year crunch" and protect your underground assets, specify only Cablecon—the "user friendly" conduit systems.



Cablecon Fiber-in-Duct (FID™) 1¼" duct with fiber

Cablecon Drop-in-Duct® (DID®) 13mm duct with RG-6 service wire

Cablecon Cable-in-Conduit (CIC) 1" duct with .500 coax

Cablecon String-in-Duct (SID™) ¾" empty duct with pull-string

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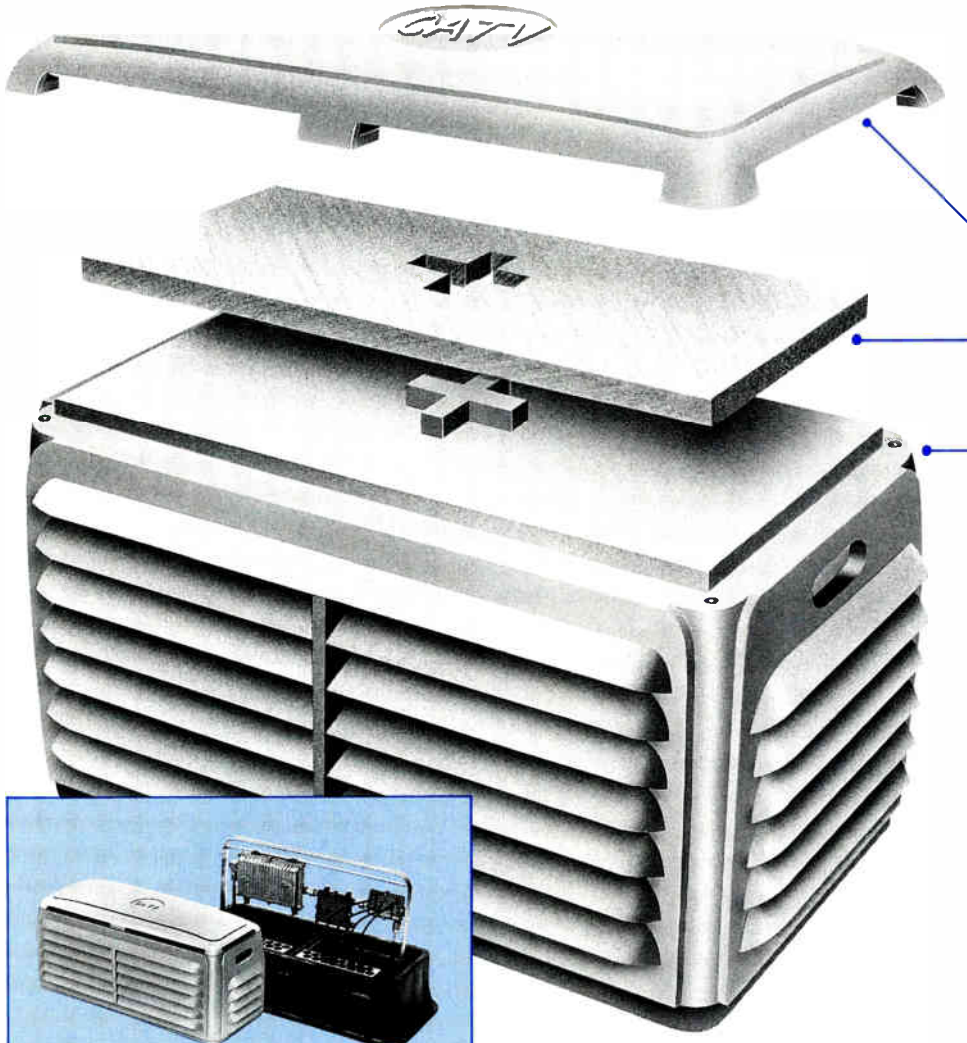
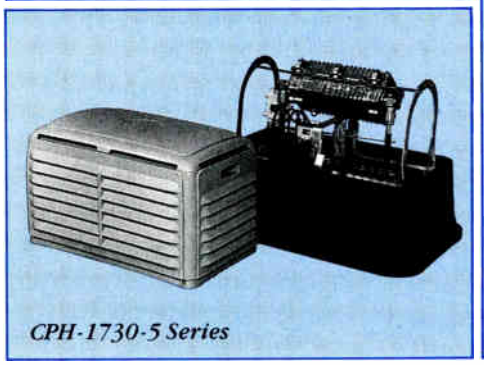


What do San Diego, CA, Fairfax County, VA, Jacksonville, FL and Sacramento, CA have in common? They've all switched to Channell's 5 Series Heat Dissipation Covers (HDC)! In fact, in just 12 months, 38% of our active equipment enclosure customers have switched to HDC. Why? Because these unique pedestal covers are designed to take the heat off underground active electronics.

Channell's HDC covers were developed to dramatically reduce temperature extremes on amplifiers, especially on their IC boards and power supplies. Industry engineers concur that, by keeping your active gear cooler, it will undoubtedly last longer.

So, why not beat the heat with HDC covers and increase system reliability while prolonging the life of your active equipment plant? For complete information and a "cool" giveaway, call Channell Commercial ***toll free*** today.

CPH-1230-5 Series


CPH-1730-5 Series


CPH-2436-5 Series

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Reader Service Number 9.

LETTERS TO THE EDITOR

Dipole

I found your article "How to build a signal leakage dipole" to be informative and of inherent value from an instructional approach. However, I feel obligated to point out the potential hazards of using the depicted dipole on a regular basis in the field. It offers no protection to its users from inadvertent element contact with low-lying electric utility lines. Nor does it provide against possible eye injury from the element ends.

If, in fact (as the article implies) procuring a high quality dipole is not likely because of budget limitations, I sincerely hope the safety aspect will take precedent and convince cable systems to provide for it without exception.

Jim Gracie
Director of Transmission
Prism

Editor's note: As its title indicates, the intent of the article was how to construct a dipole antenna, not how to use one. It still goes without saying that there are potential hazards when using not only the "home-brew" dipole for leakage measurements but any dipole. A non-conductive support (such as the wooden handle or piece of PVC pipe recommended in the article) will provide a moderate degree of protection from contact with overhead power lines as will the measurement procedure required by the FCC. Part 76.609(h) of the commission's rules states, "the resonant half wave dipole antenna shall be placed 3 meters from and positioned directly below the system components, and at 3 meters above the ground...measurements shall be made where the other conductors are 10 or more feet away from the measuring antenna."

As for protection from eye injury, electrical tape or plastic caps on the ends of the dipole elements will help somewhat in addition to the use of safety glasses while performing the measurements.

While these recommendations will not eliminate all accidents, neither will the use of commercially built antennas since some of them use metallic supports, some don't have end caps and most do not have insulated elements.

Dedicated to CATV

I recently became a subscriber to *Communications Technology* through the merge with *Installer/Technician*. I became a subscriber to *IT* due to the excellent articles and tips published for the "laymen" of this business. I was more pleased with the quality and contents of *CT*. It is refreshing to read a magazine dedicated to the cable industry. I am able to keep abreast of new technological breakthroughs in this industry and treated to informative articles on everyday operations and sometimes overlooked shortcuts, tips, ideas, etc. This makes us all more efficient and valuable.

Your magazine stresses cost-effectiveness, professionalism and customer service. We are all well aware it is our customers that make our industry. It could be our customers that *break* our industry. The articles you print in your magazine help us to provide essential customer service, ensuring a long-lived and pleasant relationship with the viewers who give us "life."

In closing, one other aspect of your magazine appeals to me. The professional business and service advertisements. The ads help to keep us informed of new technology, equipment and innovations concerning our industry. We see changes in this industry overnight and corporate advertising in your magazine helps us to keep "on top" of new technology. Along with the trade advertisers, I am pleased to see "CT's Lab Report" included in your magazine. We need this type of help in the business.

Kenneth W. Sterling
Systems Maintenance Technician
Newchannels Cable TV

RF spectrum

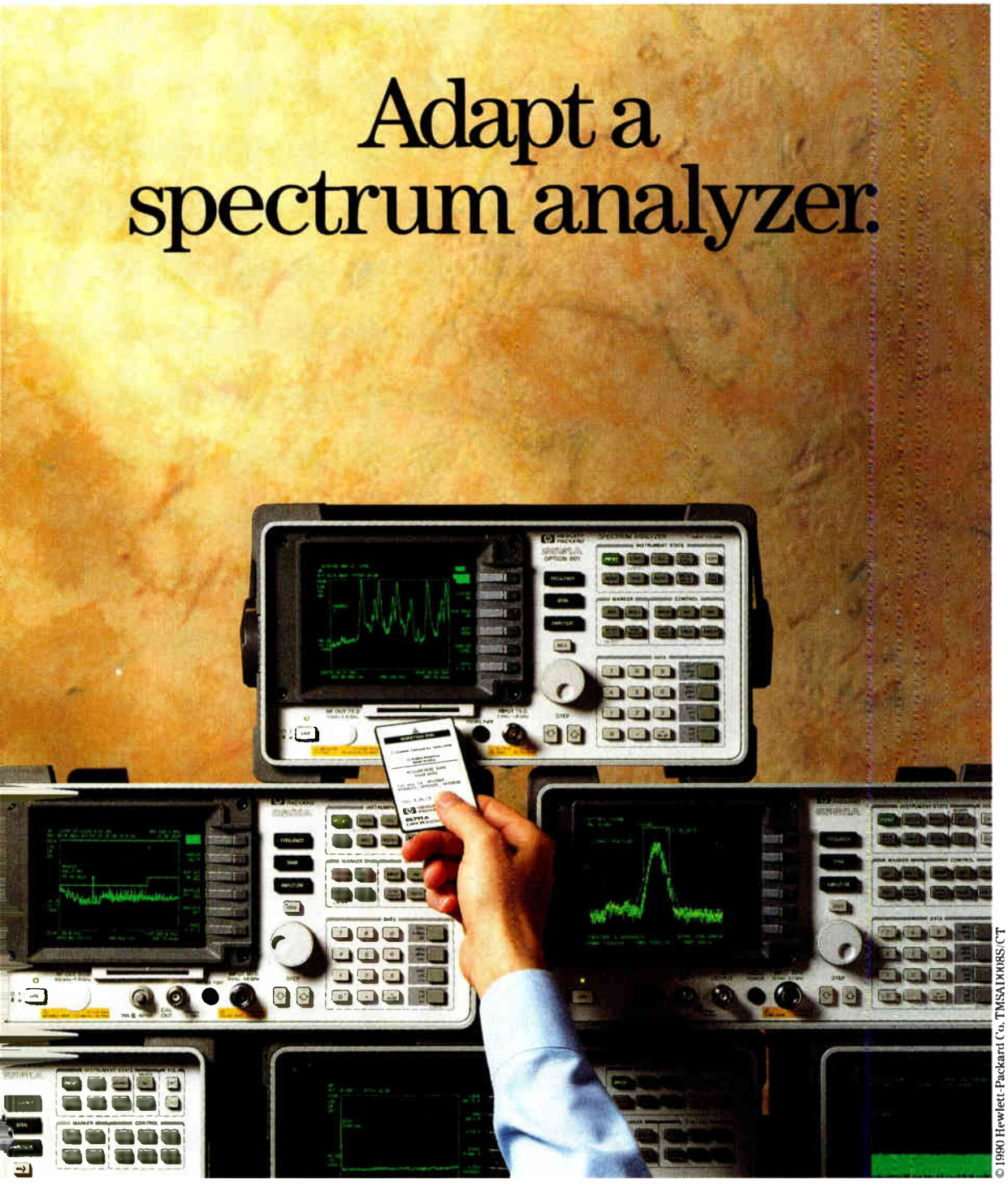
Your "RF Spectrum" wall poster in the February 1990 issue of *CT* was just beautiful, but I must point out an inaccuracy, albeit minor. The amateur 160 meter band runs from 1,800 to 2,000 kHz, not to just 1,900 kHz. The top 100 kHz may be shared, but amateurs are allowed to use it.

It was heartening to notice that you remembered to include the "new" bands at 10, 18 and 24.9 MHz. Although it appears that amateur radio has lost the 220-222 MHz portion of this 1.33 meter band, the appeals process has not terminated yet and this allocation may possibly be restored to the service.

Robert A. Wanderer (KT2D)
Evaluation Engineer
United Artists Cablesystems Corp.

Editor's note: Unfortunately that oversight was on the original material supplied to us by NTIA, but being a ham operator myself (N0IVN) I should have caught that one!

Adapt a spectrum analyzer.



You'll find it easy to tailor an HP portable spectrum analyzer to your particular tests.

That's because memory cards program specific analyzers for applications such as CATV, digital radio and EMC analysis. Which means less training, easy one-button measurements, and faster troubleshooting.

Whether you need a basic analyzer or a high-performance MIL-rugged unit, you'll find it in the HP 8560/8590 family. It covers a range from 50 Hz to 26.5 GHz. And it combines a wide selection of models with flexible performance options to give you an affordable solution.

So call **1-800-752-0900** today. Ask for **Ext. 1236** for a free CATV Video and Fact Kit.

There is a better way.

HEWLETT PACKARD

Reader Service Number 11.

Jack Sachs of Sachs Communications dedicates the new Sachs Communications Training Center. The center's address is 9200 E. Mineral Ave., Suite 424, Englewood, Colo. 80112. The phone number is (303) 790-7330.

NEWS

C-COR announces COMLUX merger plan

STATE COLLEGE, Pa.—C-COR will exercise its option to enter into an agreement and plan of merger with COMLUX. COMLUX will be merged into a wholly owned subsidiary of C-COR.

Back on Dec. 1, 1989, C-COR agreed to fund COMLUX's development of digital fiber-optic equipment for use in CATV systems. Under the terms of the contract, C-COR paid COMLUX $1 million to fund the development project.

In a related agreement, C-COR was granted the option it now is exercising to acquire all of the outstanding shares of COMLUX in exchange for a number of shares of C-COR common stock equal to about 3 percent of the outstanding shares of C-COR. Both parties have the right not to complete the transaction under the agreement in the event the price of C-COR stock is not within an agreed upon price range in the 10 days before closing. All principals of COMLUX will remain with C-COR.

CableLabs, MIT announce research

BOULDER, Colo.—Cable Television Laboratories established a $300,000 research fund with Massachusetts Institute of Technology to support MIT in development of digital video compression. Work will also be done examining exploratory approaches and any related advancements in digital video compression that might benefit the CATV industry.

In other news, the Advanced Television Center and CableLabs reached a final approval that will allow CableLabs to use the ATTC facilities in Alexandria, Va. The facilities will be used for testing advanced television (ATV) transmission systems, which is in support of the Advisory Council on Advanced Television Service of the Federal Communications Commission.

U.K. inventor unveils 3-D TV

LONDON—Deep Vision is a new technology involving a digital decoder added to an ordinary TV set that gives a three dimensional effect. James Ashby, a U.K. inventor, has applied for an international patent for this technology.

According to Ashby, the invention electronically stimulates the brain into creating

an illusion. A normal film is made into a digital version and what Ashby calls stereo cues are inserted at the same time. The digital decoder that is added to the TV set then uses the cues to send slightly different images to each eye. No matter what angle or distance from which someone views the screen, the brain perceives the image in three dimensions.

Nexus named one of 50 best

BURNABY,B.C.—Nexus Engineering Corp. was named one of the 50 best managed private companies in Canada. The list of honorees was compiled by the firm of Arthur Anderson Co., and published in *Canadian Business Magazine*.

Three criteria were used in the search. The first screening was based on financial success. The next step involved interviews to determine just how the companies were managed. A survey was sent out that rated companies on return of capital, sales growth, profit growth, sales per employee and profit per employee. These surveys were sent to 4,700 companies and 400 made the first cut.

TCI's Sie, Japanese discuss broadband ISDN

DENVER—Tele-Communications Inc. officials and a study team from Japan's Ministry of Posts and Telecommunications met to discuss the relationship between cable TV and broadband ISDN. The Japanese are studying the use of optical fiber and digital technology in CATV systems and the relationship between cable and telephone technology.

John Sie, senior vice president of TCI, said to the group, "Cable TV service and switched, point-to-point telephone service are fundamentally different businesses that require fundamentally different delivery systems. Cable will make broad use of fiber and digital technology, but any attempt to combine our service and telephone service in the same integrated delivery system is neither economic nor practical, and will not, therefore, be competitive."

On a related subject a director of the Japanese Broadcast Bureau in the Ministry confirmed that NTT, Japan's telephone company, hasn't received approval to construct a fiber-to-the-home BISDN network in that country. He also said the ministry would not definitely consider that issue until its current task force study was completed, which will be two or three years from now.

ATC's Dooley dies

DENVER—ATC's Jim Chiddix was sad to report the death of Mavis Dooley as a result of a longtime illness. Dooley worked in the corporate office, corporate new business and was most recently director of purchasing at ATC Denver. She originated the concept of establishing a purchasing co-op at ATC.

Microwave Radio purchases MAC division

LOWELL, Mass.—Microwave Radio Corp. acquired the business and assets of the M/A-COM MAC Division from M/A-COM Inc. The division's assets include short-haul and long-haul analog radio communication systems used in the microwave

transmission of audio, video and data signals.

The acquisition includes a commitment for continued support of M/A-COM MAC systems installed throughout the world. According to the company, Microwave Radio Corp. becomes the leading supplier of portable, short-haul and long-haul fixed-link analog microwave radio systems.

Police uncover theft of service scam

CARMEL, N.Y.—About 100 cable TV descrambling devices were confiscated here by the Putnam County Sheriff's Department after C-TEC Cable Systems complained about theft of service. The company provides communities in both Putnam and Dutchess counties with cable service.

Three residents were arrested and charged with theft of service in connection with the case. Homeowners were given amnesty providing they turned in their illegal cable devices before the end of May. As the investigation continues, those who refused to turn in the illegal cable devices will be arrested. Theft of cable service is a class A misdemeanor or a violation depending on the circumstance or amount of cable illegally received according to New York State penal law.

Augat, Channell sign marketing pact

ATLANTA—Augat Communications Group and Channell Commercial announced they have entered into a marketing and distribution agreement to promote Augat's high-end technology products to the CATV industry. Initially, Channell will market Augat's service wire connector products, including Snap-N-Seal F connectors and will provide warehouse distribution for these and other CATV connector products for OEM master distribution.

Channell also will be the exclusive marketing representative for Augat's CATV fiber-optic products. Auxiliary products for both product lines such as stripping tools, connector crimping tools for Snap-N-Seal connectors, CLI test equipment, fiber-optic connector installation tool kits and curing ovens are also part of the agreement. The warehouse distribution agreement will allow Channell to carry inventory of the Augat products the company will market. It also will allow Augat to inventory all of the company's CATV connector products in warehouses owned by Channell, which will improve Augat's national distribution capabilities and provide significant support for their representatives and distributors, according to the two companies.

Eidak, Video Data announce positive test

ATLANTA—Eidak and Video Data Systems announced the Eidak copy protection technology works on the VDS-manufactured Laser Cine-Machine. According to the companies, the recently completed positive compatibility test of an Eidakized copy protected disc may allow for the advanced availability of fresh PPV product on the Laser Vision standard disc player that is part of the Laser Cine-Machine System.

According to the companies, the addition of the copy protection feature along with the ability of the Laser Cine-Machine to allow for custom scheduling and control multichannel, multistart-time playback will permit VDS to service operators interested in the stand-alone playback format that can support near video on demand (NVOD) over cable today.

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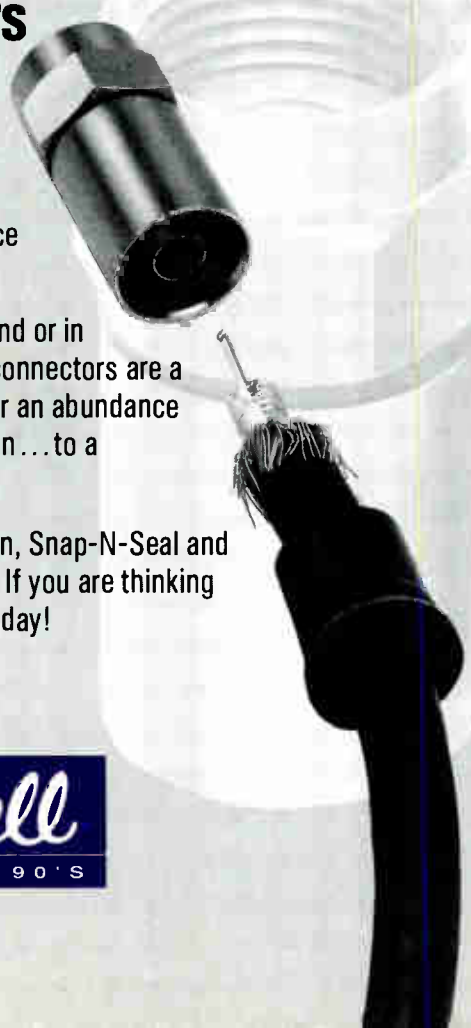

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Reader Service Number 15.

NV Philips, Thomson-CSF announce HDTV research pact

EIDHOVEN, Netherlands—NV Philips Gloeilampenfabrieken said it signed an accord with Thomson-CSF SA of France for joint research and development of high definition television (HDTV). The research is to occur between 1990-1995.

According to Philips, the project required an investment of around 3 billion ecus (approximately $3.66 billion). It added that it could not specify how much of that total each partner would contribute since this will be linked to the content and progress of the project. The project will be aimed at getting HDTV out of the experimental stage.

Hardware suppliers contribute to training

ENGLEWOOD, Colo.—Alpha Technologies, Anixter, AT&T, CaLan, Channell Commercial, Comm/Scope, Eagle Comtronics, Gilbert Engineering, Magnavox CATV, Scientific-Atlanta and Trilithic contributed over $600,000 in a joint project to sponsor the production of The Business Learning Group's new interactive video technical training series. The first two programs in the series are *General Safety* and *Basic Installer Training*.

To develop the two programs, The Business Learning Group (a subsidiary of Jones International) worked with two special advisory groups to maintain the accuracy of the courses in the Technical Training Series—a group of MSOs currently using interactive videodisc training systems and a group representing engineering associations and experts in the fields of installation, standards, safe practices and technical performance.

S-A awarded several contracts

ATLANTA—Scientific-Atlanta was selected by K Prime Partners as the system supplier for K Prime's direct-to-the-home satellite service. The initial order for S-A's B-MAC satellite transmission system exceeds $25 million.

In other S-A news, the company announced that through its Canadian distributor, Comlink Systems Inc., the company was awarded an order for AM fiber-optics equipment from Videotron Ltd. for its Montreal system. It is the largest cable TV system in North America and serves approximately 600,000 subscribers. The initial installation will include a minimum of 11 fiber nodes using S-A's optoelectronic transmitters and optoelectronic bridging amplifiers. Installation began in June.

S-A also announced it was chosen to provide satellite data receivers to the Associated Press to establish a high-speed Latin American network for receiving the AP's news service. S-A's Model 4585 data receiver will allow the AP to transmit its service to over 200 sites in Latin America. The order is valued at approximately $1 million.

- General Instrument Corp.'s VideoCipher division announced new authorization for its VIDEOpal instant pay-per-view ordering system will be restricted to VideoCipher II Plus-equipped consumer satellite systems. The company said the change is designed to take advantage of the security advancements in the VideoCipher II Plus technology to protect against signal theft.

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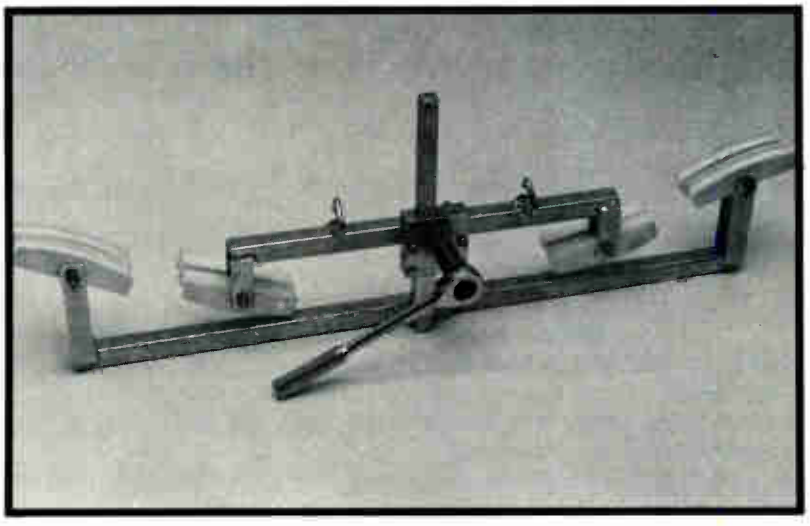

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SCTE's role in training the industry

By Howard Whitman
Manager of Editorial and Promotion
Society of Cable Television Engineers

In the 21 years that have passed since its formation, the Society of Cable Television Engineers (SCTE) has come to play a large and constantly increasing role in the training of cable TV technical personnel. As an organization founded to elevate the knowledge and recognition of the industry's engineers, technicians and installers, SCTE has created a variety of programs designed to address the training needs of each facet of the industry's operations.

"SCTE has created a variety of programs designed to address the training needs of each facet of the industry's operations."

National and local confabs

SCTE's Cable-Tec Expo, the annual training and CATV hardware conference that allows industry manufacturers and suppliers to meet with cable system technicians and engineers, has come to be recognized as the industry's optimal technical training opportunity. Held every year since 1983, this year's expo occurred June 21-24 in Nashville, Tenn. The expo offers four days of educational events, including a full day of technical panel discussions, a hardware-oriented exhibit floor, hands-on instruction, and technical seminars and demonstrations on a variety of important issues.

SCTE regularly conducts national seminars and conferences at locations throughout the country. The Society recently inaugurated its Technology for Technicians series of national seminars conducted by SCTE Director of Chapter Development and Training Ralph Haimowitz. Each Technology for Technicians event is designed for a different level of technical personnel. To date, two different events, "Technology for Technicians I" (aimed at installer/techs, service techs and their field supervisors) and "Technology for Technicians II" (created for maintenance techs, chief techs and system engineers) have been presented. Each of these events offered three days of intensive technical theory, combined with actual hands-on training presented in a laboratory environment.

The Society also periodically sponsors national conferences on topics of vital importance to the industry's future. The most recent event, the "Fiber Optics 1990" conference held in March in Monterey, Calif., offered attendees ample training opportunities through panel discussions featuring some of the industry's technical leaders, as well as demonstrations of hardware at the forefront of this significant new technology. SCTE is currently planning another fiber-optics conference for 1991. (For further information, see this month's *Interval*).

For those unable to attend Cable-Tec Expo or the Society's national events, training may be gained at one of the many technical seminars conducted by SCTE's 55 local chapters and meeting groups. These organizations can be found in accessible locations throughout the United States and the Caribbean. Seminars organized by these groups feature presentations by respected industry professionals, and are valuable forums for technical discussion at the local level, expanding the knowledge of our members while aiding in their individual development.

Training seminars may be prohibitive to some due to inaccessibility or time constraints. Fortunately, SCTE has developed a method of bringing technical seminars to industry personnel everywhere. Our Satellite Tele-Seminar Program provides videotaped technical training programs each month, making them available for cable systems across the country to downlink and record. These programs may be received via satellite by any cable system and recorded for immediate and future employee training purposes. SCTE also recently premiered a new series of product-specific tele-seminar programs, developed to aid and assist in training technical personnel in the use of specific companies' product lines.

Certification programs

Seminars, live or via satellite, are not the only available means of technical education, however. The Society's Broadband Communications Technician/Engineer (BCT/E) Certification Program also is a valuable method of enhancing an individual's personal development within the industry. Through a challenging program of study and testing, a candidate for BCT/E certification receives much more than a certificate, having gained valuable knowledge and experience as well as a means of evaluating his professional abilities in the process. The Society's local groups regularly conduct tutorials on the BCT/E program's seven categories, including: Signal Processing Centers (I), Video and Audio Signals and Systems (II), Transportation Systems (III), Distribution Systems (IV), Data Networking and Architecture (V), Terminal Devices (VI) and Engineering Management and Professionalism (VII). Candidates in the BCT/E program enrolled at technician and/or engineering levels will gain a well-rounded knowledge of the most highly recommended technical procedures currently in practice.

In hopes of furthering SCTE's goals of a well-educated technical community, the Society recently developed its Installer Certification Program. Candidates will not be evaluated purely on their performance on examinations. Other means of evaluation will be utilized, such as field exercises testing a candidate's skill, experience and practical knowledge. Examinations in the Installer Certification Program, administered for the first time at Cable-Tec Expo '89 in Orlando, Fla., are currently available at the local level through the Society's local chapters and meeting groups. The Installer Certification Program Committee's *Installer Training Manual*, currently available either with SCTE installer membership or as an SCTE publication, offers industry systems a concise and consistent basis for a solid installation training program, as well as an invaluable resource to those participating in the program.

The Society's emphasis on training will only grow stronger in years to come. SCTE has concentrated its efforts to provide training opportunities to the industry and will continue to offer a variety of training opportunities to accommodate technical personnel at all levels. By improving our skills and knowledge through education, we improve our industry, our service and ourselves.

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Reader Service Number 18.

An evolving training facility for our changing industry

By Ronald W. Wolfe
Manager, ATC National Training Center

Throughout its history the cable TV industry has faced some rather unique challenges with regard to training its personnel. Traditional institutions have provided little, if any, industry-specific training. I remember wrestling with the choices available at the technical institute that I attended in the late 1970s. I had to decide whether I wanted to specialize in telephony, TV repairing and service, digital sciences and a host of other possibilities.

Cable TV technology was not one of the choices. It seems the only time cable TV was discussed was in the cafeteria, where we shared ideas on how to defeat the local system's security measures. After spending a couple of years studying digital circuits and microprocessors, I sent off my resume and letters to the likes of Cray Research, 3M, Honeywell and IBM. I received several of the customary replies stating that when I had gained some job experience I should call back and after a while I began to wonder if I would ever receive an offer.

The "little house on the prairie"—an installation practice facility.

TVROs feed satellite signals to the on-site headend.

The ATC National Training Center.

The way we were

One day I received a telephone call from a cable TV system in Oshkosh, Wis., stating they would be interested in speaking to me about a job as an installer. They understood that I didn't have any background in CATV but there were "training programs" available to teach me what I needed to know. I took the job in spite of the fact I had my heart set on becoming a research engineer at one of the big computer companies and within a few months I realized that I had fallen into something spectacular.

The industry was going through a period of explosive growth and it seemed that all you had to do to get promoted was to express an interest. Assuming duties of increasing responsibility was sometimes uncomfortable but I was usually told not to worry, that I would "grow into the position." I never did receive that training I mentioned before (other than a few days of doing grunt work with a senior technician and answers to some of my questions asked over a cup of coffee or a cold beer after work.) System managers were reluctant to allow their technical employees to attend sessions where peers from other companies would be present for fear that we would discover openings at other companies who paid a nickel or two more than they were willing or able to offer. In all fairness though, we really had refined on-the-job training (OJT) to an art form in this industry and it worked well enough to support our needs for many years.

While all of this was happening there was something occurring in Denver that I was unaware of. ATC was in the process of dedicating its National Training Center. It was June 1981 and ATC had just opened a 7,200-square foot facility that contained classrooms and laboratories as well as outside plant facilities that were used for training installers, construction personnel and service technicians.

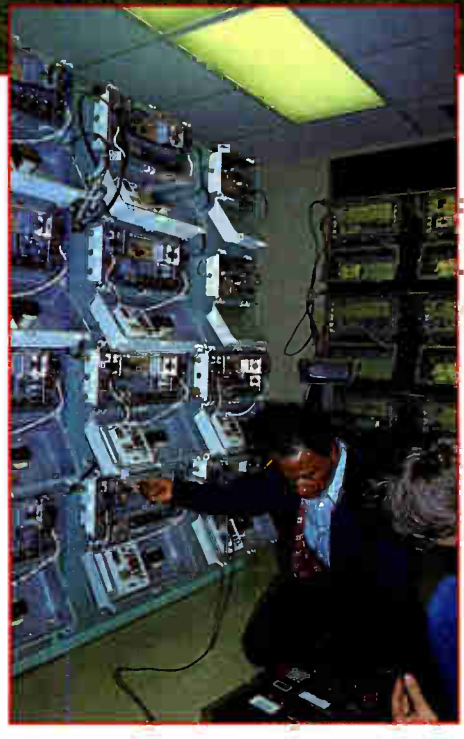
The facility includes an operational cable system, complete with TVROs, trunk and feeder plant, a microwave link, and a headend and test equipment. Lab stations can accommodate groups of up to 20 students, with complete complements of equipment and materials necessary to build and analyze RF circuits.

Practice poles and outside plant allow students the opportunity to work in an actual system without the distractions normally present in an operating system with paying (and non-paying) customers. In addition, we can provide hands-on experience with equipment in an environment that does not cause service interruptions.

Training manuals were written by the NTC staff, which matched the course progression and provided a level of industry-specific technical information previously unavailable through any single source. I didn't really know anything about the NTC until I joined ATC and relocated to Denver in 1987. By that time hundreds of em-

Aligning the microwave path.

Practice poles.



Cascade balancing.

Keeping training records: It's smart, it's the law

By Alan Babcock
Technical Training Manager
Warner Cable Communications Inc.

There always seems to be requirements for more and more paperwork. No longer are system engineers able to spend all their time on technical engineering tasks. These are requirements for keeping productivity records, service call records, installation completions, construction progress reports, headend logs, etc. Now comes a requirement for more paperwork (or at least record keeping). This article will discuss the need for keeping accurate training records and describe a couple of methods that can be used for the task.

"How you keep the records is not important as long as information can be filed and retrieved when needed."

The need for training records

There are at least two reasons for keeping accurate training records. The first is for use as a management tool. By keeping records of the training completed by employees the supervisor can better make determinations for promotions, special projects, etc. Making these types of employment decisions is easier if documentation exists as an indication of the knowledge obtained by individual employees. Employees completing training aren't guaranteed to be better choices for promotion but adequate training should be a factor weighed into the decision. Many organizations have very specific requirements about the training required before a promotion can be given.

Most of us operate under certain budget restrictions. One of the accounts in the budget that must be managed is *training expense*. Keeping records about who attended what training and when will help manage the cost of providing training for all employees within the allocated resources. Without records of the persons completing training it is difficult to assess who is next in line for training.

The second reason for keeping accurate training records is it is required as protection for yourself, your employees and your company. Certain organizations have very specific requirements for keeping training records.

An example is the OSHA requirement for keeping training records of persons trained in the handling of hazardous materials. Your organization may not have many hazardous materials but this doesn't mean it can ignore the OSHA Hazard Communication Standard (HCS). This standard requires training (and record keeping) for all employees. You must be able to shown an OSHA inspector records of training given to employees in the implementation of your HCS program and handling of any hazardous materials. Failure to provide training and keep records of the training is a violation of the HCS and your company can be cited by OSHA for the violation.

Training records also may be called in litigation or arbitration hearings in support of labor decisions. For example, if an employee is dismissed for cause and files suit against your organization the training records may help defend the dismissal. If all employees received the same training but this employee didn't perform on the job, the dismissal may be more easily justified.

In situations where employees are trained in safety-related issues the records are extremely important. By periodically reviewing the records you can protect your employees by making sure you provide training to employees who need it *before* an accident occurs. Persons injured on the job have the legal right to file suit if they weren't trained in the safe operation of equipment or safe procedures for doing the work. Training records protect you and your organization in such a situation.

How to keep the records

Records can be kept on paper or in a computer data base. In either case, an organized approach must be established. Keeping paper records can be done very simply and it doesn't require much effort to establish a system. The filing system can be organized by employee or by training class/category.

For example, it is possible to add a sheet of paper to an employee's personnel file showing completion of a training session. Most formal training classes provide certificates of completion. A copy of the certificate can be sufficient in many cases. Other information may be important, however, such as a list of the objectives of the class, grade obtained (if appropriate), expiration of the certificate, etc. Adding this additional information can be done on a standard form to be included in the employee file. This form could be completed each time the employee attends a training session. This approach makes it easy to track all training completed by a particular individual but makes it difficult to quickly determine all the employees that completed a specific class or type of training.

A second type of paper record system is to file records by course/category rather than employee name. This filing system allows a file for each class or class type. For example, there may be a file for all employees completing pole climbing training. In the file there should be a list of the course objectives/content and a summary sheet of the names, dates, scores, etc., of all the employees completing training. While this system makes it easy to see which employees have completed a specific class, it is difficult to

(Continued on page 76)

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Training your maintenance and restoration team

By Rebecca S. Frye
Training Director, Siecor Corp.

As the deployment of fiber optics grows, the need for a comprehensive and effective fiber-optic cable system maintenance and restoration plan will become critical. A well-defined plan will improve the operator's ability to expeditiously identify faults and act on them, thus restoring service to customers quickly. Although the concept of having a maintenance and restoration plan for the system is not new to the industry, there are unique issues and needs that must be addressed when dealing with a fiber-optic cable system.

A plan is only as effective as the team implementing it. One of the most critical parts of a CATV company's maintenance and restoration plan is training the restoration team. System reliability and rapid restoration capability are critical to maintaining a high level of customer service. The time necessary to restore a system is directly related to the skill level, dedication and effectiveness of the restoration team.

A functional, working team is vital to a rapid, complete restoration. Each team member must know exactly what he is responsible for completing. Cross-training is vital to ensure each team member understands the responsibility of other team members and how each particular area of expertise fits in. Drills or practice sessions are extremely important in verifying that the team is as efficient and effective as possible. These exercises can also serve to identify areas that may require further practice and to determine deficiencies in material readiness, all of which ultimately could save restoration time. But how do you make sure your team is qualified? What types of training are required?

The basics

First, your team should understand the basic principles of fiber optics. This is essential for anyone involved with the fiber-optics system, from decision making managers to field personnel. Knowing how and why the system works will make it easier for the restoration team to master basic skills of using equipment in the field. Don't be put off by the theoretical or mathematical properties associated with fiber. In basic terms, fiber optics involves the transmission of information by light pulses.

Fiber also provides a number of advantages for cable systems, including reducing the number of active components needed, improving signal quality and providing the ability to carry both digital and analog signals. Additionally, fiber cables are small and lightweight, and offer large bandwidth capacity, low loss and immunity to electromagnetic interference.

Other basic skills include ensuring that each team member practices proper safety procedures. During a time when speed and accuracy are critical, it also is very important that team members remain injury-free.

Equipment proficiency

System repair begins with the identification and location of the system failure, which requires team proficiency in the use of optical test equipment. Once located the fault must be repaired. To do this, your restoration team must learn the skills necessary to operate splicing equipment and understand cable and hardware handling techniques. Consequently, hands-on training with up-to-date products used in the field is essential. A maintenance plan isn't worth the paper it's written on if the personnel required to implement it haven't received thorough hands-on training by professionals with extensive firsthand knowledge of the procedures.

To locate a cable system fault, the restoration team must be able to operate fiber-optic test equipment such as optical time domain reflectometers (OTDRs) and power meters. The OTDR is one of the most versatile pieces of optical testing equipment

Siecor's Fiber-Optic Training Course

Siecor's fiber-optic training course, "Fiber-optic installation, splicing, maintenance and restoration for cable TV applications," is recognized by the Society of Cable Television Engineers as a source of preparation for the fiber-optics portion of the BCT/E Category III examination. Successful completion of the course earns four recertification units for those technician and engineer members already holding BCT/E certification.

The training class, with a high concentration of hands-on material, prepares technicians and engineers for all aspects of fiber installation and maintenance. The information focuses on the cable environment alone. Topics are advantages and disadvantages of fiber-optic applications, optical-fiber characteristics, modes, attenuation, analog and digital transmission, splicing, repairs, connectors, performance and cost issues. In addition, cable handling procedures, fusion and mechanical splicing, cable termination and acceptance testing are taught with extensive hands-on practice. Procedures for maintenance and restoration plans also are detailed.

Siecor classes are taught by experienced field engineers. Classes can be taught on the customer site and materials can be customized as needed. On-the-job training also is available.

Courtesy of Siecor Corp., Hickory, N.C.

Hands-on training with up-to-date products used in the field is essential.

available. It can be used for fault location, preparation of as-built documents (including splice loss data) for newly installed systems and troubleshooting. Power meters also can be used to isolate faults between the electronics and the cable plant quickly and simply. Team members should have training in using these instruments in the field.

Repairing the fault can be simple or complex. It may involve replacing an optical connector or electronic component, replacing a link of optical cable or anything in between. So, the restoration team should be well-versed in all possible solutions.

Proper cable handling procedures, hardware preparation, mechanical splicing for temporary repair and fusion splicing for permanent repair are vital and necessary skills in the event a system repair is necessary. In addition to these responsibilities, designated personnel should be responsible for maintaining the emergency restoration materials and equipment, as the primary users of it.

It is important to note that it is very easy to end up with an elite "fiber team" in your company. Although this may be a functional necessity at first, in the long run it will be to the operator's advantage to cross-train as many personnel as possible in fiber optics for flexibility in scheduling and emergency restoration task assignment. The ability to perform more than one task may prove beneficial in the event that one team member is not available when an emergency occurs. The team should regularly prac-

(Continued on page 75)

"As the deployment of fiber optics grows, the need for a comprehensive and effective fiber-optic cable system maintenance and restoration plan will become critical."

Solution for CATV training: Interactive videodiscs

By Pam Nobles
Staff Engineer/Technical Training
Jones Intercable Inc.

Approximately half of all of the cable TV industry's employees hold technical positions. Within any cable TV system, the majority of these positions are held by installers and technicians. The technical area historically has a high turnover; it is costly and time-consuming to continually train replacements. Also, the lack of qualified instructors as well as undisciplined learning habits contribute to this problem.

Two interactive videodisc training programs presently in the production stage are being developed to address these problems. These programs, which can be used as stand-alone training or to augment existing training programs, will comprise the first two modules in a total training curriculum for technical associates. They are among the first of their kind within the cable TV industry and have been developed in a manner that embraces industry standards so that use by other cable companies is possible.

Installer Training and *General Safety* are planned for release later this year. These programs are being produced by the Business Learning Group, a subsidiary of Jones International. The following will provide a description of basic laser disc technology, a summary of the content of the programs and an outline of the steps necessary to complete an interactive video for training.

What is interactive video?

Interactive videodisc training programs have many advantages over traditional training. An interactive program can be geared toward any level of a student's experience. Depending on the student's responses, the program may skip the basics if the student demonstrates the material is understood. Immediate feedback is provided. Also, a student can be easily tested on the material studied. One of the greatest benefits of these systems is the immediate availability of training. Simply schedule the equipment for training or review whenever it is convenient.

Interactive videodisc training is a computerized video training approach. It consists of a TV set, personal computer and a videodisc player. A student watches the video training that is interspersed with a variety of questions based on the course material. Depending on the student's response, the computer selects feedback that reinforces or reteaches the subject matter. This automatic "branching" ensures the learner of personalized instruction. At the end of each lesson the student receives information as to how he did in that particular segment. These indicators can help the supervisor determine how to coach over the long run with each learner. The video is designed to present simulations that prepare the learners for work that they are being trained to perform.

Basic laser disc technology

The laser disc system is an optical system that operates by reading reflected light from the disc. Microscopic pits are used to encode the digital information, which is read back by a laser. In order to read information from a disc the laser beam is focused on the spiral track of pits and the amount of light reflected back into the objective lens is measured. Light striking one of the pits is diffracted to a wide angle and very little finds its way back to the lens. But when the beam focuses on the flat area between the pits most of the light is reflected back. The modulated signal produced by the combination of reflected and diffracted light represents the stored information.

The laser disc is capable of random access, which has many advantages over a linear tape. Material can be geared to learner's experience and input, offering a scope, rate, sequence, style, sophistication level and medium, which is to a large extent determined by a "dialog" between the learner and the system. An attempt to skip over material in a linear tape is risky, since there is no way a learner can know what is missed.

Random access offers direct, uncomplicated access to data, a vast storage capacity, both in motion and still visuals, and rapid response time. There are about 14 billion pits of information recorded on one side of a disc, arranged in a spiral. One ring of the spiral is called a track; there are 54,000 tracks per side. Each track contains one frame of visual information; therefore, one side contains 54,000 frames of picture. Audio is carried on two independent channels with a frequency range of 20 to 20,000 Hz.

A typical 12-inch constant angle velocity (CAV) disc, which rotates at a speed of 1,800 RPM (NTSC), can play 30 minutes of video information on each side. However, the actual running time of the training is much longer due to the "thought time" that lapses during the exercises between the computer screen and student interface.

Development

The steps in the development of an interactive video program include the following: 1) research, 2) obtaining approval, 3) assembly of content, 4) writing the script, 5) video production, 6) programming and 7) testing.

The first step, research, involves identifying a need for the program. Before beginning work on these programs the training needs of installers and technicians were analyzed and documented. This was accomplished primarily by examining statistics, reviewing reasons past programs were not successful and interviewing installers and technicians to determine what they wanted. The following summarizes the results of this research.

- *Determine if videodisc is best.* Review all possible mediums to present the training: instructor and classroom, self-study workbook, linear video, etc. Videodisc training is not always the best solution since it is expensive and time-consuming to produce.
- *High technical employee turnover.* The turnover of installers in the cable TV industry is historically very high. In a typical cable system, the average installer has been in his position less than one year. New employees are continually being hired and trained. Since interactive training programs are basically self-administering, new employees can be trained at any time. By creating a self-study training program an instructor will not be tied up every time a new employee is hired.
- *Lack of qualified instructors.* Presently there are over 70 cable systems operated by Jones International, all of which need to train installers. The usual way a new installer is trained is to "ride around with another installer" who may not have received adequate training initially. Additional training is conducted by technical supervisors who in many cases have not had formal training in instructing others. A centrally developed program will eliminate individual cable system preparation, thus eliminating numerous hours of preparation as well as frustration on the part of the individual required to present the training. Also, the quality of training each installer receives at every system is controllable and evaluation results will be consistent.
- *Undisciplined learning habits.* The typical installer has perhaps a high school education; many have not had the opportunity to attend college. There is a need to develop a training program that can get through to people who may not have a good "learning track record." By creating characters that an installer will relate to and respect, a training program can be created that is fun as well as having the ability to keep the student's attention. Creating competitive situations within the program itself or among other students will help stimulate interest and promote learning.
- *Motivation.* In many cases it was found that installers and technicians knew the correct procedures—especially when it comes to safety—but chose not to observe them. So training isn't always the issue. In addition to training, a goal of these programs is to instill a desire to be self-motivated to do the right thing. In addition to providing the procedures of "what to do," "why it is done this way" is also included. Testimonies of what might happen if guidelines are not followed are incorporated.

Obtaining approval

After determining that interactive video training is a viable solution for your system's needs, approval from management and funding must be obtained. This as you know is not always easy! The best approach is to justify the benefits of the program in terms of dollars saved. It is very difficult for a company's financial controllers to approve a program simply because it will make someone's job easier. It must be capable of being measured so that communicating dollars saved through the implementation of such a program is possible. Examples of items that can be measured include time saved through more efficient training or time and money saved through a reduction in service calls.

To illustrate this, assume that each cable system on the average needs to train six new installers every year (this number may vary, of course, depending upon the size and geographical location of the system). It takes an average of 20 hours of the supervisor's (or another installer's) time to train a new installer. At a salary of $15 an hour, which includes company benefits and overhead, the cost to train these new installers may be as high as $126,000 a year. The estimated cost to produce one interactive videodisc program is between $100,000 and $250,000. By allowing the supervisor to have more time to attend to other responsibilities, a typical program can pay for itself within one or two years.

- *Service call percentages.* Documenting the reduction in service calls also can be used as a measurable justification. One such area identified, referred to as "controllable service calls," is in the installation area. It has been documented that between 70 and 90 percent of all service calls occur in the installation (drop) portion of the cable plant and approximately half of these are a result of faulty workmanship. A reduction in service calls due to Jones Intercable's "Qualified Installer Program" has already been documented. This program is essentially a guide for how installations should be performed. With further training, an additional reduction in service call percentages is anticipated. At an average cost of $35 a service call, a projected payback is easily calculated.
- *Insurance claims.* It also is costly to pay insurance claims for injuries that may have been prevented if the proper training was conducted. For example, Jones paid more than $500,000 in insurance claims in 1988, 90 percent of which were attributed to carelessness. If just half of these claims can be reduced through more intensive training in safety procedures, one program is paid for.

Getting it together

Determining the content of the program is the next critical step. Since interactive videodiscs are expensive, it's advantageous to get it right the first time. Plus, once the disc has been made, revisions to the video portion are not possible. The content of our two technical programs has been derived from a number of sources. One source of input is the "User's Consortium."

This group consists of all users of the previous interactive video programs by the Business Learning Group and includes over 35 MSOs in over 200 separate sites. Another group is Jones Intercable's and Spacelink's chief engineers. Through the input of these two groups and using existing training program outlines when available, we were able to identify the main topics to be covered in the training. The final User's Consortium meeting for the technical discs took place last March. The purpose of this final gathering was to fine tune the drafts of the scripts.

Writing the scripts, therefore, is the next step. The content of the program now needs to be put into "student-friendly" format. This is where the interaction between the student, video, computer and workbook takes place. Interfacing all these elements is a bit more complicated than any one alone. First, the flow of

"This program will address one problem that presently exists: lack of training consistently available to the 'revolving door' of installers."

"Depending on the student's response, the computer selects (the appropriate feedback)... This automatic 'branching' ensures the learner of personalized instruction."

the material must be decided. For *Installer Training*, it was determined a chronological order of material would be best, starting with the first day of training for a new installer all the way through to finishing the install. With this method, the student must finish each module before moving to the next one. The *Safety* program can be used at monthly tech meetings as well as new employee training—so each module has been written to be stand-alone.

Writing the scripts includes all information necessary to the finished product, including all dialogue between characters, the video scenes and action, computer graphics and the tie-in with the student's workbook. The scripts also include the exercises the student will work through as well as the feedback for covrect and incorrect answers. Because of the branching instructions necessary to accomplish these tasks, the scripts tend to grow as large as a New York City phone book.

When video is produced, everyone who possibly may be involved with making a major motion picture is involved: set designers and builders, producers, directors, camera operators, actors, subject matter experts, make-up artists and a host of others. Experts are definitely necessary during this process. The scenes are typically short, since the video where the majority of the training takes place is interspersed with computer, workbook or hands-on exercises. Special effects are added during the editing process. Since these two programs address the same audience, they are being developed and produced simultaneously. This way there will be continuity between the projects. Also, combining the writing, actors, production and disc mastering will be cost-effective and efficient.

Computer programmers are needed to merge everything together. Each piece of video needs to know when to start and when to stop. The timing involved is critical. The program can be written in almost any language such as Pascal or "C." Flow charts of all possible branches are developed to simulate the structure of the program. As in any training program, testing (and revising if necessary) is done. The final program should be tested in various locations before final release.

The final *Installer Training* program will consist of four sides of the 12-inch laser disc; *General Safety* will be three. A computer disc containing user's instructions and evaluations, a student workbook and a supervisor's guide will support the programs. Let's explore these programs a little closer.

Description of programs

Installer Training will incorporate standardization guidelines and procedures similar to our existing Qualified Installer Program. The interactive part of the program is basically self-study. Practice exercises, evaluations and hands-on practices will be incorporated into the program. The system training facilitator will be supplied a supervisor's guide to help pace the installer's training. The supervisor's guide will assist the installation supervisor with all necessary activities away from the interactive workstation. Guidelines for testing on field work also will be included. During the field portion of the training the installer will work more closely with the supervisor. The administration of the field evaluations will be accomplished in a similar manner as our existing Qualified Installer Program.

The student has the opportunity to see and practice all the elements of performing an installation through the interaction of our two main characters. The training program begins with the first day of a new installer, Keith, in a fictitious cable system. Keith has had no prior cable experience but is a willing and capable student. With the help of Paul, his supervisor, Keith proceeds to learn all aspects of cable installation, starting with CATV historical and technical background, aerial and underground installations, grounding, connecting to customer equipment, through finishing the install. The installation student at the system will "travel" with Keith as he learns what it means to be an installer. Keith of course needs to learn how to climb a pole and the safe way to handle a ladder. Included in *Installer Training* will be an aerial safety program complete with a detailed supervisor manual.

The purpose of *General Safety* is to prepare installers and technicians to perform any job safely. It may be assumed that some time during their career students have been exposed to these procedures; this program ties these guidelines into a tidy package. The *Safety* program will cover all aspects of safety as related to cable TV, including a review of personal safety equipment, pole climbing techniques and ladder safety. Additional topics include power awareness, working environments and substance abuse. The supervisor's guide will include a calendar of safety meetings as well as references on where to find additional outside training, such as defensive driving and first aid.

We meet up with the rest of the cable office associates in this program. Each "imaginary" installer or technician that the student will meet on the video monitor will have a distinct personality and way of thinking and working. For example, we meet Enrico, who "doesn't think safety is that big of a problem." We also meet Yalana; she is an installer who "doesn't think about safety much." Interacting with this unique cast of characters is bound to keep the interest of the students.

This program is designed to be used as overall safety instruction for an individual or in conjunction with the monthly tech meetings. The detailed supervisor's guide will facilitate supervisor/student interaction and, as described in *Installer Training*, support for field evaluations and continued hands-on training is incorporated.

A cable system's goals

The use of interactive videodisc training will not completely eliminate the problems associated with the high turnover of employees. This problem has deeper roots. Before this problem can be solved other concerns need to be addressed including hiring and screening procedures, as well as salary increases to keep good employees. However, this program will address one problem that presently exists: lack of training consistently available to the "revolving door" of installers. Lack of qualified instructors will be tackled directly by interactive videodisc training. The program is the teacher's assistant and the delivery is always the same. Although the students may maintain their undisciplined learning habits, the fun element of the program will keep their interest high and promote learning.

The ultimate goal of a cable TV system is to supply the cable customer with excellent service and the best quality TV picture possible. The technical associate who is properly trained will aid in improving productivity, efficiency and ultimately, ensure that the company's goals are met. Interactive video is here to meet the challenge in achieving these goals.

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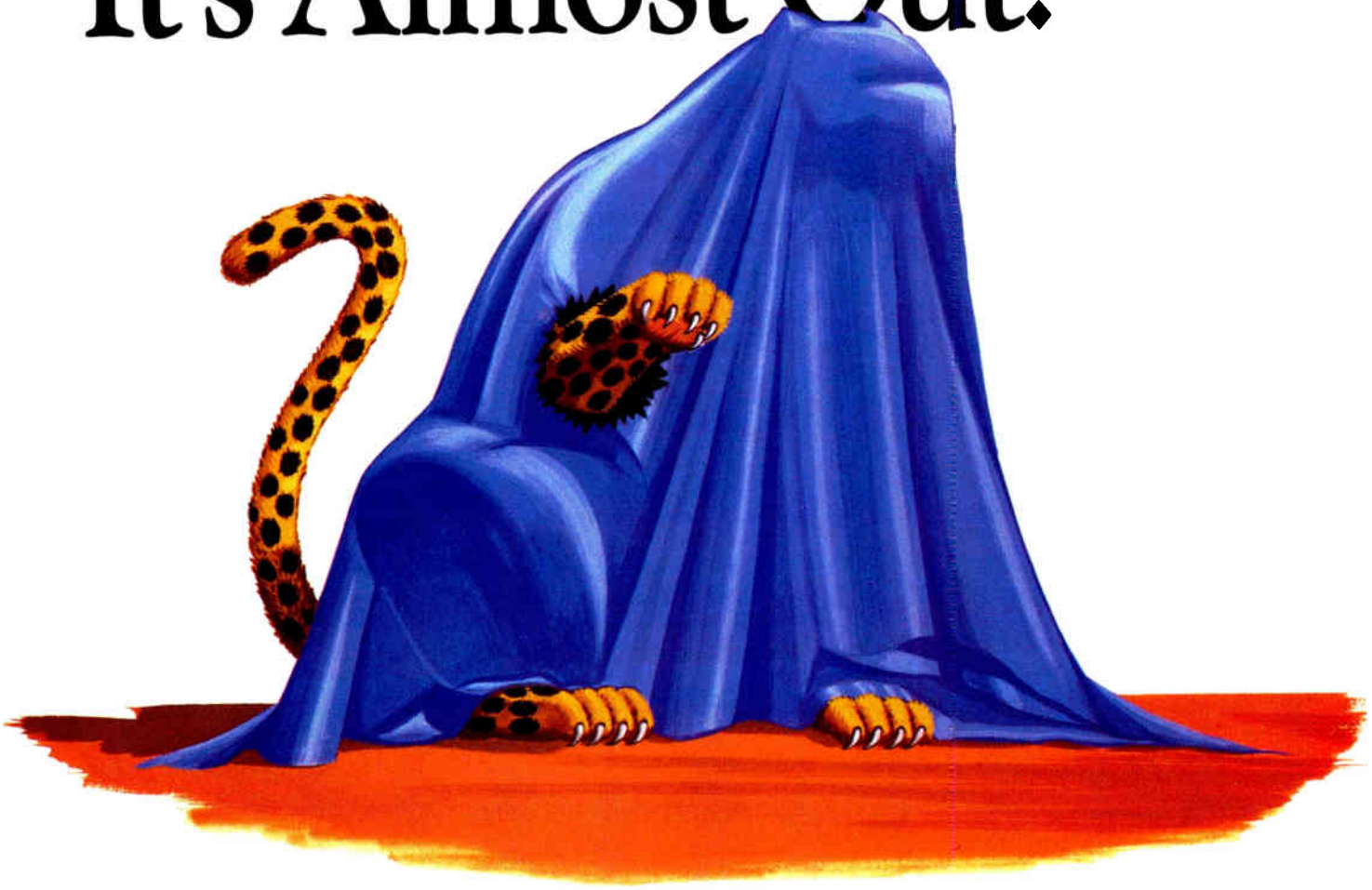

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Reader Service Number 21.

Improving quality through performance management

By Dana Eggert
President, Performance Plus

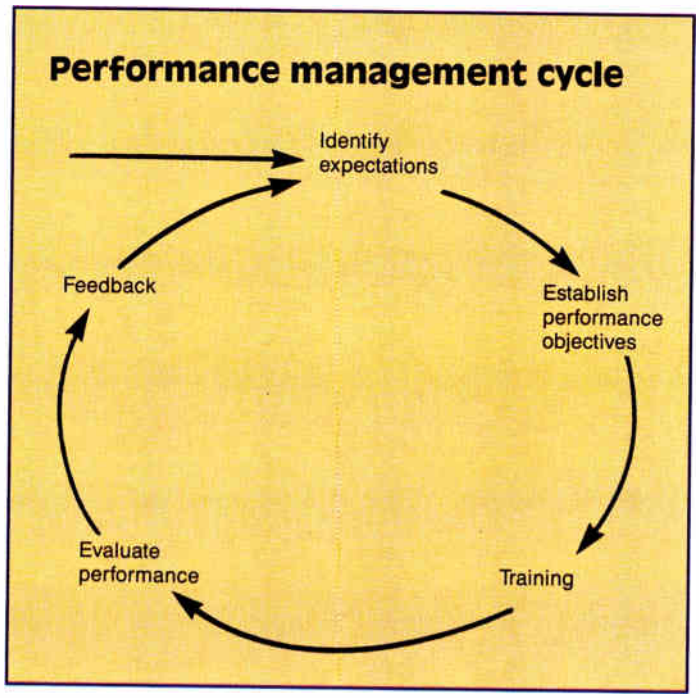
The need to improve the quality of products and services—customer service, technical service and programming services—is an ongoing process for the cable industry. Gaining and maintaining subscribers is a day-to-day challenge in an increasingly competitive marketplace, a challenge frequently addressed in an itemized fashion as opposed to a strategic approach. Improving customer service is a customer service department issue. Improving signal quality is a technical department issue. Improving penetration and retention are sales and marketing department issues.

While many improvement efforts that address individual issues are successful, a total quality improvement approach takes a broader perspective of improving the quality of all services provided. A performance management program offers such an organized approach to improving quality throughout the organization by improving performance.

What is performance?

Performance is the effective accomplishment or fulfillment of a task or function. In this sense, performance can refer to systems, machines or humans. We frequently refer to the performance of a computer in terms of speed or processing capability. We talk about vehicles in terms of gas mileage, reliability and maintenance. Human performance is associated with the number of service calls completed or the number of new installs accomplished in a day.

In all circumstances, performance must be measured and evaluated with relation to either a formal or informal set of standards to determine whether the task or function has been accomplished effectively. Without such a comparison, improving performance cannot be accomplished.



For most of our young lives, our performance was measured and evaluated based on a grade scale. The system was relatively simple—we took tests, we did our homework, we did book reports. Then the teacher evaluated our work based on her expectations, sometimes clearly communicated, sometimes purely subjective—or so we thought.

Because we had frequently assigned tasks in grade school, we also received constant feedback so we knew what our overall grade was at any point. It also meant we had many opportunities to either blow it or improve our grades. As we got older, fewer assignments or tasks were formally evaluated. In college, teachers frequently gave a midterm and a final exam. We became responsible for applying ourselves to accomplish the research and study required to perform well in these two situations.

In business, performance is formally evaluated as the employee review or performance appraisal, occurring most frequently around salary review time, usually once a year. Again, we are responsible for accomplishing the daily tasks necessary for successful evaluation. From an early age then, the pattern of linking performance with evaluation is firmly ingrained.

Why is performance critical to improving quality?

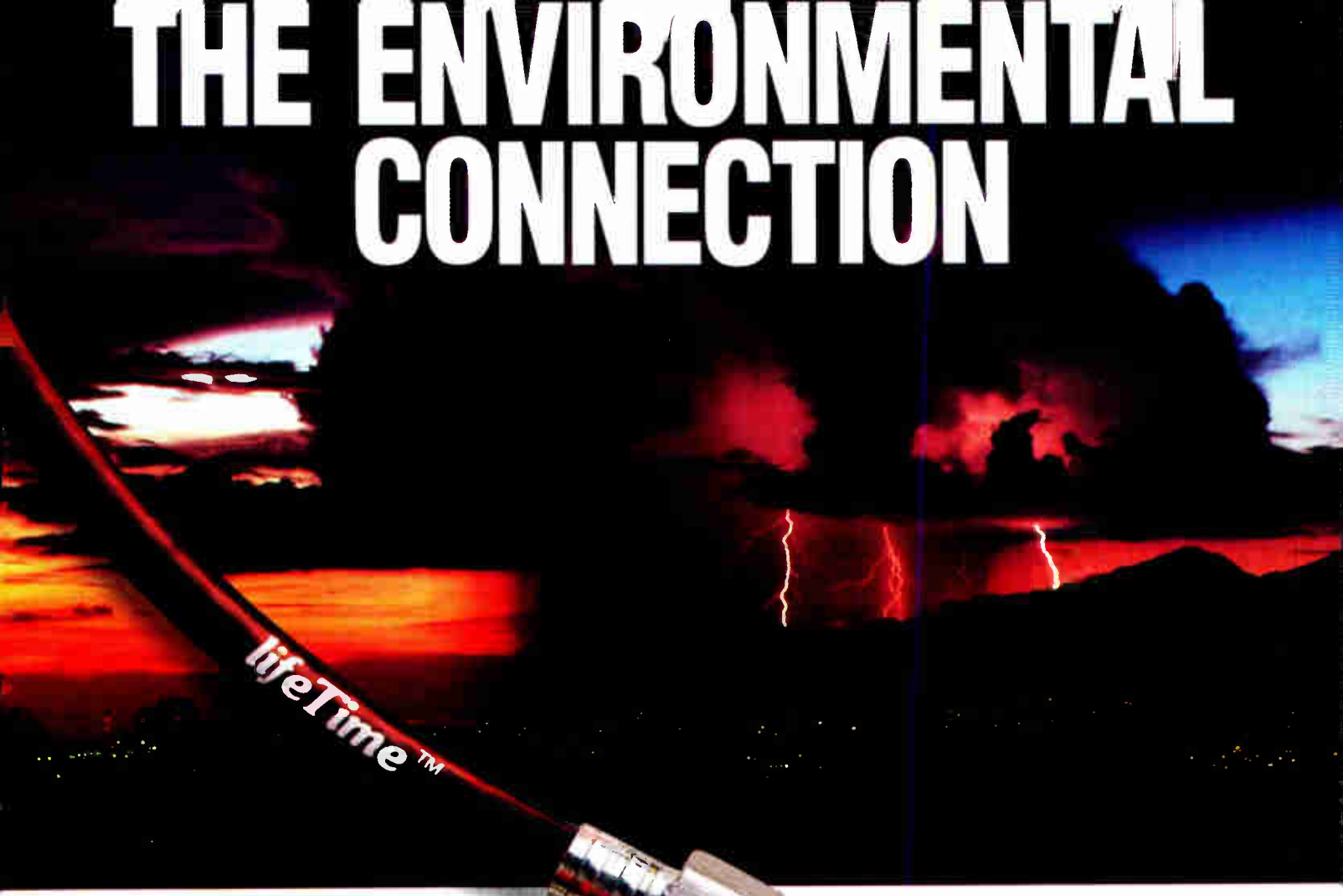
There are three factors basic to improving quality: standards, performance and evaluation. To improve quality a set of standards is established. Then the system, machine or human is responsible for performing the tasks necessary to meet the standards. The effectiveness of the performance is then measured and evaluated based on the established standards. As performance meets higher standards, quality is improved.

For example, the financial performance of a company is commonly evaluated in a number of ways such as share price, return on investment, cash flow and so forth. Indeed, most companies have long-range business plans detailing the financial growth of the company. Additionally, companies establish short-term objectives in the form of annual budgets and projections that are measured on at least a quarterly, if not monthly, basis. As a company's financial performance meets or exceeds the established goals and expectations, the higher the quality of investment for the shareholder.

Just as investors evaluate the financial performance of a company, subscribers evaluate the performance of the cable system. In most cases, subscribers expect an improvement in the quality of their cable service. To improve the quality of service requires improving performance at all levels of the organization, technical and non-technical. A performance management program is an organized approach to establishing standards, performing at the required levels and evaluating the performance on a frequent basis.

(Continued on page 78)

THE ENVIRONMENTAL CONNECTION



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Reader Service Number 22

TFC...*Where technology meets the bottom line.*

History of the NCTI

By Tom Brooksher
Executive Vice President, General Manager
National Cable Television Institute

The old saw "necessity is the mother of invention," could have been coined to describe the founding of the National Cable Television Institute (NCTI) back in 1968. At that time the necessity was the industry's need for cable TV technical training and the invention was NCTI.

Beg, borrow, steal

While cable TV in 1968 was only a shadow of the industry we now know, there was already a very real need for technical training. Not only was the service provided by cable new in most parts of the country but the technology that was making it possible was being invented, borrowed and adapted from other industries.

"Back then there was nothing in print; a lot of things we had to teach only existed in guys' heads," said NCTI Chairman Roland Hieb, one of the original employees of the institute back in 1968. "There was also a language problem. Since much of this had never been written down, there was a lot of slang and made-up words commonly being used to describe various materials and parts of the system. In some parts of the country, a span clamp was called a bug nut. Even the manufacturers' catalogs had different names and they were often completely different from what the guys were calling the thing out in the field," Hieb says.

Early on NCTI recognized the need to both standardize terms and to define the terms used in the material. Incorporating a glossary with each lesson became an integral part of NCTI's training philosophy and continues today.

Hieb adds, "There was a lot of disagreement, too. Even over whether something worked or not. Nobody was testing the validity of manufacturers' specs and the specs were very difficult to compare because there wasn't even a basic level of standardization of how to measure things."

According to Hieb, much of the industry's initial testing, verification, standardization and mediation was done as a means to help NCTI develop its initial lessons. Bob Brown of Tele-vue provided many of the industry's technical practices for its early courses.

Hieb says the founding of the institute corresponded to many changes in the cable TV technology. "About the time we were starting up, the industry was moving from the tube to the transistor and powering on the cable," Hieb says. "Those were big changes for the industry. About that time most systems were also moving away from the pressure tap. The result of that was a much tighter plant and better service to customers."

NCTI began as a sister company to CPC Publishing Co. (now Cardiff Publishing Co.) at the strong urging of a group of early MSOs. There had been a lot of talk around the industry about the need for technical training but according to Hieb nothing was happening. There was talk of starting a series of technical seminars around the country but when the time came to make it happen, none of the MSOs were willing to take their key technical employees out of the field and send them to a seminar. Thus, printed, self-study courses became the group's focus and the idea was brought to CPC.

NCTI course material vintage 1973 (left) vs. 1990 material (right).

A great deal of the institute's initial support came from one of the major MSOs of the day, Tele-vue. Based in the Seattle area, Tele-vue later sold its systems to CBS Broadcasting. Many are now a part of Viacom. Homer Bergren of Tele-vue committed 100 enrollments to the fledgling institute as well as the resources of his key technicians, including Brown and Jerry Laufer who edited most of the early material. Members of the Tele-vue technical staff, along with many of the leading cable technologists of the day such as Hilmer Taxdahl and Argyle ("Sox") Bridgett authored NCTI's first lessons.

CPC Publishing's Stan Searle and Patrick Pogue were the institute's first president and vice president and Hieb was named executive director early on, a position he held until his elevation to chairman earlier this year. They were supported by a board of advisors that included such industry luminaries as I. Switzer of Maclean-Hunter; Hubert Schlafly of Teleprompter; Bill Bresnan then with Jack Kent Cooke Inc.; Theodore Brown of Vikoa; Earl Hickman of Ameco Engineering; George Milner of Vumore; Vic Nicholson of Jerrold; Milford Richey of Collins Microwave; Jack Aylward of Amphenol Cable; Heinz Blum of Entron; John Campbell of CAS Manufacturing; Gay Kleykamp of Kaiser CATV; Jerry Scheel of Community Television; and Gaylord Rogeness of Anaconda Astrodata.

NCTI parallels CATV

Over the past 20 years, the evolution of NCTI's course offering has closely paralleled the evolution of the cable TV industry. Early courses carried a heavy emphasis on system construction practices and techniques. In the mid to late '70s, as the industry began to change to an operations focus, NCTI's courses began to incorporate more lessons relating to technical oper-

(Continued on page 81)

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Reader Service Number 23.

It's the person that matters in the F connection

The following is reprinted from the April 1990 issue of "Specs" courtesy of CableLabs.

By Ron Hranac

Over the past few years our industry has refined the simple F connector to a point whereby it has been refined almost to perfection. The F connector has been blamed for a relatively large percentage of our industry's service calls and has received meticulous attention in its improvement by the manufacturers to help reduce its contribution to our service woes. If only our industry would now devote as much attention to the people who put those connectors on in the first place.

We have seen the demise of the two-piece F connector and its replacement by a single piece attached crimp ring design. Domestic versions sell for about 12 cents each and are of high and consistent quality. If this style connector is installed properly—that is the right connector is used for a given cable, the cable is trimmed to the proper prep dimensions, the right hex crimper is used (correct dimensions and not worn out), the connector is wrench-tightened to the mating attachment and boots and gel are used for weatherproofing—it will last for more than 15 years and provide better than 30 dB return loss well past 600 MHz. Unfortunately, it's a big if. This conventional type of connector is very craft-sensitive and requires a moderate amount of training to ensure correct installation. But the connector itself isn't the real culprit.

More harm than good

To make matters worse, we also have some manufacturers selling manual and motorized one-step prep tools for drop cable and the conventional F connector. In their effort to remove some of the craft-sensitivity involved in connector installation these one-step preparation tools do more harm than good. While they may trim the center conductor and dielectric to the correct dimensions (1/4 inch and 1/8 inch respectively), they also remove most of the braid in the process. Without 3/8 inch of braid folded back over the jacket, connector pullout strength is reduced 50 percent and RF shielding is reduced 24 percent.

But it doesn't stop there. Other manufacturers are selling thread sealing compounds to keep the connector from coming loose (a wrench will do the same thing) or even little plastic molds that you fill with an "RF proof" compound that keeps the dBs in, the water out and the connector tight. Sadly, these are nothing more than bandages that cover up the root of the problem—improperly trained people.

Better answers have come from the connector manufacturers themselves, who have introduced a number of "premium" style F connectors. The top-of-the-line premium connectors sell for 36 to 40 cents each and require special tools to install correctly. When installed as their respective manufacturers direct these connectors (while not 100 percent foolproof) do reduce a lot of the craft-sensitivity involved in connector installation. Furthermore, they also can outlast the personnel in your system, assuming proper installation.

Somewhere in between the conventional hex-crimp F connector and the top-of-the-line premium versions are the sealed "universal" designs. These usually incorporate integral weatherproof O-rings and some sort of sealing compound in the back of the connector. Here, too, proper installation will result in a long-lasting high quality RF connection.

Even our drop cables have matured to the point where they will last for decades. For RF shielding we have bonded foil and high braid coverage. Aerial drops are further protected by an integral support messenger. (Anyone using non-bonded foil drop cable or who insists on installing non-messengered aerial drops is asking for trouble.) Furthermore, the cable itself can be protected from the elements by flooding compound for underground installations and aerial drops can be protected with moisture barrier compounds. And all of these things work! The weak link is the connection—or more specifically, the person making that connection.

"It's our people who need refinement to the level of quality our industry has provided in the simple F connector."

It's human error

It's the person making the connection who needs our attention. Enough attention has been given to the connectors—they work. The cable we use is fine. It's our people who need refinement to the level of quality our industry has provided in the simple F connector.

Our people are our industry's most valuable resource. They represent our companies to our customers. Our people install, maintain and operate sophisticated broadband communications networks. Yet our bread and butter (our installers) are the lowest paid, least trained and least motivated people in this business. Certainly there are exceptions; the National Cable Television Institute and some MSOs have very comprehensive training programs. The Society of Cable Television Engineers recently introduced the industry's only widely available installer certification program. But efforts like these will take time to have a major impact.

What needs to occur now is a change of attitude toward the lower echelon of our industry. Those people who are taken for granted, who often are considered dispensible but who in reality are among the most valuable assets a company has, must be embraced and brought into the fold. It's time to train them, to motivate them and recognize their contributions to the bottom line.

It's far too easy to hire someone right off the street, give them a set of tools, let them ride around with someone for a few days, then turn them loose to perform installations. When paid a salary that is a dollar or two an hour above the minimum wage, it's also too easy to "just hire someone else" if the first (or second, or third) person doesn't work out. When mediocre quality results in a service call, there seems to be time to do it right the second time. But what does poor quality and high turnover really cost?

Consider what the connector manufacturers have invested in improving the F connector. And the F connector is only part of their total product line that is continually being refined and upgraded. What

(Continued on page 82)

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Reader Service Number 24.

The right tool for subscriber satisfaction!

Oh no, another survey!

By Kenneth T. Deschler
Cable Correspondence Courses

Recently I was involved in conducting a survey of 150 cable TV companies for the Vocational Education division of the St. Louis Board of Education to determine the salaries, duties and skills needed for entry level employment of CATV technicians. Another goal of the survey was to obtain information about future trends and employment opportunities within the cable field.

The 150 companies were chosen from phone directories, replies to direct mailings from Cable Correspondence Courses and employment advertisements found in various trade magazines. Two systems were chosen from each of the 50 states; one was sent a general questionnaire (Figure 1) and the other a competency checklist (Figure 2). In addition, within a 100-mile radius of St. Louis, 25 companies were sent general questionnaires and another 25 competency checklists. Of the 75 questionnaires sent, 10 (or 13.3 percent) were returned. Of the 75 competency checklists sent, 29 (or 38.6 percent) were returned. Thus, an overall return rate of 26 percent was achieved.

For the purpose of categorizing the returns, the United States was divided into four quadrants. The east to west division is located along the Missouri/Kansas border and the north to south division is located along the Missouri/Arkansas border. The returns from Alaska were included in the northwest quadrant. Because we did not receive any returns from California, the division line running east to west had no effect on the totals. Eight

"Responses...indicate that employment prospects are excellent and the industry will require more highly trained techs in the future."

Figure 1: Questionnaire on CATV

1) What are the pay scales in your system?
Starting: $6.37 (average)
Top: $13.50 (average)
Supervisory: $20,000 to $40,000

2) What are the duties of installers?
- Install outlets
- Deliver converters
- Describe available services
- Provide the best signal
- Climb poles
- Connect TV and VCR
- Interact with customers
- Possess good mech./elec. aptitude
- Disconnect outlets
- Use ladders
- Troubleshoot
- Fine tune TV
- Prewire
- Post-wire
- Install scrambler and descrambler

3) What are the duties of service technicians?
- Install outlets
- Deliver converters
- Describe available services
- Provide the best signal
- Troubleshoot the cable system
- Interact with customers
- Climb poles
- Understand basic electronics
- Provide documentation
- Maintain plant from headend to sub
- Connect and disconnect subs
- Operate and maintain test equipment and vehicles

4) What are the duties of headend technicians?
- Assure equipment operation for the best signal
- Maintain receivers, antennas and microwave station
- Supervise and train field personnel
- Measure signal levels
- Perform preventive maintenance
- Recondition and repair amplifiers
- Provide FCC documentation

5) Is basic electronics training necessary to maintain a cable system?
- Yes (90 percent)
- Absolutely (10 percent)

6) What are the future job prospects for the cable industry?
- Excellent for well-trained, conscientious individuals
- Excellent for technical services
- Good in the short term
- Management positions for people with marketing and business background
- More highly trained technicians will be required in the next five to 10 years

Five years:
- Continuous training
- Increase by 10 percent
- Direct broadcast satellite
- Very good
- More like the phone company
- Major competition should open up doors to other technologies

10 years:
- Very stable
- Very good
- Increased competition between CATV and phone companies
- Stabilized into utility-type service

7) What do you envision in the future for cable?
Services:
- Unlimited
- Shopping (20 percent response)
- Bill paying
- Electronic mail
- Banking
- Expanded channel lineup
- Two-way communication
- Computer services
- Telephone service
- Full range of services
- Increase in quality

Programming:
- Very broad
- More local programming
- Reduction in prices
- Greater variety
- Increase in quantity and quality
- More interactive purchase decisions
- Customer-specific viewing options
- CATV will not be able to own programming sources

Methods of delivery:
- Unlimited
- Direct broadcast satellite (50 percent response)
- Fiber optics (60 percent response)

8) Is post-high school training essential for entry-level employment in your industry?
- Yes (10 percent response)
- No (40 percent response)
- Helps (10 percent response)
- Not for installers; we do OJT
- Not for entry level, but required for advancement
- Not currently, but in the future
- Yes, very helpful to gain employment; to advance, at least two years essential

states located in the northeast quadrant provided 22 of the total 39 responses; nine states in the northwest provided 11 responses; and 2 states in the southwest provided 2 responses. Because four responses did not have postmarks, we could not identify their state of origin.

The questionnaire summarized

The questionnaire consisted of eight questions about wages; the duties of the various technicians; future predictions for the CATV industry in terms of services, programming and methods of delivery for TV signals; and whether training beyond high school was essential for entry-level employment. By analyzing the questionnaire we can see the following:

1) The starting pay for a technician ranges from a minimum of $5 per hour to a maximum of $7.50 per hour. The average of all the responses was found to be $6.37 per hour.

2) The top salary for a technician went from a low of $12 per hour to a high of $14.50 per hour. The average top salary was found to be $13.50 per hour.

3) The annual pay scale for supervisory personnel was reported to range from $20,00 to $40,000, depending upon the size of the company's subscriber base.

4) The duties of the various levels of technicians are outlined in the answers to Questions 2, 3 and 4.

5) All of those responding to Question 5 indicated they felt basic electronics training was necessary to maintain a cable system.

6) Responses to Question 6 indicate that employment prospects are excellent and the industry will require more highly trained techs in the future.

7) By analyzing the responses to Question 7, we found the following:

- There will be a tremendous growth in services offered by the cable industry.
- In the future, the cable industry may resemble the structure of the telephone industry.
- The cable industry will be involved in sending programming directly to its subscribers through the use of direct broadcast satellites (DBS).
- Of the respondents, 60 percent felt the cable industry will utilize fiber optics as its primary carrier of signals.
- Programming will become cheaper, broader in scope and include more subscriber options.

8) Of the respondents to Question 8, 70 percent felt that post-high school training was not essential to entry-level employment at this time. Some respondents felt that training beyond high school will be required in the future as well as for advancement.

Figure 2: Technician competencies and rankings

Please read the student competencies listed below and rate each item according to its degree of importance. Refer to the key. Please feel free to add or delete items you feel should be included or excluded. Using one as the most important, rate each item as to its importance to the trade.

Key:
Unnec. = unnecessary
Opt. = optional
Imp. = important
Essen. = essential

Item	Student competencies	Responses received Unnec.	Opt.	Imp.	Essen.	Rating
1	Understand the major portions of a cable system			6	23	4
2	Cut and core trunk cable		6	12	11	24
3	Cut and core feeder cable		4	9	16	20
4	Install trunk cable fittings		5	12	12	23
5	Install feeder cable fittings		3	8	18	19
6	Install F connectors		1		28	2
7	Use an SLM to determine the signal strength on the coaxial cable			2	27	1
8	Make single cable subscriber drops		1	5	23	7
9	Make dual cable subscriber drops	1	8	8	12	25
10	Install signal splitters in drop cable		1	8	20	13
11	Install matching transformers in drop cable		1	9	19	17
12	Install converters in the subscriber drop		2	8	19	16
13	Tune TV receivers for optimum reception of signals			8	21	8
14	Understand DC electrical principles	1	2	21	6	21
15	Understand AC electrical principles	1	4	18	6	22
16	Understand the principle of amplifier operation		3	10	16	11
17	Align amplifiers for proper gain and slope		3	11	15	14
18	Determine proper values of directional couplers and taps to be used on coax distribution lines		4	8	17	15
19	Understand the principle of coax transmission line operation			14	15	10
20	Understand the principle of fiber-optic transmission line operation	3	21	3	2	26
21	Use basic hand tools of the trade			7	22	5
22	Use basic power tools of the trade			10	19	12
23	Use ladders			9	20	9
24	Use pole climbing equipment		1	8	20	6
25	Communicate effectively with subs and fellow workers			4	25	3
26	Complete maintenance and service forms			10	19	18

The competency checklist summarized

The competency checklist is made up of 26 tasks performed by cable technicians on their jobs. The right hand column shows the ranking that was assigned to the task by those who responded to the survey. Each of the other columns contain the number of responses received. Using a signal level meter to determine the signal strength on the coaxial cable (Item 7) was listed as the most important task to the proper operation of a system. Note also that 27 (93.1 percent) of the respondents listed it as an essential task while only two (6.9 percent) listed it as an important task.

As I looked over the rankings given, I noted the following inconsistencies:

1) Item 16, understanding the principles of operation of amplifiers, was rated 11th in importance while aligning amplifier gain and slope controls (Item 17) was rated only 14th in importance. This rating would indicate that the use of power tools (Item 22) and the installation of signal split-

(Continued on page 83)

the ring, star or hybrid star will not have as many taps as the bus architecture, therefore it is a better design to avoid fiber taps.

Passive optical components

Other passive optical components also are important elements of an optical LAN (see Figure 6). It is easier to split optical power than to combine it. Fused couplers and passive switches are designed with low loss.

Another optical device is a passive star coupler. It does a fine job of coupling light to three or more fibers. For example, with a 16-input and 16-output star coupler, the input light splits 16 ways, which calculates to approximately a 12 dB loss. If we double the amount to 32 inputs and 32 outputs this increases to approximately 15 dB (not much worse). A sufficient number of outputs can be obtained at a reasonable loss. The star couplers also are used in series, greatly multiplying the number of outputs. Electro-optic (EO) interfaces may be added electronically to couple the signals. Also, collision detection may be included, creating an active star. Packet or circuit switch the network and now we have evolved to the CO (central office) fiber-optic digital switches used by RBOCs.

We have discussed LAN components —their strengths and drawbacks. Keep in mind what was discussed previously while evaluating the following two types of networks (automated factory LANs and avionic subsystems) with their vastly different requirements. To try to use the same type of network for both would be like trying to feed gasoline to a horse.

Automated factory LANs interconnect large numbers of inexpensive equipment. Many plug-in ports are needed. Inexpensive ports that are easy to troubleshoot and reconfigure are required. Most likely the individuals wishing to reconfigure the network will not be electrical engineers or computer geniuses.

With an avionics subsystem a lot of ports are not required. The expense per port is not an essential requirement but the system does require extremely reliable performance. This network demands self-healing redundancy. After all, you wouldn't want the pilot of a hi-tech aircraft you are riding in to have "transmission error" appear on his control panel just as he is attempting to land. Passive star is an excellent choice for avionics applications. The star is a passive component having inherent reliability.

FDDI has arrived

Our discussion of optical LANs would not be complete without a mention of fiber data distributed interface (FDDI). FDDI is the proposed American National Stan-

(Continued on page 86)

Figure 6: Passive optical component functions

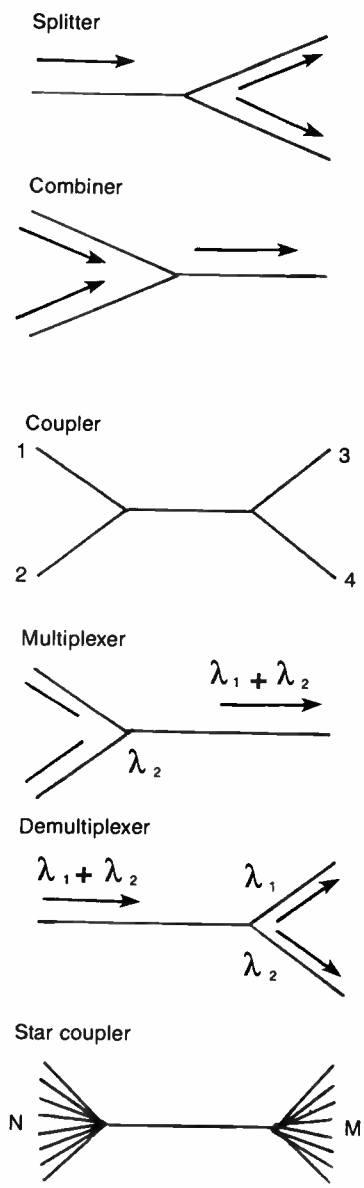
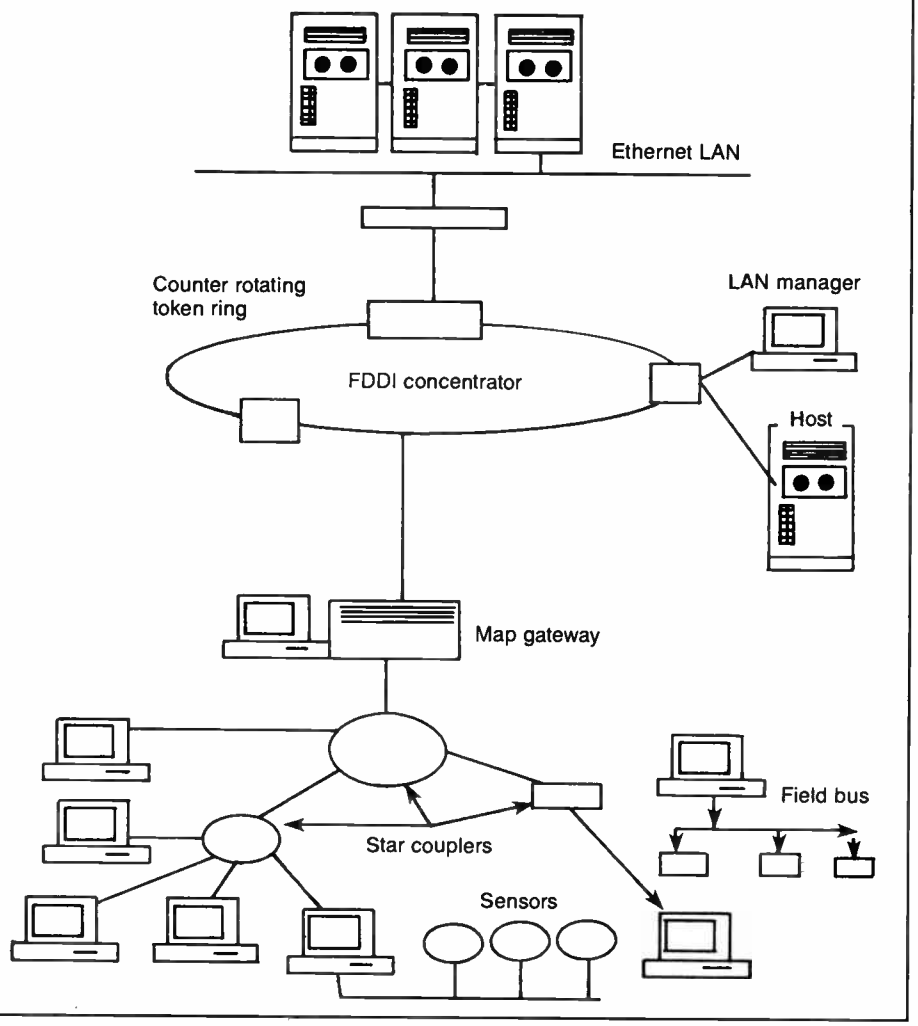


Figure 7: FDDI factory network



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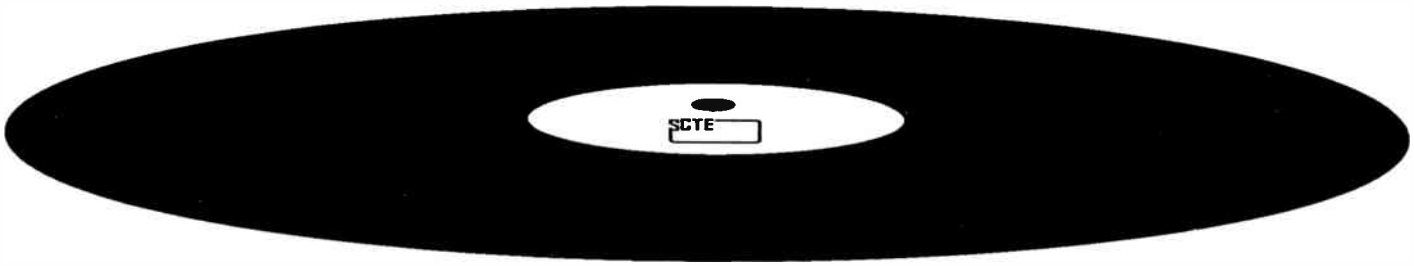

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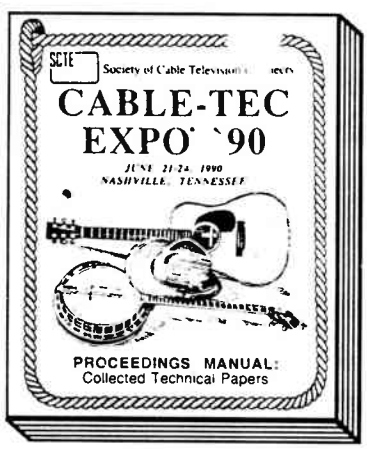

SCTE

Satellite Tele-Seminar Program

As a continuing service to the industry, SCTE provides uplinked videotape programs on technical training each month, making them available to cable systems across the country for downlink recording.

Upcoming 1990 Programs:

videotaped at Cable-Tec Expo `89 in Orlando, Fla.

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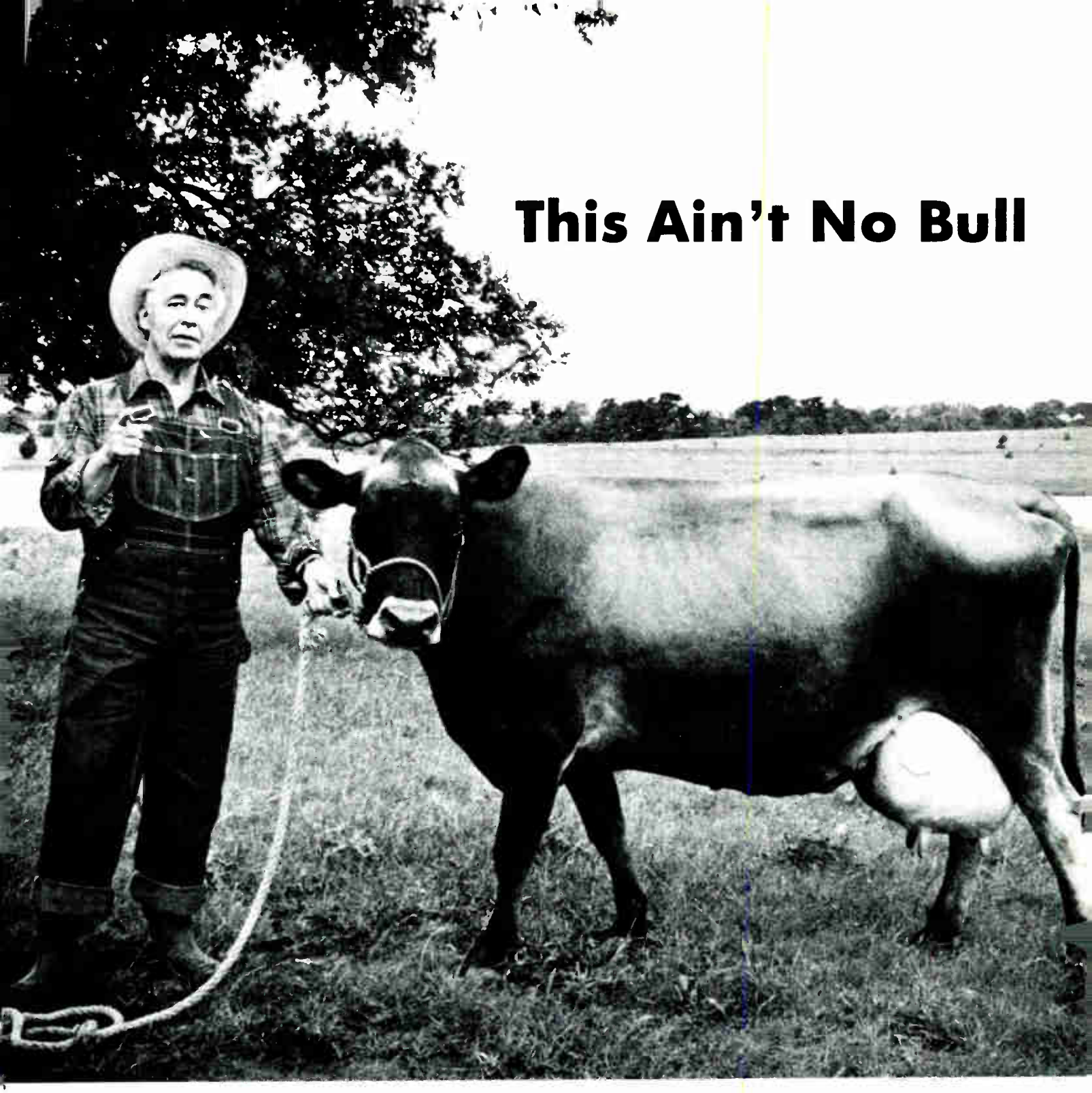
TO ORDER THE PROCEEDINGS MANUAL: All orders must be prepaid. Shipping and handling costs are included in the Continental U.S. All prices are in U.S. dollars. SCTE accepts MasterCard and Visa.

SEND ORDERS TO: SOCIETY OF CABLE TELEVISION ENGINEERS, 669 EXTON COMMONS, EXTON, PA 19341, OR CALL (215) 363-6888 TO CHARGE BY PHONE.



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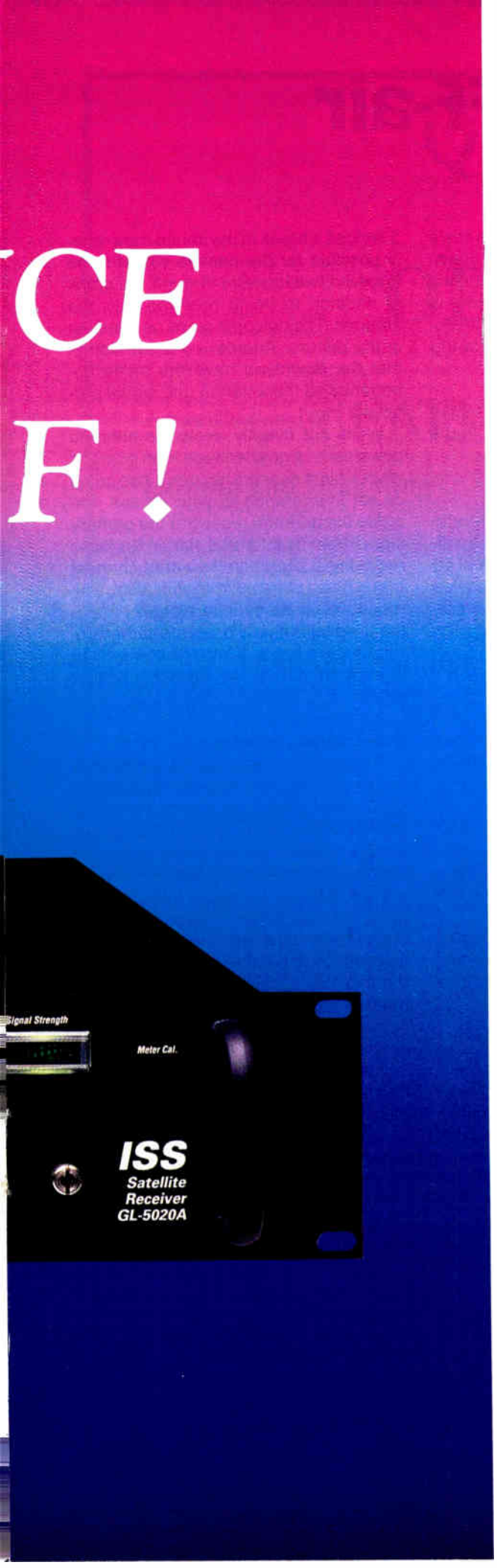

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Reader Service Number 28.

How to give a tech talk

By Rikki T. Lee
Editorial Consultant

Good afternoon and welcome to "How to give a technical talk."

I bet this has happened to some of you: An SCTE group's program chairman calls, asks you to present a talk on, say, headend maintenance. It's for a seminar scheduled in two months. But you tell him, "No, I can't." But why not? There are lots of things in your favor, like:

One, you and your colleagues know you're a natural at keeping your system's headend in fine shape. So your experience isn't lacking.

Two, in the past year, you wrote a great report on maintenance techniques. So your ability to express yourself can't be a problem.

Three, lately your workload has been rather flexible. So the usual "sorry, I have no time" sounds like a pretty lame excuse in this case.

And four, your boss would award you a day off if you spoke at an SCTE seminar. So you've got company support and incentive.

Well, what's the real reason for not wanting to give the talk? Simply this: You're scared to death of making a fool of yourself.

If you want to be a perfect public speaker, take one of the many popular courses available. But if you only care about getting over your nervousness and doing a decent job presenting technical information to a classroom of colleagues, all you'll need are a few hints.

Are you talking to me?

Think about it: You talk about headends with co-workers in the cafeteria. Why not in a seminar? Well, besides the location, there are two differences with the classroom: First, you're doing all the talking and second, you're talking to people you've never met. These two facts alone cause butterflies in the stomach of an instructor to take flight.

But wait—you know a lot about headends, and many in the classroom don't. People come from miles around not to *see* you but to *learn* from you. Of course, you'll amaze them as you weave personal tales of headend safaris.

So speak about what you know, not to a mob but to separate individuals (just like in the cafeteria). As you address the class, look at someone—one person at a time—in the audience right in the eyes for about five seconds. Then do it to another person for about five seconds. And talk to each one of them naturally, even conversationally.

If you enter the classroom and think that your students will laugh at you and find fault with anything you say or do, you deserve to have a coronary. If you remember that your mission is to share your knowledge, your focus shifts from yourself to the information you will present.

Even professional speakers suffer from a bit of anxiety before a talk. But instead of letting their nerves take control, these pros turn nervousness into energy and enthusiasm as they speak. It's OK, even natural, to be nervous; just use it to give a more exciting talk.

So keep the right attitude and focus on the information. Also, you'll cut down on stage fright by preparing and rehearsing. For those of you relatively inexperienced at giving talks, preparation consists of writing everything you plan to say in advance. Rehearsal means that you practice your talk aloud until you know it by heart, in your sleep.

Preparing the text of a talk is like writing a technical report. Before you begin writing the speech, you should construct an outline of the major points you wish to cover. But unlike a report, the text should be written in conversational language. Like I'm talking to you right now. When you read it aloud, it should sound natural. If it sounds like a written report, try using shorter sentences and more familiar words.

The attention span of most listeners is short. No matter how good you are, minds will mysteriously wander and think about other things for a few seconds. Then they'll come back to the present—to what you're saying. So you need to repeat your major points several times during the talk, as well as at the beginning and the end.

Also, you've got to grab your students' attention in the first few minutes. Or else, their minds will spend more time than normal floating off. So plan a catchy opening —a joke, an anecdote, a controversial remark. Or concoct a scenario that puts your listener in the middle of the action, as I did at the beginning—remember your phone call?

And when you write the talk, sprinkle plenty of words that your audience can visualize as they listen. Use concrete examples whenever possible. Actually rummage through your attic of headend experiences.

At this point, round up any visual materials you might need—tapes, slides, overhead transparencies, equipment, etc. Visuals relieve the monotony for your students. Also put together handouts of your outline, exercises, transparency or slide information and so on, for everyone.

Rehearsed spontaneity

You've finished preparing, so begin rehearsing. Memorize the text by reading it aloud five times and listening to yourself speak. *Rehear* it as you *rehearse* it. If you change the slide or point out something on your modulator, you should pause during rehearsal as a cue.

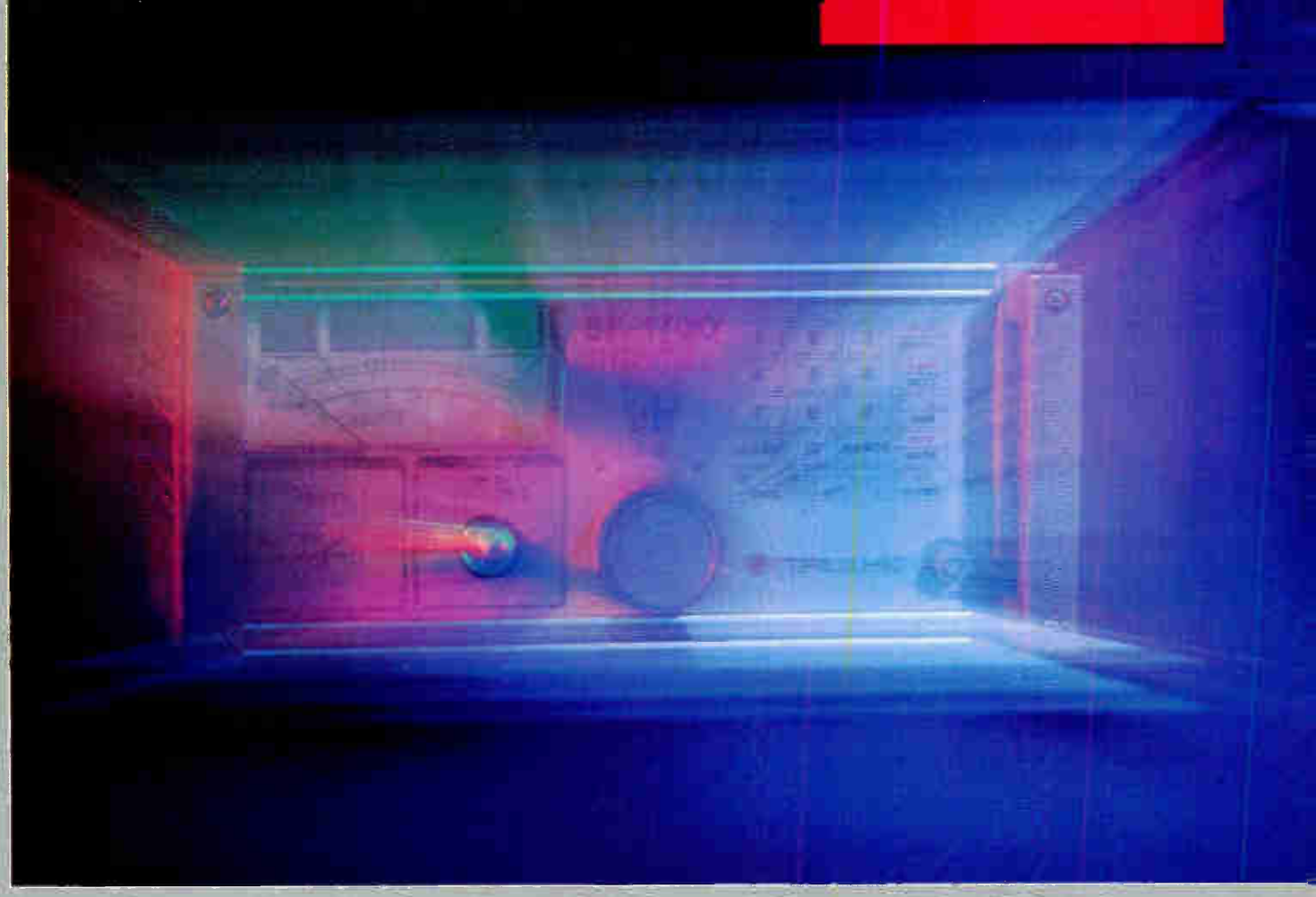
It's not a good idea to speak without any notes. So copy down on index cards the main points of the talk in the order you wish to cover them. Use these cards to refer to if you get stuck. Then you should practice the talk once or twice using the note cards and, if possible, the visuals you plan to use. In other words, a dress rehearsal.

You might ask, "Why do I have to memorize everything?" Well, it's the same theory behind an actor learning lines for a play. You don't want to make any mistakes "on stage" but you also want to seem alive (not robotic) to your audience.

When it's your turn to talk to the class, keep in mind a few more things. To begin with, don't panic; if you've done your preparation and rehearsal, everything should go smoothly. Next, relax and speak in your normal speed—perhaps even slower if you're naturally a fast talker. And finally, be open to questions when they occur but be sure to stay on track with your prepared remarks. Ask for questions when you're finished.

Mistakes will occur. Your first talk won't be perfect. But if you survive (and you will), you might wish to repeat the experience elsewhere. You'll do better each time. Then you'll want to volunteer whenever you can. For example, SCTE groups need you to share your technical knowledge. I advise you to enlist in the Society's National Speakers' Bureau. Besides just recognition and a career boost, giving a technical talk offers you a more private reward: the "speaker's high."

My time is up. Any questions?



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Reader Service Number 29.

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There is a cable product today that you can count on for the growth in your future. Quantum Reach.

QR, from Comm/Scope, is unmatched for its superior handling. It is, by far, the easiest coax to bend or to pull through conduit. It is also lightweight which makes it a favorite of construction crews. But now we have taken this field-proven QR line and made it even better. We've added 1GHz bandwidth capacity which will make Quantum Reach even more attractive for your future building plans.

For more information about QR or any of our Extended Reach family of 1GHz cable products, contact your nearest Comm/Scope representative or call Comm/Scope, Inc. (800) 982-1708 or (704) 324-2200.

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SCTE

July 1990

Awards Presented at Expo Luncheon

SCTE held its Annual Awards Luncheon June 21, the opening day of Cable-Tec Expo `90 at the Stouffer Nashville Hotel in Nashville, Tenn. The following members and organizations were recognized at the luncheon:

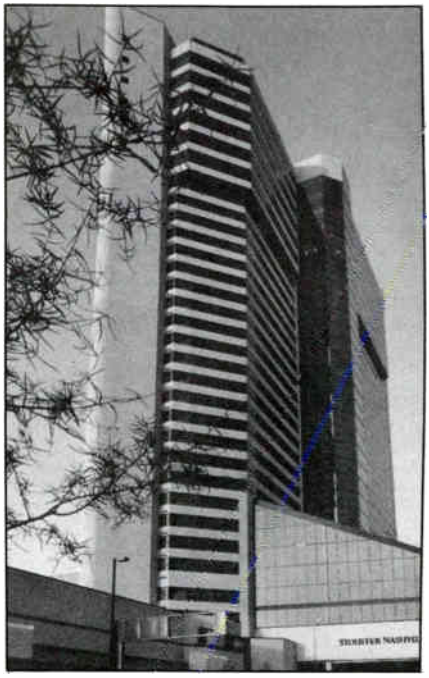
*Outgoing members of the SCTE board of directors: Wendell Bailey, Bob Price and Dave Willis.

*Coordinators of technical programs at state/regional cable shows for the Society: Texas Show--Dan Pike and Les Read; Atlantic City Show--Gary Selwitz; Great Lakes Show--Randy Pattison and Ralph Haimowitz; and Western Show--Pete Petrovich and Dave Large.

* The Program Committee of the Fiber Optics 1990 Conference was recognized for its efforts in the planning of the successful March 1990 conference. Receiving awards were: Pete Petrovich (chairman), Jim Chiddix, Tom Elliot, Ron Hranac, Mike Kaus, Dave Large and William Riker.

*Expo Program Committee members William Riker (chairman), Jim Chiddix (co-chairman), Tom Jokerst, Larry Lehman, Paul Levine, Don Shackelford and B.J. Toner also received awards for their efforts for Cable-Tec Expo `90.

*Seven SCTE meeting groups were elevated to full chapter status in the Society: Big Sky Chapter--Harlowtown, Mont.; Dairyland Chapter--Wausau, Wis.; Dakota Territories Chapter--Rapid City, S.D.; Great Plains Chapter--Omaha, Neb.; Palmetto Chapter--Columbia, S.C.; Sierra Chapter--Auburn, Calif.; and Wheat State Chapter--Wichita, Kan.



The Stouffer Nashville Hotel

*Metrovision of Livonia, Mich., received a Special Recognition Award for its production of a technical marketing training videotape that was

shown on the Society's Satellite Tele-Seminar Program in late 1989.

*SCTE Region 8 Director Jack Trower was recognized as immediate past president for his year of service as the Society's national president.

*Jerrold Communications was the recipient of the 1990 President's Award in recognition for its support of the Society through contributions to the SCTE New Building Fund, as well as the providing of speakers for technical seminars.

*Richard Covell of Jerrold Communications was the 1990 recipient of the Society's Member of the Year Award in recognition of his service to the Society. Included among his SCTE activities are the development of the SCTE Installer Program Training Manual, speaking at numerous SCTE technical events and serving on the board of directors as at-large director and western vice president.

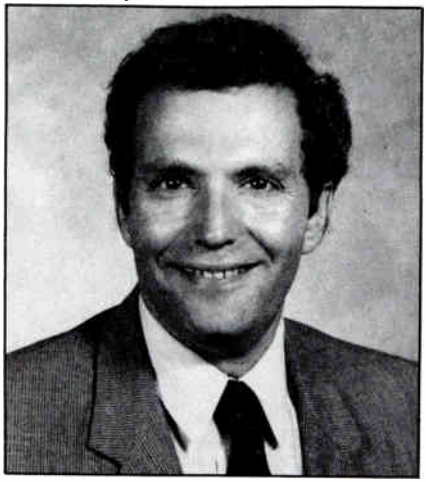
Stephen Ross Appointed Of Counsel to the Society

The board of directors of the Society, at a May 20 meeting held in Atlanta, adopted the recommendation of SCTE Executive Vice President Bill Riker to appoint Stephen Ross, Esq. as of counsel to the Society and its board.

As of counsel, Ross will advise the Society and the board primarily on telecommunications matters at the national level involving the Federal Communications Commission (FCC), other federal and state/local governments, and the U.S. Congress and executive branch.

Ross is a partner in the Washington law firm of Fletcher, Heald and Hildreth. He joined the firm in 1988 after spending almost 20 years at the FCC in the cable TV area. His last position at the FCC was chief of the Mass Media Bureau's Cable Television Branch. In this position, he was responsible for all cable TV regulation at the federal level. His unique insider position at the FCC makes him one of the most knowledgeable legal experts in the field of cable TV.

Among the honors Ross has received is his membership in the Cable Television Pioneers. He is one of the few former FCC staffers to be honored with membership in this organization.



Steve Ross

Ross is a strong supporter of technical education, stating, "Cable is a technology-driven business. Companies which cannot keep up will find it harder to meet the demands of their franchising authorities and their subscribers."

The Society welcomes Ross and hopes the relationship will be a long and fruitful one.

Call for Papers Issued for 1990 Fiber Conference

The Society is currently seeking abstracts for a three-day national SCTE conference on fiber optics to be held January 1991 in Florida at a location to be named. People interested in presenting technical papers at the conference should send submissions to the following address by **Sept. 1**:

Fiber Optics 1991
c/o SCTE
669 Exton Commons
Exton, PA 19341

Submissions should include an abstract of the proposed paper or presentation.

Prospective speakers should keep in mind that all papers accepted for the seminar will be printed in a proceedings book to be given to attendees of the seminar.

For further information on submissions for the fiber-optics conference, please contact SCTE national headquarters at (215) 363-6888.

SCTE Calendar

The "**SCTE Calendar**" is an *Interval* feature incorporating Satellite Tele-Seminar Program listings(*), news of upcoming national events and announcements of upcoming local SCTE chapter and meeting group seminars.

Dates for 1990

July 11 Hudson Valley Chapter--Capital Cablevision, Albany, N.Y. Topics: "Video Waveform Interpretation," "Character Generators" and "Video Switching Usages." Contact: Robert Price, (518) 382-8000.

July 11 Mount Rainier Chapter--Location to be supplied. Topic: "First Aid Certification and CPR." Contact: Sally Kinsman, (206) 821-7233.

July 11-14 Rocky Mountain Chapter--Breckenridge, Colo. Technical sessions at Colorado Cable Television Association convention on "Management and Professionalism," "People Skills" and "Safety." Second Annual Cable Games to be held. Contact: Rikki Lee, (303) 321-7551.

July 12 Big Country Meeting Group--Brownwood, Texas. Information to be supplied. Contact: Albert Scarborough, (915) 698-3585.

July 14 Chaparral Chapter--Amfac Hotel, Albuquerque, N.M. Topic: "Data Networking" with Alan Potter of EF Data Corp. Contact: Brian Throop, (505) 761-6289.

July 18 Big Sky Chapter--Big Sky Resort, Big Sky, Mont. Topic: "BCT/E Review - Categories IV and VII." Contact: Marla DeShaw, (406) 632-4300.

July 18 Dixie Chapter--Montgomery, Ala. Information to be supplied. Contact: Rickey Luke, (205) 277-4455.

July 18 Great Plains Chapter--To be held in Omaha, Neb. Topic: "Plant Maintenance." Contact: Jennifer Hays, (402) 333-6484.

July 18 Greater Chicago Chapter--Location to be supplied. Topic: "BCT/E Category II - Video and Audio Signals and Systems." Contact: John Grothendick, (312) 438-4200.

July 18 Razorback Chapter--To be held in Little Rock, Ark. Topic to be supplied. Contact: Jim Dickerson, (501) 777-4684.

July 19 Southeast Texas Meeting Group--Warner Cable, Houston. Topic to be supplied. Contact: Tom Rowan, (713) 580-7360.

July 25 Appalachian Mid-Atlantic Chapter--Location to be announced. Annual Pig Roast and Golf Outing to be held. Contact: Richard Ginter, (814) 672-5393.

July 25 Great Lakes Chapter--Location to be announced. BCT/E testing to be conducted in Categories II, IV, V and VI. Contact: Daniel Leith, (313) 549-8288.

July 25 Piedmont Chapter--Location to be supplied. Topic: "Rebuilds and Upgrades." Contact: Rick Hollowell, (919) 968-4631.

July 26 Iowa Heartland Chapter--Cedar Rapids, Iowa. BCT/E testing to be conducted in Categories IV and VII (tentative). Contact: Denis Martel, (319) 395-9699.

July 29 Old Dominion Chapter--Busch Gardens, Williamsburg, Va. Annual gathering to show appreciation for chapter members. Contact: Margaret Davison-Harvey, (703) 248-3400.

***July 31** Satellite Tele-Seminar Program, *"Digital Video: A Future Alternative (Part Two)"* with Steffen Rasmussen of ABL Engineering. Videotaped at Cable-Tec Expo `89 in Orlando, Fla.

August 8 Rocky Mountain Chapter--Location to be announced. Topics: "Antennas" and "Electrical and Other Interference." Contact: Rikki Lee, (303) 321-7551.

August 9 Chesapeake Chapter--Holiday Inn, Columbia, Md. Topic: "Installer Certification Training Class." Contact: Keith Hennek, (301) 731-5560.

August 10 Chesapeake Chapter--Columbia Holiday Inn, Jessup, Md. Topic: "Installer Certification Program," intensive eight-hour seminar to include administration of Installer Program Examinations. Speaker: Ralph Haimowitz of SCTE. Contact: Keith Hennek, (301) 731-5560.

August 10 Rocky Mountain Chapter--Radisson Hotel South, Colo. Contact: Rikki Lee, (303) 321-7551. BCT/E examinations to be administered.

August 13 Greater Chicago Chapter--Location to be supplied. BCT/E testing to be administered. Contact: John Grothendick, (312) 438-4200.

August 13 Palmetto Chapter--Information to be supplied. Contact: Rick Barnett, (803) 747-1403.

August 14-15 Ohio Valley Chapter--August 14: Cleveland. August 15: Cincinatti. Topic to be supplied. Contact: Jon Ludi, (513) 435-2092.

August 15 Delaware Valley Chapter--Information to be supplied. Contact: Diana Riley, (717) 263-8258.

August 15 Great Plains Chapter--Location to be announced. BCT/E testing to be administered. Contact: Jennifer Hays, (402) 333-6484.

August 15 Penn/Ohio Meeting Group--Location to be announced. Topic: "NCTA Adopted Technical Standards." Contact: Bernie Czarnecki, (814) 838-1466.

August 16 Southeast Texas Meeting Group--Warner Cable, Houston. Topic to be supplied. Contact: Tom Rowan, (713) 580-7360.

August 21-23 Dixie Chapter--Information to be supplied. Contact: Rickey Luke, (205) 277-4455.

***August 28** Satellite Tele-Seminar Program, *"Cable Vs. The Telcos (Part One)"* with Gary Kim of Multichannel News, Steve Wilkerson of the Florida Cable Television Association, Gary Moore of Southern Energy Consultants Lt and Mark Balmes of Southern Bell. Videotaped at Cable-Tec Expo `89 in Orlando, Fla.

August 30-31 Great Plains Chapter--To be held in conjunction with the NCCA Show in Omaha, Neb. Topic: "Terminal Devices and Signal Security." BCT/E testing to be administered. Contact: Jennifer Hays, (402) 333-6484.

*Tele-Seminar Programs may be downlinked by any cable system and recorded for immediate and future employee training purposes. All Tele-Seminar Programs will air from 12-1 p.m. ET on Transponder 2 of Galaxy III.

Meetings Held at the NCTA Show

Bill Riker

Rob Stuehrk (left) and Bill McGorry (right) of Cable Publishing Group present Society President Jack Trower (center) a "giant" check representing SCTE's proceeds from this year's membership directory. A portion of these additional funds will be used to purchase an examination scanner to accelerate the processing of BCT/E certification examinations. This scanner was just one of the items discussed by the BCT/E Administration Committee (pictured below) at its recent meeting.

Bill Riker

Members of the BCT/E Administration and Curriculum Committees, including Richard Covell, Ron Hranac, Ralph Haimowitz, Bob Luff, Les Read, Robert V.C. Dickinson, Dave Large and Pete Petrovich, meet at the NCTA Show to discuss updating curriculum bibliographies, creating new test questions and expediting the processing of test results.

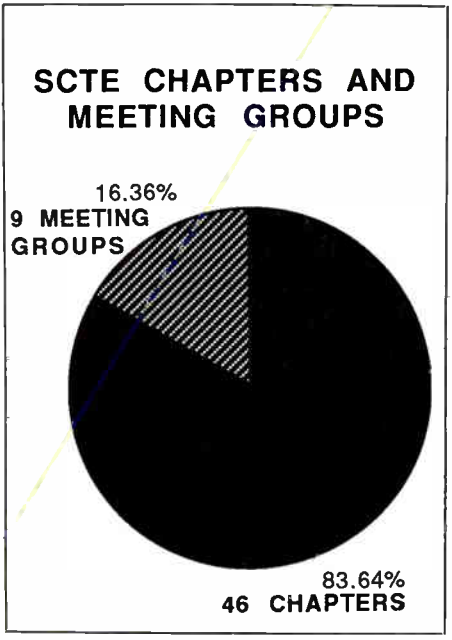
Bill Riker meets with 1984 SCTE President Jim Emerson and U.K. SCTE Secretary Tom Hall at the NCTA Show in Atlanta.

Chapters/Meeting Groups Listed

The following is a current listing of SCTE's 55 local chapters and meeting groups including mailing addresses and the names and phone numbers of each groups' designated contact person.

This list takes into account the seven groups that were elevated to chapter status at Cable-Tec Expo `90 in Nashville, Tenn.

Those not currently active with an SCTE group are urged to contact the group in their area for information on how to receive low-cost technical training at the local level.



The pie chart above shows the proportion of SCTE chapters to meeting groups following the elevation of seven meeting groups to chapter status at Cable-Tec Expo '90.

Appalachian Mid-Atlantic Chapter
P.O. Box 474
Coalport, Pa. 16627
Contact: Richard Ginter, Secretary/Treasurer, (814) 672-5393

Big Sky Chapter
P.O. Box 50
Harlowtown, Mont. 59036
Contact: Marla DeShaw,

Darlene O'Hearn, Joseph Kowalewski and N.P. Speranza of CableVision Industries of Liberty, N.Y., meet with Bill Riker at SCTE national headquarters in April to discuss utilizing the BCT/E Program as a means to train and certify their company's technical personnel.

Howard Whitman

Secretary/Treasurer, (406) 632-4300

Cactus Chapter
c/o Mr. Harold Mackey
Times Mirror Cable TV
17602 N. Black Canyon Highway
Phoenix, Ariz. 85023
Contact: Harold Mackey Jr., Vice President, (602) 866-0072, x282

Caribbean Area Chapter
c/o John A. Green
P.O. Box 1950
Ponce, Puerto Rico 00733
Contact: John Green, (809) 844-7350 or (809) 848-7746

Cascade Range Chapter
P.O. Box 30415
Portland, Ore. 97230-9998
Contact: Norrie Bush, Director, (206) 254-3228

Central California Chapter
P.O. Box 2117
Lodi, Calif. 95241-2117
Contact: Terry Englehardt, Secretary/Treasurer, (209) 369-7451

Central Illinois Chapter
P.O. Box 4129
Urbana, Ill. 61801-8813
Contact: Ralph Duff, Past President, (217) 424-8478

Central Indiana Chapter
3030 Roosevelt Ave.
Indianapolis, Ind. 46218
Contact: Gregg Nydegger, Second Vice President, (812) 372-8424

Chapparal Chapter
P.O. Box 21876
Albuquerque, N.M. 87154
Contact: Brian Throop, Secretary/Treasurer, (505) 761-6200

Chattahoochee Chapter
P.O. Box 1010
Hartwell, Ga. 30643
Contact: John Williamson Jr., Secretary/Treasurer, (404) 376-5259

Chesapeake Chapter
P.O. Box 337
Timonium, Md. 21093-0337
Contact: Keith Hennek, (301) 731-5560

Dairyland Chapter
c/o Bruce Wasleske
Jones Intercable
400 Scott St.
Wausau, Wis. 54401
Contact: John Boltik, President, (608) 372-2999

Dakota Territories Chapter
P.O. Box 537
Rapid City, S.D. 57701
Contact: A.J. VandeKamp, Vice President, (605) 339-3339

Delaware Valley Chapter
P.O. Box 282
Jamison, Pa. 19829
Contact: Diana Riley, Past President, (717) 263-8258

Dixie Chapter
P.O. Box 240304
Montgomery, Ala. 36124-0304
Contact: Rickey Luke, Secretary/Treasurer, (205) 277-4455

Florida Chapter
P.O. Box 10566
Riviera Beach, Fla. 33419
Contact: Rick Scheller, Chairman, (305) 753-0100

Gateway Chapter
P.O. Box 823
St. Louis, Mo. 63006-0823
Contact: Kenneth Gage, Secretary/Treasurer, (314) 576-4446

Golden Gate Chapter
146 S. Spruce St.
South San Francisco, Calif. 94080
Contact: Tom Elliott, Publicity Chairman, (408) 727-5295

Great Lakes Chapter
P.O. Box 1701

Troy, Mich. 48099-1701
Contact: Daniel Leith, Second Vice President, (313) 549-8288

Great Plains Chapter
P.O. Box 24871
Omaha, Neb. 68124-0871
Contact: Jennifer Hays, President, (402) 333-6484.

Greater Chicago Chapter
P.O. Box 72
Palatine, Ill. 60078-0072
Contact: John Grothendick, President, (312) 438-4200

Heart of America Chapter
P.O. Box 8161
Kansas City, Mo. 64112-0161
Contact: Wendell Woody, (708) 350-7788, ext. 263

Hudson Valley Chapter
P.O. Box 311
Liberty, N.Y. 12754
Contact: Robert Price, President, (518) 382-8000

Inland Empire Chapter
P.O. Box 7102
Spokane, Wash. 99207
Contact: Carl Sherwood, (509) 484-4931

Iowa Heartland Chapter
P.O. Box 842
Moline, Iowa 61265
Contact: Denis Martel, President, (319) 395-9699

Michiana Chapter
P.O. Box 6614
South Bend, Ind. 46660
Contact: Russ Stickney, Secretary, (219) 259-8015

Miss/Lou Chapter
5428 Florida Bvd.
Baton Rouge, La. 70806
Contact: Dave Matthews, Vice President of Facilities and Treasury, (504) 923-0256

Mount Rainier Chapter
P.O. Box 58786
Seattle, Wash. 98138-1786
Contact: Sally Kinsman, Secretary and Media Director, (206) 821-7233

New England Chapter
c/o Bill Riley
Continental Cablevision
950 W. Chestnut St.
Brockton, Mass. 02401
Contact: Jeffrey Piotter, Secretary, (508) 685-0258

New Jersey Chapter
P.O. Box 104
Englishtown, N.J. 07726-0104
Contact: Jim Miller, Secretary/Treasurer, (201) 446-3612

North Central Chapter
P.O. Box 15154
Dallas, Texas 75201
Contact: M.J. Jackson, President, (800) 528-5567

North Country Chapter
P.O. Box 11904
Minneapolis, Minn. 55411
Contact: Rich Henkemeyer, President, (612) 522-5200 or voice mail (612) 522-2038, touch tone dial 622

Ohio Valley Chapter
P.O. Box 7249
Toledo, Ohio 43615
Contact: Jon Ludi, Treasurer, (513) 435-2092

Oklahoma Chapter
P.O. Box 14922
Oklahoma City, Okla. 73113
Contact: Herman Holland, Secretary, (405) 353-2250.

Old Dominion Chapter
P.O. Box 831
Verona, Va. 24482
Contact: Margaret Harvey, Secretary, (703) 248-3400

Palmetto Chapter
P.O. Box 232
Columbia, S.C. 29202-0232
Contact: Rick Barnett, President, (803) 747-1403, ext. 262

Piedmont Chapter
P.O. Box 476
Granite Quarry, N.C. 28072
Contact: Rick Hollowell, President, (919) 968-4661

Razorback Chapter
P.O. Box 1483
Hope, Ark. 72403
Contact: Jim Dickerson, Secretary, (501) 777-4684

Rocky Mountain Chapter
P.O. Box 5317
Englewood, Colo. 80155
Contact: Rikki Lee, Media Director, (303) 321-7551

Sierra Chapter
P.O. Box 4105
Auburn, Calif. 95603
Contact: Steve Allen, President, (916) 786-8597

Southern California Chapter
19425-B Soledad Canyon Rd.,
P.O. Box 185

Santa Corita, Calif. 91351
Contact: Tom Colegrove, Secretary/Treasurer, (805) 251-8054

Tennessee Chapter
P.O. Box 750610
Memphis, Tenn. 38117
Contact: Don Shackelford, President, (901) 365-1770

Tip-O-Tex Chapter
P.O. Box 2106
Harlingen, Texas 78551
Contact: Mike Strakos, (512) 664-8715

Upstate New York Chapter
P.O. Box 1083
West Seneca, NY. 14224
Contact: Ed Pickett, First Vice President, (716) 325-1111

Wheat State Chapter
P.O. Box 48282
Wichita, Kan. 67201-8282
Contact: Mark Wilson, President, (316) 262-4270

Wyoming Chapter
P.O. Box 5389
Cheyenne, Wyo. 82003
Contact: J.R. Johnston, Secretary/ Treasurer, (307) 632-8114

Ark-La-Tex Meeting Group
P.O. Box 1364
Longview, Texas 75606
Contact: Robert Hagan, Secretary, (214) 758-9991

Big Country Meeting Group
P.O. Box 6487
Abilene, Texas 79608-6487
Contact: Albert Scarborough, Chairman, (915) 698-3585

Bonneville Meeting Group
c/o Roger Peterson
TCI Cablevision of Utah
1251 Wilmington Ave.
Salt Lake City, Utah 84106
Contact: Roger Peterson, (801) 486-3036

Lake Michigan Meeting Group
P.O. Box 272
Ada, Mich. 49301-0272
Contact: Grant Pearce, (616) 247-1701.

New York City Meeting Group
321 Richard Mine Rd.
Wharton, N.J. 07885
Contact: Andrew Skop, President, (201) 722-1935

Penn/Ohio Meeting Group
c/o Bernie Czarnecki
Cablemasters Corp.
P.O. Box 219
Lake City, Pa. 16423
Contact: Bernie Czarnecki, (814) 838-1466

Snake River Meeting Group
P.O. Box 988
Twin Falls, Idaho 83201
Contact: R. Kline, First Vice President/Secretary, (208) 376-0230

Southeast Texas Meeting Group
P.O. Box 87802
Houston, Texas 77287
Contact: Tom Rowan, President, (713) 580-7360

Valley Isle Meeting Group
P.O. Box 3311119
Kahului, Hawaii 96733
Contact: Howard Feig, Chairman, (808) 242-7257

Vermont/New Hampshire Meeting Group
P.O. Box 365
North Springfield, Vt. 05150
Contact: Matthew Alldredge, (800) 552-6652

Chapter and Meeting Group Spotlight

"Chapter and Meeting Group Spotlight" is an *Interval* section that focuses on recent SCTE chapter or meeting group events noteworthy for their topic, attendance numbers or innovative approaches to technical training.

The Great Plains Chapter held a seminar entitled "Basic Electricity" May 12 at the Holiday Inn in Omaha, Neb. Steve Fry of Gateway Electronics and Marshall Borchert of Riser-Bond Instruments were the speakers for the event.

The Greater Chicago Chapter reviewed BCT/E Category IV, "Distribution Systems," and provided an update on CLI May 17 at the Embassy Suites Hotel in Schaumburg, Ill. SCTE At-Large Director and Western Vice President Richard Covell of Jerrold Communications spoke on distribution systems. The seminar, which drew an attendance of 59 people, concluded with a viewing of a videotape of a recent Satellite Tele-Seminar presentation of instruction on how to fill out CLI Form 320 with John Wong of the FCC.

The Heart of America Chapter's April 19 meeting, held at the Holiday Inn Sports Complex in Kansas City, Mo., featured technical sessions on "System Troubleshooting and Maintenance" and "Headend Troubleshooting and Maintenance" by Chris Frederick of General Instrument. The chapter's chairman of the board, Don Gall of American Cablevision, gave a brief presentation on fiber optics at the end of the seminar, and reported that 58 attendees were present that day.

The Iowa Heartland Chapter recently devoted a weekend to the topic of fiber optics in a seminar held April 6-7 at the Best Western Bavarian Inn in Des Moines, Iowa. According to Secretary/Treasurer Mitch Carlson, 43 people were in attendance at the event, which featured these presentations:

"Fiber-Optic Development" with Rick Cole of Comcast Cablevision, who presented an overview of history of the development of fiber, and the theory of how it works and its design application.

"Fiber Cable and Splicing," presented by SCTE Secretary and Region 5 Director Wendell Woody of Anixter Cable TV, featured discussion of how fiber cable is manufactured and spliced. He also demonstrated and supplied "hands-on" instruction on installing mechanical rotary splices.

On May 9, **The Mount Rainier Chapter** held a meeting at the beautiful Silverdale Resort Hotel in Bremerton, Wash. Chapter Secretary Sally Kinsman reports, "We had 69 paid attendees who spent the day hearing several speakers cover 'Outage Control.' Obie O'Brien of TCI Yakima discussed the importance of being prepared and I continued with a discussion of the various ways maps and system specs can be helpful. Gary Cree talked about the importance of logical troubleshooting and customer callback procedures.

"After a lunch on the patio, the afternoon sessions continued with a presentation on major disasters by Gary Cree and Arne Hill that covered how to cooperate with other utilities in the event of such occurences. We also learned additional information on standby power and extended outages.

"Following the meeting, we announced the winner of our trip to Cable-Tec Expo, including a round-trip airfare from the chapter to go with the free registration from the national Society. The winner was Rod Youngren of Viacom, who later found that he had a scheduling conflict and gave the trip to Ken McKeehen, a fellow Viacom employee who attended the meeting with him. We also gave away another nut driver set courtesy of Anixter to Clint Rees of TCI."

Fifty-one people attended **The North Country Chapter's** May 2 meeting at the Sheraton Midway in St. Paul, Minn. Mel Infanzon and Paul Raymond of Tektronix reviewed BCT/E Category II, "Video and Audio Signals and Systems," providing, in the words of Chapter Secretary Rich Henkemeyer, "excellent preparation material for BCT/E testing."

The Tip-O-Tex Chapter met

April 28 at the Alice National Bank in Alice, Texas, to view videotape presentations on "Signal Leakage, CLI and the FCC" with John Wong of the FCC, Robert V.C. Dickenson of Dovetail Systems and Brian James of CableLabs; an NCTA seminar on signal leakage; and "How To Fill Out FCC Form 320" featuring Wong. The seminar also featured a speaker, SCTE Region 4 Director Les Read of Sammons Communications, who gave the 15 attendees a written test on signal leakage. According to chapter President Mike Strakos, "After the testing, Les reviewed the questions. It was a very good way to get good information across to those who need it."

The recently elevated **Wheat State Chapter** attracted 55 attendees to its April 26 meeting at the Red Coach Inn in Wichita, Kan. This meeting also featured a playback of the "How To Fill Out FCC Form 320" video with John Wong, as well as a live question-and-answer session with Michael Moffitt of the FCC's Kansas City office.

Secretary Paul Warne reports that "After lunch, we had four vendors on hand to give presentations on leakage equipment and the services they supply. They were Lynn Watson of Anixter Cable TV, Pierre Cubbage of Mega Hertz, Nick Ferolito of Trilithic and Ed York of Skytek.

The Ark-La-Tex Meeting Group held a seminar entitled "System Maintenance, System Design, System Upgrade" April 4 at the Le Bossier Hotel in Bossier City, La. Group Secretary Robert Hagan III reported that the speaker, Fred Rogers of Quality RF Services, "started with a little quiz and then went into maintenance, design and upgrades. It was a good program."

Two members of the national board of directors, President and Region 8 Director Jack Trower and Region 4 Director Les Read, also were present to discuss SCTE at the local and national levels. This event, the group's first meeting in Louisiana, drew 22 attendees.

The New York City Meeting Group reports that 57 people attended its May 1 meeting on "Sweep Maintenance--Tips and Procedures," held at the offices of Staten Island Cable in Staten Island, N.Y. According to Secretary Donna Shanley, speakers included Issac Morgan of Scientific-Atlanta, Peter Chunka of Wavetek, Jim Bailey of Jerrold Communications, Bill McKay of C-COR and Syd Fluck of CaLan.

"The Penn-Ohio Meeting Group is up and running," reports the group's president and founder, Bernie Czarnecki. "Our first seminar held April 16 was attended by well over 100 participants. A special thanks goes out to Bob Dickenson of Dovetail Systems, Ted Hartson of Post-Newsweek Cable and the many vendors who displayed their wares for everyone."

SCTE

Society of Cable
Television Engineers
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Exton, PA 19341
(215) 363-6888

Editors:—Howard Whitman
Bill Riker

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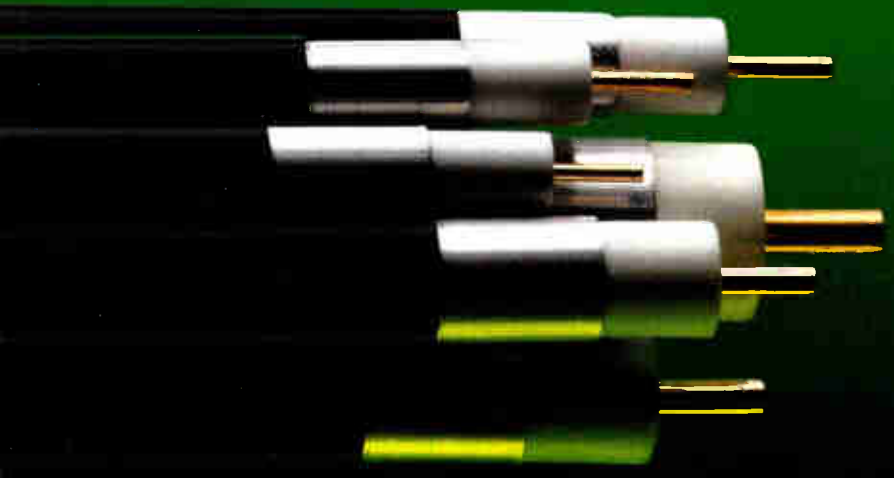

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Fax: (704) 328-2400. Telex: 802-166.

Reader Service Number 30.

S-A's frequency agile output converter

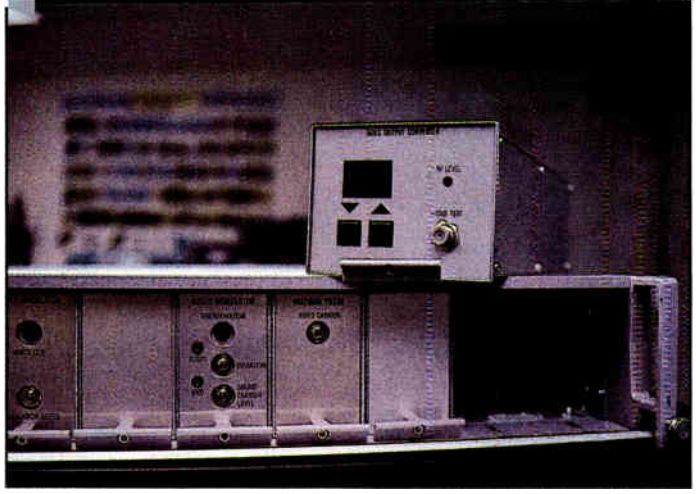
By Ron Hranac

Frequency agile operation in headend equipment has enjoyed a renewed popularity in recent years with the availability of low cost phase locked loop circuits (PLL) that provide good frequency stability and operation over wide frequency ranges. Several manufacturers have introduced stand-alone frequency agile headend equipment that is being used in both backup and full-time applications.

A few months ago S-A introduced a plug-in frequency agile output converter (FAOC) module for its 6150 processor and 6350 modulator series. It replaces the two far right modules in either chassis and provides agile operation from 50 to 550 MHz. *CT* obtained one for this month's lab report and gave it a good wringing out in Jones Intercable's corporate evaluation lab.

The FAOC module (as shown in the accompanying photo) is physically the same size as two individual 6150 or 6350 modules and is intended to replace both the output local oscillator and output converter modules. Rear connectors are plug-in compatible with the existing chassis of either the processor or modulator. The front panel of the FAOC includes a −20 dB test point, RF level control, LED display and two push buttons for frequency selection and offset programming. Depending upon the existing chassis configuration and installed options, it may be necessary in some instances to change the power supply from the standard 1 amp model to the heavier duty 1.5 amp version (contact S-A for more details).

The FAOC will operate on any EIA standard, IRC or HRC cable channel from 50 to 550 MHz and is capable of automatic aeronautical frequency offsets. The user also has the flexibility of manually programming offsets up to ±50 kHz from the standard frequency in 12.5 kHz increments. Comb generator phase lock operation is possible, but the conventional phase lock servo module must be replaced with an agile phase lock servo module. If phase lock operation is desired in a chassis that is not so equipped, then a phase lock wiring kit (S-A p/n 229435) must be installed in the chassis rear compartment.



S-A's FAOC module, ready for installation.

The module itself requires +42 dBmV visual carrier IF level, which can be checked using a module extender and SLM prior to installing the FAOC. The processor or modulator video carrier level control should then be adjusted to provide the required 45.75 MHz signal amplitude.

When first powered up, the LED display on the module will briefly indicate the software version number (e.g., "1.0"), followed by a reference code "PL" if a phase lock reference is present, or "no" if one is not available. It will then display the channel number that was last programmed. Changing channels is a matter of pressing one of the two front panel buttons. To prevent accidental changing of an output channel S-A has built a delay into the button functions, so you must hold a button in for two seconds before anything will happen. When the unit is changing channels its output is squelched to prevent interference to other channels carried on the system.

The FAOC can be tuned to any cable channel between 50 and 550 MHz by pressing either of the two buttons on the front of the module. The "up arrow" button tunes higher in frequency and the "down arrow" button tunes lower. (S-A calls them "increment" and "decrement" buttons respectively.) To program aeronautical offsets, you hold both buttons in simultaneously for two seconds until the LED displays the current frequency plan two-digit code.

The first character of the code will be S, I or H, indicating standard, IRC or HRC operation. The second character is a number that corresponds to the programmed offset. For standard and IRC operation, numbers zero through nine represent various possible offset programs; zero is no offset, one is automatic off-

Figure 1: FAOC RF output spectrum

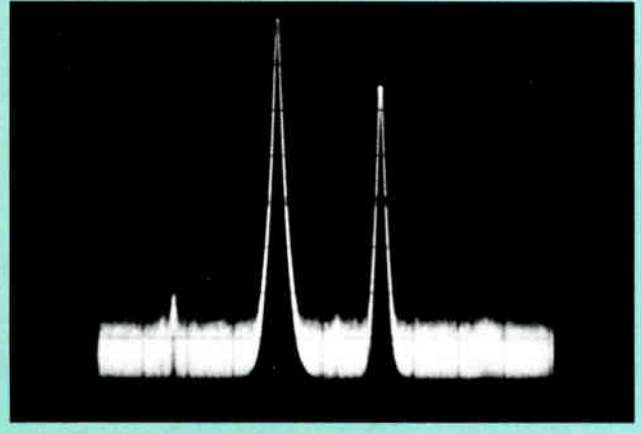


Figure 3: In-channel frequency response measured with Sin X/X test signal

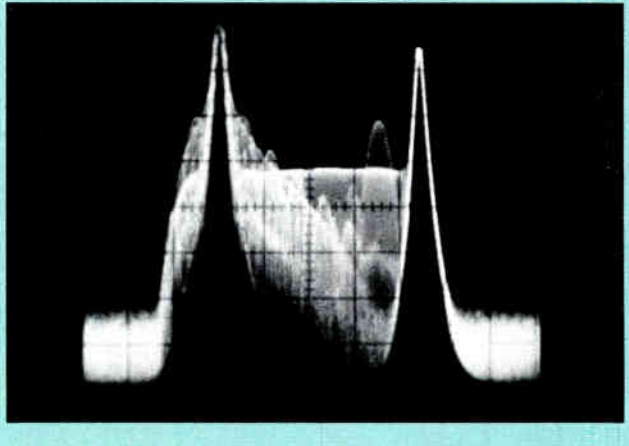
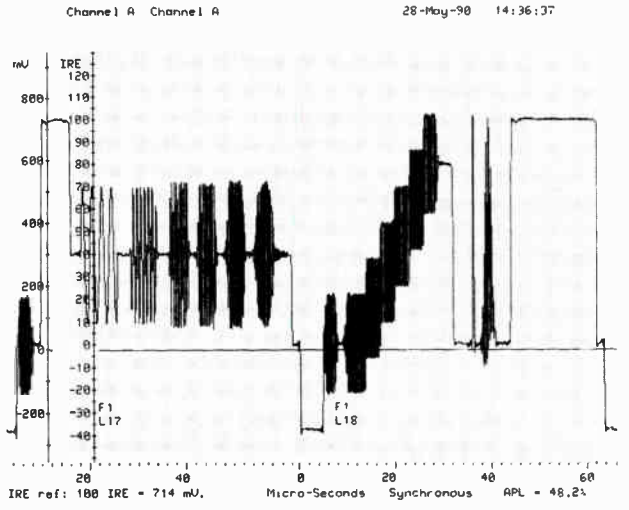


Table 1: Standard frequency measurements

Channel	Standard frequency (MHz)
2	55.24936
6	83.24933
7	175.24922
13	211.24918
14	121.24929
36	295.24908
52	391.24896
60	439.24891
70	499.24883
78	547.24876
99	115.24930

Figure 2: Demodulated VITS waveforms



set, two is +12.5 kHz manual offset, three is +25 kHz and so on. For HRC, only numbers zero through two are available; zero is conventional HRC with no offset, one corresponds to new HRC frequencies locked to a 6.0003 MHz comb generator, and two provides automatic squelch of RF output if phase lock is lost.

To program the frequency plan, press the "down arrow" button to change the first character of the program code and the "up arrow" button to change the offset digit. When you have programmed your choice, wait a couple seconds until the LED display stops flashing and the frequency plan and offset will be stored in non-volatile memory (channel choice also is stored in NVM).

In the event of problems with the FAOC, the unit's LED will display error messages. Documentation provided by S-A is thorough, and includes installation instructions and easy-to-follow operation and programming information. The FAOC's list price is $1,865, and as with many products on the market, MSO price discounts apply.

Lab measurements

The FAOC was installed in a 6350 modulator chassis (non-phase locked) whose output was connected to a Rohde & Schwarz precision demodulator. The demod was connected to a Tektronix VM-700 automatic video measurement system and test signals were supplied by a Tektronix 1900 digital video generator. A Hewlett-Packard 8558B spectrum analyzer was used to check the unit's RF performance and a Philips lab counter measured output frequency.

Table 2: Measured video distortions

Avg. picture level	48.3 %
Bar amplitude	99.4 IRE
Sync amplitude	38.2 % bar
Blanking variation	1.4 % bar
Sync variation	2.0 % bar
Burst amplitude	114.8 % sync
Burst amplitude	43.8 % bar
FCC sync width	4.84 μs
FCC sync setup	9.80 μs
FCC front porch	1.49 μs
FCC burst width	8.8 cycles
Sync risetime	141 ns
Sync falltime	140 ns
FCC equalizer	51.0 % S.W.
FCC serration	4.79 μs
VIRS setup	7.2 % bar
VIRS luminance ref.	49.8 % bar
VIRS chroma amp	102.1 % burst
VIRS chroma amp	44.7 % bar
VIRS chroma phase	−1.1 deg
Line time distortion	1.7 %
Pulse/bar ratio	102.4 %
2T pulse K-factor	0.9 %
S/N lum-weighted	58.8 dB
Chroma-lum delay	25.4 ns
Chroma-lum gain	108.6 %
Differential gain	2.33 %
Differential phase	0.82 deg
Lum non-linearity	2.44 %
Relative burst gain	−0.19 %
Relative burst phase	−0.36 deg
FCC multiburst flag	99.5 % bar
FCC MB packet 1	61.2 % flag
FCC MB packet 2	61.4 % flag
FCC MB packet 3	64.8 % flag
FCC MB packet 4	64.2 % flag
FCC MB packet 5	66.2 % flag
FCC MB packet 6	34.6 % flag

With +42 dBmV IF input to the module, its visual carrier RF output could be adjusted from +39 to +60 dBmV and the aural carrier level adjusted from 4 to 42 dB below the visual carrier. Subsequent measurements were made with the visual carrier output set at +60 dBmV and the aural carrier at +45 dBmV. At these levels, a third order intermod 4.5 MHz below the visual carrier was 60 dB down and an in-channel beat about 2 MHz above the visual carrier was more than 65 dB down (see Figure 1). Neither caused any picture impairment.

(Continued on page 117)

Training records

(Continued from page 28)

determine which classes were completed by a particular individual.

As you may deduce, the best filing system would be a combination of the two just described. Combining the two systems in paper format may be cumbersome because double entry of each student and class is required. If you have a small staff it may be possible to maintain two sets of files. In systems with more than several employees, however, a computerized data base approach may make more sense.

Actually the data base method is just a computerized approach to keeping the two separate filing systems as I just described. Two separate data bases should be established: one for tracking the training completed by each employee and one for tracking each class and the students attending. Most data base programs allow cross-referencing of the two files by "relating" them.

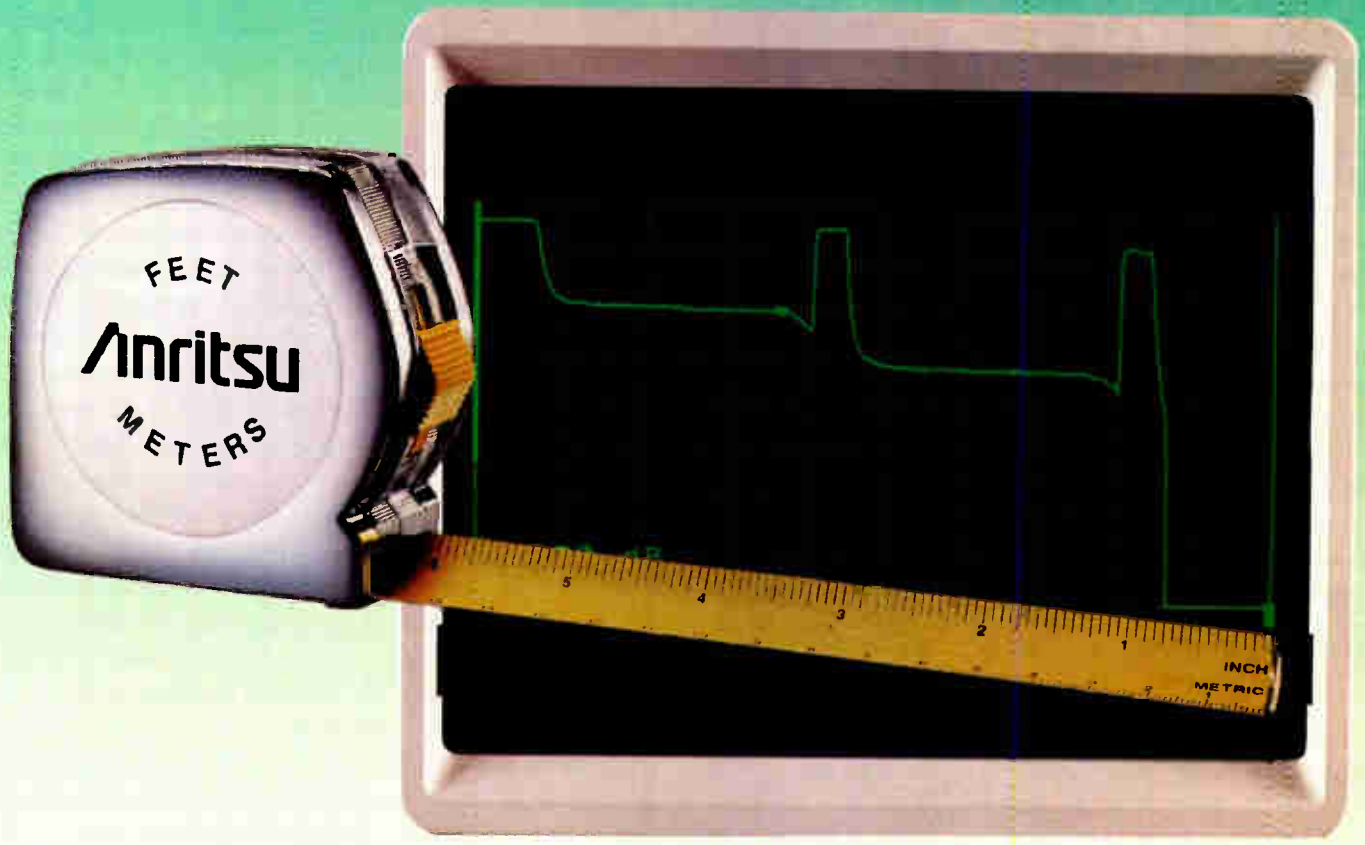
Establish a data base file listing each employee and determine what information you want to have there. Some suggestions include the following: class name/number, instructor's name, date attended, certification expiration, score/grade and class ranking. Next, establish a data base file for each class/category that employees may attend or complete. Include in this file some or all of the following: class name/number, course content/objectives, location, cost, instructor, date.

Notice that in both cases there is information for the class name/number. This information can be used to provide a "relationship" between the two separate data base files. By relating the two data base files the following actions are possible: finding all classes attended by a particular employee, finding all employees attending a particular class, listing the content/objectives of a class attended by an employee, etc.

It is beyond the scope of this article to describe how to establish relational data bases. It is suggested you refer to the instructional manuals or training materials provided for the data base program you attempt to use.

How you keep the records is not important as long as information can be filed and retrieved when needed. Paper or a computer can be used to maintain the training records in any fashion you design. However, please make sure that records are kept. You'll eventually regret it if they aren't.

FROM START...TO END



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Reader Service Number 35.

Quality training

(Continued from page 36)

The performance management cycle

Performance management is itself a dynamic process. The process requires first that we set standards. Then we must communicate those standards to the people who perform the tasks necessary to accomplish the standards. We also must provide those people with the skills necessary to perform at the new levels. We then monitor, measure and evaluate the performance, as well as communicate the results to the people who are performing the tasks. Then we start the process again by re-evaluating and adjusting the standards to higher levels.

Performance management is an effective plan to improve performance to meet specific objectives and expectations. Let's look at an example of applying the performance management process to improving the installation of F fittings. (See accompanying figure.)

1) *Identify expectations.* The company first establishes its expectations for performance, for example:

- All F fittings will be installed correctly the first time to eliminate call backs and reduce signal leakage.

2) *Establish performance standards.* The expectations are developed into written performance standards and communicated clearly to the appropriate employees, for example:

- Use the right type of connector for the type of cable.
- Weatherproof all outdoor connections.
- Maintain crimp tools for maximum effectiveness.
- Hand tighten all F fittings, plus one flat.

3) *Training.* Once the performance standards are established, the company must evaluate the skill level of the employees to determine whether or not training is needed to perform at the expected level. Training becomes a subset of the overall performance management program. As new performance levels are established, new skill levels are required and additional training must be provided.

4) *Evaluate performance.* After the employee has satisfactorily completed training and demonstrated the ability to perform at the expected level, evaluation of performance begins. In this example, the supervisor may be responsible for evaluating a random number of F fitting installations according to the performance standards on a weekly basis.

5) *Feedback.* The collected performance information can now be communicated to each employee and a plan of action developed to set higher standards or make adjustments to further improve performance. The more frequent the feedback, the greater the opportunity for improvement and adjustment.

As performance improves and goals are realized, expectations also are increased. Therefore, the process of performance management must be ongoing, constantly re-evaluating and re-establishing the standards of quality.

To be successful, a cable company must know what its customers want and expect, and how its performance compares with those expectations as well as potential competitors. Having a strategic plan for improving performance is as vital as having a business plan. By clearly defining and communicating those expectations to employees, providing the training necessary to meet those expectations and giving prompt and effective feedback, performance will improve. And as performance improves, quality improves.

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Reader Service Number 37.

NCTI training

(Continued from page 38)

ations and maintenance. The debut of NCTI's course CATV Fiber Optics last fall is further evidence of the industry's technological innovation and the institute now has plans to introduce a course on digital technology later this year.

NCTI's course structure has also undergone a steady evolution through the years from a two-course program early on to today's five course career path. Originally the institute offered an Installer/Technician course and a Chief Technician course. As the industry focus shifted from construction to construction, operation and maintenance, the Technician course was created and the sequence became Installer course, Technician course and Chief Technician course with the Technician course including some material previously offered in the Installer Technician course, some material from the original Chief Technician course and some new material. In the early '80s the course structure was revised to the current five levels—Installer, Installer Technician, Service Technician, System Technician and Advanced Technician.

In addition to offering special interest technical courses such as CATV Fiber Optics, Broadband RF Technician and CATV System Overview, earlier this year the institute began to move beyond training technical employees. Its CATV Technology for Non-Technical Personnel and CATV Technology for Industry Suppliers were the first in a series of self-study courses designed for cable TV employees in general management and operation roles. In May of this year the institute introduced Excellence in Customer Service for CSRs and technical employees with customer contact responsibilities. Future courses currently on the drawing boards are aimed at both technical and non-technical personnel and include classroom programs, seminars and computer-based training programs. As the industry continues to grow and evolve, the institute will continue to reflect that growth and evolution.

Over the past 22 years the institute has trained more than 30,000 cable industry employees and currently has more than 6,300 active students. But over that time some things haven't changed. The institute still depends heavily on the participation and input of industry advisors. While its current Technical Review Committee doesn't actually author lessons as many members of the early board did, members review all NCTI lessons as they are being developed, giving valuable advice and direction. The advisory group now numbers more than 30 and includes members from virtually all levels of the industry from senior management to first-level field supervisors. Current active committee members include Ron Carlysle and Steve Willardson of TCI; Jim Heino of Dakota County Technical College; Tim Holdsworth of Northeast Filter Co.; Mike Dietrich, Jim Kuhns and Tom Pritchard of Continental Cablevision; John Lockwood of Pico Products; Walter McIntyre of Storer Cable; Jim Neil, Joe Martens and Joe Martinez of Multimedia Cablevision; Glenn Shield of Rogers Cable TV; Michael Smith of Adelphia; Gary Wesa of Greenbay Cablevision; Brian Kinsey and Terrill Spotanski of Mile High Cablevision; Dan Pike of Prime Cable; Carl Casey of Scientific-Atlanta; Al Dawkins of the ATC National Training Center; Carmine D'Elio of Antronix; Bernie Doffing of Paragon Cable; Gerald Goldman of RMS Electronics; A. William LeDoux of Tektronix; Barry Smith of Times Fiber; and Bruce Weintraub of Arlington Cable Partners.

With this continued input of these key industry resources, the NCTI is ready to tackle the industry's technical challenges into the 21st century and beyond.

To me a more logical sequence of ranking would be the following:

1) Communicate effectively with subs and fellow workers (Item 25).
2) Understand the major portions of a cable system (Item 1).
3) Use basic hand tools of the trade (Item 21).
4) Use basic power tools of the trade (Item 22).
5) Complete maintenance and service forms (Item 26).
6) Use an SLM to determine the signal strength on the coaxial cable (Item 7).
7) Understand the principle of operation of coaxial cable transmission lines (Item 19).
8) Understand the principle of operation of fiber-optic transmission lines (Item 20).
9) Use ladders (Item 23).
10) Use pole climbing equipment (Item 24).
11) Install F connectors (Item 6).
12) Make single cable subscriber drops (Item 8).
13) Make dual cable subscriber drops (Item 9).
14) Install signal splitters in drop cable (Item 10).
15) Install matching transformers in drop cable (Item 11).
16) Install converters in the subscriber drop (Item 12).
17) Tune TV receivers for optimum reception of CATV signals (Item 13).
18) Understand DC electrical principles (Item 14).
19) Understand AC electrical principles (Item 15).
20) Understand the principle of operation of amplifiers (Item 16).
21) Align amplifiers for proper gain and slope (Item 17).
22) Determine proper values of directional couplers and taps to be used on coax distribution lines (Item 18).
23) Cut and core feeder cables (Item 3).
24) Install feeder cable fittings (Item 5).
25) Cut and core trunk cables (Item 2).
26) Install trunk cable fittings (Item 4).

If this sequence is used, a division between Items 17 and 18 would separate the duties of installers and service technicians.

The author would like to thank all 39 respondents for their time and trouble. The author also would like your comments, either pro or con, about the results of this survey and may be contacted at P.O. Box 1319, St. Charles, Mo. 63302.

AD INDEX

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Fiber LAN

(Continued from page 46)

dards Institute (ANSI) standard for a fiber-optic LAN operating at 1,300 nm wavelength at 100 megabits per second. The 62.5/125 micrometer fiber will transmit over a dual counter rotating ring and connect with the FDDI 2-fiber snap-in connector. The FDDI configuration allows for up to 500 stations. FDDI operates within a range of 100 km with a maximum distance of 2 km between adjacent stations. FDDI permits one network management system for a large and varied network application such as a university campus.

Figure 7 demonstrates a factory application using FDDI technology. The FDDI loop can accommodate voice, video, production and process control equipment, remote sensors and is compatible with all standard LAN architectures. The best news is that there are now several vendors producing and shipping FDDI products.

You may wonder, "What about FDDI national interconnectivity?" ANSI responds, "Sonet can tackle this task." FDDI compatibility is in the works with intelligent gateways to allow FDDI signal to travel the Sonet expressway.

Sonet, initially proposed by Bellcore, has moved rapidly through the complex weave of national and international standards committees to recent final approval. ANSI designed Sonet as a standard format to transmit optical signals from various vendors' networks and equipment. Sonet operates the 54 megabits per second signal transport signal (STS-1). This base transport signal rate can be used in multiples up to 13 gigabits per second. The 155.52 megabits per second (European base rate) is the optimum level to meet present requirements and allow for future expansion.

What is coming next? If FDDI is not high speed enough for you, there is a new LAN standard on the horizon called HPPI (high profile parallel interface). HPPI, supported heavily by DEC (Digital Equipment Co.) is a redundant loop architecutre, FDDI-compatible and can operate at speeds up to 1.2 gigabits per second. One thing is certain, the need for speed is definitely in vogue these days.

Through the use of new technology such as optical switching, erbium-doped optical amplifiers and faster narrower linewidth lasers (just to name a few) we will see a continual transformation in our industry. Engineers and end users alike are anticipating new and innovative development throughout the '90s.

July 1990

Spotlight on troubleshooting

BACK TO BASICS

The training and educational supplement to Communications Technology magazine.

Formerly Installer/Technician

Table of Contents

Service calls: Causes and solutions

By Fredrick Rosales
Senior Design Engineer, Private Satellite Networks

For years the cable industry has fervently discussed the cause of most service calls. Though a consensus exists on the reasons for the most common service calls, minimal statistical data has been presented in support. Lack of training has generally been identified as the root cause of service calls and the inability to reduce them.

In this article, I will present statistical data gathered over two years, review the most common service call reasons and present some thoughts. The data represents a typical system that is 10 years old and addressable. Carefully review your system to discount non-applicable items (i.e., converterless systems will not have converter-related problems).

Systems typically code corrective actions to reduce the note entries required from service technicians. This facilitates analysis and tracking of performance. The sample system uses 41 "fix" codes but each system must tailor its coding to fit its requirements.

The accompanying table lists the top 10 fix functions of our sample system. Note that the first five constitute 60.6 percent of all service calls, while all 10 cause 78.2 percent of calls. As commonly thought, connectors and converters are the two most common reasons for service calls, totaling 31 percent. At $30 per truck roll (not including materials) and their sheer volume, a small reduction can result in sizeable savings.

Ten most common problems noted on service calls

Cause	Percent
F fittings	16.0
Converters	15.0
Not home	11.0
Fine tuning	10.2
Defective addressable converters	9.4
Cancel	4.7
No problem	3.6
Addressable converter not turned on when first initiated	2.9
To (Installation)	2.8
Reconnect	2.6

The culprits

The following briefly reviews the top five problems noted on service calls returned from the field.

F fittings: Poor workmanship rather than age is the principal cause of these problems. Truck rolls can be reduced with better training and workmanship, and both will prove to be cost-saving measures. Improvement in this field will not only reduce service calls but also RFI problems (see "Making the F connection," page 74, May 1990 *CT*).

Converters: The causes here typically are lack of customer education or defective converters. Customer education must be addressed at installation time and whenever a service call is performed. A more economical approach is for CSRs to guide subs through the most common oversights, including fine tuning, TV channel selection, converter hookup, etc. Note: This requires training CSRs to be knowledgeable in several technical items.

Defective/inoperative non-addressable converters can be classified in two groups: 1) premature failure and 2) failure due to wear. Older mechanical converters fit into the latter category. Their continued use (particularly with high failure rates) should be re-evaluated every couple of years. Depending on failure rates, replacement can be a cost-saving action considering the high quality of today's electronic converters.

Defective addressable converters: When tested on the bench, a percentage of converters do not manifest the problems for which they were removed. Thus, some problems are misdiagnosed, resulting in the converter's removal, likely by untrained techs. Though training will not reduce these service calls, it will eliminate the time spent testing the units. While addressable converters also are subject to premature failure and failure due to wear, system problems such as ingress may cause an otherwise good converter to be labeled as defective.

Not home: This is the third most common problem noted on service calls and is strictly a waste. Better communications and scheduling can perhaps reduce them. This can include calling the subscriber before a technician is dispatched. A cost analysis of unnecessary truck rolls vs. additional personnel to call subs before truck rolls will show major operational savings from phoning subs. Unnecessary truck rolls will be eliminated, thus the number of service calls that techs must respond to will decrease.

Fine tuning: Reducing these calls requires training installers, CSRs and service techs to educate subs. Subscriber education must begin with the installer's introductory/educational presentation to new subs. A percentage of these calls will always exist but can be significantly reduced with customer education.

Training: Four of the five most common reasons for service calls are training related. To achieve any savings, expenditures for training are first required. This primarily will be for service techs and installers but also should include line techs and CSRs.

Systems must establish training policies for safe and effective working procedures that will ensure a drop installation's longevity. These policies must be enforced if they are to be effective. Corporate policies establishing a norm for all systems typically carry more weight and are more effective. If no corporate policies exist then the system must issue and enforce its own. In all cases, training is the critical issue. Most systems "train" their employees on the job. This method is cost-effective since the new employee is quickly deployed to the field. However, the problem with this type of training is that new employees often lack a clear understanding of their jobs and their effects on the system. Primarily for this reason some systems experience leakage problems in towns that have been rebuilt.

Systems with properly trained personnel can reduce service calls and save on operational expenses. Though the data used for this article is for one system, it is representative of the average cable system.

We entice people to subscribe to cable service. Accordingly, service techs and installers must be customer service oriented. This is particularly true for installers, the first cable representatives a new sub meets. First impressions are the most lasting and installers must demonstrate knowledge and understanding of their task while being courteous. Thus, our jobs begin when the first sub is connected and we must constantly provide quality signals to retain him.

Like all service industries, the key is training—training to satisfy the customer day in and day out. The industry has been lax on this but the time has arrived for all of us to awaken to its direct impact on operating cost and sub satisfaction.

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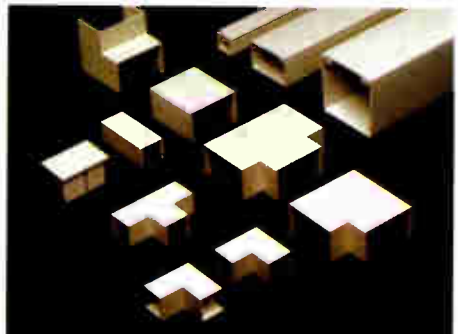

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Reader Service Number 48.

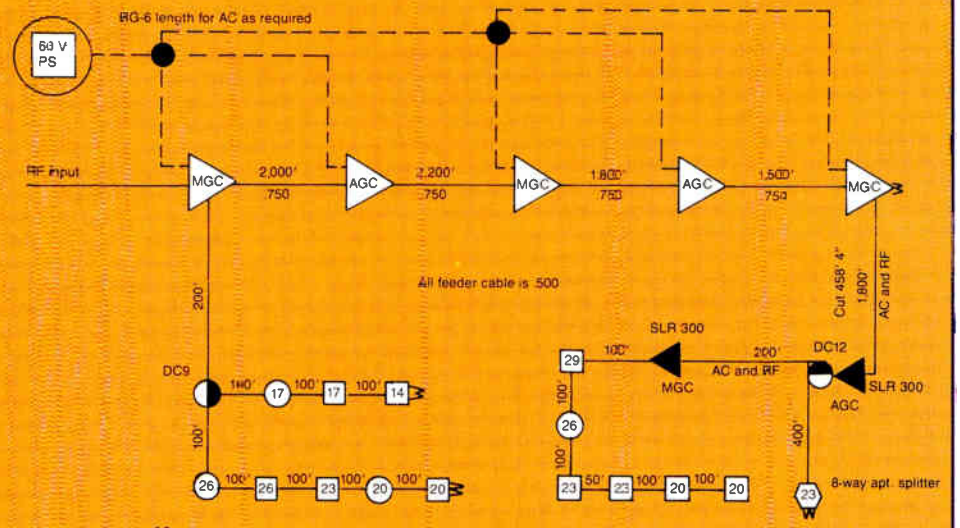
Figure 1: Sweep training board design

Design parameters

300 MHz	
Trunk out	31/31
Bridger	46/40
LE	46/40
2 LEs in cascade derated 3 dB	(43/47)
Trunk in	9
AGC LE input	22
MGC LE input	21
Tap out	12
.750 at 300 MHz = .0091/feet	
.500 at 300 MHz = .0132/feet	

Span	Cut length (RG-59)
2,000′	421′ 3″
2,200′	463′ 5″
1,800′	379′ 2½″
1,500′	316′
300′	91′ 6″
200′	61′
100′	30′ 6″
50′	15′ 3″

Cut lengths required to simulate .750 and .500 spans.



Key	Loss at 300	Loop R
RG-59 ———	.0432/feet	.0575/feet
RG-6 — — — —	.0346/feet	.0397/feet

Unless noted RG-59 is RF only, and RG-6 is AC only.

Training by the board

By Kenny Faust
Installation Supervisor, Heritage Cablevision

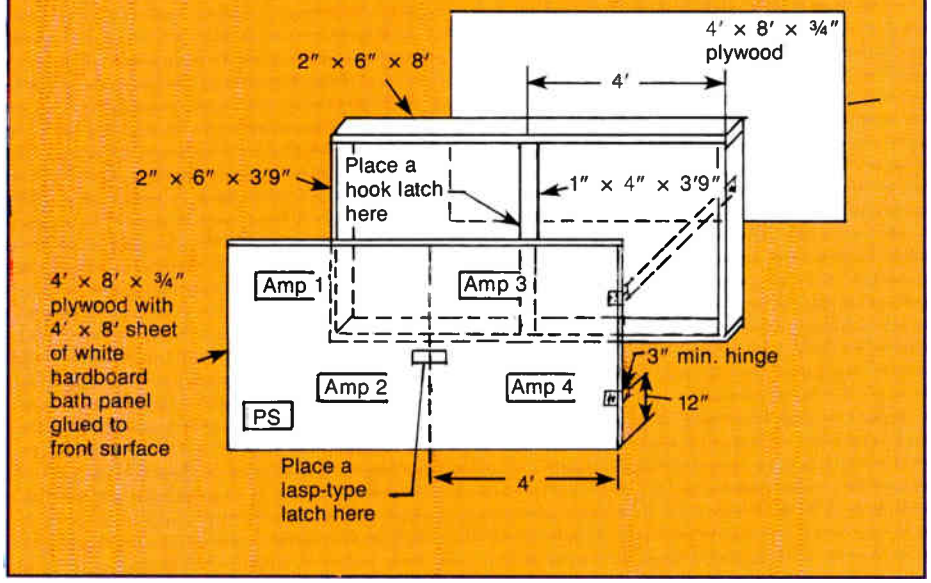
When we needed to implement a comprehensive system sweep program at Heritage Cablevision, we turned to our corporate office for assistance. We had designated an experienced lineman as our full-time sweep tech but he was in need of additional training on the monitoring equipment. Brian Wilson, an engineer from headquarters, was sent to Tennessee to help us get the ball rolling.

Since Wilson also was responsible for systems in 12 other states getting their programs off the ground, he had to find a way to efficiently budget his time. To aid him in this endeavor he designed the "sweep training board," which simulates a cable system in operation. The board has proven to be more versatile than a Swiss army knife. Not only has it been an excellent tool for sweep testing, it also is effective in training technicians in trouble-shooting techniques and giving customer service representatives, sales people and other non-technical personnel a close-up view of a cable system in action.

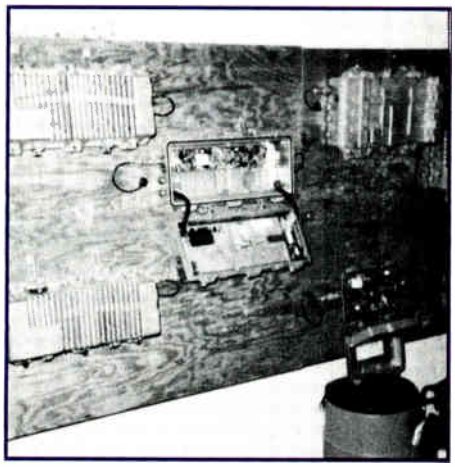
Cost-efficient, compact

By following the design shown in Figure 1 we were able to develop a configuration suited to our needs. By using RG-6 and RG-59 cable as our transmission medium we cut down on the cost of the project and made it more compact. We mounted our training board to the wall even though it could have been easily mounted on casters if we had desired greater mobility. Other than F connectors, the housing to F connector was the most widely used item in the design. Each amplifier was individually powered to increase the variety of tests that could be performed on the board. The amplifier and passive device housings were not pulled from new inventory but from routine maintenance material. Everything we used was clean and in good working order. The beauty of the design was its adaptability to any type of equipment. Even though we employed all Scientific-Atlanta amplifiers in our setup, the basic principles will work with any

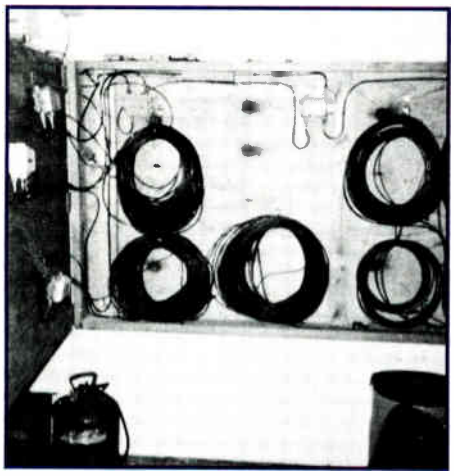
Figure 2: Sweep training board's housing design



"If your company or system cannot afford to send employees to technical seminars, this training board may be a viable alternative."



Accessing trunk/line amps on the sweep training board.



Internal wiring components on the training board.

brand of amplifier as long as the proper parameters are maintained.

Figure 2 lays out the construction plans for the board's housing. The housing contains the wiring and internal connections. The materials needed to properly mount the active and passive equipment can be modified to suit the builder's needs. (For example, we deleted the white hard-board panel for the exterior.)

In addition to the uses already mentioned, the training board can be a testing device for suspect modules and for "cooking" actives that are to be placed in hard to reach locations in the field. The board provides RF frequencies for signal level meter training, AC and DC voltage for volt-ohmmeter practice, taps for TV set adjustments and line extenders for problem-solving seminars. The list is limited only by the trainer's imagination.

Are your technicians having a difficult time diagnosing and correcting line problems? Create the problem on the training board and turn them loose. You won't have a single customer complain because the technician is learning on a self-contained sample of your system. The training takes place at your convenience and not while 10,000 subscribers are waiting for the problem to be resolved. Crises, on-the-job troubleshooting training happens all the time but how happy are your customers with a prolonged service interruption? Is it the best training you can give? Re-examine the contents of this article before you answer. If your company or system cannot afford to send employees to technical seminars, this training board may be a viable alternative that will benefit your company, your employees and most importantly, your customers.

Cable basics

This is Part IV of a series on the basic elements of cable TV measurements.

By Richard G. Covell
Applications Engineer, General Instrument/Jerrold

Coaxial cable has been the transmission medium of choice for cable systems since the first one was built about 1950. Coaxial cable has two conductors: an inner or center conductor, and the outer or sheath. Both are concentric about the same axis, thus qualifying for the term *coaxial*.

The semi-rigid coax cable typically used in trunk and feeder applications consists of an outer sheath of aluminum, an inner conductor of copper-clad aluminum and a dielectric material of gas injected polyethylene foam that separates the two conductors and maintains the distance between them. Sizes are determined by measurement of the outer diameter of the outer conductor and have been somewhat standardized in values of 0.412, 0.500, 0.540, 0.625, 0.750, 0.860, 0.875, 1 and 1.125 inch. In applications where the cable may be subjected to corrosive gases or placed underground, the outer conductor may be jacketed.

The more flexible *drop* cable used to connect the subscriber terminal to the feeder system typically has a copper-plated steel center conductor with an aluminum braid over aluminum foil as the outer sheath. Dielectric material is usually foam polyethylene but may be solid polyethylene for some buried applications subject to water intrusion. Where excellent flexibility is desired, the outer sheath is jacketed with polyvinyl chloride; for excellent resistance to moisture, polyethylene is often used. Sizes can vary as a function of the number "braids" and "foils," with single braid single foil (includes jacketing material) having a nominal outer diameter of 0.241 inch (RG-59), 0.276 inch (RG-6), 0.340 inch (no RG designation), and 0.405 inch for (RG-11).

Impedance

When examining the electrical properties of coaxial cable, each conductor can be considered as a series of small inductances with the dielectric material separating them acting as small parallel capacitances. An infinitely long string of these coils and capacitances will offer an impedance (called the *characteristic impedance*) to an RF signal applied to one end. The value of this impedance is roughly equal to the $\sqrt{L \div C}$, where L and C are the inductance and capacitance per unit length.

This characteristic impedance is a function of the size of the conductors and the spacing between them and, just like a pure resistance, will determine how much current flows in the (infinitely long) cable when a voltage is applied to one end. The simplified formula to determine the characteristic impedance of a cable with air dielectric is:

$$Z_o = 138\log(A \div B)$$

Where:

A = inner diameter of the outer conductor
B = outer diameter of the inner conductor

For dielectric other than air, the result obtained above must be multiplied by either $1 \div \sqrt{K}$ (where K is the dielectric constant of the dielectric material) or by the *velocity of propagation* (VP). VP represents the speed at which a carrier can travel in the cable and is a percentage of the speed of light in free space. The relationship between VP and K is: $K = (1 \div VP)^2$. Since most manufacturers supply the VP for their cable, that's what we will use.

For example, to find the characteristic impedance of a 0.500-inch coaxial cable with a sheath ID of 0.450 inch, a center conductor OD of 0.110 inch and a gas injected dielectric with a VP of 0.87, make the following calculations:

$$\begin{aligned} Z_o &= 138\log_{10}(A \div B) \times 0.87 \\ &= 138\log_{10}(0.450 \div 0.110) \times 0.87 \\ &= 138\log_{10}(4.091) \times 0.87 \\ &= 138 \times 0.6118 \times 0.87 \\ &= 73.45 \text{ ohms} \end{aligned}$$

Although cables are not infinitely long, we can achieve the same effect on shorter lengths by connecting a purely resistive load *equal* to the cable's characteristic impedance between the conductors at the end of the cable *not* connected to the voltage source. This is known as *terminating* the cable in a *matched* load.

Standing waves

The impedance anywhere along an infinitely long cable (or a shorter one with a matched termination) is constant, as is the voltage-to-current ratio. If we short-circuit one end of the cable, however, the impedance at that point will be zero. Any signal traveling down the cable (*incident signal*) will reverse its direction when it encounters the short and travel back up the cable toward its source (*reflected signal*). At the short circuit the current will be maximum and the voltage will be minimum. For the voltage to be minimum (0 V), the reflected voltage must be out of phase with the incident voltage, causing a cancellation at the short circuit. As the reflected voltage travels back up the cable, it will be in phase with the incident voltage, one-quarter wavelength away from the short circuit. At a half wavelength it will be out of phase, another one-quarter wavelength it will be back in phase and so on back to the source. The voltage standing wave will be maximum where the incident and reflected signals are in phase and, of course, minimum when they are out of phase. (The current will be maximum when voltage is minimum and vice versa.)

If we leave the end of a less than infinite length cable unterminated, the voltage at the open will be maximum and the current minimum, and the voltage standing waves will be displaced 90° (i.e., the voltage will be maximum a half wavelength, and succeeding half wavelengths, from the open rather than the one-quarter wavelength, and succeeding half wavelengths, as it was with a short).

The voltage standing wave ratio (VSWR) is the ratio of the maximum to the minimum voltage appearing on the cable. When terminations are properly matched to the cable, all the power

of the incident signal is absorbed by the termination and there is no reflected signal or standing waves. Since the minimum and maximum voltages would be the same, the VSWR is 1. Where the termination deviates from ideal, some of the incident signal is reflected, creating standing waves.

When the transmission cable is terminated by a purely resistive load, the formula for calculating VSWR is:

$$VSWR = Z_r \div Z_o \text{ (or } Z_o \div Z_r)^*$$

(*The higher numerical value is normally placed in the numerator so that the VSWR will be greater than 1.)

Where:

Z_r = impedance of termination
Z_o = impedance of cable

For example, to find the VSWR of a 75-ohm cable terminated with a 100-ohm resistive load, make the following calculations:

$$\begin{aligned} VSWR &= Z_r \div Z_o \\ &= 100 \div 75 \\ &= 1.333 \text{ (1.333 to 1)} \end{aligned}$$

To calculate VSWR using the incident and reflected voltages, the formula is:

$$VSWR = (E_i + E_r) \div (E_i - E_r)$$

Where:

E_i = incident voltage
E_r = reflected voltage

Measurement of the VSWR and cable impedance will allow you to solve for the load impedance and vice versa. As described in Part I (April 1990 CT), return loss (RL) is a more common method of expressing the ratio of incident to reflected signals in CATV. The formula for RL is:

$$RL = 20\log(E_r \div E_i)$$

Where:

E_r = reflected voltage
E_i = incident voltage

Attenuation

The attenuation coaxial cable offers to the transmission of RF energy is a function of the conductor diameters (the larger have less attenuation), the frequency of the RF signal (the higher the frequency the higher the attenuation) and the dielectric material (the closer the dielectric constant is to that of a vacuum—and air is very close—the less the attenuation).

Since knowing how cable attenuation changes as a function of frequency will help in the understanding of *equalization*, here's a formula that will allow you to closely determine what the attenuation of a cable section will be at any frequency if you know what it is at one frequency:

$$A_N = A_o \sqrt{F_n \div F_o}$$

Where:

A_n = new attenuation
A_o = old attenuation
F_n = new frequency
F_o = old frequency

For example, to find the attenuation of a cable at 330 MHz if it is 22 dB at 220 MHz, make the following calculations:

$$\begin{aligned} A_n &= A_o \sqrt{F_n \div F_o} \\ &= 22 \sqrt{330 \div 220} \\ &= 22 \sqrt{1.5} \\ &= 22 \text{ (1.224745)} \\ &= 26.94 \text{ dB} \end{aligned}$$

The attenuation of coaxial cable varies approximately as the square root of the frequency. As indicated in the accompanying table, the increase in attenuation at higher frequencies is less per MHz than at lower frequencies. With 10 dB of attenuation at 100 MHz, you must move to 400 MHz to increase attenuation 10 dB, a 300 MHz increment. The next 10 dB increase requires a 500 MHz increase in frequency, and the next a 700 MHz increase. The higher you go in frequency, the less attenuation change per megahertz you incur.

Frequency vs. attenuation

Frequency in MHz	Attenuation in dB
100	10.00*
200	14.14
300	17.32
400	20.00*
500	22.36
600	24.50
700	26.46
800	28.28
900	30.00*
1,000	31.62
1,100	33.17
1,200	34.64
1,300	36.06
1,400	37.42
1,500	38.72
1,600	40.00*

Cables with different VPs have slightly different attenuation curves. A piece of cable with a 0.93 VP and 22 dB attenuation at 400 MHz will have a different attenuation at 50 MHz than a 22 dB (at 400 MHz) piece of cable with a 0.87 VP.

The RF attenuation of coaxial cable increases with rising temperature and decreases as the temperature drops. Use the following formula to solve for the new attenuation as a function of temperature change:

$$A_n = A_r + [A_r \times (T_n - T_r) \times C_t]$$

Where:

A_n = attenuation at new temperature in dB
A_r = attenuation reference in dB (at design temperature)
T_n = present or new temperature
T_r = reference (design) temperature
C_t = temperature coefficient

The temperature can be per degree or 10 degrees and in degrees Fahrenheit or Celsius. The temperature coefficient, of course, must match your selection. The temperature coefficient for gas injected cable per degree Fahrenheit change is 0.00123.

For example, cable attenuation between two amplifiers at 68° F is 22 dB at Channel 13. To find what it will be at a cable temperature of 0° F, make the following calculations:

$$\begin{aligned} A_n &= 22 + [22 \times (0 - 68) \times 0.00123] \\ &= 22 + (-1.8401) \\ &= 20.16 \text{ dB} \end{aligned}$$

Loop resistance

DC loop resistance of coaxial cable is the series resistance of the center conductor and the sheath per unit length and is typically stated per 1,000 feet. As with any wire the resistance varies directly with the size of the conductors and the material from which they are made (i.e., solid copper center conductor cable has somewhat less loop resistance than a copper-clad center conductor of the same size). The center conductor contributes more resistance than the sheath for the same length. Typical loop resistance per 1,000 feet for .750 gas injected trunk cable with copper-clad center conductor is 0.75 ohms at 68° F. The voltage drop in a coax cable can be determined with the following formula:

$$E_d = I \times C_1 \times R_1$$

Where:

E_d = voltage drop
I = current in amperes
C_1 = cable length in 1,000 feet increments
R_1 = loop resistance per 1,000 feet

For example, to find the voltage drop in a 2,000-foot span of .750 gas injected cable between a 60 V power source and a trunk location with a load of 6 amperes, make the following calculations:

$$E_d = 6 \times 2 \times .75$$
$$= 9 \text{ V}$$

Poor connections at any connectors between or at these locations would increase the total resistance and voltage drop. Should the next trunk location be another 2,000 feet further with a load of 3 amperes, another 4.5 V drop would occur providing an input of 46.5 V.

As with RF, changing the temperature of the coax cable's conductors will change its resistance. To find the loop resistance of a cable at a temperature other than the reference temperature, use the following formula:

$$R_n = R_r + [R_r \times (T_n - T_r) \times C_t]$$

Where:

R_n = new loop resistance
R_r = reference loop resistance
T_n = new temperature
T_r = reference temperature
C_t = temperature coefficient

As with the formula for RF attenuation, the units of measurement and the temperature coefficient must be in agreement. The loop resistance temperature coefficient for gas injected cable with copper-clad center conductor, per degree Fahrenheit, is 0.0022.

For example, to find the loop resistance of a piece of .750 gas injected cable with copper-clad center conductor at 0° F if it is 0.75 ohm at 68° F, make the following calculations:

$$R_n = .75 + [.75 \times (0 - 68) \times .0022]$$
$$= .75 + (-.1122)$$
$$= .64 \text{ ohms}$$

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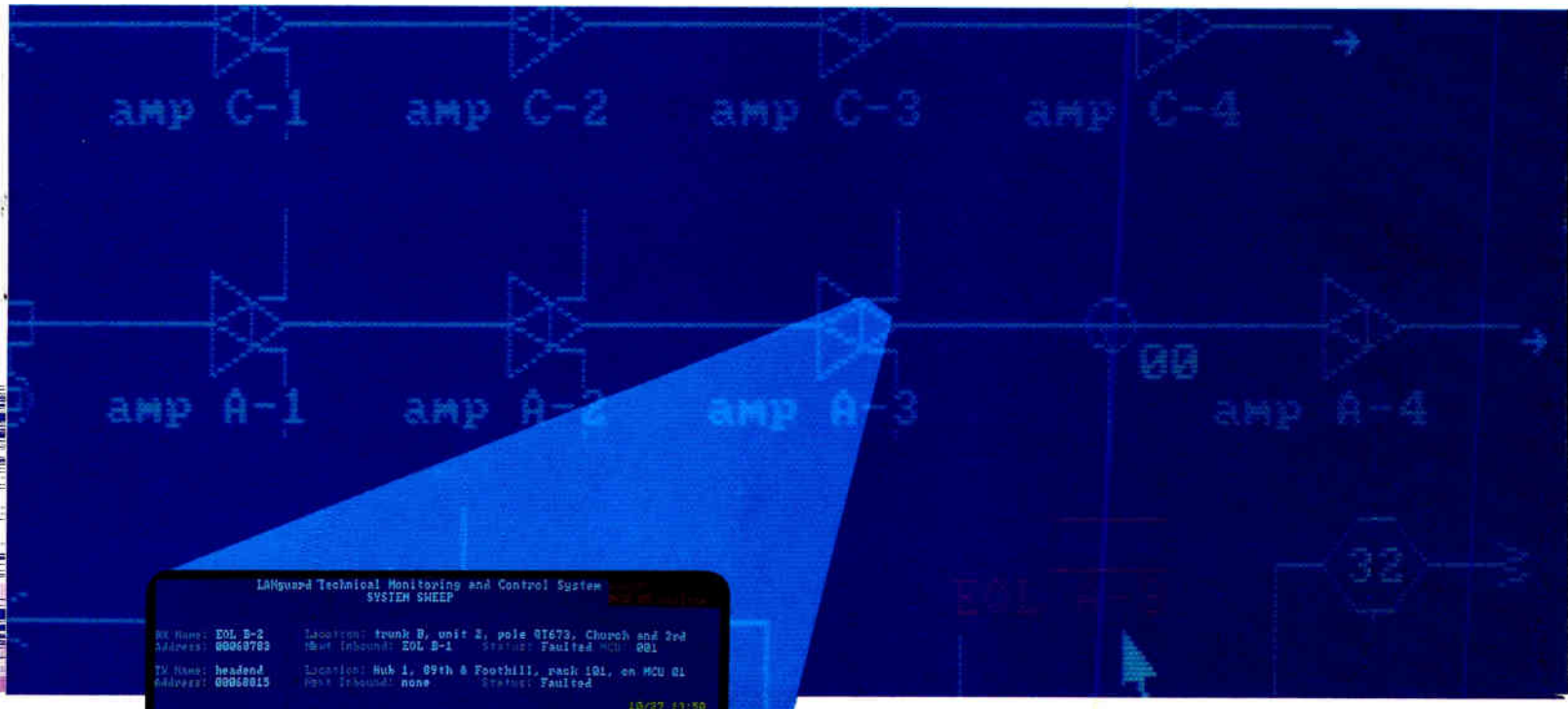

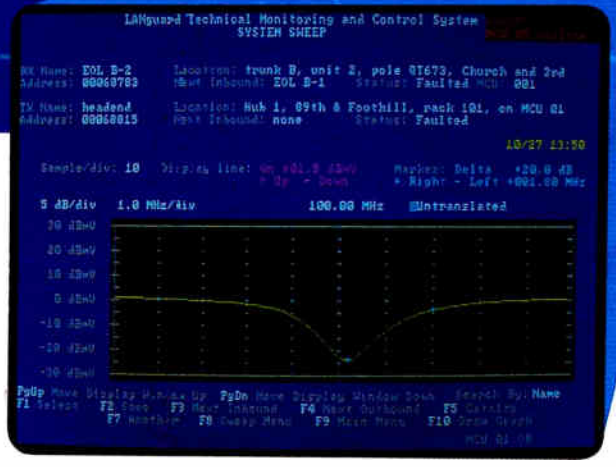

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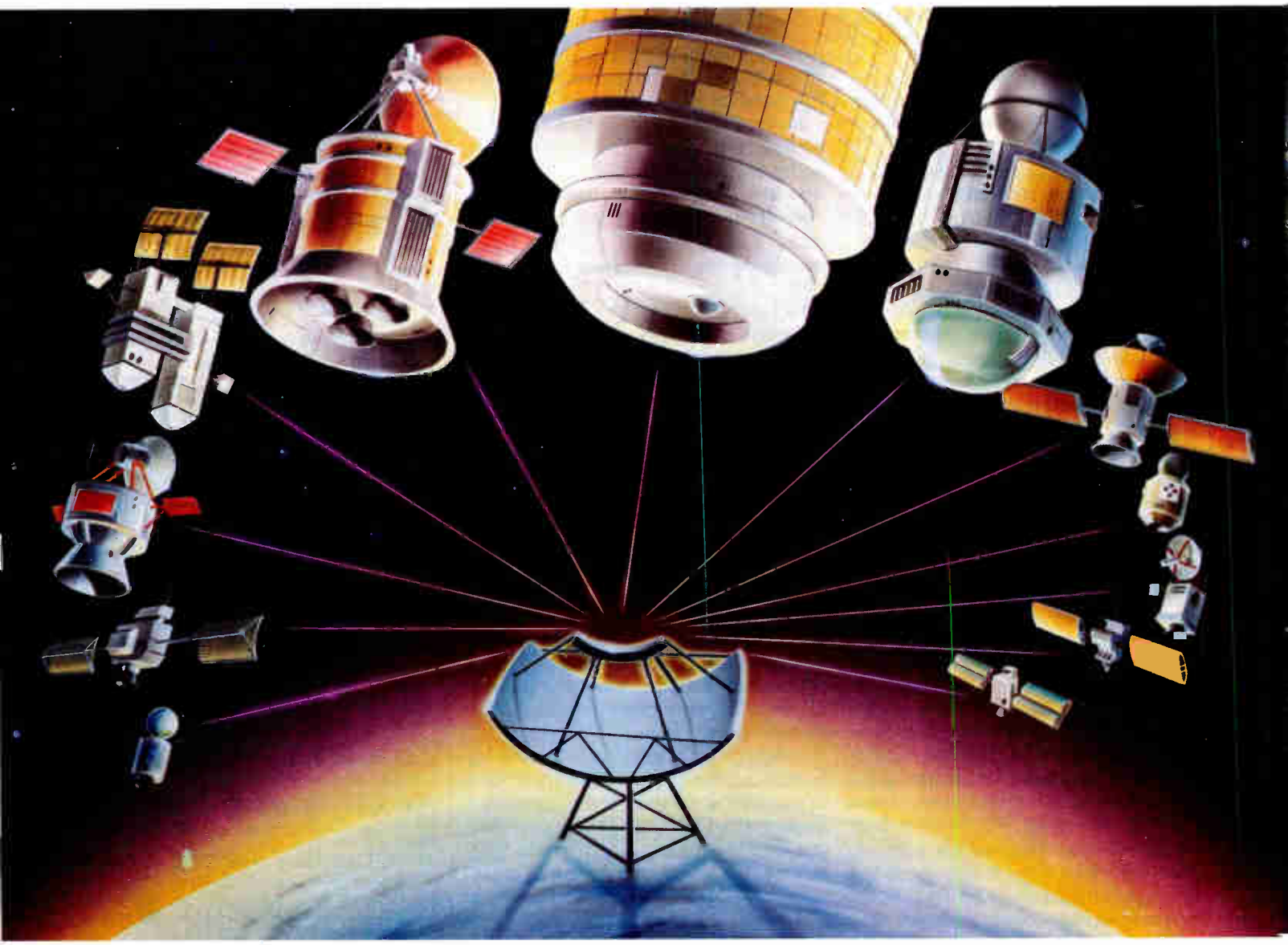

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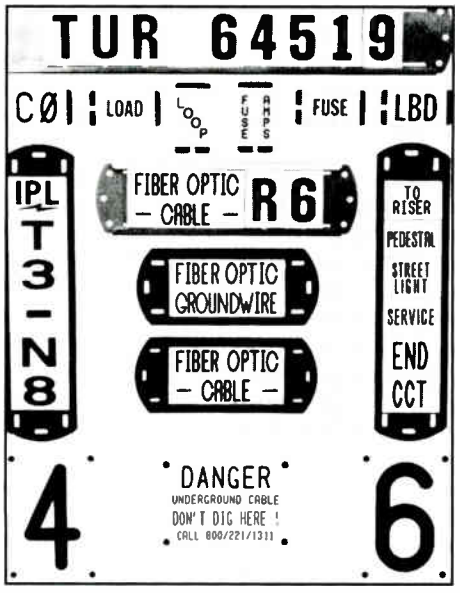


Tags, nameplates

Tech Products announced a new process to manufacture virtually indestructible tags, signs and nameplates. In the process, a character and a locking grid are molded into one piece. Then a contrasting color is injected into and around the locking grid resulting in a rugged mechanical bond. The polypropylene material used is UV stabilized, non-conductive, non-corrosive and inert to ground water chemicals, saltwater, alkali and acid solutions. The company recommends the Everlast line for identifying underground and outdoor environments.

Reader service #119

Whole-house video service

Vu-Tech Communications released SelecTeVision Plus, a product that offers whole-house video service. It is said to be user-friendly and expands simultaneous viewing of up to three different programs from three TV sets in a home, utilizing a single VCR, a single cable converter and existing coaxial cable. Program selection can be made at each TV set and infrared remote controls from the VCR and the cable converter can be utilized from any room.

The user can fully control all features of the VCR and cable converter from any TV set. Other features include improved picture quality and the ability to view one program while simultaneously taping another. This normally cannot be accomplished in addressable cable systems without signal degrading splitters and A/B switches.

Reader service #116

Multimeters

Two new 3 1/2-digit compact digital multimeters are now available from the B&K-Precision division of Maxtec International Corp. The Model 2704 is a 34-range full featured multimeter/capacitance meter with a basic DCV accuracy of 0.5 percent and the Model 2703 is a 19-range multimeter with a basic DCV accuracy of 0.8 percent. Both models are designed for bench or field use and feature battery operation. They measure voltage, resistance and current and feature a diode check and an audible continuity checker. The Model 2704 also measures capacitance to 20 μF and transistor gain.

Both units feature high-contrast LCD readouts, tilt-out stand and single rotary switch operation. Each measures 5 inches by 2 7/8 inches by 1 3/8 inches. They measure DC current to 10 amps. The Model 2704 also measures AC current and both provide protection against accidental misuse with high-energy fusing and overvoltage protection. Both models come with test leads, detailed instruction manual, schematic diagram and parts list.

Reader service #121 (Model 2704), #120 (Model 2703)

Coax switches

Viewsonics' new series of remote electronic coaxial switches consist of items with the following functions: basic switch, RF sensing and video sensing. Return loss is 18 dB DC-600, DC is to 1 GHz, isolation is 60 dB minimum to 860 MHz and 100 dB RFI minimum. They are available in 14-90 days depending on switch model.

Reader service #108

Signal processor

The new Cadco Model 362HL is said to be the first heterodyne signal processor to automatically select an input signal's offset frequency—whether the origination of the signal is off-air, off-cable standard or off-cable HRC—and heterodyne process to an output channel: standard, HRC, standard with Federal Communica-

tions Commission offset or HRC with FCC offset. The processor input circuit determines if the input signal is frequency offset and if so, corrects the frequency for heterodyne processing to a selectable output channel. If the output channel has FCC aeronautical offset requirement, the correct offset, +12.5 or +25.0 kHz, is automatically selected by microprocessor control. This feature is said to eliminate concern about a processed channel meeting FCC aeronautical frequency requirements. According to the company, frequency accuracy and stability exceed FCC specification.

The unit's input channels are off-air Chs. 2-13 VHF, Chs. 14-69 UHF and cable channels 2-QQQ (54 through 558 MHz). The 362HL output channels (NTSC standard) are cable channels 2-YY at an output level of +40 to +60 dBmV, adjustable. All channel readouts and operating parameters are digital or LED displayed and all operating controls are external. The unit is housed in a standard 19-inch wide rack-mount case that is 1¾ inches tall.

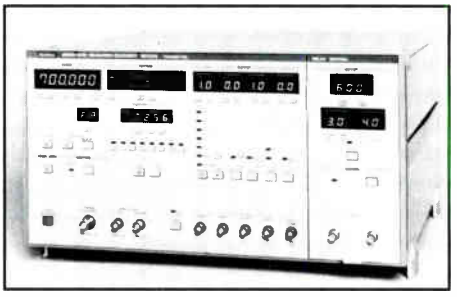
Reader service #137

Piercing tool

Allied introduced its new Model 218C Hole-Hog pneumatic piercing tool. It is said to open clean, compact tunnels for installation of pipe, cable, conduit or wiring at the lowest cost per foot. It is a portable, 2 1/8-inch diameter tool that breaks through the ground beneath roads, driveways, sidewalks, foundations and more without disturbing surface features or landscaping.

The product sets up in minutes and a small, shallow entry pit is all you need to launch the 40-inch long tool. It weighs 28 pounds. Start-up features include a special swivel valve that reduces friction at start-up and an air-feed capacity.

Reader service #110

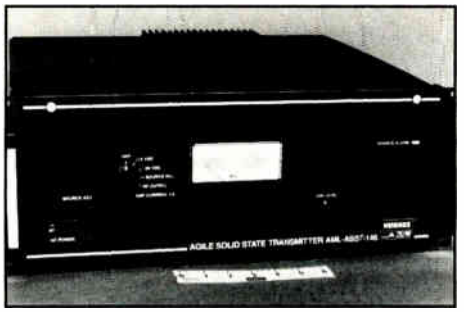


Delay unit

Antritsu announced the Model MH5115A delay unit, a companion plug-in module for the company's ME522A bit-error-rate test set, which provides phase adjustment of up to 6 ns for clock signals. The MH5115A also can be used with BER test sets from other manufacturers when powered by the MZ1003A auxiliary mainframe.

When coupled to the ME522A, the MH5115A allows the phase relationship between data and clock signals to be accurately set. The delay unit operates from 1 to 700 MHz, provides continuous phase adjustment from 0 to 6 ns in 50-ps steps and offers amplitude variation of 1 to 3 V and offset of −1 to −4 V. It is

IEEE-488 GPIB compatible. Clock input and output are available from the front panel.
Reader service #118



Transmitter

Hughes Aircraft Co.'s microwave products division introduced a new frequency-agile all solid-state transmitter, Model AML-ASST-146. It is designed for use as hot standby backup for any one of the 80 TV channels of its AML STX-141 and SSTX-145 transmitters. It can be inserted in the bottom of a circulator chain or preferably its output may be fed through an external harmonic filter directly to an unused port of a magic tee in the output multiplex combining network of the transmitter.

According to the company, switching over the VHF input to the agile transmitter from an existing channel could be accomplished in less than a minute, virtually eliminating down time. It has a bandwidth of 500 MHz, requires no retuning when changing channels and operates in the CARS band (12.7 to 13.2 GHz). It is compatible with all Hughes AML microwave receivers.
Reader service #117

Receiver/descrambler, modulator

Standard Communications introduced its Agile IRD II C/Ku-band commercial satellite receiver and integrated VideoCipher descrambler module. It is 1.75 inches high by 19 inches and the entire receiver and VideoCipher module takes up one rack space.

The receiver portion uses a 950-1,450 MHz RF input and a 70 MHz final IF. Active RF loop-thru and external IF loops are standard features and the unit will be licensed for use with the new VideoCipher II Plus modules as well as the standard VideoCipher II C. Front panel level controls have center indentations that are factory calibrated for reference output levels. Six various IF bandpass filters also are available for use in mild TI environments and Ku-band half transponders are available. A second PLL agile broadcast quality audio demodulator is available. The Agile IRD II is compatible with all satellite scrambling formats.

Standard's Model TVM450 commercial frequency agile modulator has visual and aural IF loop-thrus compatible with RF scrambling and BTSC configurations or it will accept the company's CSG60 BTSC generator module. The unit can be converted to a frequency off-air processor with the company's optional OAP450 off-air processor.

The product is a 450 MHz modulator and is frequency agile through low, mid and high VHF; superband and hyperband. The multiple functions of off-air processor, BTSC stereo generator or standalone CATV modulator are made possible by its modular design.
Reader service #136 (receiver/descrambler), #135 (modulator)

Cable-telco report

Dawson Communications is publishing *The Cable-Telco Report*, a monthly publication specializing in the latest developments bearing on the shared

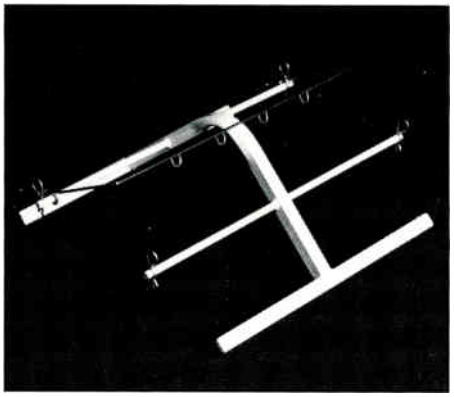
strategic interests of wireline service providers. The newsletter will cover competition, policy, service development and technology.

Questions considered by the publication will include: Will telcos be allowed to operate cable TV franchises in their territories? Should cable companies consider getting into the telephone business? Is technology pointing toward one or two wires into the home? Is there any real profit potential in switched video? Do cable companies have something to offer cellular telephone operators? What are telcos and cable companies learning from fiber and other development trials?
Reader service #113

Interactive TV

The new VeeTeeTV interactive TV system is marketed exclusively by VideoTex of America. It is built on an Intel 80386 host computer platform. The addition of video controllers allows up to 5,000 simultaneous users to interact with a NTSC quality broadcast signal through their touch-tone telephones.

With the product, dynamic response to live broadcasts, taped programs and computerized image signals (including animation) is possible. On-screen displays can be directly controlled by the viewer. This viewer participation and response is prompted through either the telephone, the TV screen display or both. No special viewer equipment is required.
Reader service #133



Wire caddy

Spoolmaster Products' Mini Caddy provides a way of transporting and dispensing small quantities of spooled wire and cable. Its low-profile design prevents the caddy from tipping while in use. It will carry up to eight 500-foot spools of 600 volt building wire.

It is constructed of carbon steel tubing and powder coated with a polyester resin finish for exterior durability and corrosion resistance. The spool bars are ½-inch solid steel. The company's optional wire guide attaches to the product to prevent tangles.
Reader service #115

Drop amps

The TDA-6 series of drop amplifiers were introduced by Triple Crown. They are designed for a new approach to the problem of in-home distribution level management for CATV subscribers. According to the company, the amps (which are based on high performance 86-channel push-pull design) offer the signal handling capability necessary in order to elevate drop levels with minimal signal degradation. The amps are packaged in a RFI-sealed diecast aluminum housing and provide sloped gain over the frequency band 40-600 MHz. The basic unit is a one-way device, with a future add-on diplex package becoming available for passive return operation.

Power is provided from a wall-plug

transformer package and can be delivered either directly to the terminal screws or injected into the output coaxial cable from a remote downstream location. Output powering is selected by installation of a jumper on the terminal screws. The amplifier circuitry is gas discharge tube surge protected and the casting incorporates a ground boss that accepts solid or stranded ground wire size 14 to 10 gauge.
Reader service #134

Ferro power supplies

Lectro Products introduced its EconoMax basic 15 amp ferroresonant power supply. It uses the company's heat sink technology and is said to be easy to install and maintain.

The company also developed a complete range of specialized ferro power supplies for the international market. They are available in 210-255 VAC, 50 Hz input and 60 VAC output in 12, 15 and 18 amp sizes. A 24 amp dual output version is also available. The units can be supplied complete with cabinets or with special mounting brackets designed to mount in existing utility cabinets. A line of fully modular standby units with 210-255 VAC, 50 Hz input are also available.
Reader service # 139 (EconoMax), #138 (international ferro power)

Counter-timer

Optoelectronics announced a new universal counter-timer for frequency test and measurement. It is battery powered and operating from sub-audio to microwave, it is claimed the smallest and lightest such instrument in the market today. It is called the Handi-Counter Model UTC 3000. It is designed for use in traditional laboratory benchtop service as a frequency finder and in a wide variety of field-service applications where two-way radio communication is important.

The unit is used to measure frequencies, periods, time intervals and ratios of frequencies. It weighs 15 ounces and occupies 30 cubic (5.3 by 3.9 by 1.4) inches. It offers an ultra-wide dynamic range from 10 Hz to 2,400 MHz and is useful up to 3,200 MHz. Three signal-frequency ranges include a direct counting range that goes from 10 Hz to 20 MHz, an internally prescaled range to 600 MHz (useful to 900 MHz) and a second prescaled range specified to 2,400 MHz (useful to 3,200 MHz). Its time base is referenced to an internal 10 MHz crystal oscillator with ±1 PPM accuracy.
Reader service #114

AM fiber products

Texscan announced a new line of AM fiber-optic products that are designed to take the technology directly to the bridger amplifier location, thus eliminating trunk cascades. The fiber receivers are based

on a family of new high performance RF distribution amplifiers known as the Flamethrower series and new high performance, low noise optical receivers developed by the company for use in AM fiber systems. The products are compatible with the company's existing Pathmaker Plus product line and will allow the operator to maximize RF reach between optical nodes. Thus, this lowers both optical and RF equipment requirements and maximizes reliability and performance in the system.

Also supporting this "fiber to bridger" architecture are options for redundant DC powering and the Vital Signs network management system. These new opto/RF products are also upgradeable to two-way optical operation for the carriage of return signals to the system headends or hubs.

The new 1030 series high performance optical receiver and the Flamethrower products are part of a continuing developmental program supporting AM fiber systems.

Reader service #132

Passives

Toner Cable Equipment announced its new line of distribution and subscriber passives. The 5-600 MHz units all have greater than −100 dB radiation housings. The distribution passives include two- and three-way splitters, directional couplers and power inserters. The subscriber passives include two-, three-, four- and eight-way splitters and eight values of directional couplers. The devices come in vertical and horizontal configurations.

Reader service #131

Hole cutters

A line of carbide hole cutters is now available from Klein Tools. They cut large, perfectly round holes in a range of materials. They are especially well-suited for cutting holes in electrical boxes for ½-inch, ¾-inch or 1-inch conduit. The cutters are marketed under the Klein-Unibit trade name.

They have a life expectancy three to four times longer than other types of hole cutters, according to the company. They cut fast with minimal effort. A 7/8-inch hole (for ½-inch knockout) can be cut in 16-gauge steel consistently in less than five seconds. Each hole cutter comes with a two-sided, self-starting pilot bit and requires no center punch or cutting oil. When needed, the two points of the pilot bit can be quickly reversed for renewed starting ability. Vibrating, chattering and "hogging-in" are prevented by the single carbide edge of the cutters. Three sizes are available for 7/8-inch, 1 1/8-inch and 1 7/32-inch holes.

Reader service #112

LNB

An addition to California Amplifier's LNA and LNB line was made. It is a commercial C-band LNB designed for full compatibility with Scientific-Atlanta Model 6550 and 6580 receivers. The new LNB is called the C30946 commercial DRO/LNB HEMT 270-770 MHz.

According to the company, this new product has excellent application as an upgrade and/or replacement unit. The available temperatures start at 55° K and are available as cool as 40° K.

Reader service #107

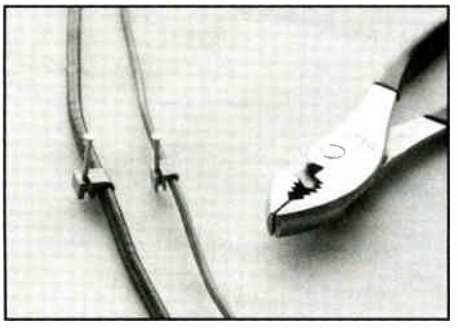
Camcorder

The GY-X1TCU camcorder was announced by JVC Professional Products and is said to be the first camcorder that combines a 3-CCD camera with a S-VHS-C recorder in a single unit that weighs 11 pounds including viewfinder, lens and battery.

Features include three 1/2-inch CCDs that deliver resolution of 330,000 pixels, 58 dB signal-to-noise ratio and over 600 lines of resolution. The recorder portion has an advanced memory system that has four memories for storage of gamma levels, master black control, contour level, flare level, iris setting, gain selection and other parameters. Values in three of the memories are preset for studio, outdoor and indoor shooting, including one that is adjustable by the user. Each of the four memories is made user-adjustable with an optional circuit board.

The unit's microprocessor-controlled iris system lets the user set the speed, level, APL, peak mix level and detecting area of the iris and information can be stored in the memory system. Once the record switch is activated, the camera iris and white balance are automatically ad-

justed so the operators can devote their attention to shooting. Other features include a voice warning system; 14 times zoom lens with a rectangular hood and mechanical inner focus system; two auto-white memories with filter positions indicated in the viewfinder; ALC with manual override; audio level indicator in the finder; gen-lock; and remote operation with optional remote control.
Reader service #129



Cable clip

M&B Manufacturing announced a new aluminum cable clip that attaches the drop cable and the ground wire. The clip has a slot that allows the installer to crimp the clip with pliers around the ground wire and break off the tab resulting in a professional job in installing the ground wire. It protects the cable from hammer blows when used for installing the cable.
Reader service #105

Calibration systems

Wavetek Microwave announced two application specific calibration systems that consist of the 8003 precision scalar analyzer, and 8910 series programmable sweep generator and an attenuator calibration kit that includes two low VSWR sensors to minimize mismatch uncertainty effects and an 80500 series directional bridge.

The ±0.03 dB/20 dB linearity of the 8003 provides equivalent accuracy to measurement receiver methods for both attenuation and VSWR measurements. The swept frequency display of the test set

(Continued on page 125)

Durkan

Bird Electronics appointed **Liam Durkan** European sales manager. Previously he managed N.V. Yokowo (Europe) S.A.'s marketing and sales office in the microwave field.

Cableready announced the addition of **Bill Stewart** as national sales manager of telecommunications to develop the LAN and telecommunications markets as well as expand the cable TV market. Previously he was the multiunit construction manager for Mile-Hi Cablevision.

CableData announced five executive promotions.

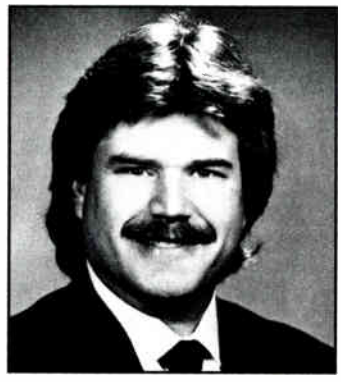
Nancy Frank was named vice president of marketing. For the past five years she served as director of marketing for the company.

Larry Larson is vice president of sales. He formerly was director of sales.

Jackie Long was appointed vice president of national support. Formerly she was CableData's director of national support.

Chuck Newkirk was named vice president of regional operations. He has previously served as the company's field engineer manager for the Indianapolis and Philadelphia regions, worked in sales and marketing support and served as regional director for both the Indianapolis and Sacramento, Calif., regions.

Finally, **Keith Peterson** was appointed vice president of national conversions and MIS. He was promoted to director in 1984 and in 1989 he took on the responsibilities of the field side of national conversions.



Stotts

Charles Stotts joined **CCMS Inc.** as a member of its training/customer service support staff. He was previously traffic manager for Coaxial Communications.

Bill Dancy was promoted to manager of technical services by **Midwest CATV**. He has been with the company for 30 years and has served as senior vice president and general manager of one of the company's former communications divisions.

Also, Midwest promoted **Scott Henry** to applications engineer. Formerly he was field services engineer.

Coaxial International announced the addition of **Frank Pickard** as vice president of marketing and business development and **Mary O'Hara** as director of media relations. Prior to joining the company, Pickard worked for American Television and

Communications as corporate director of new business. O'Hara formerly was an account supervisor for Simons Allyn Marketing Communications.

Ellsworth

California Amplifier hired **Thomas Ellsworth** as marketing manager. Prior to this, he was marketing manager for Los Angeles Cellular Telephone Co.

Fernandez

R.L. Drake named **Miguel Fernandez** general manager of its new international division. Prior to joining the company, he held positions with Thompson CSF of France and Tagra S.A. of Spain.

RF Technology named **Ron Barnes** as sales representative for the northwest region. He is the president of Triad Communications.

Charles Patterson was named sales representative for the mid-eastern region. He is the president of Charles Patterson Associates.

Michael Dowling accepted the position of regional sales manager for **Hughes Aircraft Co.**'s microwave communications products. He comes to the company from Lindsay Specialty Products where he was national sales manager.

Scientific-Atlanta appointed **J. Marne Gleason** as vice president, general counsel and secretary. He joins S-A from the Mutual Life Insurance Co. of New York where he was vice president and chief litigation officer.

Electronic Metal Products made two new appointment announcements. **Russ Udelhofen** was named vice president of marketing. He has been involved in new business development for the past 10 years including five years at the Gates Corp. **Neil Serafin** was appointed to the newly created position of national sales manager of CATV products. Previously he served in management positions with Scott Cable, Magnavox CATV and Cable TV Supply.

Derwin Otwell is the new national CATV accounts manager for **Power and Telephone Supply Co.** Formerly he was regional manager in the company's Atlanta office.

Vision Cable named **Austin Cross** general manager to its Sumter, S.C., system. His most recent position was general manager for Cablevision Industries in Volusia County, Fla.

CALENDAR

July

July 9-10: AT&T fiber-optic training on assembling connectors, AT&T Regional Product Training Center, Atlanta. Contact (800) TRAINER.

July 9-11: AT&T fiber-optic training on underground lightguide, AT&T Bell Laboratories, Chester, N.J. Contact (800) TRAINER.

July 9-13: AT&T fiber-optic training on installation and splicing, AT&T National Product Training Center, Dublin, Ohio, and AT&T Regional Product Training Center, Atlanta. Contact (800) TRAINER.

July 10-13: Siecor training on fiber-optic installation and splicing for LAN, building and campus applications, Hickory, N.C. Contact (800) 634-9064.

July 11: SCTE Hudson Valley Chapter technical seminar on video waveform interpretation, character generators and video switching usages, Capital Cablevision offices, Albany, N.Y. Contact Robert Price, (518) 382-8000.

July 11: SCTE Mount Rainier Chapter technical seminar on first aid certification and CPR. Contact Sally Kinsman, (206) 821-7233.

July 11-13: AT&T fiber-optic training on aerial lightguide, AT&T Bell Laboratories, Chester, N.J. Contact (800) TRAINER.

July 11-14: Colorado Cable Television Association convention, Beaver Run Resort, Breckenridge, Colo. Contact Mary Maxfield, (303) 863-0084.

July 11-14: SCTE Rocky Mountain Chapter technical seminar on management and professionalism, people skills and safety, Breckenridge, Colo. Second Annual Cable Games to be held also. Contact Steve Johnson, (303) 799-1200.

July 12: SCTE Big Country Meeting Group technical seminar, Brownwood, Texas. Contact Albert Scarborough, (915) 698-3585.

July 12-13: Jerrold and CTAM's Cable Insights '89: Taking the Mystery out of CATV Technology, Essex House Hotel, New York. Contact Kathy McHale, (800) 523-6678 or (800) 562-6965 (in Pennsylvania).

July 12-14: North Dakota State Cable Association convention and annual meeting, Doublewood Inn, Fargo, N.D. Contact Bill Debacker, (701) 280-0033.

July 16-17: AT&T fiber-optic training on testing optical fiber, AT&T National Product Training Center, Dublin, Ohio, and AT&T Regional Product Training Center, Atlanta. Contact (800) TRAINER.

July 16-19: AT&T fiber-optic training on splicing cable, AT&T Regional Product Training Center, Atlanta. Contact (800) TRAINER.

July 18: SCTE Dixie Chapter technical seminar, Montgomery, Ala. Contact Rickey Luke, (205) 277-4455.

July 18: SCTE Greater Chicago Chapter technical seminar on BCT/E Category II —Video and audio systems and signals. Contact John Grothendick, (312) 438-4200.

July 18: SCTE Razorback Chapter technical seminar, Little Rock, Ark. Contact Jim Dickerson, (501) 777-4684.

July 18: SCTE Great Plains Meeting Group technical seminar on plant maintenance, Omaha, Neb. Contact Jennifer Hays, (402) 333-6484.

July 18-20: Florida Cable Television Association annual convention, The Registry

Resort, Naples, Fla. Contact (417) 681-1990.
July 20: SCTE Golden Gate Chapter technical seminar on fiber optics, Italian Gardens, San Jose, Calif. Contact John Parker, (408) 437-7600.
July 23-26: Hughes AML seminar on broadband, Torrance, Calif. Contact (213) 517-5629.
July 24-26: Florida Cable Television Association annual convention, Sheraton Bonaventure Resort and Spa, Fort Lauderdale, Fla. Contact (904) 681-1990.
July 24-27: Siecor training on fiber-optic installation and splicing for LAN building and campus applications, Hickory, N.C. Contact (800) 634-9064.
July 25: SCTE Appalachian Mid-Atlantic Chapter annual pig roast and golf outing. Contact Richard Ginter, (814) 672-5393.

Planning ahead

Sept. 16-18: Eastern Show, Washington D.C.
Sept. 18-20: Great Lakes Expo, Indianapolis.
Oct. 2-4: Atlantic Cable Show, Atlantic City, N.J.
Oct 9-11: Mid America Show, Kansas City, Mo.
Oct. 30-Nov. 1: Cable Television Association convention, London.
Nov. 28-30: Western Show, Anaheim, Calif.

July 25: SCTE Piedmont Chapter technical seminar on rebuild and upgrade engineering. Contact Rick Hollowell, (919) 968-4631.
July 29: SCTE Golden Gate Chapter technical seminar, BCT/E testing. Contact John Parker (408) 437-7600.

CT's Lab Report

(Continued from page 73)

The output RF spectrum above the channel tuned to had no spurious or harmonic products that were measurable but several were found below the channel. With the exception of one at −58 dBc (about 30 MHz) all others were greater than 60 dB down.

Output frequencies were checked on a number of channels between 50 and 550 MHz and Table 1 summarizes what was measured. Offset operation also was checked, and Ch. 14 was measured at 121.26178 MHz (+12.5 kHz) and Ch. 99 was 115.27428 MHz (+25 kHz). When switched to HRC, Ch. 6 was 83.99933 MHz and IRC yielded 85.24932 MHz.

Table 2 summarizes measured video distortions, which include the contributions of both the modulator and FAOC. Figure 2 is the demodulated VITS waveforms with the demod's sound trap switched off. Figure 3 is a photo of the modulator/FAOC combination's in-channel frequency response measured with the Sin X/X test signal and shows ±0.5 dB response.

Comments

The module worked as specified and will be useful for those systems desiring to provide modular backup for S-A headend equipment. While the FAOC could be used for full-time operation in place of the standard 6150 and 6350 output modules, I suspect most operators would elect to use one or more for backup purposes. Its 50 to 550 MHz bandwidth and frequency programming capabilities make it suitable for most applications and its modular packaging is convenient for use with S-A's existing headend gear.

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PL MGR, E, 40K	PROJ ENG, W, 32K	LN TCH, FL, 10/HR
STAFF ENG, NE, 38K	TCH MGR, SE, 38K	LN TCH, NE, 11/HR
SLS ENG, W, 50K	CH TCH, MW, 30K	HDEND MICRO, W, 10/HR
MKTG ENG, SE, 55K	DESIGNER, W, 30K	LN TCH, VA, 12/HR
SLS ENG, E, 60K	CH TCH, E, 24K	LN TCH, NJ, 13/HR
PL MGR, N, 36K	CH TCH, NE, 32K	SERV TCH, S, 8/HR
CH TCH, S, 27K	STAFF ENG, NE, 35K	SERV TCH, SE, 9/HR

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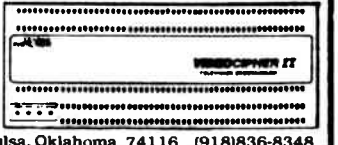
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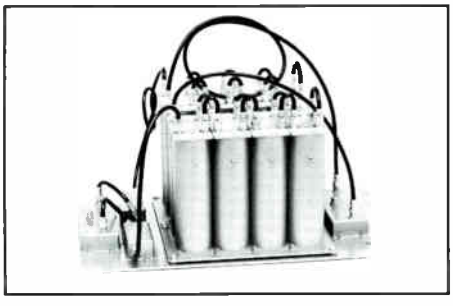
(Continued from page 113)

eliminates the risk of unexpected holes that can occur with the fixed frequency systems. The 8003 precision scalar analyzer and low VSWR sensors provide the same high integrity of measurement results as traditional vector systems that can now be reserved for applications where phase information is critical.

The 8910 series programmable sweep generators cover the frequency range from 10 MHz to 26.5 GHz, depending on the version selected. They use fundamental oscillators for all microwave bands that substantially reduce the false responses and measurement errors due to harmonics and sub-harmonics with earlier microwave sweepers. The lower output VSWR ($\leq$1.25 typical to 12 GHz) of the 8910 series significantly reduces mismatch uncertainties on transmission measurements especially when used in conjunction with the 80500 series directional bridges.

The 80310 series low VSWR sensors in the attenuation calibration kit use an integral 6 dB pad to achieve a VSWR of 1.16 up to 12.4 GHz compared to the VSWR of 1.33 for older sensors. The sensors have a dynamic range of 90 dB (a 14 dB improvement). This is said to make them ideal for testing wide range (60 dB) attenuators or filters with high ultimate rejection. Three sensors are available covering the frequency range 10 MHz to 40 GHz.

Reader service #106



Bandstop filter

The Model 7139 bandstop filter from Microwave Filter suppresses a selected frequency segment of a broadband LAN for security or test purposes. It suppresses a 78 MHz wide spectrum (222-300 MHz) in a broadband LAN (162-550 MHz). Stopband suppression is 40 dB minimum with insertion loss in the remainder of the LAN bandwidth less than 3 dB. Impedance is 75 ohms and connectors are type F. The product is mounted on a 19-inch rack panel.

Reader service #109

Demodulator

The Blonder-Tongue AD-1 is an agile audio/video demodulator. Front panel switches permit non-volatile RF tuning any one of 395 TV channels, which include broadcast UHF/VHF assignments and CATV standard/IRC/HRC assignments from 54 to 801 MHz. The AD-1 demodulates any NTSC signal to baseband video and audio signals for monitoring or remodulation. It also provides a 4.5 MHz subcarrier and a broadband multiplex output for MTS/BTSC applications.

The unit incorporates a PLL synthesized LO to assure precise tuning and a Nyquist SAW filter provides stable, accurate demodulation of the VSB signal. This preserves timing and minimizes distortions. Keyed AGC circuitry compensates for signal fluctuations. A synchronous video detector provides low differential gain and minimal phase distortion, which reduces video ringing and color smear. The unit requires 1 3/4 inches of height in a 19-inch rack.

Reader service #128

SCTE: An investment in yourself

This month, the "President's Message" is from the Society's executive vice president, Bill Riker. In August, the new SCTE president will pen his inaugural column.

By William Riker
Executive Vice President, SCTE

The Society of Cable Television Engineers Inc. is a non-profit professional organization formed in 1969 to promote the sharing of operational and technical knowledge in the fields of cable TV and broadband communications.

The SCTE membership is comprised of individuals from all areas of the communications industry. Among its members are cable system engineers and technicians, manufacturers, installers, construction personnel—even system owners and their operations staffs. Anyone involved with cable TV, radio and TV broadcasting or other allied communications fields may become a member.

A majority of the membership are not degreed engineers, but individuals wishing to increase their working knowledge of communications technologies through participation in the Society. While most individuals choose to become involved with SCTE by joining as an active member, student and sustaining (corporate) memberships are also available.

How can SCTE help you?

The Society is widely recognized as an excellent forum for the exchange of information and ideas on important broadband technical issues. Cable-Tec Expo, the training and CATV hardware conference presented annually by SCTE, allows more than 100 industry manufacturers and suppliers the opportunity to meet with over 1,000 cable system engineers and technicians. The Society's many chapters and meeting groups are also an integral part of the organization. At the local level, committees are busy serving the needs of the chapter, while providing members with opportunities for leadership and involvement. Becoming active in chapter affairs is an effective way to establish professional contacts, develop valuable leadership skills and contribute to the industry.

An understanding of current legislative issues affecting the broadband communications industry is essential for making timely, cost-effective decisions and long-range planning. As an active member of the National Cable Television Association's Engineering Committee, SCTE is constantly updated on such issues and can inform its members of these matters, while having input into the formation of related legislation. *The Interval*, SCTE's monthly newsletter, and *Communications Technology*, the Society's official trade journal, keep members informed of these important legislative issues and provide updates on new technological developments within the industry. *The Interval* also offers exclusive information on the Society's activities and educational programs.

Where is it going?

In keeping with the goal of sharing information, the SCTE has developed its Broadband Communications Technician/Engineer (BCT/E) and Installer Professional Designation Certification Programs. The SCTE also has produced many videotapes on technical training issues that are offered to cable systems across the country through its "Satellite Tele-Seminar" program. (For more information on these programs, see the article on page 22.)

To become a member of SCTE, or to receive further information on the Society, please photocopy and complete the accompanying form and mail it to SCTE.

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Exton, PA 19341

☐ I hereby apply for membership in the Society of Cable Television Engineers, Inc., and agree to abide by its bylaws. Additional member material will be mailed to me within 45 days. Payment in U.S. funds is enclosed. I understand dues are billed annually.

☐ Please send me further information on the Society of Cable Television Engineers, Inc.

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