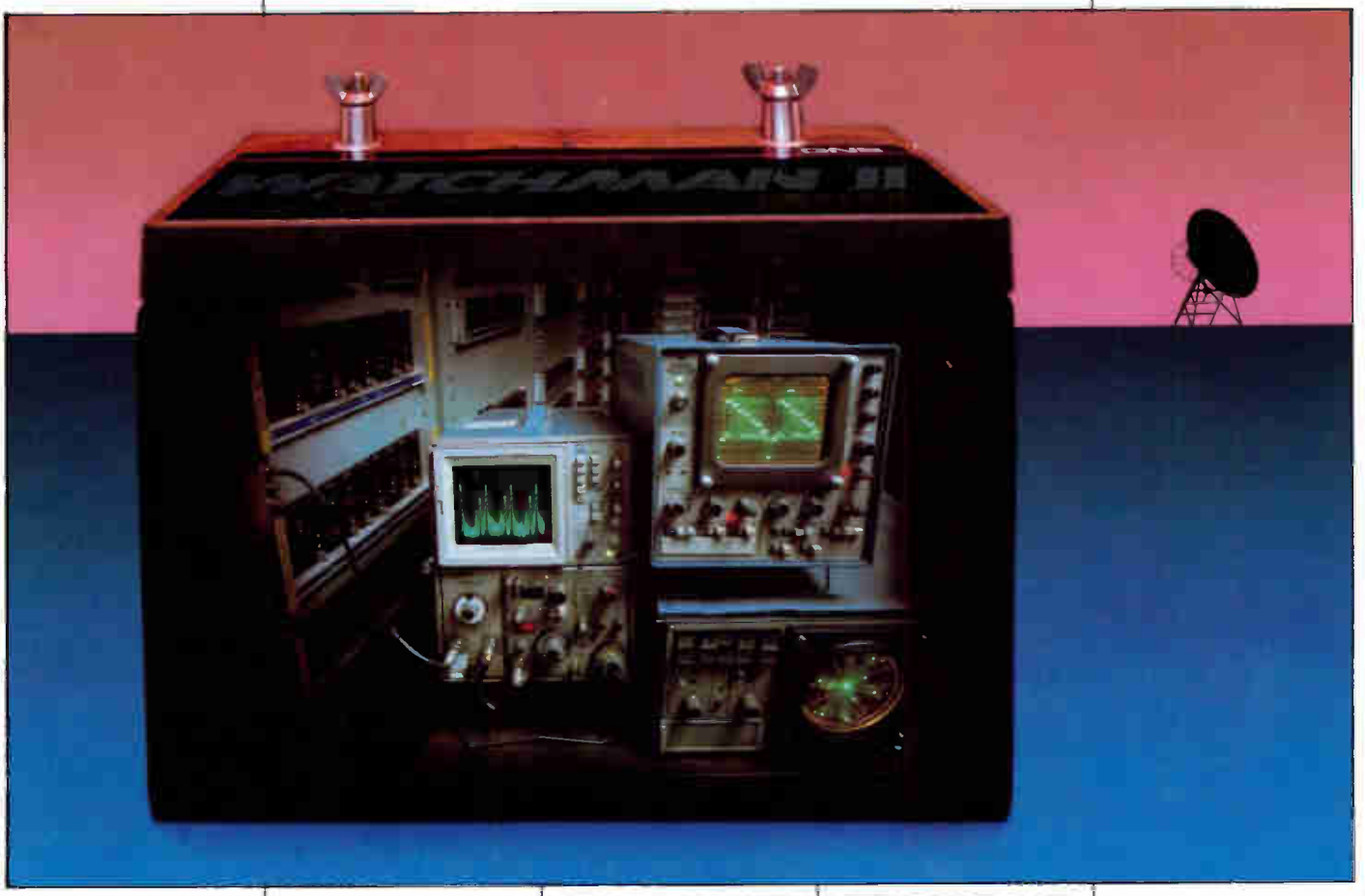
COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers



Standby powering: The inside perspective

National roundup

April 1986

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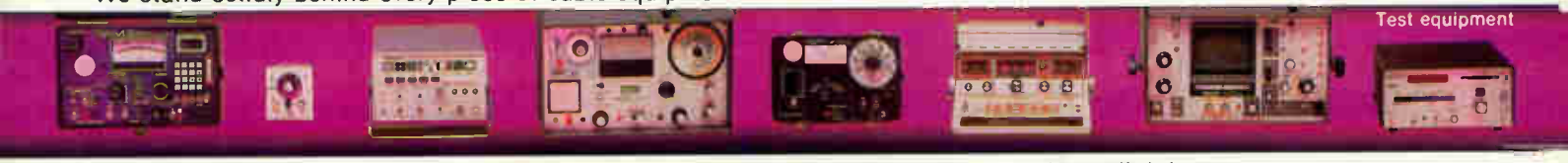

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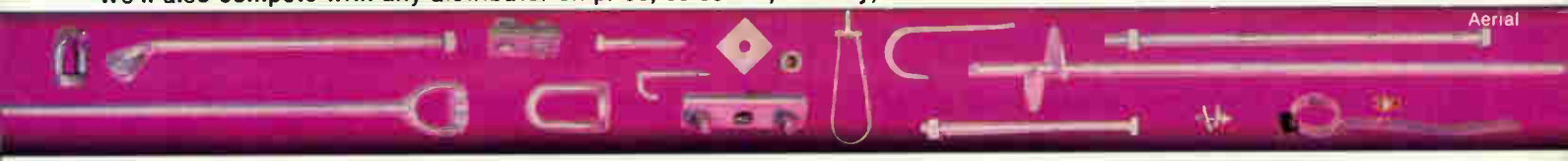

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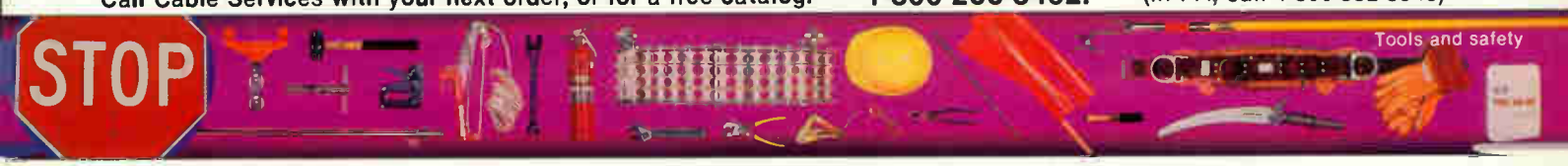

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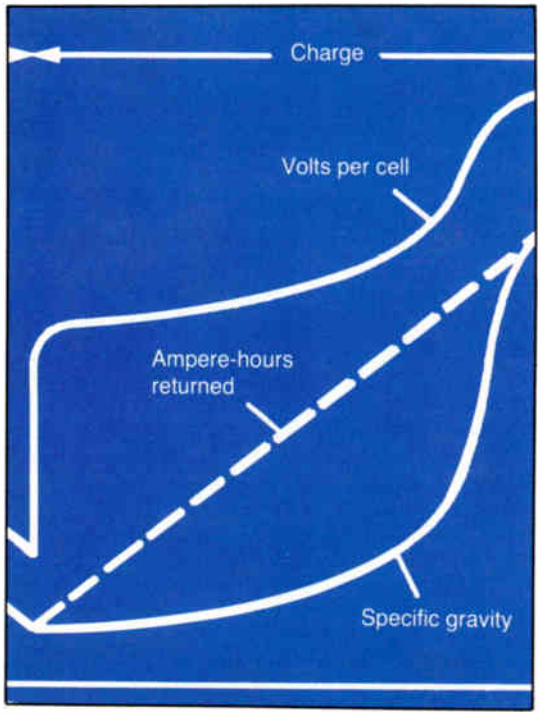
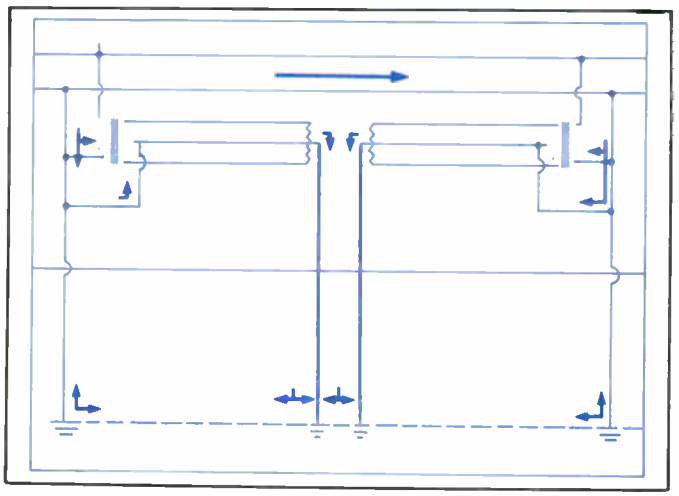
CONTENTS

Departments





Features

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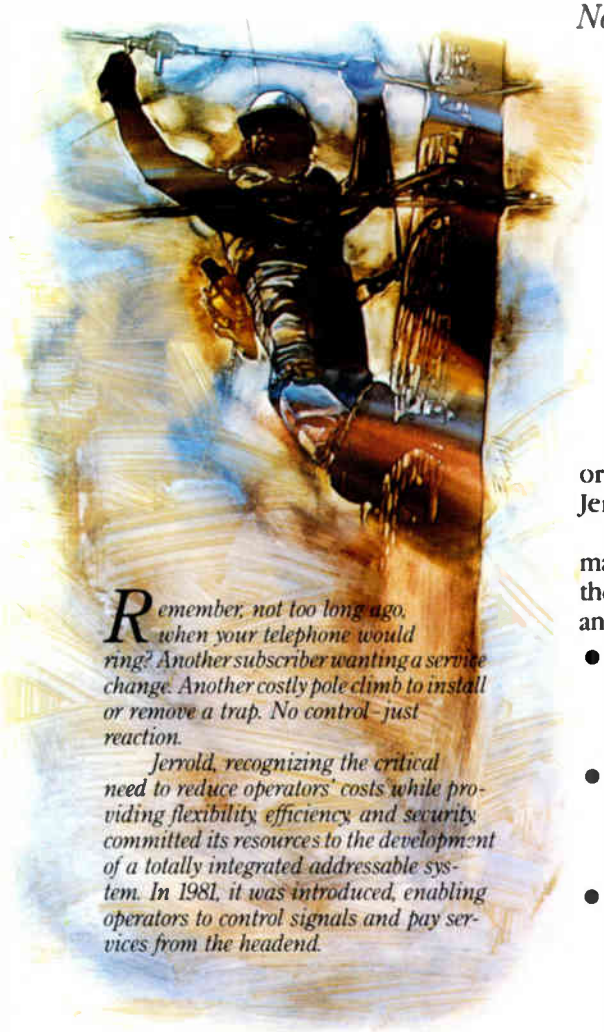
Jerrold/TOCOM Addressability. Unparalleled.



Remember, not too long ago, when your telephone would ring? Another subscriber wanting a service change. Another costly pole climb to install or remove a trap. No control–just reaction.

Jerrold, recognizing the critical need to reduce operators' costs while providing flexibility, efficiency and security, committed its resources to the development of a totally integrated addressable system. In 1981, it was introduced, enabling operators to control signals and pay services from the headend.

Whether your plans for your next addressable system call for baseband or RF, on-premises or off-premises, add-ons or state-of-the-art converters, Jerrold–and only Jerrold–can provide your choice.

With the broadest range of addressable systems and equipment on the market today, Jerrold can accommodate your specific system's design. We offer the systems, products, and services that assure maximum efficiency, flexibility and control:

- TWO-WAY UPGRADABILITY. Buy only what will pay off for you today. Jerrold converters can be upgraded to two-way addressability later. When you're ready, you can add on two-way capability to increase revenues with IPPV and other interactive services.
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You know we'll be there.

Reader Service Number 3.

GENERAL INSTRUMENT

EDITOR'S LETTER

Here's to the engineers

In 1948 in Mahonoy City, Pa., the concept of cable television was first implemented by John Walson, an appliance store owner. Because the mountainous terrain surrounding the town made reception terrible, Walson had a difficult time selling TV sets. Taking matters into his own hands, he built a tower on a mountaintop, ran cable from the tower to his store where he connected it to a TV set in the store window. Residents, seeing the clear reception, willingly paid Walson a $2 monthly fee to hook up to the cable.

In 1986 the advances in cable technology staggers the imagination. Scrambled satellite services, pay-per-view, stereo television, C- and Ku-band satellites are but a few of these technological advancements. And who were the driving forces in concept and implementation of these new technologies? The engineers, of course.

Engineers acknowledged

At this year's convention banquet in the Fairmont Hotel on March 18, the NCTA presented its National Awards, the cable industry's highest honors for individuals. The Science and Technology Award was presented to Joe Van Loan, vice president of engineering for Viacom Cable. Van Loan recently assembled critical technical evidence that underscored the negative impact that must-carry status for broadcast stereo would have on cable television, thus making a major contribution to the cable industry's success at the FCC. Van Loan is a long-time member of NCTA's Engineering Committee, is active in the SCTE and other communications industry organizations. Van Loan undoubtedly deserves this award and we appreciate his talents in the technical community.

The Vanguard Award, given to an individual whose leadership and foresight have placed the cable industry in the vanguard of the new communications technologies, was presented to William Strange Jr., vice president of corporate development for Sammons Corporation.

The Challenger Award, honoring outstanding achievements of an individual 40 or under, was presented to Marc Nathanson, president and CEO of Falcon Communications.

Recipients of the 1986 President's Award were Ralph Baruch, chairman of Viacom International; Edward Horowitz, HBO senior vice president of technology and operations; and G. Jeffrey Reynolds, president of Valley Cablevision.

Robert Wussler, executive vice president of Turner Broadcasting Systems and president of WTBS, received the Associates Award, which recognizes the contributions of the industry's programmers and equipment suppliers. John Gault, executive vice president of ATC and president of Time Inc.'s Manhattan Cable division, received the State/Regional Association Award. Charles Townsend III, president and COO of Colony Communications, received the Marketing Award.

Ron Roach

Luff and Polis

SCTE on the move

At a board of directors meeting held during the convention, the SCTE board elected its officers for the coming year. They are: president, Robert Luff, United Artists Cablesystems; Eastern vice president, John Kurpinski, Cable Services Co.; Western vice president, Sally Kinsman, Kinsman Design Associates; and secretary/treasurer, Andy Devereaux, American Cablesystems Corp.

Tom Polis received a mounted gavel for his contributions as last year's president. Stated Polis, "We've seen a real camaraderie by the board members in overcoming problems." Polis in turn handed the gavel to new SCTE President Robert Luff, who stated, "I pledge my utmost to carry on the fine efforts of the outgoing board members."

Our best wishes go out to the new officers and board members and a sincere well-done to outgoing President Tom Polis. (For more on the SCTE see "News," page 10.)

At the NCTA show, the SCTE also introduced a promotional videotape to better illustrate the many advantages of membership in the Society. The seven-minute video, developed by the SCTE staff in association with Audio-Video Telecommunications, focuses on the rapid growth of the cable television industry in recent years and steps taken by the Society to keep technical personnel current with changes in technology and improvements in system operational procedures. SCTE programs including satellite tele-seminars, chapter development and BCT/E certification are highlighted in the presentation with emphasis on how management can take advantage of these technical training opportunities.

Having been on the technical side of cable for 14 years, it's gratifying to me to see engineers given credit for keeping the cable industry in the forefront of technology. Here's to all of our industry's engineers, those acknowledged and those behind-the-scenes.

Tom J. Barnett

TO BE RELIABLE, YOU HAVE TO HAVE THE GUTS.

Pull off our cover and you'll see why Alpha is the CATV Standby Power Supply leader. Sure, we could have designed a system using two transformers like most manufacturers, but no, we decided that a single ferro-transformer would be more reliable. It was gutsy, it was innovative, and it works.

Some customers wanted to check the power supplies by just driving by. So we built-in **Automatic Performance Monitoring**. Other customers didn't want to leave their office. What did we do? We designed and built the first stand alone status monitoring system — another innovation from Alpha.

Our guts reflect our sincere desire to give you the standby power supply features you want because serving our customers is as important to us as serving your customers is to you. The way we see it, if we take care of you, you can take care of them.

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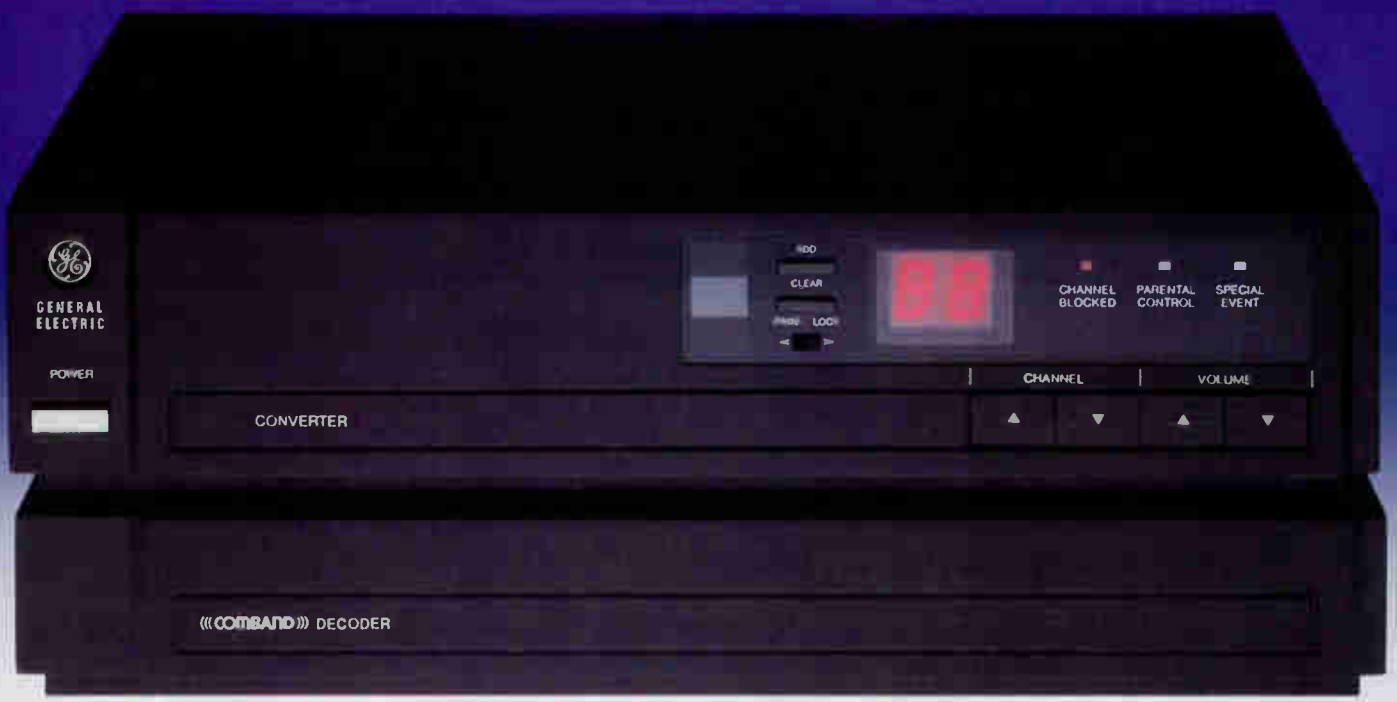
Now MMDS Operators Don't Have To Go Through Channels To Double Their Channels.



The Comband® System.

Forget about red tape. Because now you can take channel expansion into your own hands.

All it takes is the Comband® system from General Electric.

The Comband system is a necessity for all Multichannel Multipoint Distribution Service operators and Instructional Television Fixed Service operators. Because its unique two-for-one technology lets you quickly double the channels within your allotted bandwidth.

The system also offers other features that will enable your operation to reap greater profits. It's flexible, stereo-ready and contains an unsurpassed one-way addressable baseband system. Plus the Comband bandwidth compression process makes signal theft virtually impossible. Unauthorized programs cannot be seen or heard.

The modular design of the Comband system allows you to control when, and to what extent, you upgrade your operation. So whether you're planning to enter a market or planning to capture a larger share of one, you can do so with minimum time and expense with a Comband system.

Before you make any further plans, see the Comband system in action. Call Ron Polomsky at 1-800-432-2253 to arrange a Comband demonstration.

Because when it comes to doubling the capabilities of your operation, we're the authority.

COMMUNICATIONS TECHNOLOGY

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Pirelli plans U.S. fiber-optics R&D center, trains local workforce

LEXINGTON, S.C.—Pirelli Cable Corp., headquartered in Union, N.J., has announced plans for the establishment of a research and development center in Lexington, S.C., to address the needs of the United States and Canada for new and improved fiber optic communications products.

The research facility will adjoin a new fiber-optic cable manufacturing plant. Upon completion, the laboratories and plant will represent an estimated investment of $11.7 million. The proximity of the University of South Carolina was cited by Pirelli spokesmen as a major factor in the selection of the site. The company expects to recruit approximately 75 percent of the center's personnel locally.

James McCourt, vice president and general manager of the Cable Systems Division, has said that the research center will provide technical support services both for Pirelli Cable Corp. and to Pirelli Cable Inc. of Canada. Some projects, he added, will also be conducted on behalf of the worldwide network of Pirelli companies.

Pirelli, in a joint effort with the South Carolina State Board for Technical and Comprehensive Education, has conducted what the company says is the area's first training course in fiber-optic technology.

All 34 South Carolina residents who completed the eight-week, 40-hour course have been offered employment at Pirelli's Lexington manufacturing facility. They represent the first of several groups to qualify for the training program. Approximately 100 workers will be employed in the facility by mid-summer, most of them graduates of the company's training courses.

Don Edelman forms new venture

CHAPPAQUA, N.Y.—Don Edelman, formerly president of RMS Electronics Inc., has announced the formation of Passive Devices Inc. (PDI). Initially, the company will provide two distinctly different lines of passive hardware designed for the CATV industry. A number of the new products will be available with 120 dB RFI.

The Supreme Series is a complete line of matching transformers, splitters, couplers, taps and pads. Features include silver-plated housings, machine-threaded connectors and completely enclosed end caps to protect the pin portion of the connectors. The Standard Series of matching transformers, splitters, couplers, taps and pads offers excellent mechanical and electrical characteristics at competitive pricing, according to the company. Both product lines will be available mid-summer 1986.

At the NCTA convention PDI's new RF surge protection device, the Surgender, was on display for the industry.

The Surgender is designed to protect all types of coaxial cable-connected equipment from damage caused by lightning induced or man-made voltage surges on the cable. Primarily intended to protect converters, the unit will also protect subscribers' TVs and VCRs. The patent-applied-for product will be available this month for delivery.

PDI can be contacted at 201 King St., Chappaqua, N.Y. 10504, (914) 238-8683.

SCTE picks '86-87 officers, awards plaques at annual membership meeting

DALLAS—At a board of directors meeting held March 15 at the NCTA convention, the new board elected its officers for the coming year. They are: president, Robert Luff, United Artists Cablesystems; Eastern vice president, John Kurpinski, Cable Services Co.; Western vice president, Sally Kinsman, Kinsman Design Associates; and secretary/treasurer, Andy Devereaux, American Cablesystems Corp.

Members of the SCTE board of directors were elected by the entire Society membership during its annual elections held in January. The 1986 board is comprised of: Region 1, Bob Vogel, Sytek Inc.; Region 2, Sally Kinsman; Region 3, Steve Bell, Video Cable Systems Inc.; Region 4, Gerald Marnell, Tribune Cable; Region 5, Glyndell Moore, Storer Communications; Region 6, Gary Selwitz, Warner Amex; Region 7, Andy Devereaux; At-Large: Len Ecker, consultant; John Kurpinski; Robert Luff; Tom Polis, RT/Katek Communications Group; and Dave Willis, Tele-Communications Inc.

Jim Emerson, Rex Porter and John Shaw received plaques in recognition for their service on the board during their 1984-85 terms of office, and Tom Polis received a mounted gavel for his contributions as last year's president (see "Editor's Letter," page 6).

Paul Beeman, of MTV Networks Inc. received a special plaque in recognition for his service as a curriculum committe chairman in the Society's BCT/E Certification Program.

In other SCTE news, time is running out for pre-registration to the Society's annual convention, the Cable-Tech Expo, to be held June 12-15 in Phoenix, Ariz. For more details on the expo, circle #1 on the reader service card in this issue and just drop it in the mail.

SSS changes name

TULSA, Okla.—Since March 3, 1986, Tempo Enterprises Inc. has been the official name of Satellite Syndicated Systems Inc. Because SSS, founded in 1978, has introduced so many products and services under separate names into the cable television and satellite communications marketplace, company officials felt it was time to tie all of these various products together under one name to heighten the identity of the total corporation.

Therefore, the name Tempo Television replaces SPN, Satellite Program Network; Tempo Sound is the new name given to Star Ship Stereo; and Tempo Cable is now what was formerly known as Cable Southwest. Other corporate affiliates, subsidiaries and divisions are also taking on new names including: Tempo Data, previously known as Cable-Text; Tempo Productions, formerly named SPN Productions; and Tempo Travel, a travel agency that was known as SPN Travel.

Jerrold, United sign $25 M accord

HATBORO, Pa.,—The Jerrold Division of General Instrument Corp. has agreed to supply cable TV electronics equipment and services to 22 United Cable Television Corp. systems over a three-year period. The estimated value of the orders is $25 million. Delivery has already begun.

United will be converting 22 Western and Midwestern systems to addressability over the next several years and Jerrold will supply VCR-compatible Starcom VI converters and addressable headend control equipment.

Jerrold also will supply system electronics for United's system in East San Fernando Valley, Calif., including two-way addressable converters with volume control and an addressable headend controller. The California system will install a Commander IV headend system and equip approximately 1,800 miles of plant with Jerrold Starline X amplifiers and other 550 MHz distribution equipment.

NCTA asks FCC for use of aural remote frequencies

WASHINGTON—The National Cable Television Association has asked the Federal Communications Commission to reconsider its decision not to authorize cable systems to use certain frequencies for aural remote pickup (RPU) operations on a shared basis with

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VIEWSONICS FM STEREO TV and VCR HOOK UP KITS are "SUBSCRIBER FRIENDLY"...and will save you installation costs.

VSMTV-1 for one way 550MHz systems

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Includes (1) FM Stereo TV, 550 MHz splitter or coupler, (1) 1 foot and (1) 12 foot highly shielded coaxial cable with connectors, (1) matching transformer and (1) A/B switch.

VSVCR-2

Includes (1) AB Switch, (1) 550MHz Splitter, (3) highly shielded coaxial cables with connectors.

Each kit contains an easy-to-use, pictorial instruction booklet.

We can customize kits with your own name, logo and price on the header card and instruction booklet or any variation in components.

VS Viewsonics inc.

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Call Toll Free: 800-645-7600
In New York Call: 516-921-7080

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broadcast and low-power television stations.

In the petition for reconsideration, filed March 10, NCTA also asked that the FCC reconsider its decision to permit cable networks to use only a small portion of remote pickup spectrum and only if the network serves at least 5 million subscribers.

NCTA argued that the FCC, in conluding that cable operators have no particular need for aural RPU spectrum, ignored the NCTA's assertions that cable systems do, in fact, need and want to use such facilities.

NCTA disputed the FCC's determination that "unlimited" cable access to RPU spectrum will cause congestion and interference with broadcast operations, saying that the commission misconstrued the broadcast industry's "reluctance" to share RPU frequency for an "inability" to share.

Studioline establishes warranty service center

RESTON, Va.—Studioline Corp. of America has established a national distribution and warranty mantenance center for the company's Stereo-Track audio decoders.

Stereo-Track decoders come with a one-year limiited warranty on all parts and labor. Studioline imports finished decoders and parts from the manufacturer, Tokyo-based Weston Corp. The distribution center is located at 7719-C New East Riverside Dr., Austin, Texas 78744, (512) 385-1335.

Phasecom ends CATV headend production

LOS ANGELES—Phasecom announced the termination of production of its CATV headend product line. According to the company this product line now represents only a small percentage of its overall business, making manufacturing no longer practical.

The company will maintain its capability for the manufacture of products on a special order or OEM basis at negotiated prices.

For customer service and parts, factory authorized centers have been established at Western CATV (3430 Fujita Ave., Torrance, Calif. 90505-4078, 213-539-8030) and NCS Industries Inc. (2255 E. Wyandotte Rd., Willow Grove, Pa. 19090, 800-523-2342).

Cable museum fund drive launched

UNIVERSITY PARK, Pa.—A $2 million fund drive has been launched to finance the National Museum of Cable Television and a telecommunications center at the Pennsylvania State University School of Communications. Richard Loftus has been named project coordinator.

Loftus, founder and president of Trident Communications Group Inc., is also chairman of the political action committee of the National Cable Television Association. He will be coordinating efforts with the Office of University Development to raise $1 million to endow a faculty chair in telecommunications at Penn State, $500,000 to establish a building program for the museum and the school, and $500,000 for museum operating costs.

Besides preserving cable television's history and accomplishments, the museum will be a center for curriculum development in technology, programming ethics, marketing and related areas.

Midwest Corp. acquires CWY Electronics

CHARLESTON, W.Va.—Midwest Corp. has acquired CWY Electronics, the Lafayette, Ind.-based manufacturer and distributor of equipment and suplies for the CATV and MATV industries.

Sam Silverstein, Midwest president, said that CWY will operate as a subsidiary of Midwest, a cable systems equipment distributor serving the Eastern Seaboard and Appalachian regions for more than 25 years. CWY management will continue directing CWY's manufacturing and marketing, with Bill Whiteley, president; Terry French, vice president and general manager; and Wendell Whitaker, national sales manager.

One CWY service that was particularly attractive to Midwest is the Sync System, a service of inventory control and regular truck route deliveries to cable operators. CWY introduced the Sync System on a regional basis in

September 1985. Silverstein said that plans were being finalized to expand distribution of CWY's line of equipment racks, pedestals, apartment security enclosures and services such as the Sync System.

Anixter expands M/A-COM line

SKOKIE, Ill.—Anixter Communications announced a purchase agreement with M/A-COM Video Products Group to distribute the new VideoCipher 2000E descrambler for the home TVRO market. Anixter also has placed an order for additional VideoCipher II-C units. Initial orders are in excess of $20 million. Anixter has been a stocking distributor of the VideoCipher II-C for the cable TV industry for over a year.

Avantek pays record employee profit sharing

SANTA CLARA, Calif.—Avantek Inc.'s profit sharing contribution to employees for fiscal year 1985 reached a record $4.6 million. This represents a 16 percent increase over the $4 million distributed in 1984.

For each Avantek employee eligible for the full year, profit sharing amounted to approximately 9.1 percent of base pay. This is equivalent to about 4.7 weeks of additional pay for the year.

Aventek has now made profit sharing payments to its employees for 18 consecutive years. Over the past five years, the company has contributed more than $16 million to the employee profit sharing plan. Every Avantek employee who has been with Aventek over this five-year period has received profit sharing contributions amounting to more than six months of additional pay.

In other news, Avantek's Telecommunications Group, Milpitas, Calif., was awarded a contract for $3.2 million from Andrew Corp. of Orlando Park, Ill., for Model AR2000 video satellite receivers and associated electronic components. The product shipments under the contract will continue through June 1986.

S-A ships one millionth Model 6780 converter

ATLANTA—In December 1985 Scientific-Atlanta Inc. shipped its one millionth Model 6780 set-top terminal. The Model 6780, introduced in February 1982, is a 36-channel converter that operates up to 300 MHz.

More recently, S-A received an order from Warner Amex Cable Communications Inc. for the company's newest set-top terminal, the Model 8525, valued in excess of $1 million. Warner Amex intends to use the products in its Destin and Niceville, Fla., franchises.

S-A also received orders totaling more than $1.5 million from Storer Cable Communications Inc. Included in the orders are Model 8520 remote-control set-top terminals, the bulk of which have been delivered to Storer's Sarasota, Fla., franchise. Another order, for Storer's franchise in Little Rock, Ark., calls for Model 8550 addressable set-top terminals and a System Manager III for addressable system control. Installation for this system has already begun.

Brad Cable designated Jerrold service center

SCHENECTADY, N.Y.—Brad Cable Electronics Inc. has been designated as a Jerrold authorized warranty service center at all Brad locations. Brad has service centers in Schenectady, N.Y.; Tampa, Fla.; and Fife, Wash. In addition to naming Brad as authorized warranty centers, Jerrold also appointed Brad as an approved sales center for Jerrold addressable JSX-A and JRX-A converters.

Brad Cable has been listed in *Inc. Magazine* three consecutive years as one of America's fastest growing privately held companies.

Electrohome focuses on commercial satellite field

KITCHENER, Canada—Electrohome Ltd.'s Communications Group announced that it will focus on-going satellite product marketing and investment in the commercial cable TV systems field.

Manufacturing and marketing rights for con-

We increased the capacity, added to the memory. And remember, it's from Panasonic.

We just made a good thing even better. It's the new Panasonic® TZ-PC120 converter. So now you can give your subscribers even more for their money.

For your subscribers who want more channels, our new converter can handle up to 68. Each precisely controlled by phase-locked synthesized tuning, switchable between HRC and Standard/IRC offsets.

When more memory is a subscriber priority, give them a plain converter that can store and select up to 68 favorite channels. Of course, the TZ-PC120 also features direct access as well as all-channel scan. There's even last-channel recall.

When it comes to parental control, we don't kid around. Your subscribers can lock out the few sensitive channels they don't want their children to see. Without affecting the remaining channels. And a stored charge retains the memory for more than two weeks to protect against power failure.

There's also an 18-button infrared remote control unit complete with batteries. It's compact, controls every function and operates while sitting neatly on top of the converter.

As good as all this sounds, one thing sounds even better: The reliability that comes after 25 years of cable know-how. The new Panasonic TZ-PC120. All you have to do is remember it's from Panasonic.

For more information, contact: Panasonic Industrial Company, Video Communications Division, One Panasonic Way, Secaucus, NJ 07094. Or call:

East Coast: (201) 392-4109
West Coast: (415) 672-2592

Panasonic
Industrial Company

Reader Service Number 11.

sumer products have been sold to Finline Communications Inc. of Waterloo, Ontario, a newly established company. Further expansion of the commercial satellite product line at Electrohome is expected in the near future.

Finline will immediately assume responsibility for R&D, manufacutring, marketing, and warranty service for Electrohome's consumer satellite receiver, the E-1. The product will continue to be marketed under the Electrohome brand name.

Convicted cable thief to serve 180-day jail term

AURORA, Colo.—A 26-year-old male resident of this Denver suburb convicted on two counts of cable television service theft in December 1985 has been sentenced to serve 180 days in the Arapahoe County Jail.

United Cable of Colorado was notified in September through an anonymous tip as well as a subscriber that the man was illegally installing cable service. Upon an investigation on the part of United Calbe, and with the testimony of his ex-girlfriend, it was discovered that the guilty party had illegally tapped into the cable box in his fourplex apartment building. Further, it was determined that he had illegally spliced a paying subscriber's cable to the house next door and had tampered with the trapping device on a utility pole. The man then represented himself as a United Cable employee and charged the resident a one time hook-up fee of $50.

The man was convicted and sentenced under the 1984 Colorado Theft of Cable Television Service Statute. This statute makes theft of cable television service a class 2 misdemeanor punishable by up to 12 months in jail, a $1,000 fine, or both.

With numerous convictions under the 1984 statute, the Aurora man is the first person convicted of cable televison service theft in Colorado to actually serve time in jail.

Macom Industries now Pico Macom

LOS ANGELES—Macom Industries. OEM Sales, and Pico Home Satellite West of Van Nuys, are now divisions operating under the new corporate name of Pico Macom Inc., a wholly owned subsidiary of Pico Products Inc. of Liverpool, N.Y. Additionally, Pico Macom Inc. will operate from a new facility in the Lakeview Terrace section of Los Angeles.

System overbuild contract awarded

DALLAS—CATV Subscriber Services Inc. of Greensboro, N.C. has been awarded a construction contract from Mobile Cablevision Inc. to build 100 miles of underground plant. The build is an extension of the present 100 miles now activated and operated by Mobile Cablevision, the second CATV franchise holder to provide cable service to Mobile, Ala. Plans are to complete this second segment of 100 miles of overbuild plant in four months. The contract was signed at the NCTA convention in Dallas.

Wavetek establishes authorized service centers

BEACH GROVE, Ind.—Wavetek has announced the opening of the first of several authorized regional service centers. NCS Industries Inc., Willow Grove, Pa., is now fully authorized by Wavetek to support CATV and broadband test equipment products manufactured by Wavetek Indiana Inc. Services will include warranty repair and calibration by factory-trained technicians.

Can-Am to repair Catel headend equipment

SANTA CLARA, Calif.—George Benton, vice president of marketing and sales for Catel Telecommunications Inc., and J. Larry Parsons, vice president/general manager of Can-Am Service Corp., have announced the signing of an agreement for Can-Am to repair headend equipment for Catel's customers. The agreement is for equipment that is out of warranty.

Nessie and other monsters

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

Monster is a commonly used descriptive noun that may be attached to widely disparate subjects who share many similar characteristics. Firstly, monster means large, important, attention getting. Secondly, it is mythical and unreal. Thirdly, those individuals associated with the monster mystique are unscientific, mentally unbalanced and part of the lunatic fringe of society.

Nonetheless, the monster streak appears in every endeavor, and I have been involved in both the mainstream of monster research as well as an observer of monster-tainted projects in the electronics arena. By no means can this one article cover all the monsters I have investigated, but it will try to point out the amazing coincidences between the animal and the inanimate monsters.

Loch Ness monster

Robert Rines, a physicist and patent attorney, also an old friend, invited me in 1970 to join a scientific team of amateur cryptozoologists journeying to Loch Ness, Scotland, in search of the famous Loch Ness monster. I arrived a skeptic, and departed a believer. To date, no one has obtained uncontested evidence that Nessie exists — neither bone, nor flesh, nor closeup photography — but ample sightings, sonar traces and grainy photos encourage us to return again and again for that elusive definitive sign that there is a Nessie!

Champ

There is another monster, closer to home, in Lake Champlain, N.Y. Champ has not enjoyed the notoriety afforded Nessie. Perhaps New York wineyards are not as potent as the Scotch stills! However, there is a Lake Champlain Phenomena Investigation headed by Joe Zorzynski and in the summer of '85, Richard Smith and I were privileged to hear firsthand the testimony of two lady golfers (good yardage credibility) who saw Champ in the full afternoon sun with three open coils, about 50 feet long, barrel sized body, travelling about 10 miles per hour. Not a plesiosaur, but your everyday sea serpent!

Pay TV

My choice for the runner up in the electronic monster contest. Commander McDonald of Zenith said it first back in 1929: If you want quality TV entertainment, pay for it! This monster is still invisible on a pay-per-view stage even though parts of the beast may appear as happens in the course of a carnival striptease performance.

Until HBO parted the curtain of pay TV in 1975 with satellite delivery, anyone who expressed confidence in the future of pay TV was deluged with the doleful and expensive sagas of past failed pay TV experiments. If I initiated a discussion on either Nessie or pay TV prior to 1975, the reaction was the same: Take an aspirin and you'll feel better in the morning!

CBS color

The premier electronic monster beyond comparison. This is how it went. Sept. 30, 1946, CBS petitions FCC to authorize UHF color stations. Nov. 4, 1946, RCA demonstrates an all-electronic system for color TV. March 24, 1947, FCC denies CBS petition; wants more research. Oct. 10, 1949, CBS demonstrates its new recommended color standards. Sept. 4, 1950, FCC states it will adopt non-compatible 405-line CBS color. June 4, 1951, Supreme Court affirms FCC adoption of CBS color standards. July 27, 1953, NTSC petitions FCC to drop CBS field sequential system. Dec. 21, 1953, FCC approves the NTSC all-electronic compatible color TV standards.

What did that CBS mechanical monster as authorized by the FCC for three years, look like? The Teleking Television Laboratory in 1950 built a CBS-style TV able to receive the experimental CBS broadcasts in New York. We bolted to the bench a large synchronous motor, which rotated at 600 RPM a 3½-foot diameter spiral color wheel positioned in front of a 10" black and white TV set. Nevermind the cost of the electronics, we were instantly intimidated by the "roar" of the monster at 600 RPM. It would have had to be enclosed in a soundproof cast iron box weighing hundreds of pounds to pass any reasonable safety standards. Our recommendation to management: Hire an FCC lawyer, if he fails to slay the CBS monster, close the factory!

Other monsters

Here are some other electronic monsters: quadrophonic FM; cordless telephone assignments; 41-56 MHz FM; TV Channel 1; the failure to scramble all microwave channels; failure to eliminate VHF TV channels in favor of UHF; failure to eliminate UHF taboo tables; BTSC stereo sound; AM stereo. Every engineer has his own cherished monsters, I am sure.

If pay-per-view should ever turn profitable, and Nessie would pose for pictures in sunlight, perhaps my few remaining friends will cease suggesting the salubrious ministrations of a psychiatrist.

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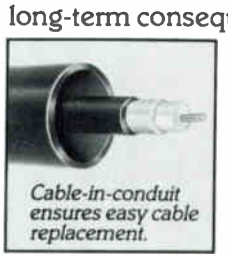

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The lead acid cell: Cable television's great unknown

With the ever-increasing use of standby power and consequently lead acid storage cells, the need for an understanding of this device and its components has arisen. No one battery is perfect, but with a basic knowledge of cell constructions and their corresponding performances, one can then appreciate the manner in which batteries are treated when exposed to the charge and discharge parameters of the industry's available equipment. This article will deal with the various design and application characteristics one should be aware of when called upon to make a choice from today's available products.

By Marty deAlmina
Manager, Non-Cable TV Markets
Burrup & Sims, Lectro Division

A brief look into the past shows that subsequent to research conducted during the years 1859 to 1879 by Gaston Plante (considered to be the father of the lead acid cell), a wealth of ingenuity and imagination was employed to provide a rapid evolution in the design and application of early batteries. This period of advancement continued until the turn of the century. Since then, the improvements have been essentially refinements of these early designs using more modern materials and techniques.

Needless to say, there is still no ideal battery, one which would exhibit infinite energy, handle all power levels, operate over a full range of temperatures, have an infinite shelf life and be consumer-proof. Since batteries haven't reached perfection, we must approach the device with its many limitations in mind.

In the design of a lead acid cell, the function of the various components must be considered in relation to the actual requirements of the application for which it will be used. It is worth noting that any design is a compromise. Cells that are designed, for example, for optimum capacity at relatively low or moderate discharge loads contain maximum quantities of active material. At the other extreme, cells capable of high-rate, large current delivery performances are designed with reaction surfaces and other features to minimize internal resistance. The latter is done often at the expense of total capacity.

It will be found that cells designed for high-

'The SLA technology, as applied to CATV uses, would seem to have the best of all available performance characteristics'

Figure 1: Capacity/power loss during storage at 25°C

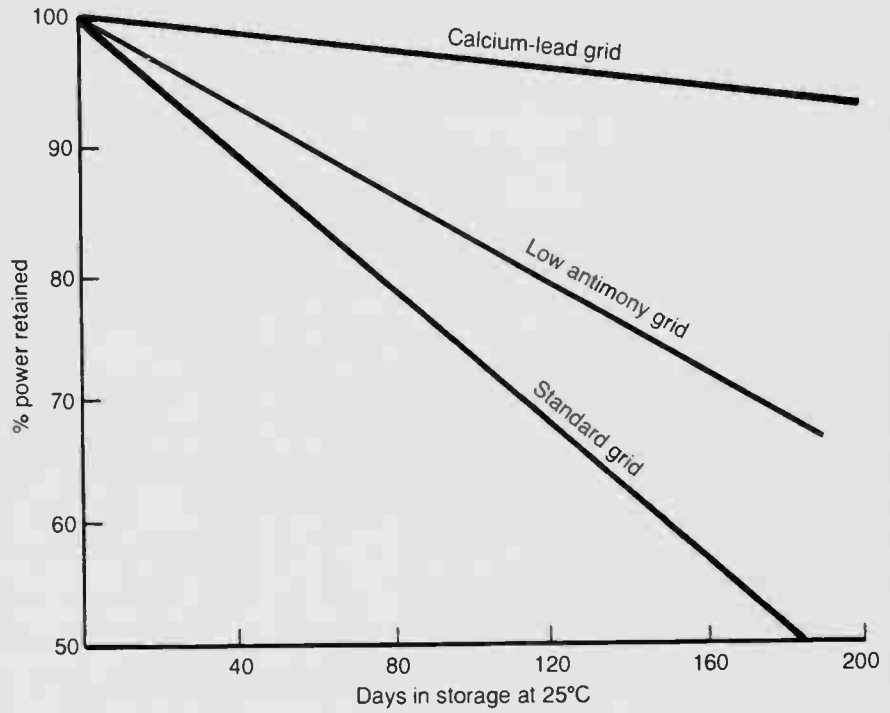
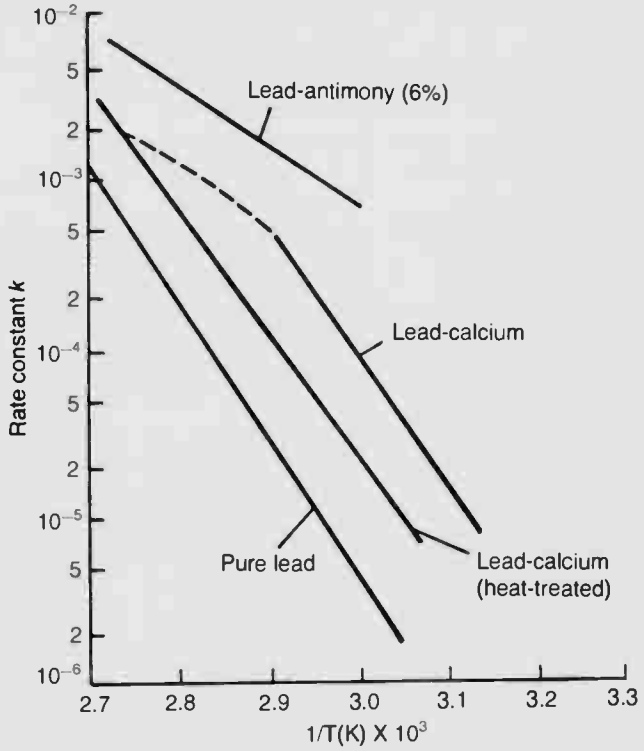
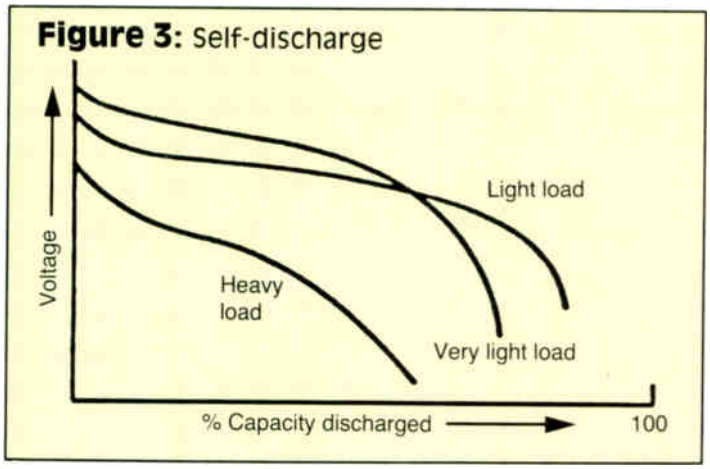
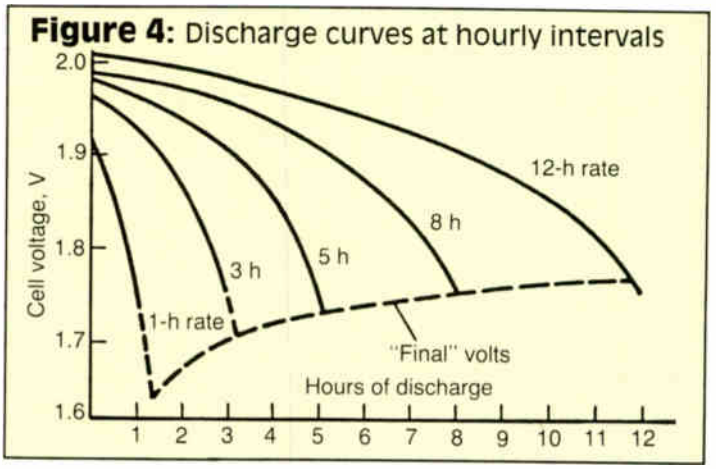


Figure 2: Plate corrosion rate chart



Corrosion rate constant *k* on log scale vs. *i/t* (*K*) for different lead-alloy grids.





rate service will exhibit a more constant performance, i.e., current output, than those of the greater capacity category; which is to say that capacity is a statement of the total time a particular cell can deliver a stated rate of service.

The typical lead acid battery is comprised of three basic elements: the positive plate, the negative plate and the electrolyte. There are, of course, other nonreactive components such as the separators, connecting straps and case. We will only consider the active components and interrelated effects.

Plates and grids

The plates should be considered as a compound element in that they are a combination of two items. First, a grid is formed by one of several methods. The most popular, for a vertical plate design, is a casting process where the lead is poured into a mold to form the basic structural component.

The second most popular process employed today is a wrought technique where a solid lead sheet is drawn through an expander that places slots in the sheet and then stretches these slots into openings much like the common expanded mesh sheets available from most hardware suppliers. This system reduces the cost of manufacture as there is less energy required to process a continuous sheet of lead as opposed to that of individual castings. The advantage of individual casting is that changes can be made in the lead mixture at any time, while in the wrought process the entire lead supply must be reworked.

After the grid is prepared, a mixture of highly reactive sponge lead for the negative electrode or lead dioxide for the positive electrode is mixed with sulfuric acid to form a paste. Included in this mixture are sufficient expander materials to maintain porosity, this being necessary to achieve an optimum ion conductivity in and out of the plate material. The paste is then spread onto the grid, which will provide the necessary structure and electrical conductivity required.

There are, however, several points regarding the lead which must be addressed. If pure lead (chemically by far the most desirable element) were to be used for the grid structure, it would not exhibit enough rigidity to withstand

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Figure 5: Discharge/charge characteristics

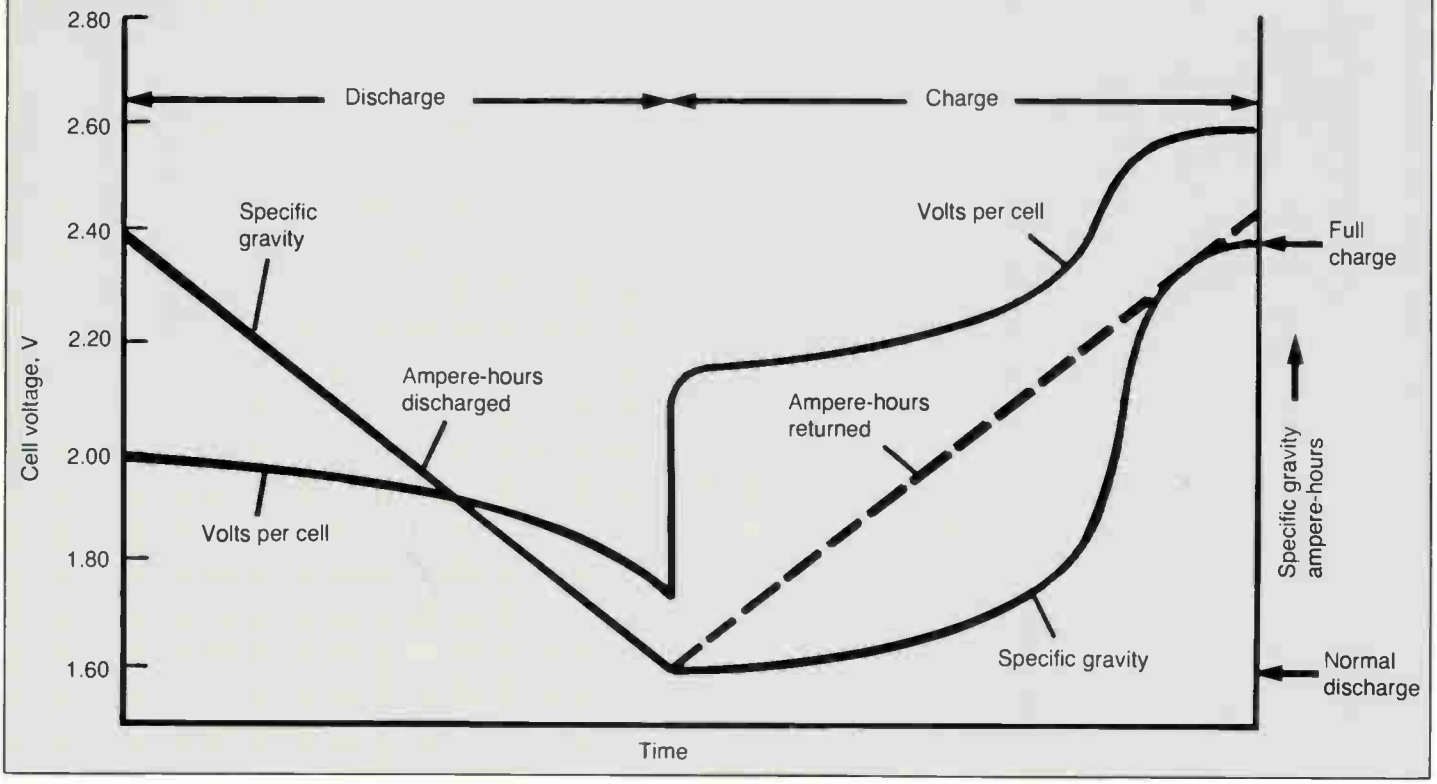
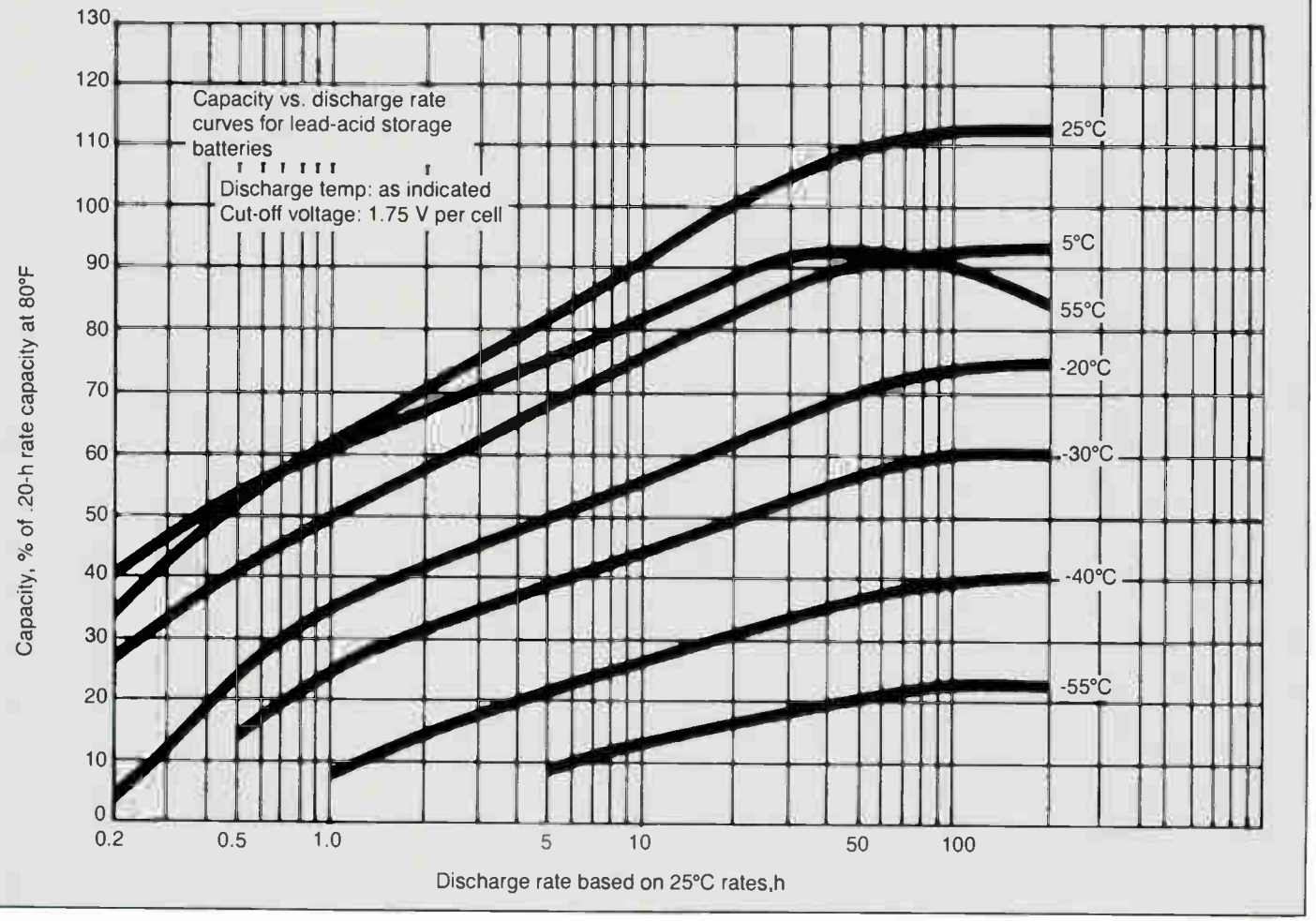


Figure 6: Temperature effects on electrolyte



handling during manufacture, not to mention the actual in-service requirements.

This then dictates that an alloy be introduced into the pure lead to add sufficient strength and rigidity. Historically an antimonial alloy was used as this strength-adding agent. The presence of this compound exhibited two major negative side effects, the first of which is that of excessive gas production.

This gassing is a direct result of electrolysis depletion of the water at the end of charge. This electrolysis produces hydrogen at the negative plate and oxygen at the positive plate. The main contributor to this activity is the presence of the antimony alloy. In the past, low-cost vertical plate design batteries were routinely maintained and frequent watering intervals were not of great concern.

In the mid-1970s, the maintenance-free lead acid battery became popular. This design featured a grid alloy that was basically a nonreactive component. By removing the antimonial alloy, plate corrosion (which also increased the water depletion as the cell aged) was reduced. The nonreactive strengthening agent produced a more nearly pure lead grid, resulting in a dramatically reduced end-of-charge gassing rate. This was the introduction of the lead-calcium battery. The inclusion of calcium resulted in a reduction of the antimony to generally no more than .15 percent.

The second ill effect of using antimony for grid alloy is its contribution to a high self-discharge rate. This loss of battery capacity while in storage is dependent on a number of factors, including the type of lead alloy used, the concentration of electrolyte, the age of the battery and the storage temperature. However, the primary culprit is antimony lead alloy. Self-discharge is caused by local reaction of the plate materials and occurs almost entirely in the negative electrode. The rate of self-discharge is about 15 percent per month for antimonial-lead batteries at 25° C. Batteries using lead-calcium grids have substantially lower rates of self-discharge.

For best practice, a battery on stand (in storage) should be recharged every three to six months, since prolonged storage can cause irreversible damage and make recharging difficult owing to sulfation of the plates (see Figure 1).

Stationary batteries utilize a thick plate design that reflects the lack of need for high energy and power as in the case of starting, lights and ignition (SLI) types. The typical overcharge operation of stationary batteries requires a large electrolyte volume and non-antimonial lead grids, all to maximize intervals between waterings. This over- or constant recharging, by any of the various on-off, dual-rate or closed loop methods used today, causes some positive grid corrosion. This is manifested as "growth" or expansion of the grid structure and must be allowed for during design of the cell so as to provide room for this normal expansion to take place during the useful life of the battery. Excessive overcharging can accelerate this activity to a point where, if allowed to continue over time, it may cause case rupture to occur. The normal tolerated growth is calculated to be about 10 percent over the life of the cell (see Figure 2).

Electrolyte and specific gravity

The selection of a specific gravity (sp.gr.) used for the electrolyte depends on the application and service requirements. The concentration must be high enough for good ionic conductivity and to fulfill electrochemical requirements, but not so high as to cause separator deterioration or corrosion of other parts of the cell that would shorten life and increase self discharge.

In some cases where a battery is required to operate in high ambient temperatures, the electrolyte concentration may be deliberately reduced to offset the effects of temperature elevated chemical activity resulting in accelerated plate corrosion and lowered overvoltage gassing potential.

The concentration for most lead acid batteries to be used in temperate climates is usually between 1.26 and 1.28 sp.gr. Higher concentrations tend to attack the separators and other components. Lower concentrations tend to be insufficiently conductive in a partially charged cell and freeze at low temperatures. In standby and stationary cells with larger proportional electrolyte volumes and no high rate demands, concentrations as low as 1.21 sp.gr. are used.

It is important to maintain not only the correct sp.gr. at full charge per the manufacturer's specifications; but also, especially in the

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case of calcium alloyed grids, not to contaminate the acid solution. A preventive measure, from the manufacturer's standpoint for automobile batteries, has been to permanently attach the vent caps. This is done understanding that under normal conditions the electrolysis of the water will be at a rate far lower than the overall aging of the cell. Therefore, cell failure due to other factors will occur prior to damage caused by water loss.

If the electrolyte is allowed to become contaminated, as in the case of replenishment with other than distilled water, an increase of the gassing rate will result. This obviously will increase watering intervals and if at these times the same practice of using non-distilled water is employed, the gassing rate will again be increased. This practice, if allowed to continue, will most likely result in premature failure of the cell as it is highly unlikely that the watering schedules will be adjusted to compensate for this increased loss.

Voltage and specific gravity

The nominal voltage of the lead acid cell is 2 V. The open circuit potential is a direct function of the sp.gr. ranging from 2.12 V for a cell with sp.gr. of 1.28 to a potential of 2.05 V at 1.21 sp.gr. Figures 3, 4 and 5 present typical discharge curves for the lead acid cell. The end voltage is usually about 1.75 V, but can be as low as 1.0 V at extremely high rates such as in automotive starting service. During discharge the sp.gr. decreases about 0.125 to 0.150 points from a fully charged to a fully discharged condition. The change is proportional to the ampere-hours discharged.

The sp.gr. is thus an excellent means for checking the state of charge of the battery. A short period should be allowed prior to measurement after completion of the discharge for equalization of the concentration throughout the cell. On charge, the change in sp.gr. should similarly be proportional to the ampere-hours accepted by the cell. There will be a lag if the cell incorporates a high concentration of electrolytes as complete mixing of the concentration will not occur until overvoltage gassing occurs at the end of charge.

The variation of the performance of the lead acid cell at different temperatures and loads is given in Figures 6 and 7. Although the battery will operate over a wide range of temperatures, continuous operation at high temperatures may reduce cycle life as a result of the aforementioned increased rate of chemical activity and subsequent corrosion.

It should be understood that in applications where the battery will be housed outside, subject to very low temperatures for long periods of time (dissipating the internal heat needed for full capacity delivery), some form of warming provision should be considered. If long-term storage is going to take place, an area should be chosen that will provide a low mean temperature but will not fall below freezing, as temperatures below 32°F may cause damage to partially or totally discharged cells.

Phosphoric acid effects

The utilization of phosphoric acid as an electrolyte additive was patented in 1929 for the purposes of strengthening the positive active material and preventing harmful sulfation during long discharged stand conditions. In the case of cell designs using tubular positive plates, a reduction in active material shedding and in the rate of positive grid corrosion have been claimed.

It has been demonstrated that cycle life of lead acid batteries using plates with lead-calcium grids is increased when the electrolyte contains small amounts of phosphoric acid, but with the cost of five to 10 percent reduction in the positive plate capacity. The mechanism by which phosphoric acid increases cycle life is the pattern modification of the lead sulfate as it forms on the plate's active material surface.

The result is a more conductive interface, with less sulfate barrier and less interference with the discharge process. There are also chemical and/or electrochemical reactions that occur between the phosphoric acid and the positive plate active material, with phosphoric acid incorporation at the time of charge and release during discharge. However, the formation of lead phosphate compounds in the positive plate during charge is the likely

Figure 7: Effects of varying discharge loads

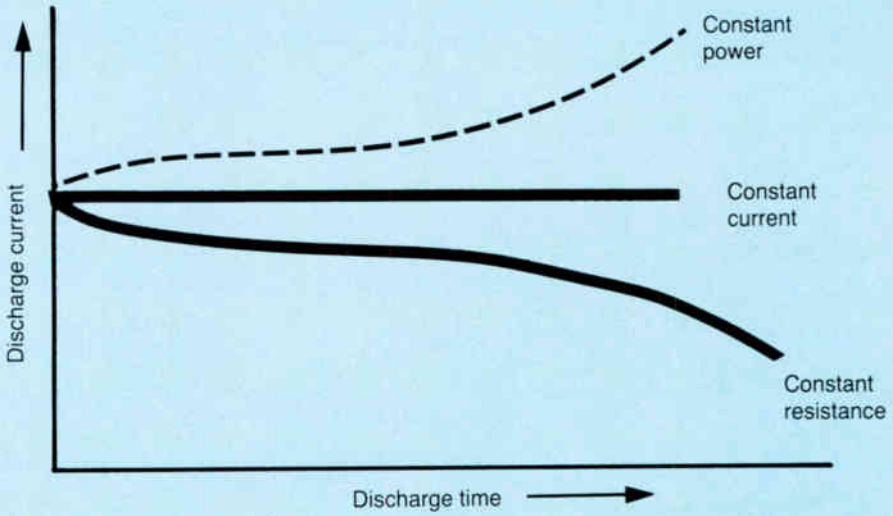
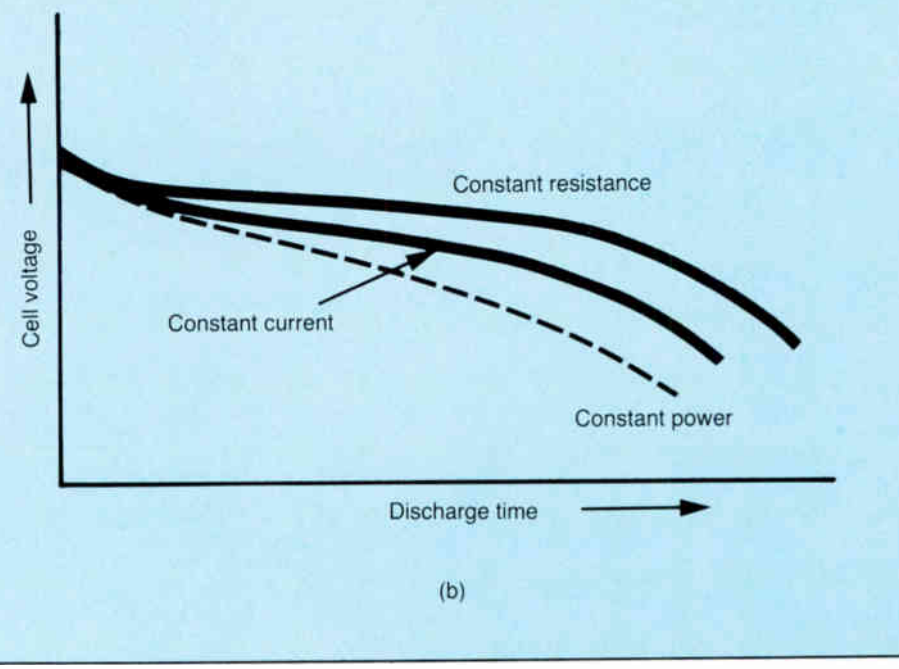
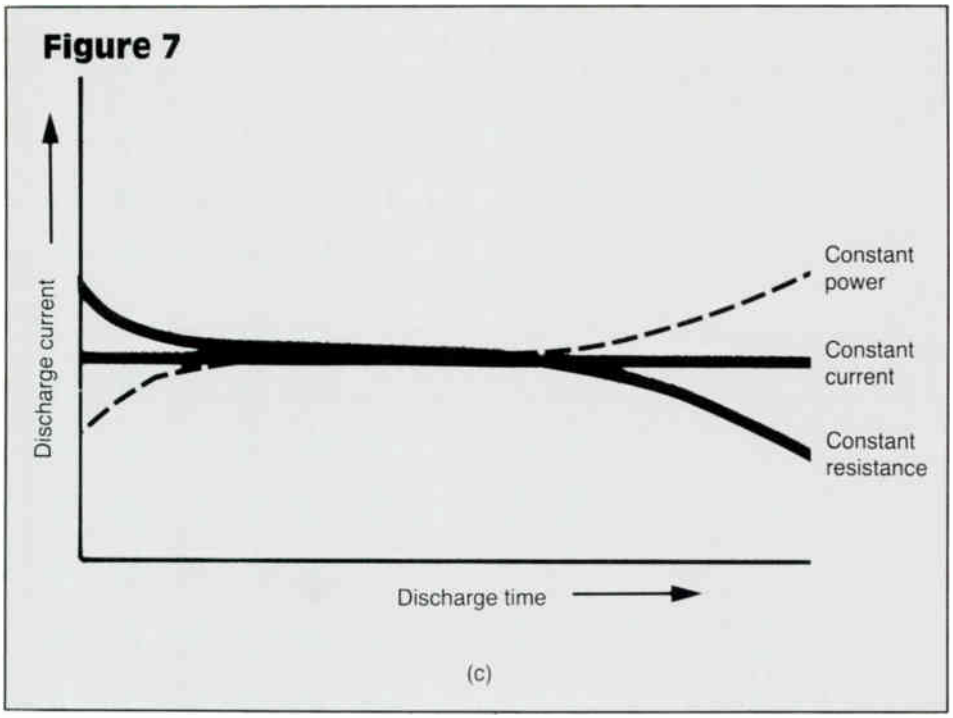
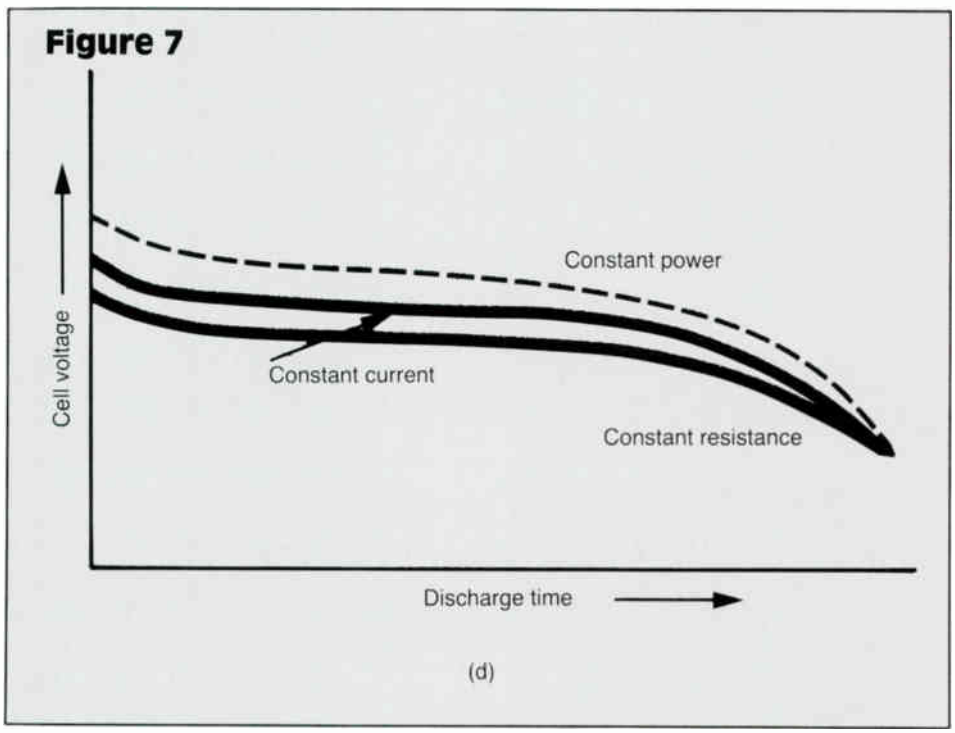


Figure 7







candidate for responsibility of the observed reduction in capacity in such cases. Other effects due to the presence of phosphoric acid in the electrolyte solution are lead "mossing" and dendrite formation, both of which are factors that tend to reduce capacity.

Each cell design has a particular point at which its energy is considered exhausted. This specification is termed "cutoff." Excessive discharge has a direct influence on the service life of the battery; for this reason the manufacturers state this voltage for their products. A system designed to be powered by batteries should be capable of operating efficiently from the full range of the battery's useful capacity. A unit that can tolerate only a small window of input variation will not have the same operational time as a system that can operate over the specific upper and lower limits of the selected battery. If the battery is excessively discharged on a recurring basis, then excessive plate corrosion and insulative deposits will be allowed to occur.

Another type of capacity-reducing discharge rate is one whose rate is extremely light. This has a tendency to also accelerate the deterioration of the chemical components as well as forcing the self-discharge to become a factor in overall capacity determination (see Figure 2).

Recently the cable industry has seen the entrance of a battery technology that utilizes an electrochemical action that claims to be effective in offsetting some of the various drawbacks of the traditional cell, be it flooded with a free electrolyte or with the acid in a gelled medium. It is of a lead acid composition with vertical plate construction utilizing a calcium-alloyed grid structure. The electrolyte is suspended in a glass fiber wick substance that, by capillary attraction, holds the acid suspended between the plates, eliminating the need for a flooded environment. Note that it is only the acid between the plates in which the ion activity takes place; the balance, in a typical flooded design, is there to reduce the replenishment requirement.

In this configuration, the electrolyte has been starved of its oxygen content and has incorporated an excess of negative active material. These two main factors, operating together, facilitate the recombination of the gases given off during charge and eliminate the need for replenishment since electrolysis of the water is kept to a minimum and any gases not recombined are held within the cell's own atmosphere. Being sealed also prevents the possibility of contamination from outside pollutants. These batteries exhibit a lowered internal resistance allowing for good charging characteristics and the capacity to deliver peak currents greater than those of a flooded design.

Discharge loads

A battery will discharge under different modes if the equipment loads are different. Three typical modes are 1) constant resistance (the equipment resistance remains constant during discharge); 2) constant current; and 3) constant power (the current load on the battery increases as the voltage drops to maintain a constant power, I x V).

Assuming that the discharge current is the same at the start of the discharge, the current will be different during the discharge under different discharge modes, as shown in Figure 7a. The constant resistance curve reflects the drop in the battery voltage.

Figure 7b shows the voltage vs. time discharge curves for the three modes. Under the conditions shown, the service time is longest in the constant resistance mode.

Figures 7c and 7d show the same relationships, assuming the same average current during the discharge. Under these conditions the service time is about the same, but the voltage regulation for the constant resistance mode is best. The constant power mode has the advantage, however, of providing the most uniform equipment performance throughout the life of the battery and, hence, makes most effective use of the battery's energy.

It is worth noting at this point that standby equipment powering line equipment will regard this load as a more nearly constant power load. In the case of a pulsed discharge load, these conditions will exhibit the recovery effects that occur when the cell is left open circuit for a period of time after discharge. This sawtooth type of response will, in some cases, lead one to think that a battery has sufficient charge to operate when in fact it has reached cutoff under load, but has had time to recover above the specified exhaustion voltage (see Figure 8).

Battery charging

Proper recharging is important in order to obtain optimum life from any lead acid battery under any condition of use. Some rules for proper charging are given here and apply to all types of lead acid batteries. The charge current at the start of the recharge can be of *any* value that does *not* produce an average cell voltage in the battery string greater than the gassing voltage, which is typically 2.39 V/cell.

During the recharge and until 100 percent of the previous discharge has been returned, the current should be controlled to maintain a voltage lower than the gassing voltage. If one wishes to minimize charge time, this voltage should be just below the gassing point, which is directly related to the sp.gr. and cell temperature. When 100 percent recharge is accomplished, the charge rate should be reduced to the "finish" rate, described as a constant current no higher than 5 amps (A) per 100 ampere hour of the rated capacity.

Some of the more popular methods to achieve recharge are:

1. Constant current
2. Contant potential, modified constant potential
3. Taper
4. Pulse
5. Trickle
6. Float
7. Equalize charging.

1) Constant current: Constant current recharging at one or more rates is not widely used for lead acid batteries. This is because of the need for current adjustment; unless the charging current is kept at a low level throughout the charge cycle, resulting in an extremely long recharge time.

2) Constant potential, modified constant potential: In normal industrial applications, the modified constant potential is employed. In this case the charging circuit has a current limit, and this value is maintained constant until a predetermined voltage is reached. Then the voltage is maintained constant until the battery is called upon to discharge.

It has been found that more than 50 mV positive negative over potential is necessary to prevent self-discharge. So that .005 A float current per 100 ampere hour of capacity is required for lead calcium batteries. Lead antimony cells require at least .06 A per 100 ampere hour, but this increases to about .6 A per 100 ampere hour as the battery ages. This higher current also increases the water electrolysis depletion rate. This can be attributed to plate grid corrosion and accelerated sulfation. Decisions must be made regarding the current limit and the constant voltage value in accordance with the manufacturer's specifications.

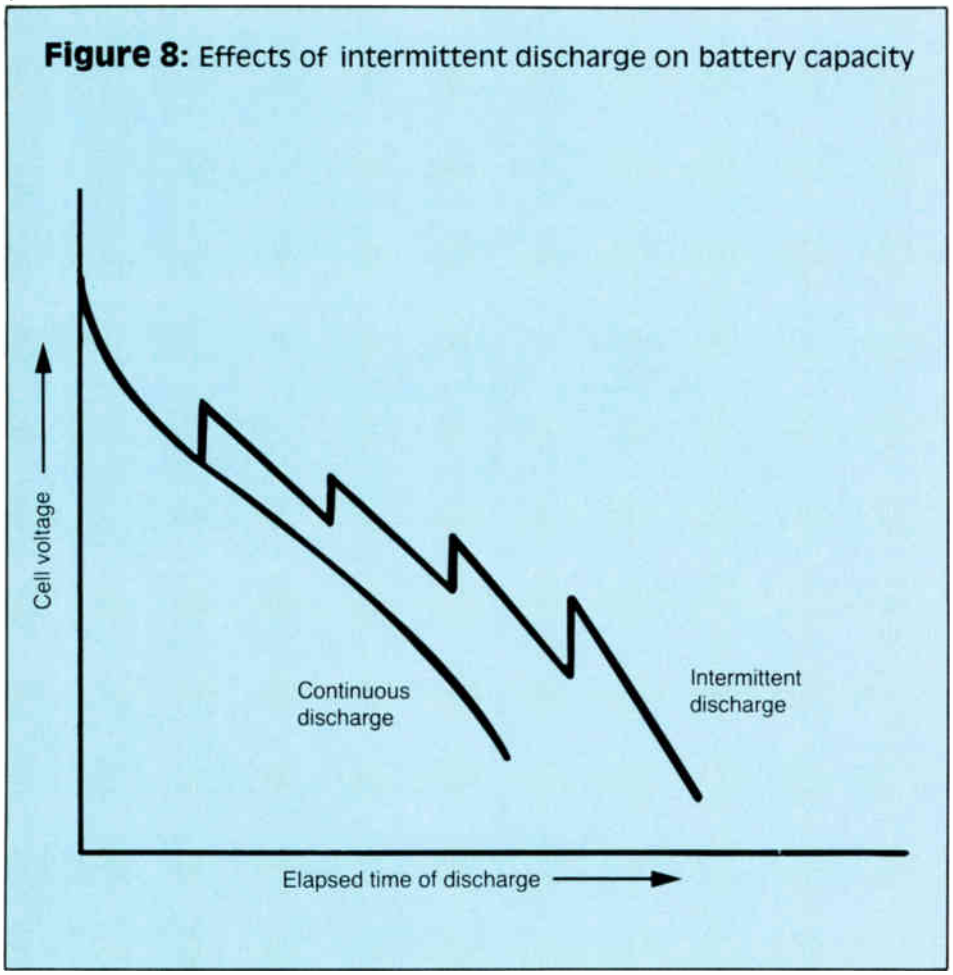
3) Taper: The taper charging is a variation of the modified constant potential method using less sophisticated controls to reduce equipment costs. The initial rate is limited, but the taper is such that, if special precautions are not taken, the 2.39 volts per cell at 25°C may be exceeded prior to the 100 percent return of charge. This method could result in gassing at the critical point of recharge. The degree of gassing is a variable depending, among other things, upon the charger design. Battery life can be degraded from excessive gassing. The voltage required to "gas" a battery decreases with increasing "electrolyte" (not ambient) temperature.

A correction factor for the actual temperature of the electrolyte should be employed. The end of charge is often controlled by a fixed voltage rather than a fixed current. Therefore, when a new battery, which has a high counter-electromotions force (CEMF) is used, this battery often does not receive sufficient charge. Conversely, an older battery whose CEMF is low, will now receive a higher than normal finishing rate resulting in excessive gassing.

4) Pulse: A pulse system periodically disconnects the batteries from the charge circuit and performs a high impedance, no load, voltage check. If the open circuit voltage is above a preset value, depending on the reference electrolyte temperature, the charger is not called upon. When the open circuit voltage decays below that limit, the charger delivers a DC pulse for a fixed period of time.

The duration of the open circuit and charge pulses are chosen so that when the battery is fully charged the time for the open circuit voltage to decay is exactly the same as the charge pulse duration. When the charger senses this conditon, it is automatically

Figure 8: Effects of intermittent discharge on battery capacity



switched over to the finish rate current and short charging pulses are delivered.

5) Trickle: This is a constant current simplistic system that delivers a very low current to the battery and is used mainly to overcome the effects of self discharge. There are no provisions for any compensation techniques.

6) Float: This is a system used to deliver a low rate, constant potential charge. In its purest form it will be found in applications where stationary batteries are used in constant temperature environments.

7) Equalize charging: There has been much discussion within our industry regarding the need to subject lead acid cells to an "equalize" charge. The decision to or not to expose the battery to this type of treatment must be based on the type of battery product one is intending to use.

In cells where a high sp.gr. is employed, as with SLI types used for high current delivery, the cell is normally exposed to an environment where it is frequently agitated (auto, truck, boat, etc.).

If the same product is placed in a stationary environment, the acid content in the electrolyte settles to the lower portion of the cell. This occurs since the chemical weight of the sulfuric acid is greater than that of water, a condition described as "stratified electrolyte." The main down-side effects on cell performance are increased plate corrosion and gassing in this high concentration area, an overall lowered capacity due to lower than normal sp.gr. in the upper portions of the cell and incorrect sp.gr. readings in relation to state-of-charge. Obviously stratification will not occur in a motion-type of environment.

In stationary applications, an excessive overcharge can be placed on the cell, forcing it to gas excessively and creating an effervescent type of action. This gassing activity will, in time, churn the electrolyte sufficiently to equalize the mixture throughout the cell.

This type of overcharge should be applied directly after recharge for a period of two to four hours. Shorter periods tend not to accomplish a complete equalization. If the cell has been allowed to stand in a discharged state for long periods of time, this treatment will also tend to shed the sulfation that may have had a chance to form.

The main disadvantage of this type of activity is the excessive water loss during the equalizing period. A charging system employing this type of overcharge will dictate the need for increased attention to the water level. Failure to do so will result in the plate surfaces becoming exposed to the atmosphere and thereby accelerating the plate material shedding process, shortening the life of the cell.

Free electrolyte flooded lead acid cells designed for CATV applications will be found to have a very light sp.gr. as the need for large power delivery is not required. These cells typically will have a sp.gr of around 1.12.

Testing conducted at G.N.B. Inc. in St. Paul, Minn., revealed that stratification did not occur in cells with this particular sp.gr. choice. It is also the opinion of G.N.B. that subjecting cells of this nature to an equalizer charge is not only unnecessary but does not enhance cell life.

In the case of gelled electrolyte cells, the gelled state of the electrolyte will prevent stratification from occurring. One can therefore deduce that in this case equalized charging is also not recommended. As a point of fact, premature cell failure can result by exposing these products to this form of overcharge. This is due to the excessive dehydration of the gell which occurs in the area where it contacts the plate surface. If allowed to continue the gell will be unable to rehydrate itself and failure will result.

Conclusions

As can be seen from the information given here, wise application of the proper battery for a specific need is most important. The cable television industry has basically three cell configurations to choose from: the traditional flooded lead acid battery, the gelled flooded battery and now the SLA configuration.

Of the three mentioned, list price comparisons will show that the traditional flooded type has the lowest cost, with the gelled and SLA being competitive with each other. The obvious disadvantage of the flooded type is the need for water replenishment and the overhead cost therein. The gelled types of no maintenance cells also can be thought of as "can't be maintained cells," as replenishment of dissipated moisture is impossible. They do however have very low gassing rates so as to provide an improved life performance before replacement is required.

The SLA technology, as applied to CATV uses, would seem to have the best of all available performance characteristics. It can be spoken of as the only true no maintenance product. Its inability to vent the internal gases obviously will prevent it from dissipating the electrolyte moisture. Improved internal resistance characteristics provide for greater capacities at lower temperatures as well as more desirable recharge results. Another positive point lies in the fact that freezing will not affect the cell adversely as in the case of flooded types. The only result will be that the cell will not operate until the internal temperature has been raised above the electrolyte freezing point, allowing ion activity to resume.

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Martin de Alminana is head of Lectro's field engineering department. He comes to Lectro with a background in computer-based automated test systems for the aviation industry, system design and application of RF communication equipment. He has also served as an instructor on military microwave communication installations.

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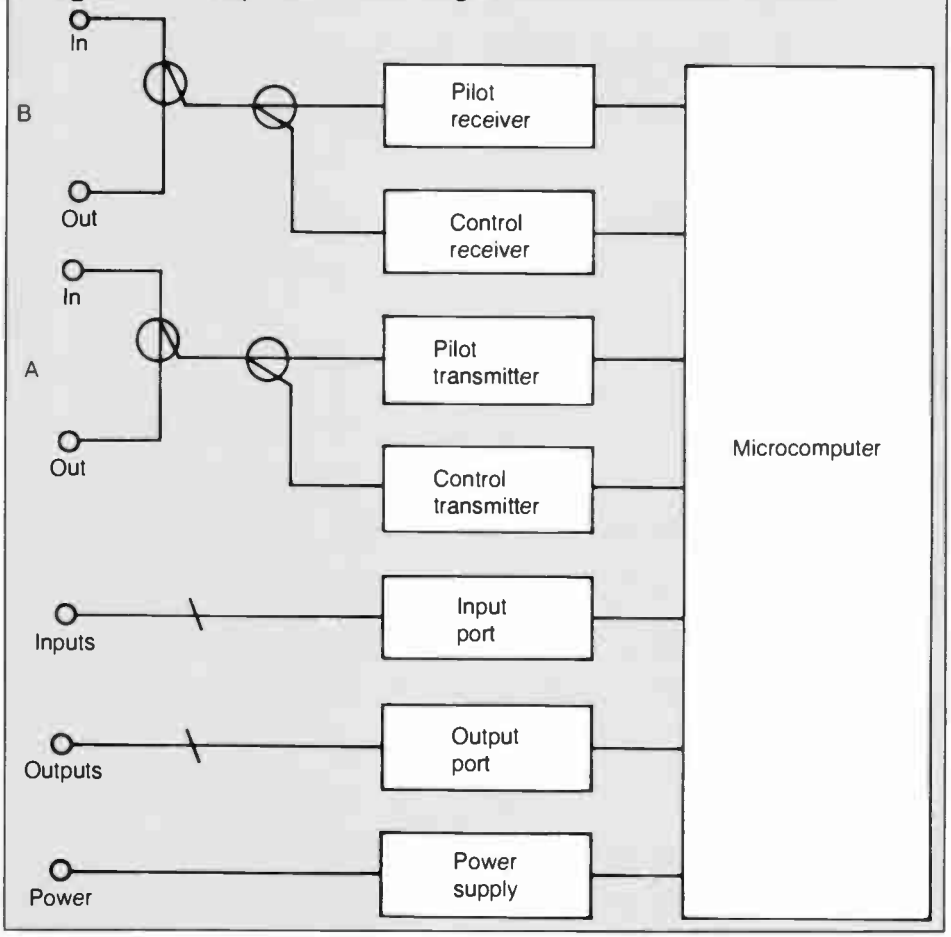
Reader Service Number 20.

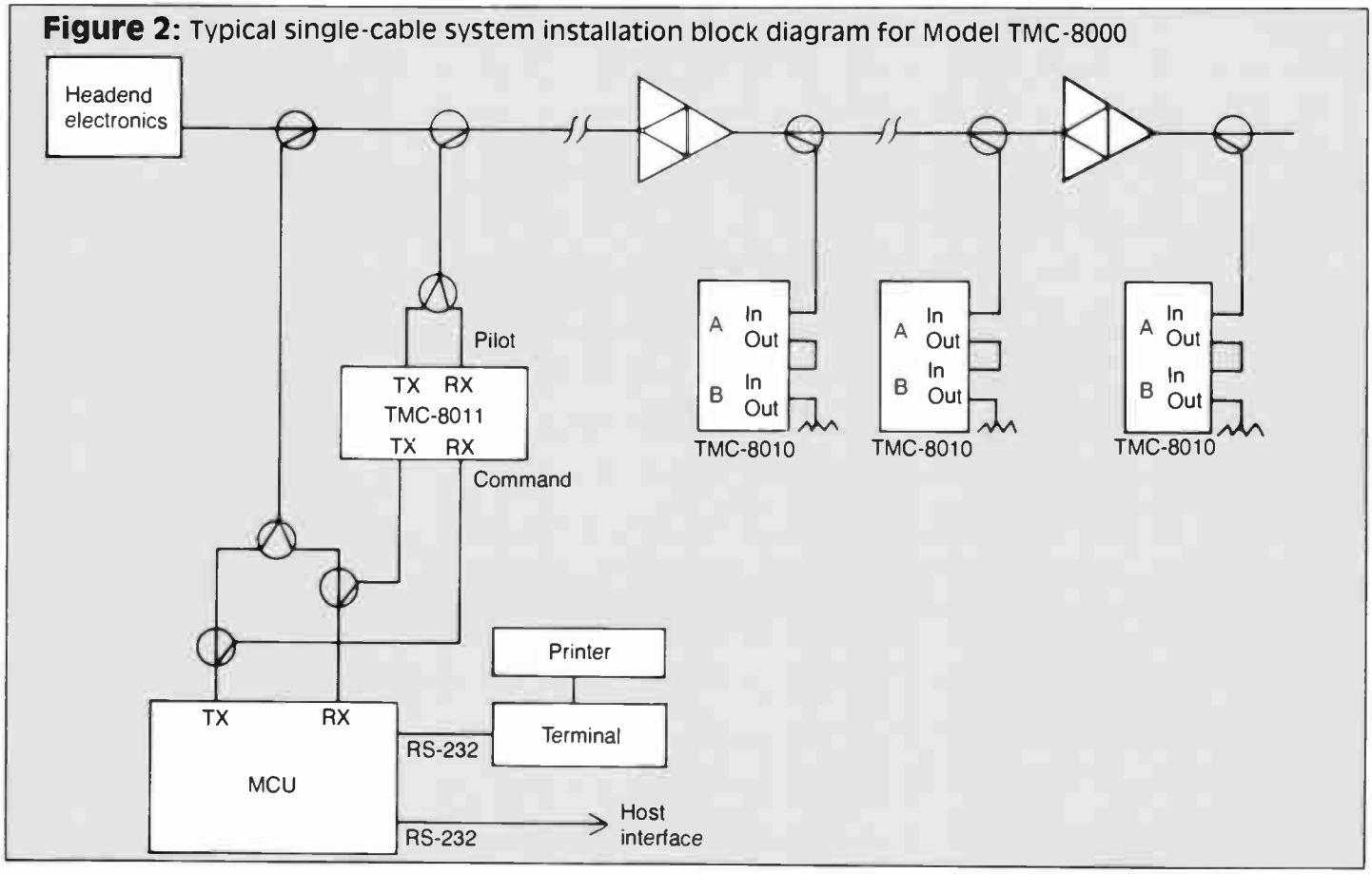
Figure 1: Simplified block diagram of the Model TMC-8010



Stand-alone for LANs and

The successful use of broadband (CATV) techniques for local area networks (LANs) demands the highest possible plant reliability. In order to achieve this goal, improved techniques are required, particularly in the area of automatic, full-time, comprehensive status monitoring of the broadband plant. Continuous upstream and downstream level monitoring are required at critical points, usually independent of amplifier locations. Ingress detection and isolation are a must, in order to

Figure 2: Typical single-cable system installation block diagram for Model TMC-8000



monitoring cable TV

maintain system performance and anticipate problems. A system of this nature, which already has been developed and deployed in local area networks, will be described in this article.

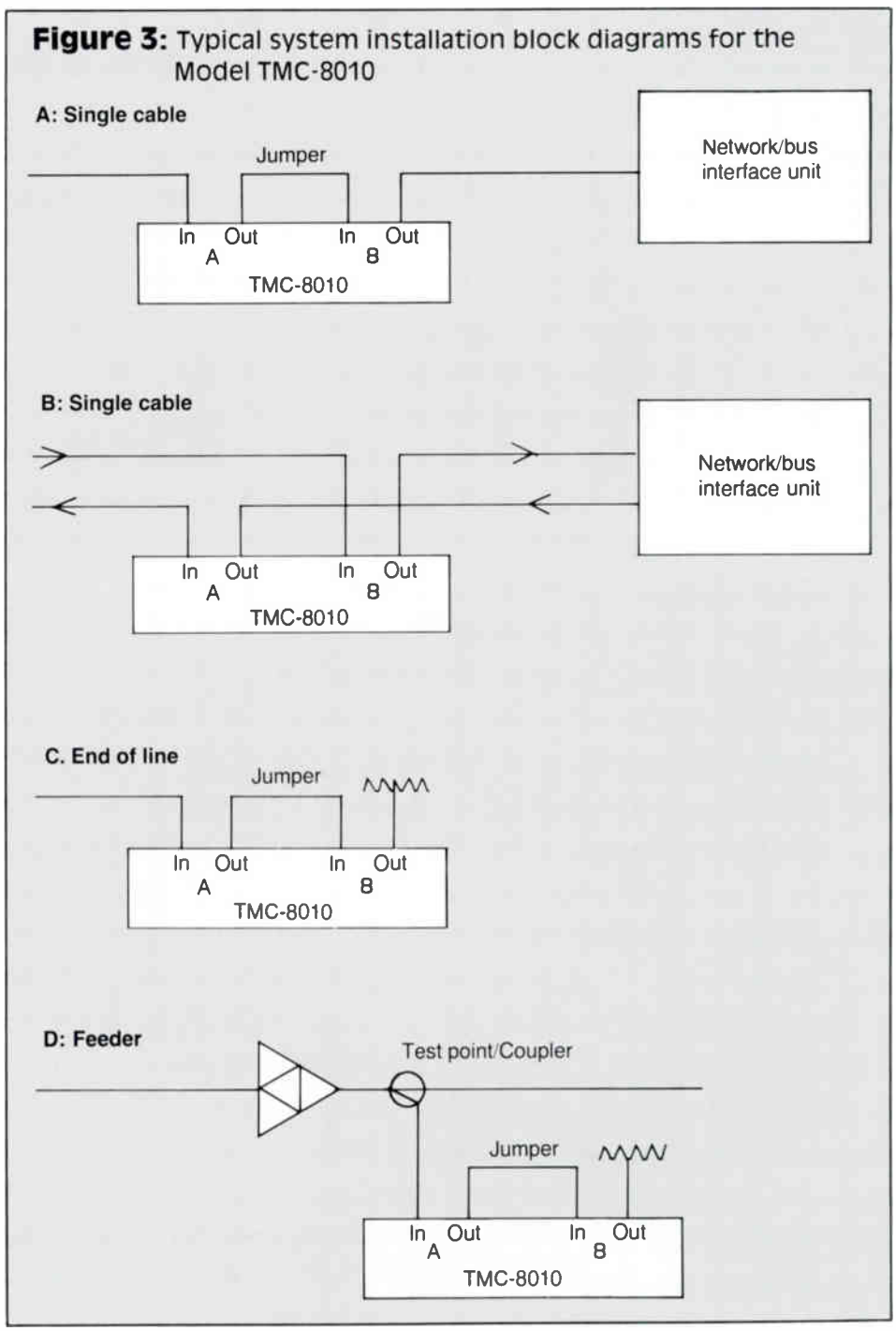
By Robert V.C. Dickinson
AM Cable TV Industries

And Roger W. Stevens
Network Technologies Division, AM Cable TV Industries

CATV system reliability has always been a concern of both network designers and operators. The level of concern has continued to grow as the number of subscribers have increased along with the number of services. Although system outages used to be expected by customer and operator alike, their occurrence has been reduced by careful system design and maintenance provided by the sophisticated CATV operator. The employment of broadband technology in local area networks demands the utmost in reliability and performance to support the extremely critical services handled. LANs are essentially two-way cable systems and may carry hundreds or even thousands of data circuits along with video and other ancillary services vital to the operation and efficiency of commercial, institutional and industrial processes. The quest for the highest reliability and availability in these installations has highlighted the need for status monitoring above and beyond that employed in traditional CATV systems; i.e., utilizing single-frequency monitoring at amplifier locations only.

To further develop these thoughts, consider what functions and parameters should be monitored to achieve both the best possible knowledge of the cable plant's performance and the means necessary to control the causes of deterioration or fault conditions. We are always concerned that levels and frequency response are maintained within their proper tolerances. In order to properly interpret these parameters, multiple-frequency measurements are a must. As a matter of fact,

Figure 3: Typical system installation block diagrams for the Model TMC-8010



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

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the traditional employment of only one or two frequencies leaves much to be desired. The ideal system would provide pilot generation over the entire spectrum plus the ability to read these levels in addition to the levels of existing signals. Equally important is the ability to monitor these level-related parameters, not only at amplifier locations, but in critical points on trunks and feeders plus end-of-line locations where the actual signals are used for communications.

If it were possible to measure pilots and signals across the band and apply the appropriate correction factors, real-time sweeping could be accomplished without the inherent problems associated with high- and low-level sweeps. This effective sweeping would be achieved by measuring signals where present and inserting pilots where signals were not available to provide measurements at intervals small enough to simulate a continuously swept spectrum. Further expansion of this concept indicates the need for inclusion of automatically maintaining tolerance windows and immediate generation of alarms for out-of-tolerance conditions. Automatic periodic record generation could provide important historic data and subsequent correlation of level information with system faults, intermittent conditions and other problems.

In a two-way network, control of ingress is critical, since the presence of signals leaking in can seriously disrupt communication circuit performance. Due to the tree-and-branch structure of most cable systems it is usually quite easy to detect the presence of ingress but quite difficult to locate its source. Installation of three-position switches in the upstream path at strategic points throughout the network provides a means of ingress location and isolation. In normal operation, these switches are set to their "on" positions (no attenuation). When ingress is observed at the headend the switches are commanded, one at a time, to a condition of modest attenuation (3 or 6 dB). This attenuation should not affect operation of upstream circuits. The insertion of this observable attenuation, however, will commensurately decrease the observed level of the ingress if the switch lies in the ingress signal path between the point of entry and the headend. By examining strategic locations and implementing effective diagnostic routines the point of ingress entry may be isolated to a section of the network, the size of which is governed by the distribution and number of switches. Should the ingress be severe enough to cause communication problems the section containing the ingress source may be disconnected by use of the "off" position, allowing the rest of the network to operate unimpeded while repairs are made. It is interesting to speculate upon the automation of these isolation procedures by tuning the upstream receiver at the headend to a specific ingress frequency and employing a diagnostic routine that will automatically isolate the ingress source.

It is well to consider how this information and its associated configuration and control functions should be displayed to the operator.

There are a number of configurations that might be required for specific applications. In medium to large local area networks, there are computers known as network managers that monitor specific data channels (or in some cases, all data channels). These computers track data circuit performance and record errors, and contain diagnostic routines to allow quick sensing and concise location of data circuit degradation and malfunction. These systems, however, lack knowledge of the operation of the broadband medium and hence are somewhat limited in their diagnostic capability. The addition of the previously described information to these network manager systems allows them to provide much more comprehensive network management.

Another typical situation is the network without a network management system. In this case stand-alone status monitoring information must be displayed on its own computer, and to be most useful, should include user-friendly comprehensive display and recording software. A more modest system is perhaps required by the small network user, who needs only the simplest command and display structure, which can generally be implemented on a low-cost computer or simple terminal.

Meeting the needs

The Network Technologies Division of AM Cable TV Industries Inc. has developed a technical monitoring and control system that responds to the previously mentioned needs.

The product is called the TMC-8000. In the TMC-8000 remote units are distributed throughout the network to perform various tasks. These units are all under the control of the TMC-8100, which communicates with the remote units by means of a polled, packet-oriented data communications protocol. There are various remote units available for use in the system. The primary one is the TMC-8010 level measuring unit (see Figure 1). The level measuring circuitry within the TMC-8010 is frequency-agile over the range of 40-400 MHz, and can, under system command, generate a pilot or make a level measurement on any frequency (on a 50 kHz comb) within that range.

For conventional downstream measurements, the unit at the headend (called the TMC-8011 due to small differences in its RF circuitry) is commanded by the TMC-8100 to generate a specific pilot frequency. At the same time the TMC-8100 instructs all other TMC-8010s in the system to measure that frequency in the downstream spectrum (see Figure 2). As a result of the frequency agility of these units, measurements can be made at user-selected frequencies throughout the band. These frequencies are selected to avoid operating network channels or frequency bands but may still be located in critical frequency ranges where the best indications of system flatness are obtained. In order to obtain a precise device-independent measurement the system employs a proprietary means of calibration, which involves the use of specific correction factors for each frequency to enable computation of exact levels.

Measurements of upstream levels and flatness are accomplished in much the same way. Here, due to the combining effect of the cable network, only a single upstream pilot can be generated at a given time if interference is to be avoided. It is, therefore, necessary to command and measure upstream pilots from around the system in separate measurements, which is easily accomplished, although requires somewhat more time. The system allows the operator to change pilot frequencies at will, thereby allowing great flexibility in troubleshooting. Normally, for continuous unattended operation, a group of selected pilot frequencies is established and the system is instructed to go through a series of automtic measurements, thereby establishing a full-time unattended monitoring mode.

In order to implement the automatic alarm function the system accepts the input of nominal level values for each frequency and each location. These nominal values may be established in either of two ways. One can select as nominal values those values that resulted from the system design. Such values can simply be entered into the controller and the controller will continually compare measured levels with the nominal levels. The other method of obtaining nominal values is to decide when the system is working properly and select whatever values are measured at that time and enter these as the values for future comparison. Nominal values may be entered for specific units or on a global basis.

After nominal values are selected, the system provides for "minor" and "major" alarm conditions. These thresholds are selected by the operator in terms of variation from nominal. For instance, one might select a minor alarm window of ±2.0 dB and a major alarm window of ±4.0 dB. These windows can be set on either a global or unit-by-unit basis. Changes can be made in the same manner.

On heavily loaded systems it is not always possible to find clear channels in which to generate pilots. This is typical in LANs and CATV alike. In such cases, a system signal such as a CATV carrier may be selected for measurement rather than a pilot. Under these conditions, the TMC system will not generate a pilot, but start by making a headend measurement of the carrier selected, followed by measurements throughout the system of the same carrier. The calibration system previously described is invoked, first for the headend TMC-8011 and subsequently for the remote TMC-8010s. This procedure achieves the same quality of measurement techniques and a multiplicity of frequencies that a plot of the system flatness between the headend and a remote point can be achieved, resulting in a plot of gain versus frequency (flatness) without aberration caused by the various signal levels on the system and without interference to TV or data channels.

In the description given previously, the

TMC-8010 and 8011 only are considered. These are end-of-line units. They are configured for either single or dual cable and loop-through installations, allowing placement directly ahead of the user device (see Figure 3). They are generally installed permanently in the system and their locations are determined by the judgment of the system engineer. End-of-line installation is important, since the units are able to measure where the signals are used, rather than at points separated from the user by cable, passives and active devices. It is recognized, however, that it is also important in system maintenance and troubleshooting to be able to ascertain levels at other system locations. These locations are generally in the distribution or trunking section of the system where hard cable is employed. For this purpose, the TMC-8015 consists of similar electronics as the TMC-8010 mounted in an outdoor housing, which is installed in-line with the distribution or trunk. These two configurations allow placement of the units wherever desired in the network. To make measurements at amplifiers, one has the choice of installing an in-line unit or using the basic TMC-8010 in conjunction with amplifier test points or existing taps.

A future version of the equipment is designed for use by the service technician. In this case a portable unit is supplied that can be plugged in as desired at any drop. The TMC-8100 recognizes the portable unit when it is plugged in and records the data that is taken. There is a proprietary means of determining which drop has been accessed. This unit not only provides level data to the technician but allows collection of such data by the system so that, where record keeping is employed, a permanent record is established and maintained.

A word should be said about the method of communicating with remote units. A single, two-way, medium-speed data channel is employed. The protocol basically consists of polling, using packet-switching techniques for longer messages. This deterministic communication system puts the entire population of units under the direct explicit control of the TMC-8100. All operations are configured, commanded and reported through this channel. The protocol has many unique functions, such as automatically picking up new units and handling defective ones, plus important diagnostic features. For instance, every command and status message is analyzed for data errors, including the separation of upstream and downstream errors. When errors exist, re-polls are instituted to achieve perfect message transmission. Records are kept of the error performance to and from each remote unit. In this way the system acquires data that provides an independent data transmission performance analysis for each remote unit. This data is available at the controller and can be used in a diagnostic sense to indicate what parts of the system are not performing well and to initiate service, often before serious degradation takes place in the network data circuits. Special external software has been written that correlates this information with the actual topology of the cable network and, in the case of mass failures, can point to the area and often the exact system component that has failed.

The TMC-8030 includes the traditional three-position upstream switch for system sectioning and ingress isolation. This unit is provided in an outdoor housing for hard-cable installation. In addition, the system can be provided with other functions, such as that of a point-multiplexer where multiple binary signals (for example, the state of a fire alarm panel) can be transferred from one location to another. Various other functions can be provided due to the extremely versatile communications system and the basic command and status architecture.

The means to assure quality

In summary, the broadband local area network medium has imposed strict performance and reliability requirements on the CATV technology it has adopted as its means of communication. Traditionally, CATV hardware manufacturers have failed to address the need for a comprehensive status monitoring system that provides monitoring and control of the broadband plant as well as specific real-time notification to the operator of any out-of-tolerance performance conditions. A system now exists that serves this need. It is hoped that this new awareness does not escape the CATV system operator, who now has the technical means to assure the quality of data services that can be sold over cable.

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Reader Service Number 25.

Sheath current phenomena

This article will give a synopsis of sheath currents, what causes sheath currents, why they should be reduced in a system, and how these sheath currents can be scientifically studied and reduced.

By Austin Coryell
Director of Field Engineering
American Television & Communications Corp

Sheath current phenomena, more commonly known as ground currents, have been with us since the beginning cable systems built back in 1948. Until the early 1960s, sheath currents caused very little damage and were of little concern to the cable operators. Each vacuum tube amplifier was powered directly from the utility secondary 110 VAC through a transformer input power supply in the amplifiers. Since vacuum tubes operated at high DC voltages, they were not as susceptible to high voltage transient failure as our present day solid-state amplifiers.

Sheath currents are any DC, low frequency AC, and/or RF currents that utilize the sheath or shields of a coaxial cable for a return to their energy sources. There are two types of sheath currents: *desired*, as in the case of the 60 VAC line powering, and RF signals we transport in our cable television systems; and *undesired*, as in the case of sheath or ground currents caused by unbalanced AC power systems, and stray RF carriers such as local radio and television stations, two-way radio, CB, etc. For the purpose of this article we will deal strictly with the utility power system, common bonded with the cable television system.

Before we commence I would like to make some brief comments concerning the National Electrical Safety Code (NESC) pertaining to the power companies.

1) The primary purpose of grounding electrical systems was for safety of people exposed to the service.

2) Part 92B states, "The neutral in a low voltage system <750 VAC is the point of ground connection."

3) Part 92D states, "All ground connection points shall be so arranged that, under normal circumstances, there will be no objectionable flow of current over the grounding conductor." If an objectionable flow of current occurs over a grounding conductor due to the use of multiple grounds, one or more of the following shall be used.

a) Abandon one or more of the grounds.

b) Change locations of grounds.

c) Interrupt the continuity of the conductor between the ground connections.

d) Subject to the approval of the administrative authority, take effective means to limit the current.

4) Part 96A states, "Individually made electrodes shall, when practical, have a resistance to ground not exceeding 25 ohms." If a single electrode resistance exceeds 25 ohms, electrodes connected in parallel shall be used. Spacing between these electrodes shall not be less than six feet. Many power companies use sectional ground rods to achieve less than 25 ohms ground and is permissible.

5) Part 97C states, "Primary and secondary circuits utilizing a single conductor as a common neutral shall have at least four ground connections on such conductor in each mile of power line, exclusive of ground connections at customers service equipment."

6) Service entrance wire size shall not be less than No. 8 AWG for copper and No. 6 AWG for aluminum.

Sheath currents from the power company services have always been present due to the commonality of bonding at the poles and at the service entrance to a residence home. What causes these sheath currents? Figure 1 takes a look at a simple electrical diagram of a utility company's secondary service (110-220 VAC). This circuit is balanced with 100 amperes of current through each side of the secondary transformer winding. Since both halves of the secondary winding have a common neutral, and the currents in each half of the transformer are equal and 180° out of phase with each other, theoretically, no currents exist on the neutral. This is a condition all power companies would prefer since no power is lost in the neutral, and ground currents do not exist.

All power companies have some unbalanced conditions on their secondaries. The more unbalanced these secondaries are, the greater the neutral currents and ground currents are, due to bonding. An example of an unbalanced secondary (Figure 2) shows 40 amperes of current flowing through the neutral conductor. Any bonding or grounding to this neutral, such as our coaxial cable system, puts the cable system in parallel with this neutral sharing this unbalanced current. Distribution of current is dependent on the resistances of these conductors.

Through the years, our industry has been expanding the frequency bandwidth to increase channel capacity of our cable systems. This required larger diameter coaxial cables to reduce cable attenuations. Increasing the diameter of these coaxial cables also reduced the resistivity of the cables, which are tied to and in parallel with the power company neutral due to bonding to a common ground. As well, systems took more precautions to begin compliance with local and national grounding requirements, again increasing po-

Table 1: Resistance of annealed copper wire

Conductor size	Ohms per foot x 10^{-3}
14	2.5
12	1.6
10	1.0
8	.63
6	.40
4	.25
2	.16
0	.098

Table 2: Coaxial cable resistances

	Resistance ohms per foot X 10^{-3}	
Cable type	Center conductor	Shield
.412	1.93	.50
.500	1.28	.40
.625	.84	.23
.750	.57	.19
.875	.42	.13
1.000	.24	.06
40% braid-59	48.2	14.7
60% braid-59	48.2	11.7
90% braid-59	48.2	6.4
40% braid-6	30.4	13.6
60% braid-6	30.4	9.3
90% braid-6	30.4	6.3

tential paths for sheath currents. These two factors have increased sheath currents in the majority of all cable systems.

Tables 1, 2 and 3 illustrate the resistance of copper wire, single coaxial cables, and configurations of coaxial cable and strand attached to poles. From Table 3 you can see that the old .412 feeder and strand had two times as much resistance as today's .625 feeder for a 450 MHz system; and the old .500 trunk-.412 feeder system had two and one-half times the resistance as today's .875 trunk-.625 feeder system. Under the same grounding conditions on a rebuild there would be considerably more sheath currents in the new system as compared to the old system using these sizes of coaxial cables.

Figures 3 through 5 show the neutral and ground currents when the cable system is not bonded to the power company grounds. As you can see, the majority of neutral currents are carried on the power company neutral.

Figures 6 through 12 show the neutral currents being shared by the cable system common bonded to the power company neutral. From these various cable configurations illustrations the sheath currents on a .625 feeder (Figure 8) are 24 percent greater than the sheath currents on a .412 feeder (Figure 6). Also, the sheath currents on a .875 trunk-.625 feeder (Figure 12) are 20 percent greater than the sheath currents on a .500 trunk-.412 feeder (Figure 9). Figure 12 also indicates the coaxial cable system is carrying 83 percent of the total unbalanced neutral currents, whereby in earlier years (Figure 9), the coaxial cable system was carrying 66 percent of the total neutral currents.

These examples show the cable systems are carrying 50 percent or greater of the power company's unbalanced neutral currents, depending on the sizes of coaxial cables being used. With these particular bonding configurations, the cable systems are susceptible to transients that are produced by

Figure 1: Diagram of a utility company's secondary service

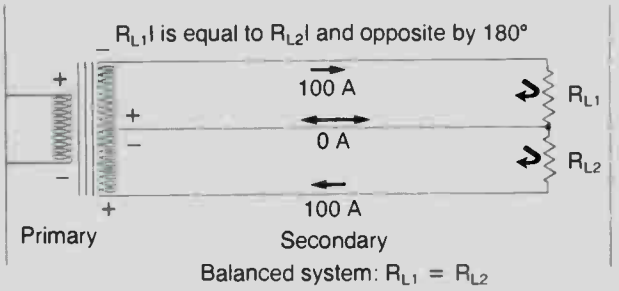


Figure 2: Example of an unbalanced secondary

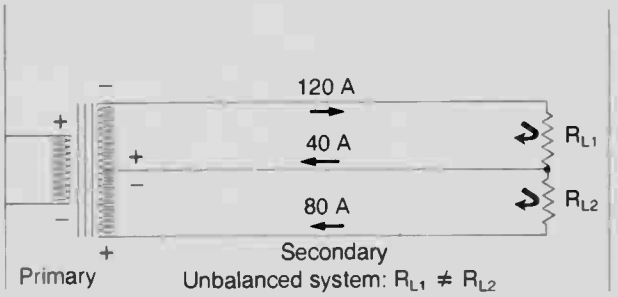


Figure 3: Power not bonded

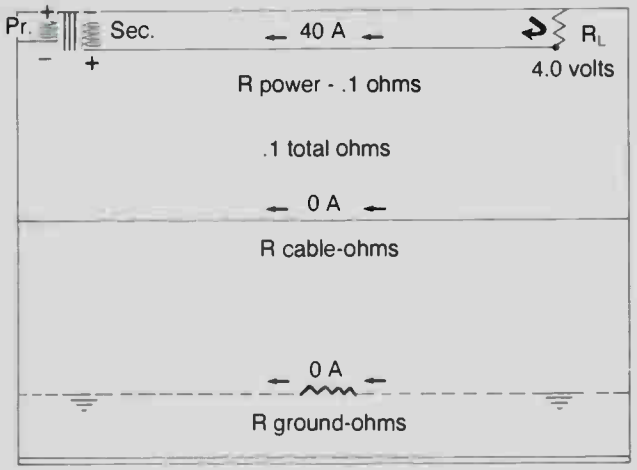


Figure 4: Power bonded to earth ground

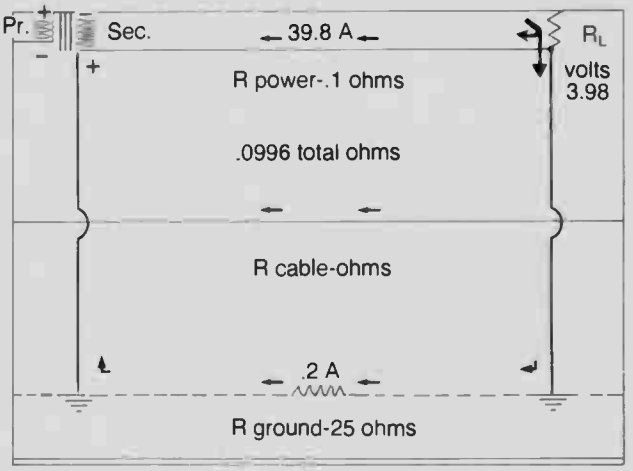
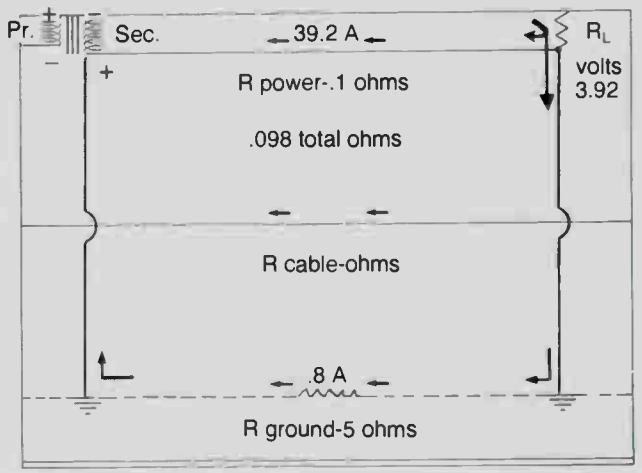


Table 3: Resistance per foot for coaxial cable configurations

Configuration	Ohms/foot
¼" Seimens high strength strand	1.84×10^{-3}
.412 cable and ¼" strand	$.39 \times 10^{-3}$
.500 cable and ¼" strand	$.33 \times 10^{-3}$
.625 cable and ¼" strand	$.20 \times 10^{-3}$
.500 trunk -.412 feeder -¼" strand	$.20 \times 10^{-3}$
.750 trunk -.412 feeder -¼" strand	$.13 \times 10^{-3}$
.750 trunk -.500 feeder -¼" strand	$.12 \times 10^{-3}$
.750 trunk -.625 feeder -¼" strand	$.10 \times 10^{-3}$
.875 trunk -.625 feeder -¼" strand	$.08 \times 10^{-3}$
1.000 trunk -.625 feeder -¼" strand	$.06 \times 10^{-3}$

Figure 5: Power bonded to earth ground



the power companies. These onrush currents, in the majority of cases, will be greater on the coaxial cable sheaths than on the power company neutrals due to the coaxial cables having less resistance to these surges.

The primary objectives of a cable operator should be to develop a plan of bonding that is in compliance with the NESC and local grounding codes, but are strategically placed to keep these sheath currents to a minimum. Figures 13 and 14 show two configurations of bonding that keep the majority of the neutral currents in the secondaries on the power company neutral. Figure 13 has the load side of the secondaries bonded to the coaxial cable system. Since the transformer secondary is not bonded to the cable system, the neutral currents' only return paths to the transformer are through the power company neutral and ground. Figure 14 has the transformer secondary neutral bonded to the cable system and the secondary load tied to ground. Again, the only return paths for the neutral currents are through the secondary and ground.

Figures 15 through 17 show the power company primary and secondary neutrals tied together and grounded. In Figure 15, the power

Figure 6: Power bonded to earth ground and cable

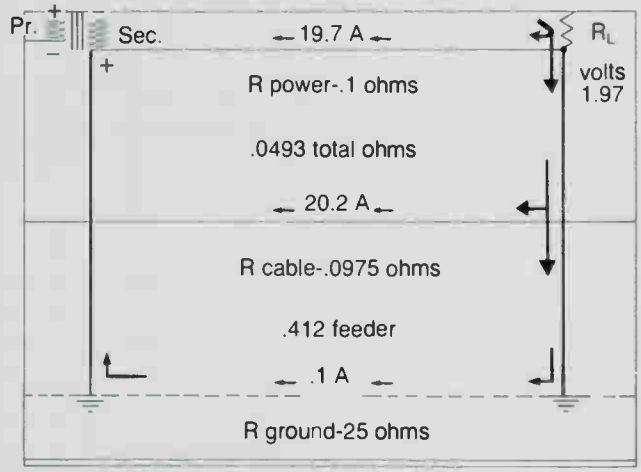


Figure 7: Power bonded to earth ground and cable

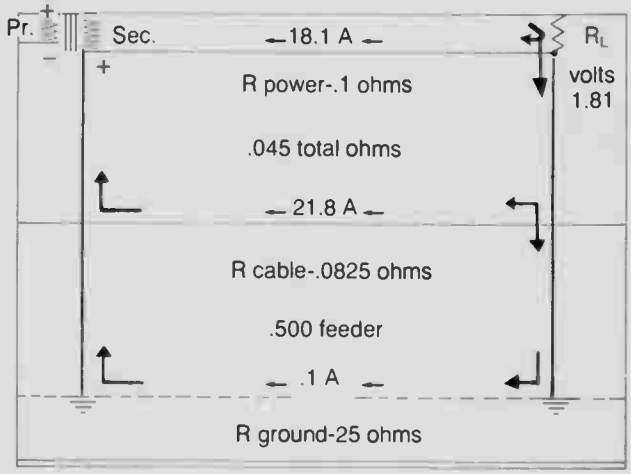


Figure 8: Power bonded to earth ground and cable

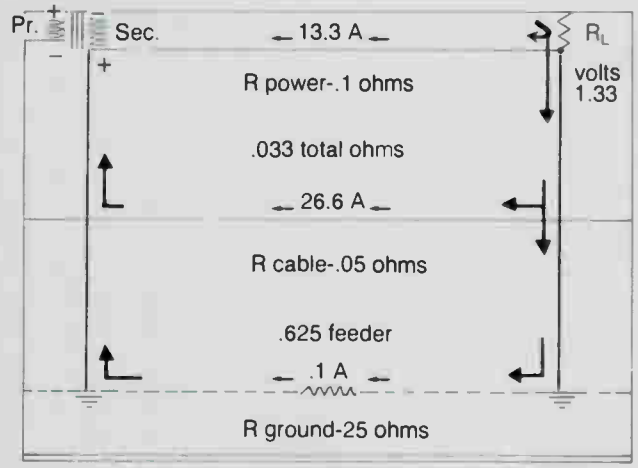


Figure 9: Power bonded to earth ground and cable

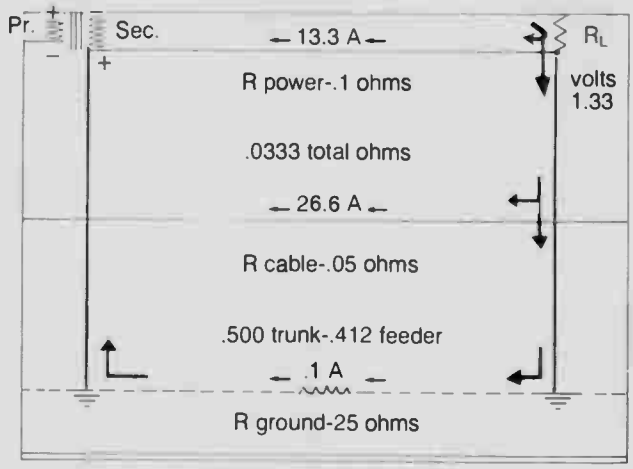


Figure 10: Power bonded to earth ground and cable

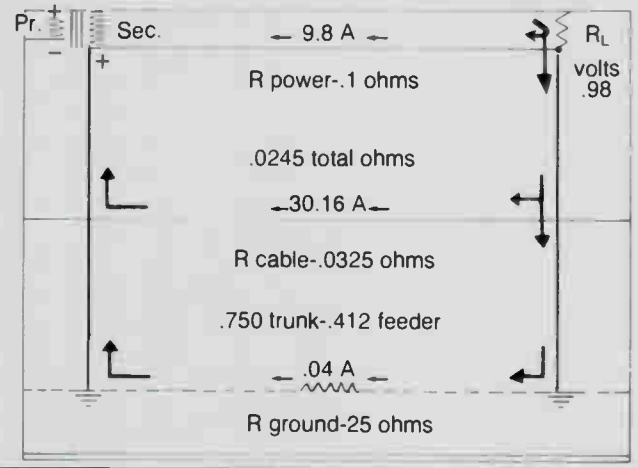
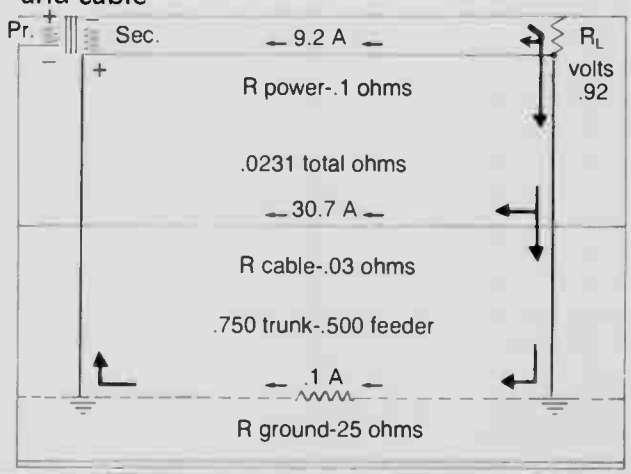


Figure 11: Power bonded to earth ground and cable



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company neutrals are tied to ground so there is no sheath current on the coaxial cable system. In Figure 16, the primary and secondary neutrals are bonded to the coaxial cable system. This illustration shows primary unbalanced currents on the cable system, making the cable system susceptible to primary transients due to switching and electromagnetic induction due to lightning and static space charges. Figure 17 shows the primary and secondary neutrals tied together and grounded. The coaxial cable system is bonded to the load side of the secondary neutral. The primary unbalanced currents' only path to the coaxial cable system is through the secondary neutral and ground, keeping both the secondary and primary neutral currents to a minimum on the coaxial cable system; thereby reducing transient surge currents, which cause equipment damage and outages.

In conclusion, sheath currents, caused by unbalanced powering conditions in the power company's primaries and secondaries, common bonded to the cable television system's plant, can be reduced considerably by strategically identifying points of common bond.

Figure 12: Power bonded to earth ground and cable

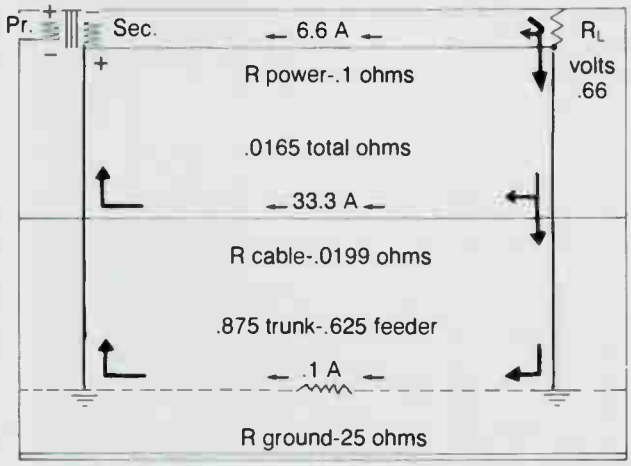


Figure 13: Power bonded to earth ground and cable

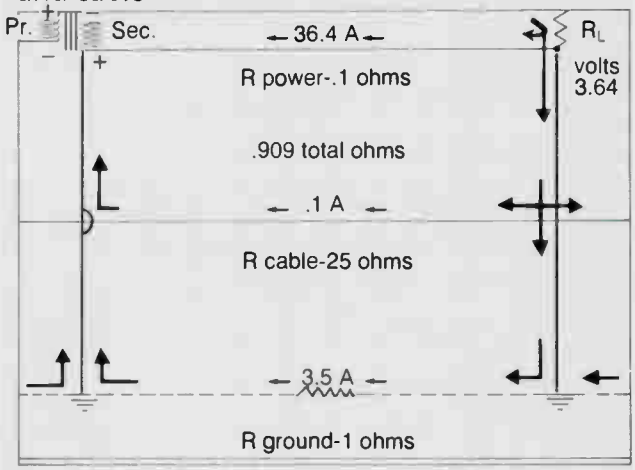


Figure 14: Power bonded to earth ground and cable

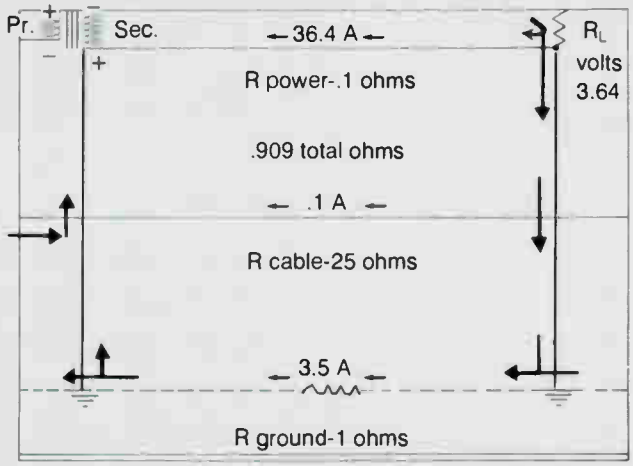


Figure 15: Primary bonded directly to secondary

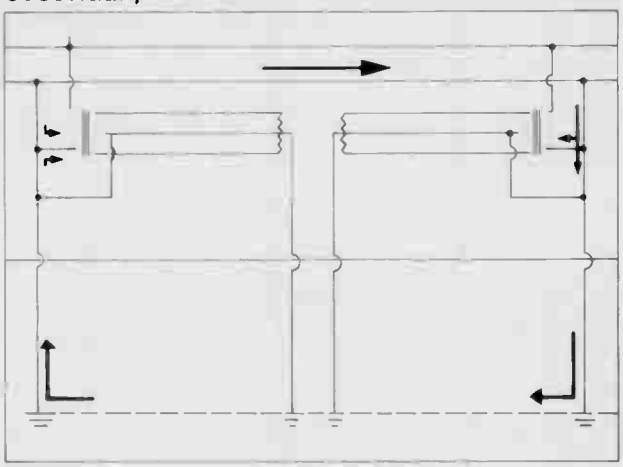


Figure 16: Primary and secondary bonded to cable

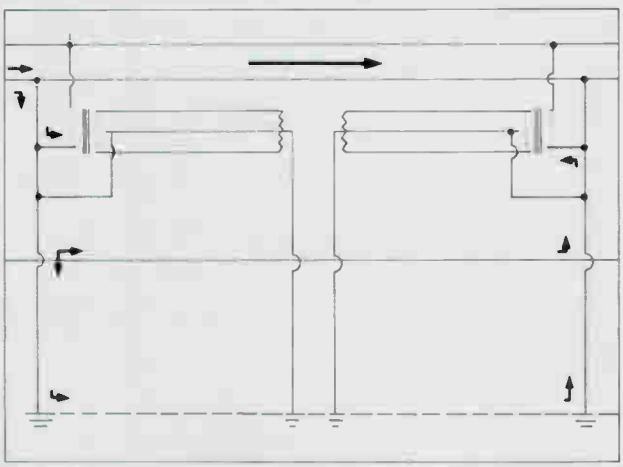
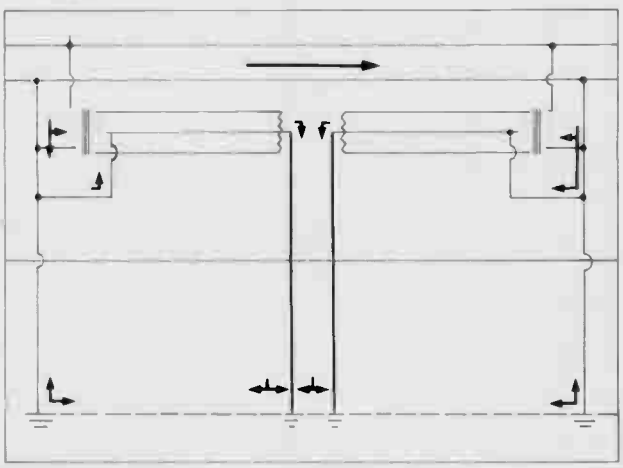


Figure 17: Primary and secondary bonded to cable



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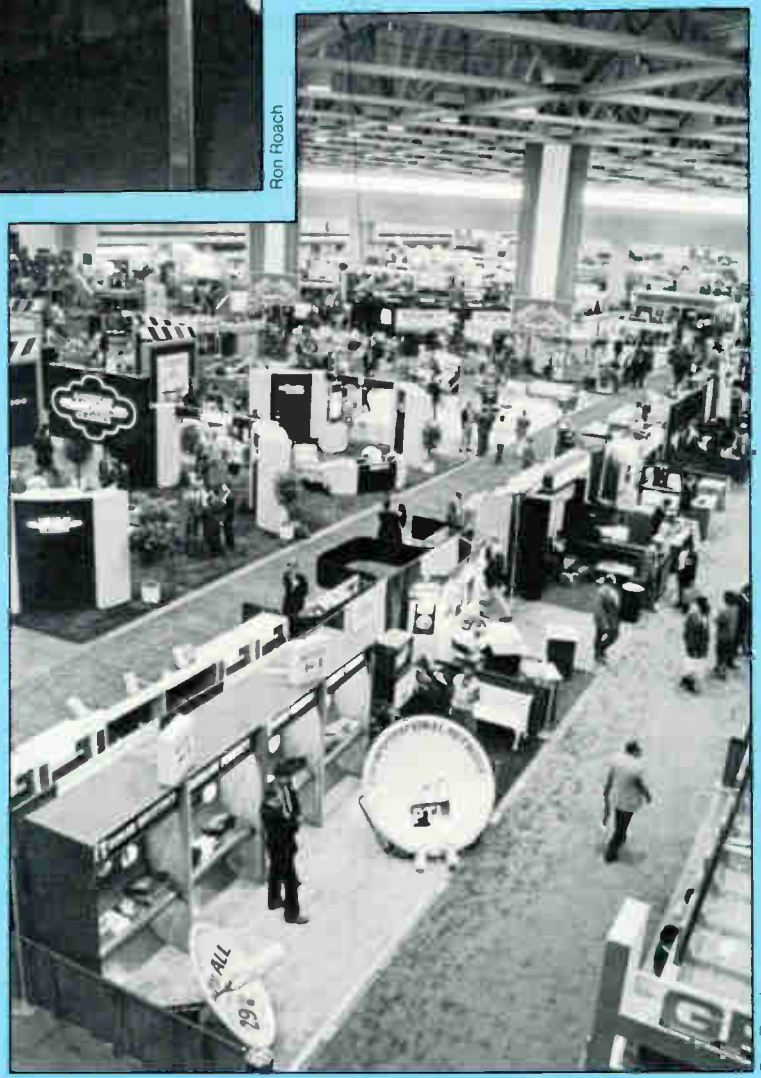
Reader Service Number 27.

NCTA roundup: Dallas style

Ron Roach

Convention Chairman Bill Strange Jr., vice president of corporate development for Sammons, readies himself for the ribbon cutting ceremony that opened up the exhibit hall for NCTA's 35th annual convention.



Ron Roach

The riding and roping are over, and cowboys have packed up their gear to head on out to the next roundup. But this year's granddaddy event, the 35th annual NCTA convention held at the Dallas Convention Center, was where the winners were acknowledged and made their presence felt. Out of the chutes rode pay-per-view technology and BTSC stereo technology — the most important issues at this year's convention.

The show this year, held March 15-18, was actually a combination event and incorporated much of the flavor of the Texas Cable TV Association's annual convention, the Texas Show. And surprisingly, the turnout almost mirrored last year's national. This year's show claimed 287 exhibitors compared to last year's 279, and attendance was 13,148 this time around compared to 13,261 last year.

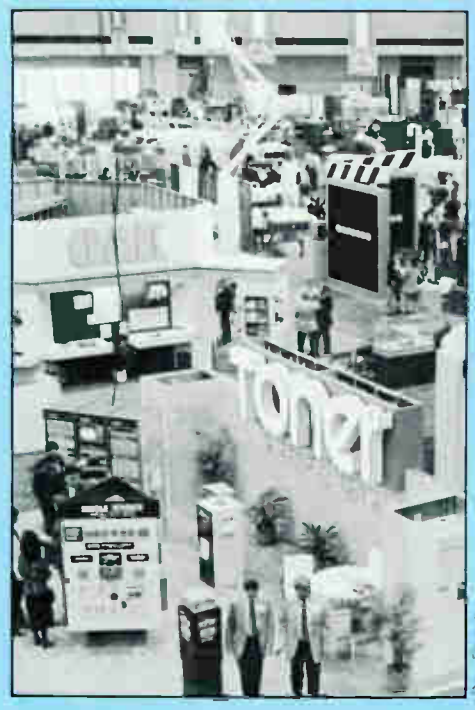
"Cable has lost none of its verve and ingenuity," stated NCTA President and CEO James Mooney. "There's more cooking in this industry today than in the past 30 years put together."

Mooney is absolutely on target. There were no great blockbusters or unveilings that took your breath away, but in a maturing industry there's going to be more emphasis on the business of cable than on the cable business.

Vendors and attendees alike agreed that the show was a success. Said Abe Sonnenschein of Hughes Microwave, "Our salesmen were very pleased with the number of new sales leads they uncovered at the show. In general," Sonnenschein continued, "this industry's gotten very mature. We're not going to see the frequent major breakthroughs we had in the past."

According to SCTE Executive Vice President Bill Riker, "Having the show in Dallas was refreshing. I feel there was a lot more traffic on the floor because there wasn't a one-armed bandit on the way in the door, and people who bothered to come to Dallas did so because of their interest in the industry as opposed to coming there for the tourist attractions. For the SCTE, it's the busiest we've been at any show."

Ron Roach


Ron Roach

On the operator's level, Russ Skinner of ATC commented, "There was a lot of emphasis on the consumer-friendly issues. I saw a lot of cooperation from the vendors on answering some of the questions we brought up. I'm really happy," Skinner added, "to see some better interaction. The vendors are coming to us now asking for input. VCR interfaces are a big topic. Certainly some guys are spending more time working on that. The whole subscriber service issue had a lot of emphasis put on it."

Standing room only

The hottest panel topics of the show, pay-per-view and BTSC stereo, drew SRO crowds from the technical and management arenas. At last year's show, we witnessed one or two prototype BTSC stereo encoders, and now we have five or six manufacturers of BTSC encoders. Last year we were wondering just how to carry stereo, and this year we're trying to implement actually carrying BTSC stereo.

Passing the BTSC signal has become a significant issue for the cable industry, due to many broadcast affiliates and independent stations incorporating stereo sound into their transmissions. BTSC is happening very quickly from the consumer viewpoint — 30 percent of sales are stereo TVs.

Satellite services such as MTV, The Movie Channel, Disney and The Nashville Network have long been transmitting in stereo. HBO has especially stressed stereo and recently recommended that all cable system affiliates utilize both BTSC and FM formats as methods of stereo carriage into the subscriber's home.

Leaming Industries demonstrated its new MTS-1 BTSC stereo generator with excellent results in its operation and performance. A direct Galaxy I satellite link was supplied, courtesy of M/A-COM, and fed into the active headend set up at the Leaming booth. This allowed for the descrambling of movie channels through Videocipher II and into the MTS-1. In addition, a BTSC unit carried The Nashville Network via a Leaming subcarrier demodulator, as well as a local tape feed to simulate a pay-per-view channel. These stereo signals were then passed through into the stereo TV as in a typical cable subscriber's home.

Scientific-Atlanta provided Heritage Communications, a CATV system operator in Dallas, with headend equipment necessary to provide five stereo feeds to the floor of the NCTA show. Heritage used S-A's new Model 6380 stereo encoder, which encodes the baseband left/right stereo audio signal received from the satellite into the BTSC "off-air" format required for reception by stereo TVs. S-A's 6350 modulators, which are also BTSC stereo-compatible, were used by Heritage.

Five satellite-delivered video services were also provided to the show floor, including HBO, Cinemax, The Movie Channel, MTV and VH-1. From the headend satellite receiver, the stereo signal passed through S-A's 6380 encoders for BTSC formatting and Model 6350 modulators, which placed each service on a selected TV channel. From there, the signal traveled through microwave links, trunk and line extender amplifiers to reach the Dallas Convention Center.

S-A demonstrated this "end-to-end" compatibility by displaying a complete BTSC stereo system — using the 6380 encoder, 6350 modulator and Series 8500 set-top terminals working in conjunction to provide high-quality video and stereo sound in a typical consumer home entertainment center.

One of the most notable advancements on the floor was Zenith's new RF scrambling system. For an RF system, it seems to be as secure as baseband. The end result is actually picking up audio and video security at a reasonable price.

In the amplifier world, Magnavox displayed its "working" 550 MHz powerdoubling cascade. Another noteworthy device being demonstrated was low-frequency status monitoring for power supplies that do not require two-way plant.

We now invite you to sit back and read about the myriad of equipment displayed at this year's 1986 NCTA convention.

• **Alpha Technologies** announced a new product, the Alpha 250 uninterruptible power source (UPS). The 250-watt backup source is designed to keep microcomputers, telephone systems or other power-sensitive electronic equipment operating during all types of power failures or brownouts.

According to the company, the Alpha 250 has many new advances over other UPS systems currently available, such as no accidental shut off, because there is no on/off switch; one hour of backup time standard and up to three hours with an optional battery pack; the ability to be mounted anywhere, since it comes with standard table-top mounting and wall or rack mounting as an option. In addition to the new advances, the Alpha 250 filters out damaging line spikes before they reach your equipment; features front panel lights for all functions; and incorporates a warning alarm that sounds before batteries are fully discharged.

Contact Alpha Technologies, 3765 Alpha Way, Bellingham, Wash. 98225, (206) 671-7703.

• **AM Cable TV** demonstrated two new devices at the NCTA show. The first was the TMC-8000 broadband monitoring system for I-Net and local area network (LAN) cable markets. The TMC-8010 modules attach anywhere within a two-way cable system to monitor a broad spectrum of RF carrier levels both forward as well as return.

Each TMC module is programmed through a master control unit (MCU) that displays real time level measurements, status reporting and programmed alarms using any standard televideo terminal.

The second product was a new generation of the Tier Guard family of taps. The TGT/MDU is an indoor, operator-controlled subscriber-friendly tap for multiple dwellings. It is fully addressable and is configured for eight and 16 drop ports; it can be cable or line powered, and provides either full agile jamming for up to 25 channels or fixed jamming for up to six channels. The TGT/MDU is wall-mounted to fit within all types of security boxes and will operate well within existing pay control technologies, according to the firm.

Contact AM Cable TV Industries, P.O. Box 505, Quakertown, Pa. 18951, (215) 536-1354.

• **Anixter Communications** introduced several new CATV products: the Jerrold VCR control unit Model VCU, Regal's eight-way multi-tap, Raychem's EZF-6 connector, and two protection products from Cable Resources Inc.

The Jerrold VCR control unit, Model VCU, was designed to simplify interconnection of cables, converters, VCRs and televisions in a subscriber's home. This unit operates in the 50-450 MHz band and includes a switchable amplifier, which allows the subscriber to decide if additional gain improves picture quality. Anixter recently signed a nationwide distribution agreement with Jerrold for the new VCR switching device.

Regal's eight-way multi-tap features 1.5 increment spacing in the 7 dB through 35 dB range. According to the company, it also has excellent electrical performance up to 600 MHz and numbered F-ports for easy identification. The tap, which has both CATV and broadband/LAN applications, is distributed internationally by Anixter.

The EZF-6 connector from Raychem fits all RG6 cable. It reduces RF leakage and moisture penetration and has, Anixter says, an outstanding pull-out strength through temperatures from -40 C to 60 C.

The terminal control system from Cable Resources is a solid steel, vinyl-coated basket device designed for transporting and storing converters. Ampli/guard is a foam shelving system that can be adapted to hold all makes and sizes of amplifiers, taps, line extenders, power packs and splitters.

Contact Anixter Bros. Inc., 4711 Golf Rd., One Concourse Plaza, Skokie, Ill. 60076, (312) 677-2600.

• **Belden Electronic Wire and Cable** introduced several new cables. High-temperature coaxial cable with a copper-tin composite shield in 50 and 75 ohm versions, part numbers 9307 and 9308, are miniature cables with a .084" outside shield diameter. Both cables are, according to the company, ideal substitutes for semi-rigid, copper-sheathed coaxial cable in applications where compact electronic packaging and tight bending radii are required.

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SSC-70 — Signal Sampler and Calibrator
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WCA-4 — Waveguide to Coax Adapter
OVERLAYS — PSA-35 Documentation Device

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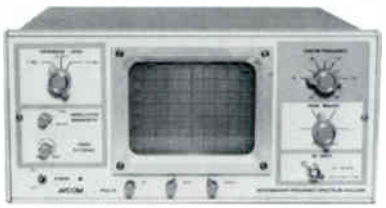

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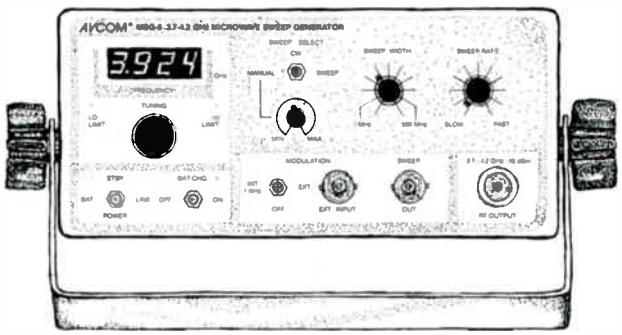

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AVCOM's MSG-770 Microwave Sweep Generator provides the capability of generating signals in the 270-770 MHz block downconverter frequency band. A sweep capability is standard over the entire 270-770 MHz band to sweep widths less than one MHz at any center frequency between 270 and 770 MHz. Frequency can be accurately read on a digital LED display. The MSG-770 can be used to sweep cables, line amplifiers, downconverters, etc. . . . .

AVCOM MSG-1450® 950-1450 MHz MICROWAVE SWEEP GENERATOR

AVCOM's MSG-1450 Microwave Sweep Generator provides the capability of generating signals in the 950-1450 MHz block downconverter frequency band. A sweep capability is standard over the entire 950-1450 MHz band to sweep widths less than one MHz at any center frequency between 950 and 1450 MHz. Frequency can be accurately read on a digital LED display. The MSG-1450 can be used with the PSA-35 to specify TI filters or to establish performance criteria for TVRO installation contracts.

AVCOM IFSG-70® 50-90 MHz INTERMEDIATE FREQUENCY SWEEP GENERATOR

AVCOM's IFSG-70 Intermediate Frequency Sweep Generator provides the capability of generating signals in the 50-90 MHz satellite communications band. A sweep capability is standard over the entire 50-90 MHz band for sweep widths of less than one MHz at any center frequency between 50 and 90 MHz. Frequency can be accurately read on a digital LED display.

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Reader Service Number 29.

Two new satellite cables for use with single and dual run block downconverters, Belden 9213 and 9214, feature four-legged parallel constructions with PVC jackets. Belden says this composite design makes the cables easier to install than conventional individual cables.

Lastly, Belden 9193 CATV drop cable is an oversize version of RG-6 type cable, specifically designed for longer distance applications. The 75-ohm coaxial construction utilizes the effective DuoBond Plus shield configuration. The shield in 9193 consists of DuoBond II bonded foil, followed by an aluminum braid shield and a second foil tape shield with a shorting fold. This foil/braid/foil construction is designed to ensure signal integrity over a wide frequency range. The cable is surrounded by a black outer PVC jacket.

According to the firm, the inner foil's bonding to the dielectric core simplifies termination by eliminating foil pushback and the bonding of the outer foil to the jacket makes cable stripping easier. The resulting cable is less bulky and more flexible than 4-layer shielded cable.

Contact Belden Electronic Wire and Cable, P.O. Box 1980, Richmond, Ind. 47375. (317) 983-5200.

• **Biddle Instruments** exhibited its Model 431 digital radar/TDR cable test set at the NCTA convention this year. The 431 is customized for CATV testing, and with 10 ranges from 10 to 5,000 feet, the instrument's special 2 nanosecond pulse width can resolve faults down to 1/20 of a foot (0.6 inches). In addition, the 431 can read return-loss measurements directly from the screen. It incorporates a five-digit LED display and a built-in memory, which can store a scope trace for up to 48 hours even with the set turned off.

The Model 431 interfaces with the Biddle digital data logger, which records scope traces on a minicassette for later analysis for cable degradation, water entry or breakdown.

Contact Biddle Instruments, 510 Township Line Rd., Blue Bell, Pa. 19422, (215) 646-9200.

• **Blonder-Tongue Laboratories Inc.** introduced two new broadband indoor distribution amplifiers designed for CATV and SMATV signal distribution systems that use a cable drop as a signal source. Both models, the BIDA 300-50 with 50 to 300 MHz bandpass and the BIDA 450-50 with 50 to 450 MHz bandpass, are configured for one-way operation. Optional field installable models are available for the addition of two-way capability with either a passive or active sub-channel return path.

All controls and indicators are externally accessible. These include two -30 dB back-matched test points, gain and slope controls, LED pilot light and fuse.

Blonder-Tongue also introduced two new headend combiners for use in MATV, CATV or SMATV systems. The OCA-8 (Stock No. 5952) is an active output combiner with eight broadband input ports. It is used in headends to combine, then amplify up to eight modulators and/or processors. The OCA-8 provides a thruline input port for mixing its high-level output with other signal sources.

The companion Blonder-Tongue OC-8 (Stock No. 5951) is a passive output combiner with eight broadband input ports. It is also used in headends to combine up to eight modulators and/or processors. The OC-8 provides a thruline input port for mixing its combined output with other sources and is manufactured with 80 dB radiation-proof passives.

Either unit can be cascaded to provide more than eight channels in larger systems. Both the OC-8 and OCA-8 are compact (only 1-3/4" high) and are designed for mounting in a standard 19" EIA rack.

Contact Blonder-Tongue Laboratories, 1 Jake Brown Rd., Old Bridge, N.J. 08857, (201) 679-4000.

• **Burnup & Sims** announced its drive to sell emergency power data protection systems to the CATV industry, introducing its new line of Lectro electrical power protection systems designed to shelter CATV customers' computer data from all-too-frequent power surges and spikes.

The Lectro line was introduced in response to the problem of data loss due to power interruptions as small as 25 milliseconds. The new product protects customers' systems with less than a 10 millisecond response.

Contact Burnup & Sims, 420 Athena Dr., Athens, Ga. 30601, (404) 482-7612 or (800) 551-3790.

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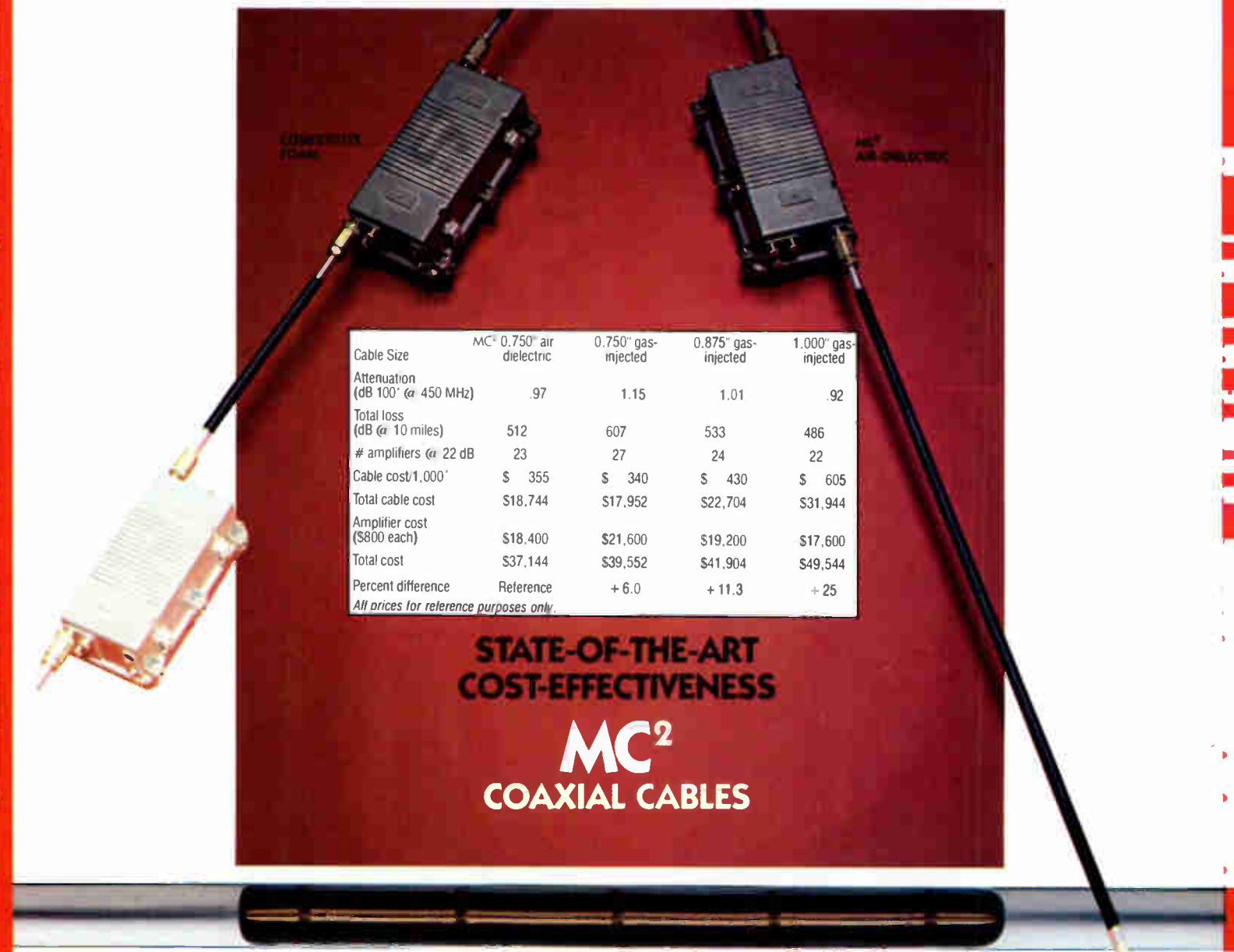

Cable Size	MC² 0.750" air dielectric	0.750" gas-injected	0.875" gas-injected	1.000" gas-injected
Attenuation (dB 100' @ 450 MHz)	.97	1.15	1.01	.92
Total loss (dB @ 10 miles)	512	607	533	486
# amplifiers @ 22 dB	23	27	24	22
Cable cost/1,000'	$ 355	$ 340	$ 430	$ 605
Total cable cost	$18,744	$17,952	$22,704	$31,944
Amplifier cost ($800 each)	$18,400	$21,600	$19,200	$17,600
Total cost	$37,144	$39,552	$41,904	$49,544
Percent difference	Reference	+6.0	+11.3	+25

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800-874-5649

Reader Service Number 31.

• **Cable Ready Inc.** highlighted its new California Clip, a modified clip for use with its Guardian Series protective molding, which also was on display. Developed during Guardian's use in a major build in Los Angeles, the California Clip is designed to adjust for severely uneven and stucco surfaces so that the system retains its security, but can also be re-entered by system operators with a patented entry key.

The Guardian Series of protective molding is designed for use in cable TV, telephone, and data transmittal systems. Made of 26 gauge custom painted galvanized steel, Guardian's 1" molding product is designed to comfortably handle 17 RG-59s. Eight-foot sections of Guardian molding require only two clips for installation.

Contact Cable Ready Inc., 1970 W. 12th Pl., Denver, Colo. 80204, (800) 222-2142 or (303) 595-0811.

• **Channell Commercial Corp.** introduced a new underground housing at its booth. The Model UTH-508 housing is designed to protect directional taps and splitters in "out-of-sight" underground applications. According to the company, the UTH-508 provides a 10 percent reduction in installation costs and incorporates a see-through dome for easy visual inspection.

Contact Channell Commercial Corp., 620 W. Foothill Blvd., Glendora, Calif. 91740, (213) 963-1694.

• **Channel Master** introduced its new line of Ku-band satellite reception equipment, available in .75-, 1-, 1.2- and 1.8-meter sizes. The new line features wall and roof mounts that incorporate a three-leg design as well as a ball and socket leg brace to accommodate almost any structure's surface. Other features include 120° azimuth and 5-70° elevation adjustments.

Contact Channel Master, P.O. Box 1416, Smithfield, N.C. 27577, (919) 394-9711.

• **Channelmatic Inc.** is now offering what the company terms "The Complete System," a commercial insert system designed as a plug-in and operate package.

Featuring the Spotmatic random access commercial insert system in a fully assembled and tested turnkey package (including VCRs, BBX-1A Billibox auto patch and bypass units, and complete testing and monitoring facilities), the system offers full local or remote PC control and the integrated Channelmatic traffic software package. According to the company, Spotmatic is now being used in over 150 systems operating around the United States.

Contact Channelmatic Inc., 821 Tavern Rd., Alpine, Calif. 92001, (619) 445-2691.

• **Data Transmission Devices** previewed a new programmable controller with an internal clock. The "Converter Commander" permits subscribers to record up to two weeks of programming on different channels, unattended. Up to 18 different programs can be recorded. According to the company, the device is easy to program and will work with existing converters and VCRs without modifications.

Contact Data Transmission Devices, 65 Walnut St., Peabody, Mass. 01960, (617) 532-1884.

• **DX Communications,** a subsidiary of C. Itoh & Co. (America) Inc., introduced the Model DSB-800, an all-in-one receiver and antenna positioner.

According to the company, with the simple-to-program features a complete package of automatic adjustments can be held in memory. Once the system is preprogrammed, everything becomes automatic, including dish positioning, selection of satellite types and numbers, channels, polarization information, stereo modes and frequencies.

The DBS-800 also can be preprogrammed to automatically select C- or Ku-band reception. Ku-band tuning to any transponder frequency and polarization adjustment are also done automatically.

Besides 4 GHz (C-band) and 12 GHz (Ku-band) compatibility, the frequency-synthesized DSB-800 features block down-conversion for multiple TV hookup capability.

The descrambler-ready DSB-800 offers simple connection to descramblers on the rear panel. The infrared remote controller permits overriding of all preprogrammed functions should conditions require it.

Contact DX Communications Inc., 10 Skyline Dr., Hawthorne, N.Y. 10532, (914) 347-4040.

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Reader Service Number 33.

• **FM Systems** featured a live demonstration of the Studioline Cable Stereo service. Nine stereo musical programs were received from Satcom III and Galaxie I at the Heritage Cablevision headend in Dallas, then transmitted through that cable system to the FM Systems' booth.

Also, a new BTSC stereo decoder was shown for the first time. This decoder demodulated the TV stereo signal from off-the-air television stations at the 41.25 MHz downconverter output. This enables cable systems to transmit TV stereo in out-of-band transmission systems such as Studioline.

Contact FM Systems, 3877 S. Main St., Santa Ana, Calif. 92707, (714) 979-3355.

• **General Electric's** Commercial Electronics Products Department demonstrated its new Comband bandwidth compression system for multichannel multipoint distribution (MMDS) and instructional television fixed services (ITFS) for attendees of the NCTA show. The Comband system enables MMDS/ITFS operators to provide twice the number of programs transmitted over the operator's allotted frequency.

General Electric is offering MDS/MMDS/ITFS operators a package of Comband equipment that includes antennas, transmitters, downconverters, subscriber terminals and decoders, services and financing. As well, total system engineering, installation and training and equipment repair are also available.

Comband incorporates a frequency and time division multiplexing process, which compresses two programs into the frequency spectrum normally occupied by one. The result is a single output that is transmitted within a standard 6 MHz band.

General Electric's Comband system for MMDS/ITFS will be available by mid-year, subject to approval of certain equipment components by the Federal Communication Commission.

Contact General Electric Co., College Boulevard, Portsmouth, Va. 23705, (804) 483-5064.

• Starplan, a free computerized system analysis for cable operators considering rebuild/upgrade options was unveiled by **General Instrument Corp./Jerrold Division** at the NCTA Show. With Starplan, operators are asked to fill out a questionnaire, covering everything from headend equipment to distribution to subscriber products. The information is then fed into a specially formatted program, developed by Jerrold engineers, and a system analysis is completed.

The result is a computer printout of an economic model, including materials and cost, to achieve the system objectives.

Also featured at the Jerrold booth was the Starcom CSV, a full-featured plain converter that has been a staple of the Canadian retail market for the past several years, according to Jerrold. More than 100,000 units have been sold through GI's Canadian subsidiary.

In addition to volume control, the 66-channel, 450 MHz CSV features favorite channel programming, last channel recall, automatic fine tuning and a convenience outlet on the back of the converter.

The Tocom Micro-ACS addressable control system.

Contact General Instrument Corp./Jerrold Division, 2200 Byberry Rd., Hatboro, Pa. 19040, (215) 674-4800.

• **General Instrument Corp./Tocom Division** displayed its 5503-VIP converter with impulse pay-per-view capability at the NCTA show. Also on display were Tocom's Micro-ACS addressable control system with remote hub control, and promotional and training pieces from the Tocom Marketing Support Program.

The 5503-VIP converter permits unattended recording of cable programming and features a day/time/event LED display. Incorporated into the design of the converter is a VCR timer similar to those used in modern videocassette recorders. The timer enables subscribers to program the converter to turn on and tune to a cable channel on a specific day at a designated time, permitting unattended recording of up to four separate events.

The unit may be field upgraded for impulse pay-per-view programming with the Tocom telephone dialer module. The module utilizes store and forward technology and is designed for use in one-way cable systems. The converter also passes stereo to BTSC-capable TVs. A special stereo adapter provides left and right channel audio outputs.

The Tocom remote hub controller gives cable operators economical control of distant system sites, according to the firm, and continuously maintains all local addressing in its database at the remote site. The operator may send subscriber updates, transmitted by the Tocom addressable control system, to the controller via a dial-up telephone link provided over a standard telephone network. In addition to the remote hub controller option, the Micro-ACS features impulse pay-per-view control of the 5503-VIP baseband addressable converter and IPPV module.

Also on display were several promotional pieces from Tocom's Marketing Support Program. The program is designed specifically to assist cable operators with marketing their services and the Tocom addressable system to subscribers.

Similar materials promoting the Tocom 5503-VIP converter and remote control unit were included. A free subscriber training videotape and a computer-based training program for cable system personnel rounded out the materials roster.

Contact General Instrument/Tocom Division, P.O. Box 47066, Dallas, Texas 75247, (214) 438-7691.

• **Grumman Electronics Systems,** an operating division of Grumman Corp., introduced the AIS 5000 automatic ad insertion system for cable television systems operators.

The AIS 5000 offers computerized control of spot commercial insertions, random access to recorded commercial material, and the ability to completely automate the control of broadcast equipment as well as sales, billing and traffic operations. The system includes a traffic computer for on-air control and status of multiple channels; a machine interface for detecting tone cues, cueing individual tape segments and for overall real-time control of machines and switchers; a sales and billing computer for advanced sales scheduling with conflict checking and invoice preparation; and an embedded tape preparation system that automatically identifies tapes and individual spots on those tapes with SMPTE time code.

Contact Grumman Electronics Systems, South Oyster Bay Road, Bethpage, N.Y. 11714, (516) 575-3987.

• The Sprucer 300, a two-way addressable converter system that includes an integrated software package that enables operators to perform a variety of functions, was highlighted at the **Kanematsu-Gosho (U.S.A.) Inc.** booth.

The Sprucer software package allows the cable operator to offer subscribers the option of ordering or canceling a PPV event. When the event is ordered, the date and time are recorded. Once the event has started, KG's line control unit, a polling computer, polls all the converters to verify that each subscriber's selection is, in fact, being viewed.

This polling information provides proof, complete with dates and times, that the PPV event was actually viewed. This verified information saves an operator money by eliminating unearned refunds.

Sprucer's real-time billing interface means that the act of ordering a PPV event also initiates a subscriber's bill. All ordering and billing are accomplished without the aid of a customer service representative. The system also enables an operator to generate reports on subscribers' viewing habits and program market shares. These reports are useful as a marketing tool, for the sale of local advertising time and for negotiating with program suppliers.

Contact Kanematsu-Gosho, 400 Cottontail Lane, Somerset, N.J. 08873, (201) 271-7300.

• **Leaming Industries** demonstrated its new MTS-1 BTSC stereo generator at the NCTA show in Dallas. A direct Galaxy I satellite link was supplied, courtesy of M/A-COM, and fed into the active headend setup at the Leaming booth. This allowed for the descrambling of movie channels through VideoCipher

By the time he's ready for kindergarten, this Regency converter will still be under warranty.

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All in all, the LC-32 is an extraordinary converter—at a very ordinary price of $85*, plus a modest fee for the optional 5-year warranty.

Costly, troublesome converter repairs are never child's play. But putting Regency LC-32 converters into your cable system sure makes life a lot simpler.

For more information, call us today at **1-800-292-0220** or write P.O. Box 116, 4 Adler Dr., E. Syracuse, NY 13057-0116.

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Reader Service Number 34.

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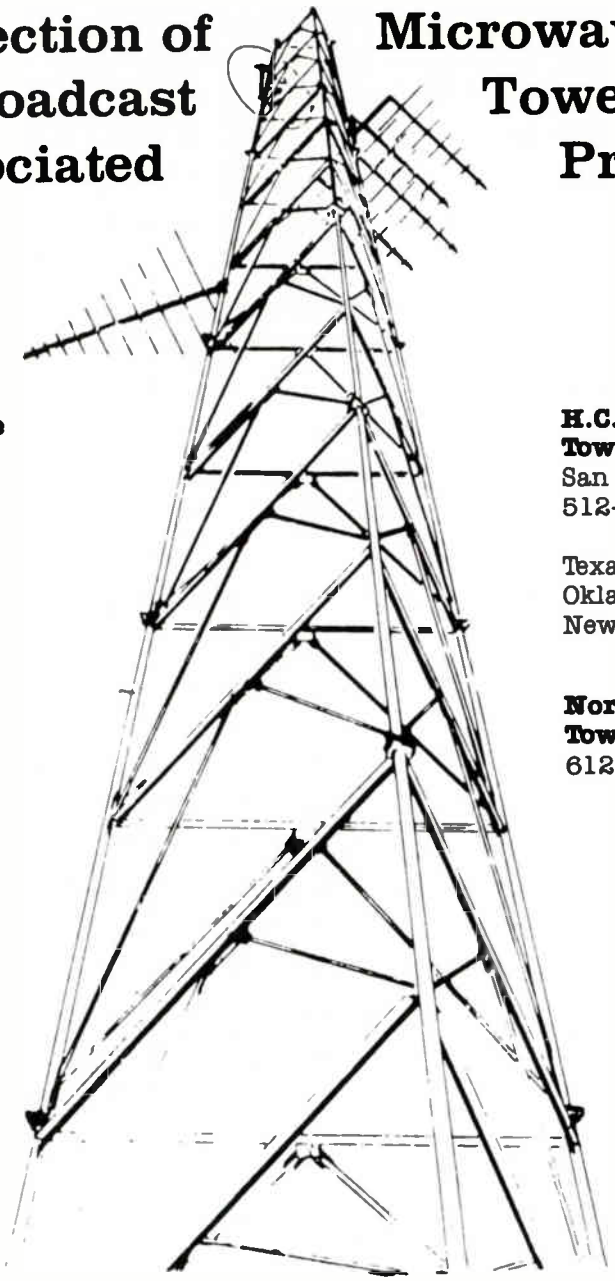

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II and into the MTS-1. In addition, a BTSC unit carried the Nashville Network via a Leaming subcarrier demodulator (FMR 622), as well as a local tape feed to simulate a pay-per-view channel. These stereo signals were then passed through into the stereo TV as in a typical cable subscriber's home.

Contact Leaming Industries, 180 McCormick Ave., Costa Mesa, Calif. 92626, (714) 979-4511.

• **LRC Electronics** showed two new products: a self-terminating coaxial cable connector and a high pass filter. The connector is designed for the automatic termination of a 75 ohm coaxial transmission line in a cable system when a cable/connector interface is interrupted. The design is compatible with RG-59 and RG-6U connectors for both PVC and plenum cables.

The filter is built with an elliptic constructed on substraight material and provides AC blocking features.

Contact LRC Electronics, 901 South Ave., Box 111, Horseheads, N.Y. 14845, (607) 739-3844.

• **Magnavox CATV Systems Inc.** announced the release of a new product: the AP660-14MA standby power supply, a UL/CSA-approved unit that protects CATV systems against loss of utility power.

The AP660-14MA consists of a ferroresonant regulator, battery charger, space for three batteries, inverter, transfer switch and line monitor. During normal operation, power passes through the transfer switch to the ferroresonant regulator, which feeds the CATV system. When the line voltage falls below a preset level, the line monitor activates the transfer switch, connecting the battery-driven inverter to the ferro-resonant regulator.

Both pole- and pedestal-mount versions are available. Three interchangeable control boards enable this standby power supply to be upgraded. Various models offer combinations of the following features: line/standby indicator, fault indicator, self-test and test on demand.

Magnavox also released new software for use with its status monitoring systems. SOFT/DSS-1 is the new software that runs Magnavox's Digital System Sentry with analog functions (DSS/A), a status monitoring system that helps spot actual and potential problems in cable systems.

A major feature of the new software is that it displays a "schematic-type" map of trunk and feeder lines on the system operator's terminal screen. This display not only reports on the status of each amplifier in a line, but also shows — on a map — the location of faults in the system. Now operators can see the effect of a fault on their system at a glance. Up to 25 separate trunk/feeder line configurations can be displayed, and the displays cycle automatically.

Onboard the Mobile Training Center, a live cascade of 16 550 MHz sub-split amplifiers rounded out Magnavox's offerings. The cascade consisted of eight power doubling amplifiers, eight high gain feedforward amplifiers, one power doubling bridger, and two power doubling line extenders, as well as return amplifiers and DSS monitoring equipment.

Contact Magnavox CATV Systems Inc., 100 Fairgrounds Dr., Manlius, N.Y. 13104, (315) 682-9105.

• **Melita Electronic Labs Inc.** announced the newest product in its line of computerized telephone call processing equipment, the Melita 4000-DVD (digital voice and data) system. The new, patented technology on which the system is based greatly expedites the handling of high volumes of incoming phone calls, and paves the way for innovative business telephone use, according to Melita.

The 4000-DVD system bridges the gap between "non-branching" voice/data systems, and the new "branching" digitized voice systems. The user typically stores message phrases on hard disk. These phrases can be combined in any chosen order and, when played back, are identical to the voice that recorded them. The various messages created in this way present options to people calling in. Each option chosen will either move the caller to a further option, or automatically transfer the caller to the appropriate department for operator/CSR assistance.

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Reader Service Number 38.

Contact Melita Electronic Labs, 3731 Northcrest Rd., #29, Atlanta, Ga. 30340, (404) 457-3700.

• **Microdyne** announced the availability of the M.A.T. (Microdyne automated terminal), which is, according to the company, the first fully automatic satellite terminal that eliminates manual adjustment of the antenna, allows program scheduling in advance and automatically selects the C- or Ku-band frequency, polarity, transponder channel and audio subcarrier. Two hundred presets can be stored, 32 of which can be timed events.

The M.A.T. downlink system consists of a 12-foot motorized polar-mount antenna (5- or 7-meter antenna optional), 96-channel C-/Ku-band broadcast quality satellite receiver with appropriate downconverters, microprocessor controller and pre-wired equipment console. The system is compatible with all major scrambling systems.

Microdyne delivers, installs and calibrates the M.A.T. Once trained, Microdyne says that an operator can program the system to receive any frequency and format of every available existing, as well as future, commercial satellite. Because the M.A.T. is fully automatic, minimal training and staff are required for its operation. Using the RS-232 or parallel ports, the M.A.T. can be controlled by a computer or it can serve as a dumb terminal.

Contact Microdyne Corp., P.O. Box 7213, Ocala, Fla. 32672, (904) 687-4633.

• **Nyson** featured several programs for ad sales, including basic and advanced training, and financing packages in addition to its product offerings, highlighted by its automated system for local advertising.

Nyson's IC-4 is designed for the small cable company as an inexpensive method of automated advertising insertion into network programs. The automatic commercial insertion unit provides "hands-off" insertion of commercials into any cable television network currently providing local avails. According to Nyson, the IC-4 is a user friendly computer-based insertion system designed to meet user requirements, and it can make commercial insertion a profitable reality instead of a grim prospect of additional equipment and massive frustration.

All the user is required to do is to place a properly formatted tape into his VCR. The IC-4 controller senses the presence of a tape and handles all cueing functions automatically. It then inserts each commercial sequentially into the network avails until the last commercials on the reel are reached. When it senses that too few commercials remain to complete a full commercial break, the controller rewinds the tape and starts with the first commercial in an endless loop until the tape is changed.

Contact Nyson, 101 Highway 123 Bypass, #C, Seneca, S.C. 29678, (803) 882-0022.

• **Oak Communications** introduced its expanded Sigma options at the NCTA show. The Oak Sigma line of addressable home terminals now includes a provision for stereo sound compatibility (BTSC), and optional compatibility with existing Oak RTC-56, KDM-400 and M-35 sync suppression scrambling systems.

Oak also announced the availability of in-band addressing with its Sigma product line. The new option is offered in a Sigma set-top unit with a three-button keypad. It is fully compatible with all other Sigma products and offers all standard Sigma features.

Heading the list of those new products is Sigma Phase II, which incorporates more extensive usage of custom digital, analog LSIs and non-volatile memory integrated circuits for a simplified and smaller mechanical package. Sigma Phase II offers a variety of user features including on-screen channel and time of day displays, self-diagnostics, frequency (channel) mapping option, stereo capability in both MTS and digital encrypted formats, addressable control of remote units and baseband audio and video outputs, and a master/slave (primary/secondary) decoder control option.

In addition to those new options, Oak's display at the show also featured its master/slave concept, which utilizes a decoder control arrangement to protect against piracy of cable TV programming on secondary decoders in a home. The concept is currently being installed in Suburban Cablevision's East Orange, N.J., systems.

Oak's EIA-compatible version of the Sigma decoder has been designed to conform to the Consumer Products Interim Baseband Interface Standard being developed by the Electronics Industries Association (EIA).

Additionally, on view was Oak's new remote (hand-held) VCR timer for use with the TC-56 decoder and a cordless remote control (Model RCU-400). The VCR timer performs all functions now available with the RCU-400, plus channel scan (up or down) and last channel recall. The RCU-400 is designed as an optional hand-held unit for use with Oak's TC-56 and KDM-400 converter/decoders, and provides a variety of control characteristics.

Contact Oak Communications, 16516 Via Esprillo, Rancho Bernardo, Calif. 92127, (619) 485-9880.

• **Panasonic Industrial Co.** introduced the new TZ-PC120 cable converter at the show. The unit offers features designed for added subscriber convenience. The TZ-PC120 converter is an enhanced version of the TZ-PC110 converter. One of the major improvements of the new product is greater channel capacity — 68 versus 57.

Panasonic Model TZ-PC120 cable converter.

In addition, all 68 channels can be programmed in the favorite channel memory, if so desired. Another standard feature on the TZ-PC120 is the last channel recall. An optional feature on the new converter is an improved parental control device.

Also, Panasonic announced that its new VCS-1 control switch will be available for sale in April. To help promote the VCS-1 to cable operators, Panasonic has produced a three-segment videotape for the product. Also included are 30-second and 60-second promotional spots for cable operators to run on their systems.

The VCS-1 is a single cable RF routing switch that allows the cable subscriber to view one of four video source signals while independently selecting one of two incoming cable signals to record on a VCR.

The unit provides 6 dB ± 2 dB of gain to achieve minimum insertion loss and ensure a high standard of quality. It also has a minimum of 65 dB of isolation between input and output ports to prevent noise and other disturbances in reception, and comes with a one-year consumer warranty.

Contact Panasonic Industrial Co., 1 Panasonic Way, Secaucus, N.J. 07094, (201) 348-7000.

• **Pioneer Communications** demonstrated its enhanced BA-5000 addressable converter at the NCTA show, while promoting the converter's multi-vendor compatibility with Oak, Jerrold and Hamlin scrambling modes. The BA-5000 was first introduced at last year's NCTA.

Without removing any existing converters, the BA-5000 can be phased into a system using the scrambling modes of Oak, Jerrold and Hamlin. The operator even continues to use his existing scrambling scheme until all BA-5000s are phased in. Once the phase-in is complete, the operator replaces the scrambling method in the headend and renders any unauthorized converters useless.

According to Pioneer, the converter's quick acceptance is due to several of its unique features such as an integrated VCR timer, an access trap to prevent subscriber tampering, and the converter's ability to offer IPPV through the company's Pulse store and forward add-on.

Pioneer also demonstrated its addressable Cradle add-on that moves operators into addressability by upgrading any standard converter to an addressable converter.

Contact Pioneer Communications, 2200 Dividend Dr., Columbus, Ohio 43228, (614) 876-0771.

• At the Dallas show, **Pirelli Optronic Systems** introduced its new line of FM modulation equipment. Designated the 900 Series, the units feature broadcast quality performance capabilities and are priced to meet other currently available equipment. Both the modulators and demodulators are frequency agile from 40 to 540 MHz bandwidth and are offered

in deviations of 4, 8, 10.75 or 13.5 MHz. Two audio subcarriers with selectable operating frequencies are available for stereo broadcasting or other applications.

In the company's exhibit, the 900 Series units were demonstrated working on a 16-channel, 22 km, single fiber, video supertrunk. A custom video switching matrix allowed any input signal to be placed on any of the trunk's 16 operating channels. Actual system performance characteristics were verified in a test equipment rack that contained a spectrum analyzer, vector scope and a waveform monitor.

Pirelli also displayed its newly developed 1,300 nm, fiber optic RP1301 Transceiver. This unit provides the capability to drop and insert video signals at any point along a fiber network.

Contact Pirelli Optronic Systems, 300 Research Pkwy., Meriden, Conn. 06450, (800) 523-7893 or (203) 238-9665.

• **RMS Electronics** showed its newly introduced 5-600 MHz Ultra-Tap series of two and four-way interchangeable directional taps. The taps are available with either die-cast, machine threaded or screw machine brass "F" ports. A "strip" gauge on the top housing indicates the proper length of the cable center conductor.

Contact RMS Electronics, 50 Antin Pl., Bronx, N.Y. 10462, (212) 892-1000.

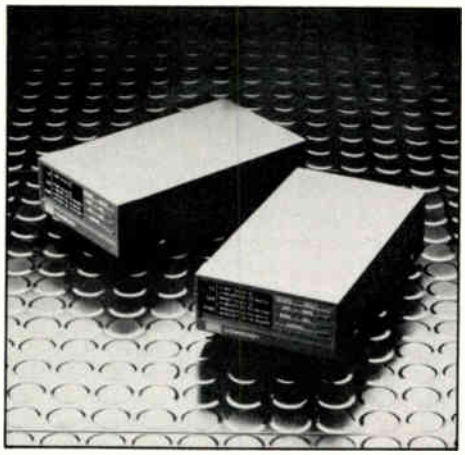
• **Sadelco** displayed two new superhetrodyne receivers, the Super 600 and Super 900 signal level meters. Both are double conversion super-hetrodyne receivers designed to measure the strength of television signals within a frequency range of 4.5 MHz to 600 MHz (Super 600), or 4.5 MHz to 890 MHz (Super 900).

These instruments provide the most often needed CATV plant measurements, according to the company, in a user-friendly package. Features include an overall accuracy of ±0.5 dB, the provision to measure AC/DC volts, ohms, S/N, hum and battery test. As well, both the Super 600 and Super 900 are provided with a built-in crystal-controlled calibrator.

Contact Sadelco Inc., 75 W. Forest Ave., Englewood, N.J. 07631, (201) 569-3323.

• **Scientific-Atlanta Inc.** introduced the Model 6585, a status monitoring/reverse switching system that S-A says reduces fault-finding time and troubleshooting cost by remotely identifying problems or potential problem areas in trunk stations throughout the cable distribution system. The Model 6585 utilizes an IBM personal computer, a color monitor, printer and RF sub-system located at the headend or central control location and transponder modules for each trunk amplifier to be monitored.

The Model 6585 system continually polls up to 2,048 trunk stations while monitoring, switching or controlling up to 21 parameters, 15 of which can be user defined. In its basic configuration, the transponder monitors the actual voltage of AC/DC power, high/low pilot levels, temperature and reverse bridge switch. Data for trunk station status changes or specific trunk station addresses are displayed and can be printed for reference.



W&S Systems' Models VCM 2001 and 2002.

Also introduced was the Model 8550-375 learning remote control, a device that gives subscribers the capability of controlling televisions, VCRs and other home entertainment electronics with a single hand-held remote control.

The Model 8550-375 imitates the infrared codes of the subscriber's remote-control units by switching into a "learn" mode. The programming sequence is easy to learn and use. When the subscriber presses matching keys on both the Model 8550-375 and the remote control to be learned, the learning remote-control unit receives and stores transmission data in its memory, transmitting that same data whenever that particular key is pressed.

S-A also introduced the new Model 8535 set-top terminal, which provides descrambling capabilities compatible with both the company's patented scrambling technique and the techniques used by other major suppliers. The 8535 terminal also features a new method of programming the terminal for service authorizations. Availability is scheduled for fall 1986.

The 8535 terminal is programmed through its infrared remote-control receiver. The subscriber options transmitter, an infrared transmit device, is used to program the terminal's non-volatile memory. An operator can select channel authorizations, scrambled channel list, barker channel number, frequency line-up (standard, HRC, IRC or EIA), parental control code and remote control enable. These settings can be stored in the subscriber options transmitter and identified as tiers of service.

Contact Scientific-Atlanta, 1 Technology Parkway, Box 105600, Atlanta, Ga. 30348, (404) 441-4000 or (800) 722-2009.

• **Triple Crown Electronics** introduced a new television stereo generator, Model SG48, at the show. The SG48 meets the standards specified by the BTSC for stereo multichannel TV sound. (FCC specification: OST bulletin No. 60, April 1984.) Standard composite video is used to derive a lock for the 15.734 kHz pilot and 31.468 kHz subcarrier to the TV horizontal sweep frequency. The peak deviation of L, R, L+R, L-R and total output can be easily monitored on a front panel.

Also introduced was the MS-112, a mid-split distribution amplifier for broadband local area network applications. The unit consists of two amplifier sections both employing dual hybrid gain blocks. Each section is equipped with independent input and interstage level and slope adjustments.

Triple Crown also showed its System 3000 hotel pay TV system, which is capable of controlling from one to 15 premium TV channels. Many of the system's features are field programmable, including premium channel assignment, operating modes and terminal addresses.

Contact Triple Crown Electronics, 4560 Fieldgate Dr., Mississauga, Ontario, Canada L4W 3W6, (416) 629-1111.

• **Vertex Communications Corp.** announced the development of a 3.1-meter Ku-band antenna at its booth at the NCTA show. The antenna features a receive-only prime focus feed system, a gain at mid-band of 49.6 dBi with a beamwidth of -3 dB at .60 degrees. Sidelobes meet the 29-25 log O dBi curve FCC 81-704 ruling.

This system was developed as a high-performance receive system for customers requiring quality video signal during high winds and harsh environmental conditions.

Contact Vertex Communications, 2600 Longview St., Kilgore, Texas 75662, (214) 984-0555.

• **W&S Systems,** a Westinghouse/Sanyo partnership, introduced a new video control module (VCM) series. The VCM 2001 and 2002 are amplified cable/VCR interface units designed to minimize signal deterioration. The interfaces are generic and work with all cable converters and any combination of TV and VCR, either standard or cable-ready.

Both the VCM 2001 and the VCM 2002 have three unswitched polarized AC outlets. The VCM 2002 has an additional auxiliary input for the use of a second VCR, videodisc player, personal computer or video game. Easy instructions make it possible for the units to be installed by the consumer.

Contact W&S Systems, 11 Stanwix St., Pittsburgh, Pa. 15222, (800) 323-9935 or (412) 642-4744.

• Also at the W&S Systems' booth, On-TRAQ, a new venture company of **Westinghouse Electric Corp.** displayed an automated surveying system. According to Westinghouse, the new service, called Cable-TRAQ, is a cost-effective alternative to customized surveys and provides more meaningful data than post-card and mail-in opinion polls.

Westinghouse and Group W originally developed the survey in 1984 for Group W Cable. Using the CableTRAQ approach, Group W was able to document the correlation between customer satisfaction and disconnects from

surveys of over 17,000 subscribers. This experience now serves as the base for the new system.

CableTRAQ gives an assessment of customer attitudes about such key service areas as telephone service, installation, telemarketing, door-to-door sales assistance, repair, cable guide and billing services. The computer-based system identifies and prioritizes customer services that require improvement as well as providing a management action plan. Each CableTRAQ report is based on telephone surveys of representative consumers in the operator's community.

Contact Westinghouse OnTRAQ, P.O. Box 355, Pittsburgh, Pa. 15230, (412) 374-7111.

• **Wineguard** featured its Chromstar 10, a 10-foot perforated aluminum satellite TV antenna, and its Model SC-8048, an eight-foot perforated aluminum antenna, at the show this year.

The Chromstar 10 features a deep-dish design with patent-pending construction innovations. The frequency range covered is 3.7 to 4.2 GHz. According to the company, the unique design of Chromstar 10 has resulted in high gain and a low noise temperature. The performance of the dish was recently documented by Paxton, Inc., an independent engineering laboratory.

Also at the booth was Wineguard's eight-foot aluminum dish (Model SC-8048). On this dish, the perforated aluminum petals are held securely in place by the company's exclusive extruded aluminum support and locking rib system, completely pre-assembled at the factory.

Contact Wineguard Satellite Systems, 3000 Kirkwood St., Burlington, Iowa 52601, (319) 753-0121.

• **Zenith Electronics Corp.** introduced two new products at the show: a new addressable cable television system based on a patented, proprietary new RF scrambling technology and a universal add-on addressable decoder.

Called PM (for phase modulation), the RF addressable box marks Zenith's entry into the RF addressable market, and is geared toward bringing addressability to the 27 million non-addressable cable TV homes. The PM system is fully compatible with the broadcast industry's BTSC stereo TV standard. It features a built-in programmable timer for unattended recording and a serial data port for impulse pay-per-view and other future applications.

Other features include: wireless remote control that can be authorized from the headend, parental control, programmable favorite channel scan, downloadable options and self-diagnostics. To achieve security, the PM system uses Zenith's patented RF scrambling technique called PROCESS (phase reversal of carrier encrypted sync suppression). The system uses new proprietary multi-element surface acoustic wave (SAW) filters, which dynamically modify both the phase and amplitude of the television RF signal for multimode scrambling.

With the SAWs, the PM system's encoded signal has dynamic sync suppression (tearing up the picture) and chroma inversion (shifting the color in the TV picture). Audio masking is also used.

The PM system also uses two custom very large scale integrated (VLSI) circuits for increased reliability and feature enhancements. Security is assured because each decoder has its own unique address code imbedded in the custom VLSI circuitry. Unlike many other RF addressable systems, data for addressability, tiering and descrambling is encrypted and transmitted in-band.

Zenith also introduced Pay-Mate, a new universal add-on addressable decoder that works with existing decoders to provide full addressable capability and a wide range of features. Part of Zenith's new PM system, Pay-Mate is a new approach to RF addressability in which data for addressing, tiering and descrambling are transmitted in-band.

The Pay-Mate system offers full headend addressability for fast program authorization for pay-per-view applications, can support up to 32 tiers of programming and is fully compatible with the broadcast industry's BTSC stereo TV system.

Pay-Mate will be available in versions with Channel 2, 3 or IF input. The IF input Pay-Mate decoder can be used with more than 6 million existing cable-compatible Zenith color TV receivers.

Contact Zenith Electronics Corp., 1000 Milwaukee Ave., Glenview, Ill. 60025, (312) 391-8181.

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Selecting cable clips

By Gregory R. Hayward
Account Manager, ITW Linx, Communications Products

Cable companies can benefit greatly from a review of alternative cable clip designs and materials for outdoor installation. Today UV-stabilized materials will withstand high impact during installation and will not be damaged from weather variations. Switching to the new designs can also reduce costly call backs. These call backs cost installers an average of $25 to $30 each and often result in lost customers.

Many factors should be considered when selecting clips for new-builds, rebuilds and upgrade construction sites. Clips must be versatile enough to secure varying cable sizes to handle a range of hard materials found at the installation sites. Constructed of sturdy materials, the clip must also be easily and quickly installed.

Durability is key

For ease in installation and to provide long-life in varying weather conditions, cable clips should be constructed of high-impact, ultraviolet-stabilized materials. Plastic clips may break or crack if not struck squarely by the installer. These clips may also deteriorate from weather conditions.

UV chemically stabilized clips will help prolong clip life and eliminate the need for early replacement. An estimated 30 to 40 percent of cable clips not UV-stabilized break during the first year; between 55 and 70 percent will break during the second year.

To avoid this problem, select a plastic material that will not crack, break or damage the cable. There is now tough, high-impact polycarbonate that is UV-stabilized to wear well even in intense lighting conditions. The clear, weather-resistant material will not deteriorate from exposure to extreme weather variations and performs well in temperatures to –40°F.

Ease of installation

UV-stabilized, high-impact clips also allow for faster installation. These clips will hammer easily into poured concrete, cinder blocks, mortar and bricks without breaking and causing damage to the cable.

'Switching to the new designs will reduce costly call backs. . . an average of $25 to $30 each'

Installing cable clips can be time consuming if securing clips and cable requires drilling holes. Drilling holes every 18 to 24 inches, at a cost of approximately 50 cents per hole, can add up quickly. Installing masonry anchors or screws can also use up valuable installation time.

With newer designs, the installer attaches the clip to the cable as he progresses. Next, he pounds the pin of the clip into the building surface with a common two to three pound ground wrought hammer.

This cable clip design is available with one or two metal pins. In some cases, for floor anchor mounts, the one-pin design fits securely into place and is sufficient. For more secure installation, the two-pin design is available. Check for tempered steel pins; they are rust-proofed and offer the strongest construction available.

The "right" clip

Residential customers are also concerned about clip aesthetics. They want cable and cable clips to blend in unobtrusively. Most manufacturers offer a choice of natural, white or black cable clips. Clear clips that blend with all backgrounds may be a better alternative. Many installers carry only the clear clips to reduce the amount of parts they stock and to meet the aesthetic needs of all customers.

Homes with aluminium siding require a special aluminum siding clip that holds cable either vertically or horizontally. The clip has a barb that is tapped into position between the overlapping of the aluminum siding joint. It snaps into the overlap to effectively resist pull out force.

This one-piece clip is an advance over previous aluminum siding installations which required several clips to anchor the cable. Horizontally, the clip holds cable securely beneath the siding lip. Vertically, the clip encloses the cable in an angled channel around the edge of the siding overlap and holds the cable snugly against the wall surface. Installed with just a hammer and screwdriver the clip provides an attractive alternative for aluminum siding use.

In review, selecting cable clips of weather-resistant, sturdy materials for quick installation is cost-efficient for cable installers. Less installation time frees up a cable crew for other jobs. When attached by reliable clips, cable will remain secure for years. The installer benefits from the initial installation savings, reduced maintenance and satisfied customers.

AD INDEX

KEEPING TRACK

Larry Fry has been named vice president of sales, and **George Fletcher** vice president of national accounts, for **General Instrument**'s broadband group. The broadband group encompasses all of General Instrument's cable television operations including Jerrold and Tocom.

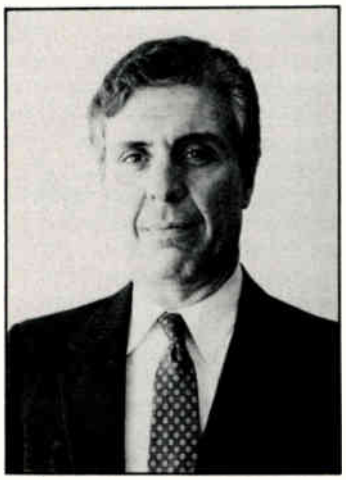
Fry will oversee the operation of field sales for all General Instrument's cable products. All regional sales managers will report to him as will Fletcher. Fletcher, who was previously Western U.S. sales vice president, will now oversee national accounts. Contact 2200 Byberry Rd., Hatboro, Pa. 19040, (215) 674-4800.

Andrew Setos has been appointed senior vice president, engineering and operations for the **Viacom Networks Group.** Most recently, Setos was senior vice president, engineering and operations, MTV Networks Inc. Contact: 1211 Avenue of the Americas, New York, N.Y. 10036, (212) 575-5175.

Gerry Jordan, formerly vice president of programming and marketing at **World Video Library Inc.,** has been promoted to senior vice president. He will administer all operations of the company, which now will be consolidated in Fort Worth, Texas. Contact: 2747 Airport Freeway, Fort Worth, Texas 76111, (817) 831-3811.

Sidereal Corp. has named **Alan Colson, Jeffrey Gretz** and **Steven Harvath** to the newly created positions of directors of product management. Colson, a seven-year veteran of the company, was previously director of engineering and engineering services. Gretz, with the company for eight years, was most recently senior director of Eastern operations. Harvath, with Sidereal for seven years, has held several key engineering posts. Contact: 9600 S.W. Barnes Rd., Portland, Ore. 97225, (800) 547-3222 or (503) 292-7103.

Scientific-Atlanta Inc. has appointed three division vice presidents in recognition of their contributions to the company's success. They are: **J. Larry Bradner,** general manager, Broadband Communications Division; **Raymon Heaton,** general manager, Atlanta Instrumentation Division; and **Thomas Winship,** general manager, Government Products Division. All three have held several positions within Scientific-Atlanta. Contact: 1 Technology Parkway, Box 105600, Atlanta, Ga. 30348, (404) 441-4000.



Verruto

Phillip Verruto was appointed to the position of vice president of sales and marketing of **AM Cable TV Industries Inc.** Verruto had been vice president of sales for Decision Data Computer Corp. Contact: AM Drive & Rt. 663, Quakertown, Pa. 18951, (215) 536-1354.

Adapt Communication Supply Co. Inc. has named **Leonora Iemmiti** as its district sales manager. Contact 17 Barstow Rd., Great Neck, N.Y. 11021, (800) 232-7826 or (516) 487-1780.

Mann Bush has rejoined the **Jerrold Division** of General Instrument Corp., and has been appointed account manager for sales activity to United Cable Television Corp. of Denver. Bush will be based out of Jerrold's Western regional sales office in Englewood, Colo. He rejoins Jerrold after serving as a Western region area sales manager for General Cable Corp. Earlier, Bush had spent more than 10 years with Jerrold as a sales and field engineer. Contact: 7100 E. Belleview Ave., #101, Englewood, Colo. 80111, (303) 740-6118.

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CALENDAR

April

April 1: SCTE Golden Gate Chapter meeting, Italian Gardens Restaurant, San Jose, Calif. Contact Wayne Sheldon, (408) 261-6420.

April 2: SCTE Appalachia Mid-Atlantic Chapter meeting, Chambersburg Holiday Inn. Contact (717) 984-2878.

April 2-4: Infotron Institute communications network design seminar, Sheraton Plaza La Reina, Los Angeles. Contact (800) 257-8352.

April 6-8: University of Mississippi Center for Telecommunications trade show and conference, "Satellite Opportunities Expo for Business and Home," Opryland Hotel, Nashville, Tenn. Contact (601) 236-5510.

April 7-11: Datapro Research Corp. Communications Week '86, San Francisco. Contact (800) DATAPRO.

April 9: SCTE Blue Ridge Mountain Meeting Group meeting, Holiday Inn, Piedmont Center, Hickory, N.C. Contact James Beavers (919) 667-4151.

April 10-11: The **Society of Cable Television Engineers** and the **Florida SCTE Meeting Group** national seminar on computer-aided CATV testing, Sheraton-Twin Towers, Orlando, Fla. Contact Richard Kirn, (813) 924-8541.

April 11: QVP seminar on pay-per-view, Warner Marriott Center, Los Angeles. Contact (914) 472-7060.

April 11-12 Iowa Technical Seminar on signal leakage, rebuilds and maintenance, Bavarian Haus, Des Moines, Iowa. Contact Kathy Alleman, (515) 246-1440.

April 15: Pennsylvania Cable Television Association third annual state legislative conference, Marriott Inn, Harrisburg, Pa. Contact Patricia Wilson, (717) 234-2190.

April 15-17: C-COR Electronics technical seminar, Indianapolis, Ind. Contact Deb Cree, (814) 238-2461.

April 15-18: Arizona State University course on antenna analysis, design and measurement, Arizona State University, Tempe. Contact (602) 965-1740.

April 16-18: Infotron Institute communications network design seminar, Bellevue Hilton, Seattle. Contact (800) 257-8352.

Planning ahead

May 13-15: Canadian Cable Television Association annual convention and cablexpo, Vancouver.

June 12-15: Society of Cable Television Engineers' Cable-Tec Expo '86, Phoenix (Ariz.) Convention Center.

July 15-17: Community Antenna Television Association annual convention, MGM Grand Hotel, Reno, Nev.

July 20-22: Eastern Show, Merchandise Mart, Atlanta.

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

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

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

April 18-20: Kentucky Cable Television Association general membership meeting, Ramada Inn, Maysville, Ky. Contact Patsy Judd, (501) 864-5352.

April 21-23: International Computer and Telecommunications Conference, COMTEL '86, Dallas Convention Center. Contact Tommy Greene, (214) 458-7011.

April 21-23: Infotron Institute communications network design seminar, The Sheraton Palace, San Francisco. Contact (800) 257-8352.

April 22-23: Blonder-Tongue SMATV/MATV/CATV/TVRO seminar, Airport Hilton, Tampa, Fla. Contact Neville Johnson, (813) 953-9843.

April 22-24: Caribbean Cable Television Association annual meeting, Blue Beard's Castle, St. Thomas, Virgin Islands. Contact Andrea Martin, (809) 774-2080.

April 23: SCTE North Jersey Chapter consumer electronics/CATV interfacing seminar, Victor's Holiday Inn, Wayne, N.J. Contact Virgil Conan, (212) 512-5309, or Ed Buchman, (201) 239-8183.

April 23: SCTE Delaware Valley Chapter meeting on the video and audio origination category of the BCT/E. Contact Bev Zane, (215) 674-4800.

April 30-May 2: Infotron Institute communications network design seminar, Westin Hotel, Chicago. Contact (800) 257-8352.

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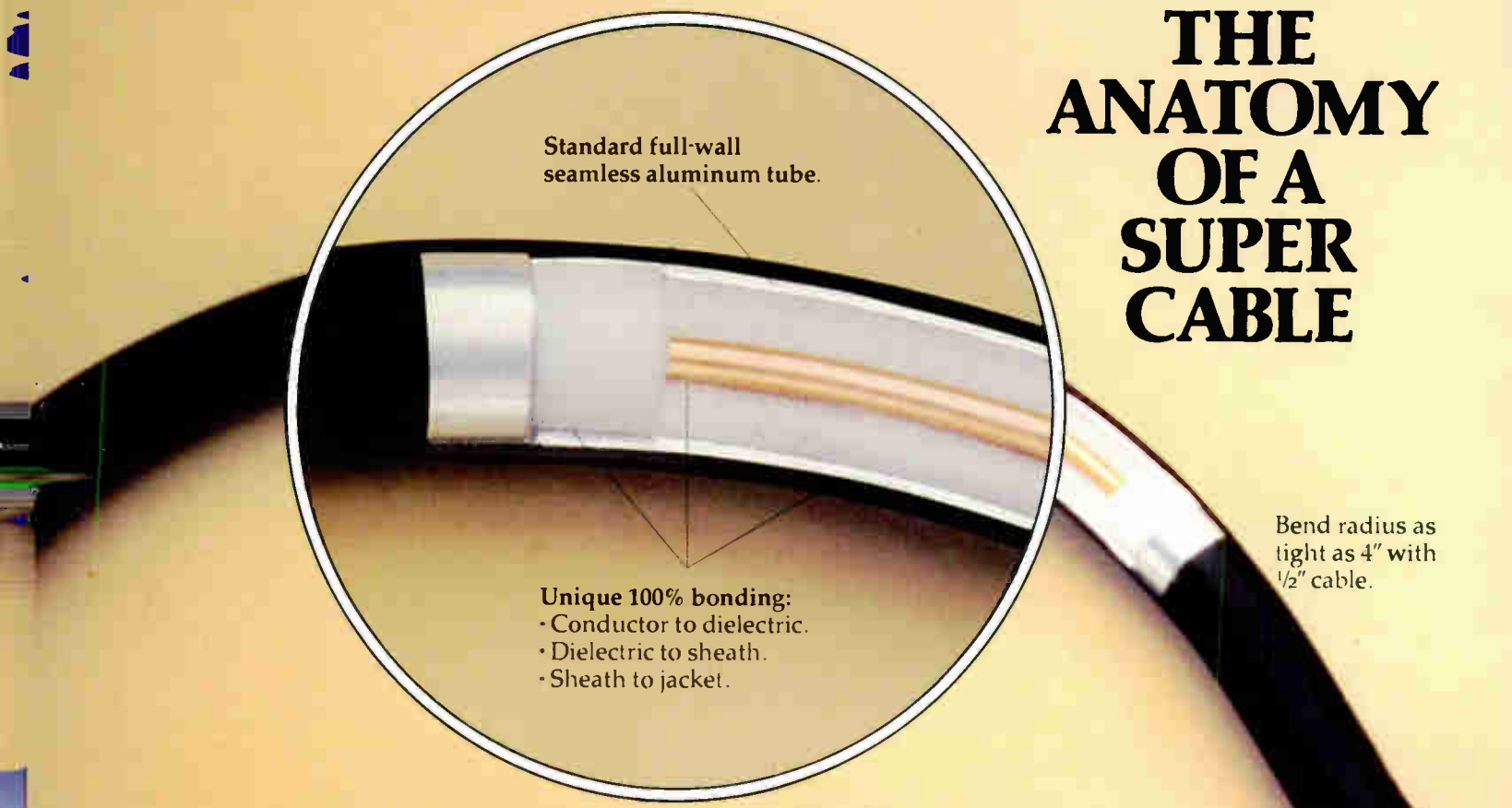

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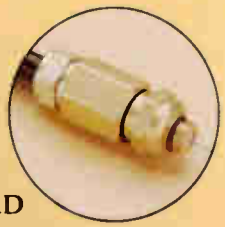

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CABLE TELEVISION DIVISION

April 30-May 2: Magnavox CATV training seminar, Denver. Contact Amy Costello, (800) 448-5171.

May

May 5-7: Infotron Institute communications network design seminar, Infotron Systems Corp., Cherry Hill, N.J. Contact (800) 257-8352.

May 5-7: Magnavox CATV training seminar, Denver. Contact Amy Costello, (800) 448-5171.

May 6-8: Online International Inc., Videotex '86, Dallas Infomart. Contact (212) 279-8890.

May 6-8: Jerrold technical seminar, Dallas. Contact Beth Schaffer, (215) 674-4800.

May 7-9: Arizona State University course on semiconductor processing, Arizona State University, Tempe, Ariz. Contact (602) 965-1740.

May 7-9: Louisiana Cable Television Association convention, Hilton Inn, Bossier City, La. Contact Lisa Black, (504) 344-6042.

May 13-15: Canadian Cable Television Association convention and expo, Hyatt Regency Hotel, Vancouver. Contact (800) 268-4704.

May 13-15: Maryland/Delaware Cable Television Association annual meeting, Governor Calvert House, Annapolis, Md. Contact Tim Hanna, (301) 332-4088.

May 14-16: Infotron Institute communications network design seminar, Sheraton Centre Hotel & Towers, New York City. Contact (800) 257-8352.

May 19-21: Arizona State University course on semiconductor facilities and clean room practices, Arizona State University, Tempe, Ariz. Contact (602) 965-1740.

May 21: SCTE Chattahoochee Chapter meeting on headend planning. Contact Gary Donaldson, (404) 979-0010.

May 28-30: Infotron Institute communications network design seminar, Sheraton Valley Forge, King of Prussia, Pa. Contact (800) 257-8352.

May 28-30: The Armed Forces Communications and Electronics Association 40th annual convention and exposition, Washington, D.C., Convention Center. Contact (703) 425-8590 or (800) 336-4583.

June

June 4-6: Magnavox CATV training seminar, Phoenix. Contact Amy Costello, (800) 448-5171.

June 12-15: SCTE Cable-Tec Expo, Convention Center, Phoenix, Ariz. Contact Bill Riker, (215) 363-6888.

June 18: SCTE Delaware Valley Chapter meeting covering signal processing centers and testing on video and audio originations, both BCT/E categories. Contact Bev Zane, (215) 674-4800.

June 18-20: Infotron Institute communications network design seminar, Infotron Systems Corp., Cherry Hill, N.J. Contact (800) 257-8352.

June 23-25: SCTE and **New York State Cable TV Commission** Northeast cable television technical seminar, Roaring Brook Ranch, Lake George, N.Y. Contact Bob Levy, (518) 474-1324.

June 24-26: C-COR Electronics technical seminar, Baltimore. Contact Debra Cree, (814) 238-2461.

June 25-27: Magnavox CATV training seminar, St. Louis, Mo. Contact Amy Costello, (800) 448-5171.

June 30-July 2: Magnavox CATV training seminar, St. Louis, Mo. Contact Amy Costello, (800) 448-5171.

July

July 8-10: Online International Ltd.'s Cable '86, National Exhibition Centre, Birmingham, England. Contact (212) 279-8890.

July 8-10: Jerrold technical seminar, Chicago. Contact Beth Schaffer, (215) 674-4800.

July 15-17: Community Antenna Television Association annual convention, MGM Grand Hotel, Reno, Nev. Contact (703) 691-8875.

July 16-18: Magnavox CATV training seminar, St. Paul, Minn. Contact Amy Costello, (800) 448-5171.

July 21-23: Magnavox CATV training seminar, St. Paul, Minn. Contact Amy Costello, (800) 448-5171.

July 24-26: Colorado Cable Television Association summer convention, Beaver Run Resort, Breckenridge, Colo. Contact (303) 863-0084.

July 30: SCTE Chattahoochee Chapter meeting on system design techniques. Contact Gary Donaldson, (404) 979-0010.

July 30-Aug. 1: Magnavox CATV training seminar, Chicago. Contact Amy Costello, (800) 448-5171.

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Power-line noise problems and solutions

By Steven Cosgrove
Communications Manager, Oneac Corporation

Plugging any piece of modern microprocessor-controlled equipment into the commercial AC power systems means connecting it to all kinds of transient noise, such as "spikes," "surges," "notches" and other electrical disturbances. This power pollution downgrades the performance and shortens the life of any system exposed to it. You can cut down on these problems, however, by providing your cable equipment with a pollution-free environment.

Power-line noise causes both intermittent problems and long-term permanent damage to your equipment. At one end of the spectrum, you may experience such temporary symptoms as lock-ups, memory loss, garbled data and garbage on the screen.

Over time the constant low-level electrical stress will gradually eat away at the microcircuitry until it no longer performs consistently or until some of the hardware fails completely. Even after you repair all the damage you can find, there will probably be additional failures for months, as other weakened parts slowly give up and die.

Power-line noise origins

How does power-line noise get into your equipment? Power-line noise has always been a part of the electrical utilities. It's a natural by-product of the distribution and use of electrical power. If demand for power increases beyond the capacity of the utility company's generator in one area, or if heavy industrial use overloads the power system, the corrective action of the utility company can cause spikes and transients to appear on the power line.

Lightning strikes can also cause surges and spikes measuring thousands of volts to show up at your electrical outlets — even when the strike is many miles away. And, on a day-to-day basis, much more electrical noise is created right in your building by noisy electrical loads. Copiers, electric typewriters, heating, ventilating and air conditioning, coffee makers, power tools, vending machines, and the like all throw noise back into the electrical system when they operate.

Although power-line noise has existed since the utility companies were built, it was not until the last 10 years that modern equipment has become sensitive to even minor power disruptions. Over the last decade, most electronic equipment manufacturers have changed from using linear DC power supplies to modern switch-mode power supplies. Because the switching power supplies operate by switching on and off rapidly and drawing a lot of current during each cycle, they can generate a lot of noise.

The other big problem is that the chips themselves are more vulnerable to noise than they used to be. In each new generation we pack more transistors into the same microscopic space. As the individual transistors get smaller, the amount of electrical overstress they can survive gets lower and lower. Modern semiconductor devices can now be disrupted by as little as .5 volt of noise. Over 10 volts of noise starts to destroy them.

Solutions to the problem

Power-line noise is an invisible problem. After experiencing some typical failures, you would probably blame either the manufacturer or yourself for problems that were really due to the electrical environment. Once the problem is recognized, however, you can start to look for a solution.

There are three basic functions you must look for in a power conditioning device in order to give your system the total protection it needs. First you must find a device that reduces the worst possible electrical noise to levels that are harmless to semiconductors before it enters the system.

Next, the power protection equipment must prevent disruptive interaction between noise-generating loads connected to the conditioner's output. This means that if two pieces of equipment are attached to one power conditioner, the action of one of the units will not disrupt the other.

Finally, a power conditioner must run efficiently. The modern switching power supplies mentioned earlier have a high current draw. Many power conditioning devices cannot meet the peak current demands unless they are considerably oversized for the job. And oversized units operate at a lower efficiency meaning higher electric bills, among other problems. There is a new technology available, however, known as a low-impedance conditioner, that provides peak current on demand without having to be oversized.

Electrical power disturbances cause the greatest number of microprocessor-based equipment failures. No other factor has this same impact. And, while you cannot view electrical noise without the aid of sophisticated monitoring equipment, you can understand how power damage occurs and what action to take in response.

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How do you measure up?

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

All system techs or chiefs read the same technical magazines, go to about the same type and number of technical seminars, have within reason about the same formal technical training, and have been usually on the job long enough so that any initial technical background differences have faded — all resulting in every CATV tech or chief knowing about the same CATV technology — especially the basics. Their supervisors and system managers are about equally happy with their techs' and chiefs' knowledge and performance and reward them with about equal raises, although system size plays a factor. Why then does every company manager, chief and tech need to support the Society of Cable Television Engineers' Broadband Communications Technician/Engineer (BCT/E) voluntary certification program?

Because all system techs and chiefs don't read the same technical magazines or quantity, or go to about the same type and number of technical seminars, or have about the same formal technical education. Even though we may have about the same years on the job and get about the same pay and raises for the size of the system, there are differences — shocking differences in what we know and how well we can perform. These differences must be discussed and addressed.

An analysis of the first six months of the BCT/E certification test results shows that while nearly half of those taking the BCT/E exam pass with excellent scores, the other half fail and fail flat. There are very few falling into the middle 60-70 percent range. This statistic is even more troubling if you have personally taken SCTE's certification exam as I have, because only then can you certify that the exam is not tricky and tests comprehension of only the very simplest of CATV tech level basics. Many people taking the exam pass the first time and do so with little formal review. The exams are open book and hardly require a calculator.

It should be very alarming to management that nearly 50 percent of the CATV technical personnel entrusted with maintaining their millions of dollars worth of CATV technical assets and subscriber signal quality and reliability are perhaps unfit to do so. It should be equally alarming to each of us to be working along side, or worse, under, or to be depending on in everyday safety situations, co-workers who do not understand even basic CATV technology. If I was pulling cable, I would want to know that the guy by the reel knew why it should be grounded. If I was in charge of system maintenance or reliability, I would want to know that my techs or co-workers knew what they were doing. If I was a pilot, I would want to know all CATV technical personnel understood the importance of immediately reporting and fixing burned out tower lights and keeping system signal leakage to a minimum.

A program with purpose

The BCT/E certification program does just that. The program is a comprehensive assessment of CATV technical basics subdivided into seven categories of independent technician level or engineering level certification: distribution systems, video and audio origination, signal processing, data, terminal devices, transportation (microwave, etc.), and engineering management. A tech working in just one or two categories need only become certified in those areas to show proficiency in his job technology basics. A chief engineer is involved in more areas, and therefore would take all seven exams. The engineering level certification repeats all seven categories, but the exams demand more knowledge and depth.

Each category exam is 50 questions and will take a moderately fast worker an hour to complete. The exams are tightly administered by registered examiners. Each exam comes from a constantly upgraded pool of 500 or more questions, assuring failure if one tries to memorize a previous answer order or somehow grab a missing exam. Two techs sitting side-by-side taking the same category exam are likely to have entirely different tests.

The BCT/E exams are offered regularly at every local SCTE chapter and meeting group or any SCTE-sponsored event such as the upcoming SCTE Cable-Tec Expo and nearly all state cable associations where SCTE has been asked to participate.

One of the problems in the past has been that it was difficult for a CATV tech or chief to honestly (and privately) see how he measures up against other techs or chiefs. It is amazing how most CATV companies or technical departments do not routinely administer proficiency exams at hiring, for promotions, or at regular intervals. As a result, until SCTE saw the crushing need and developed the BCT/E voluntary certification program and its exams, even an enthusiastic, self-disciplined well-meaning cable tech could go his whole cable career without "calibration."

Why become BCT/E certified?

The first reason to participate in this industrywide certification program is to voluntarily measure your grasp of CATV basics. Then smile and enjoy the warm rush when your certificate comes, or discover that perhaps for the first time, more work is needed to stay proficient in your comprehension and performance in our increasingly complex industry.

The second reason is to let your manager know which half of the countrywide CATV technical workforce you belong to — better than a 75 percent score and BCT/E certified with plaque on the wall or worse than a 60 percent score and not really understanding your day-to-day technical routine.

Third, sooner or later not being on a par with national CATV tech averages will catch up with you. It would be better to determine it yourself and take necessary actions than be surprised by a loss of promotion or cut by a workforce reduction.

Fourth, it shows that regardless of your individual private passing score, you care about your industry, your career and yourself. Things don't make things better — people do. A technical industry with its technical community focused on achieving better personal and group proficiency will make a very great difference to us all.

Fifth, it is catching! I must admit that before actually taking the BCT/E certification exam, I was theoretically for it, but actually not very motivated because no one else on my block was yet certified. I had heard good things about the exam third or fourth hand, but it was still too abstract and distant. Then one of the chiefs in the company took and passed the exam. Well, this brought the challenge right to my doorstep, and since my personal success and (boastful) display of the BCT/E certificate on my wall, many others are or will soon be rising to the challenge as a result.

And if you don't?

You may get left behind. In an industry where certification becomes the norm, it will become harder and harder to be hired or promoted without some form of documented evidence of your minimum technical proficiency. How would you like to go to a doctor or dentist who not only wasn't licensed but didn't even think licensing and certification was important. Many companies have already set up incentives such as higher percent salary increases for those that achieve certification.

Okay, so you'll go to work in another industry. Where? The broadcast industry has technical certification. The two-way radio industry has technical certification. Even the TV and CB radio repair industry has its CET (Certified Electronics Technician) program.

The number one reason given by those not yet lining up to sit for the BCT/E is the fear and embarrassment of failing. This is only natural and shows a positive attitude and respect for the certification process.

Many have optioned to take the BCT/E "cold turkey." It is risky to take any exam without any preparation at all. Even though you drive every day, could you pass your state's driver's exam "cold turkey?"

Industrywide certification is important to give us all a challenge and common yardstick of technical community and personal basic knowledge. BCT/E certification should be an important goal for every CATV tech and engineer this year. How will you measure up?

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