COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers

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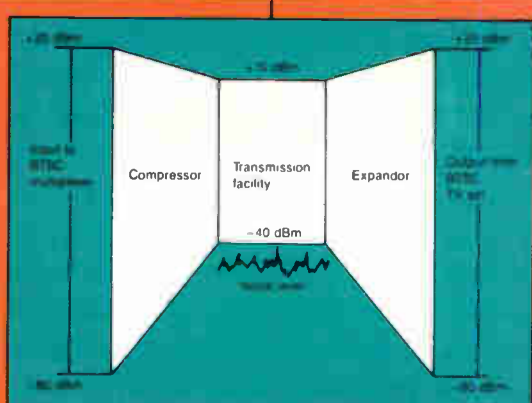

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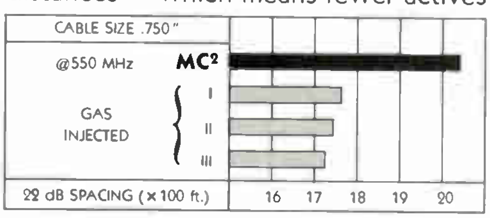

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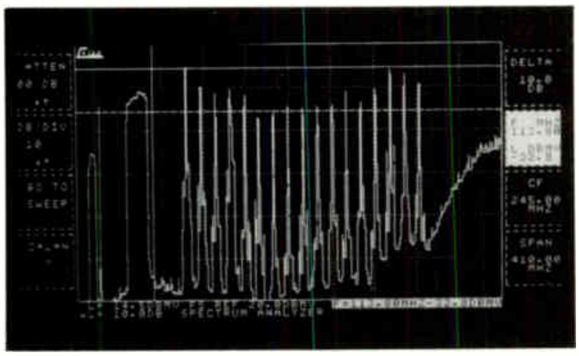

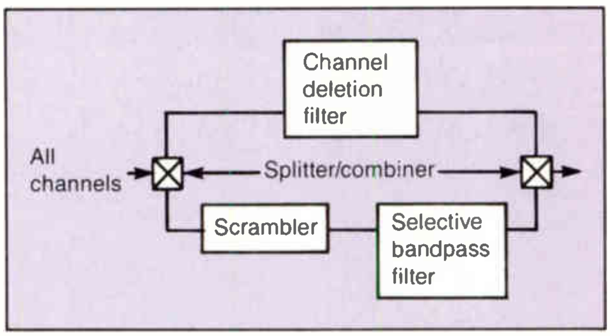

Features

 Communications Technology™ (ISSN 0884-2272) is published monthly by Communications Technology Publications Corp., 12200 E. Briarwood Ave., Suite 250, Englewood, Colo. 80112 — or — P.O. Box 3208, Englewood, Colo. 80155, (303) 792-0023. March 1988, Volume 5, Number 1. Office of publication is 12200 E. Briarwood Ave., Suite 250, Englewood, Colo. 80112. Change of address notices should be sent promptly; provide old (or copied) mailing label as well as new address, including ZIP code; allow 6 to 8 weeks for change. Second-class postage paid at Englewood and Denver, Colo. POSTMASTER: Please send address changes to Communications Technology, Box 3208, Englewood, Colo. 80155

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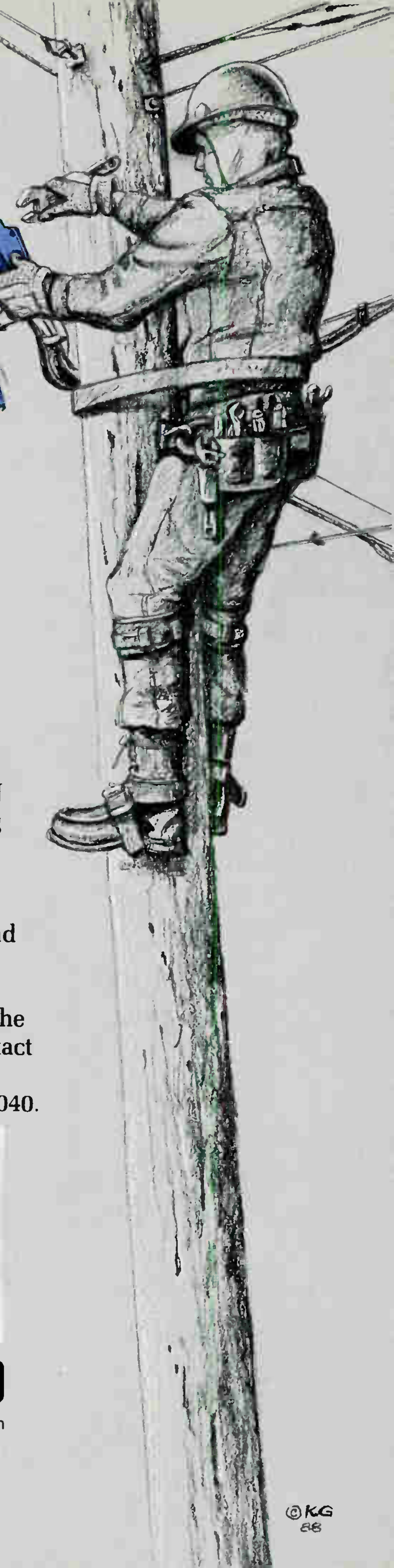

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'Remember the Alamo!'

Even though that wasn't the cry heard this year in San Antonio, the Texas Show was nevertheless a spirited event. The exhibit floor provided an uncluttered environment for the almost 2,000 attendees to "chew the fat," see the wares and even do a bit of business.

The technical sessions were again coordinated under the guiding light of the SCTE. Congratulations to the session presenters—NCTA's Wendell Bailey, Bob Dickinson from Dovetail Systems, Steve Fox of Wegener and Jones Intercable's Ron Hranac—for providing some valuable hands-on information. These no-bull sessions foddered a good deal of interaction. Many of the attendees came with questions of their own, which helped clear up specific areas of confusion and spur further discussions. All in all, the tech sessions were well-presented, well-attended and well-received.

Speaking of well-attended, Wednesday evening's Texas-style Bar-B-Que was just that. The food and the fixin's, topped off with a bit of Glen Campbell's specialty (courtesy of Showtime/The Movie Channel), provided just the right country flavor and friendly atmosphere that this show is known for. Ten-gallon hats off to Bill Arnold, the convention committee and staff of the Texas Cable TV Association.

Hurrahs also go to Scientific-Atlanta, which will offer cable operators a free technical hotline to assist in receiving the signal for next month's National Cable Month kickoff celebration. The hotline number is (800) 722-2009 (then press 2). S-A also will provide cable operators with crystals for company receivers, if needed, for only the cost of shipping and handling ($8). According to Terry Rich, vice president of sales and promotion for Heritage Communications and executive producer of the kickoff celebration, the efforts by S-A mean that the potential audience for the programming marathon can more than double.

Speaking of S-A, last month's CT cover presented a photo that we thought to be just another mild-mannered headend. How wrong we were! We received a letter from Jack Burton, project engineer at Viacom Networks Group in Smithtown, N.Y., that said, "Your February 1988 cover brought back fond memories...the headend pictured belongs to Warner Cable of Cincinnati, Ohio. The second QUBE system's headend graced the cover of Scientific-Atlanta's catalogs for a few years." And we thought it was just another pretty face. Thanks for the letter.

We're always interested in what you think about our magazine, from the cover art to the articles to (ahem!) the publisher's letters. Please drop us a line from time to time to tell us what you like, what you don't like or what you'd like to see. Also, we're always looking for articles on CATV technical topics. If you're interested in writing for *CT*, call Editor in Chief Wayne Lasley or Managing Editor Rikki Lee.

Expo bound

And don't forget the photo contest that *CT* and the SCTE are co-sponsoring. If you can capture in a photo "technical trials and tribulations," send it to: CT Photo Contest, P.O. Box 3208, Englewood, Colo. 80155. The winner receives a trip for four to San Francisco, site of the 1988 Cable-Tec Expo, June 16-19. Photo entries can be color, black and white, slides or prints. Deadline for entries is May 2. And good luck.

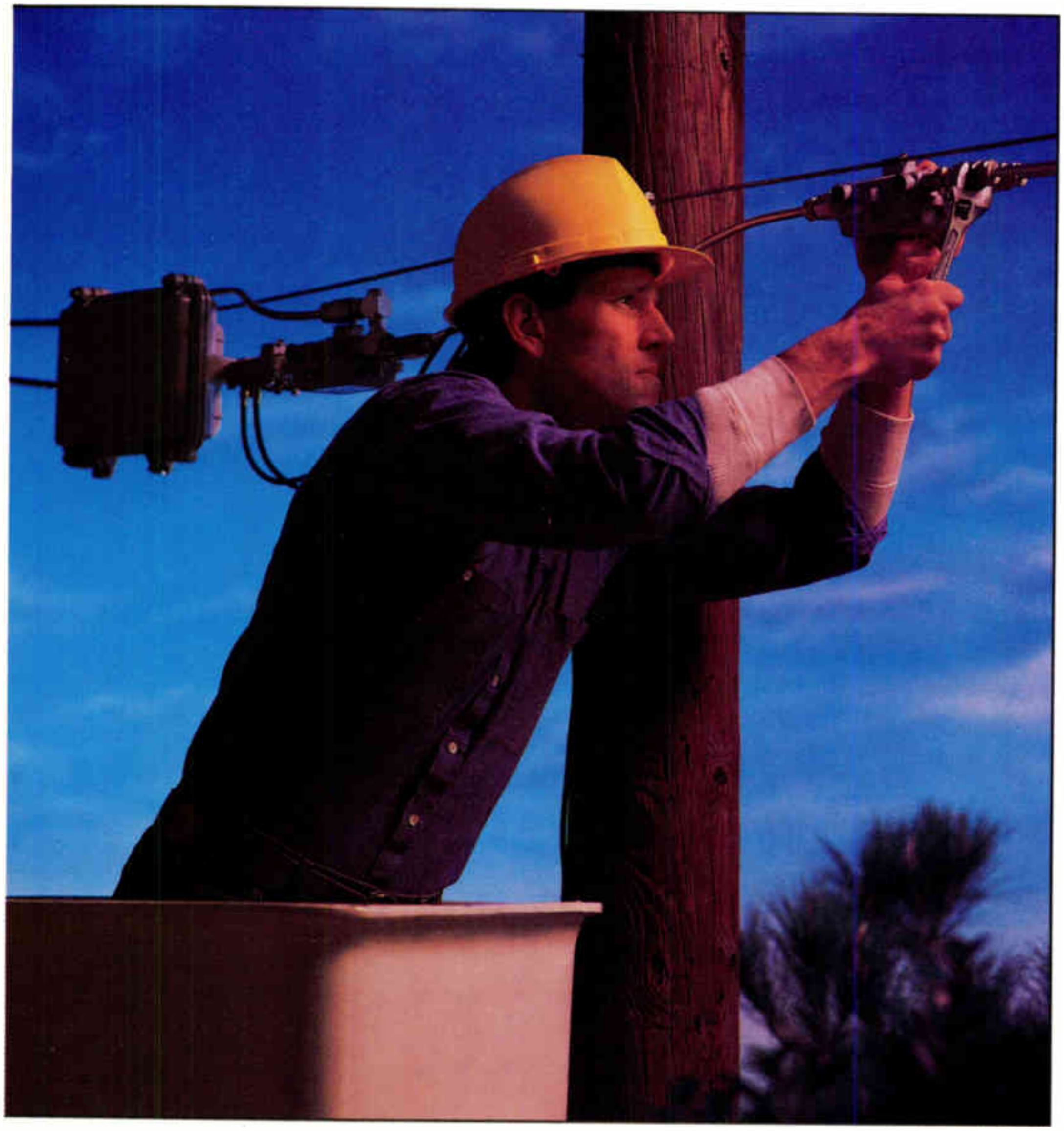
By the way, the SCTE has announced the technical program for the expo. In addition to the technical sessions and workshops, Expo '88 will provide numerous hands-on opportunities, as well as a Technical Training Center offering equipment demonstrations and an instructional exhibit floor featuring all areas of cable industry hardware. The Program Committee includes Pete Petrovich (chairman), Viacom Cablevision; David Large, Gill Cable; Dan Pike, Prime Cable; Bill Riker, SCTE; and myself. (See "News," page 10, for more details, or circle #1 on the reader service card.)

Packages containing registration materials and information on the expo will be mailed to all active national members this month. Registration rates have not changed since 1986. For the one or two of you *CT* readers who are not yet SCTE members (get on the ball, folks!), we will publish the registration information in next month's issue.

And finally, we will be publishing our *CT Daily* for the expo in June, as well as for the NCTA Show next month. If you have any press releases or new product announcements, please mail them to: CT Daily, P.O. Box 3208, Englewood, Colo. 80155. Deadline for the NCTA daily is April 8.

Paul R. Levine

HOW TO AVOID SPLITTING HEADACHES.



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We know you could use a few less headaches. So call us toll-free at **1-800-722-2009** or write to Scientific-Atlanta, P.O. Box 105027, Atlanta, GA 30348 for more information.

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Program announced for Cable-Tec Expo

EXTON, Pa.—The Society of Cable Television Engineers recently announced the technical program for Cable-Tec Expo '88, to be held June 16-19 at the San Francisco Hilton. In addition to technical sessions and workshops, the expo will offer hands-on training, a technical training center offering equipment demonstrations and an instructional exhibit floor.

Sessions planned for the Annual Engineering Conference June 16 will tentatively include: "High-definition television technology," "The future of the CATV business," "Fiber optics—Here and now" and "Frontline: Senior cable engineers." Expo workshops will include: "Signal leakage and CLI testing," "FCC compliance," "Spectrum analysis," "BTSC stereo," "Installer certification" and review courses on BCT/E Certification categories II, V and VI.

For more information, contact the SCTE at (215) 363-6888.

VideoCipher proves piracy doesn't pay

SAN DIEGO—In an effort to eliminate satellite signal theft activity, the VideoCipher Division of General Instrument Corp. is implementing an aggressive civil litigation program, anticipating an increase in criminal investigations and trials of pirates. Along with M/A-COM, Home Box Office and Showtime/The Movie Channel, VideoCipher has filed federal court motions against Shaun Kenny, Bob Cooper and Network Productions in Miami; and Benny Herring, Billy Clyde Herring, Ron Mills and Tri-State Satellite Distributors of Alabama. The defendants allegedly infringed on VideoCipher copyrights and violated the federal Cable Communications Policy Act of 1984, which prohibits the manufacture, distribution, import, retail sale and use of products designed to receive encrypted signals without authorization.

Further attempts include several investigations by the FBI and U.S. Customs Service. In January, the FBI raided two satellite TV dealerships in Oregon, Jerry's Satellite TV Systems and Sat. Tech. Div., seizing equipment and business and customer records. The FBI is investigating allegations that the businesses were actively involved in the modification, distribution and sales of satellite TV descramblers.

In other actions, the U.S. Customs Service seized 23 VideoCipher II (VC II) descramblers in Roma, Texas; 12 VC II printed circuit boards in El Paso, Texas; and descramblers of various manufacturers in Douglas, Ariz. The equipment was apparently about to be shipped into Mexico in violation of the Embargo Act, which prohibits the export of certain sensitive U.S. technologies (including the data encryption standard used in VideoCipher descrambling systems) except to Canada and certain U.S. territories and protectorates. Under the regulation, VideoCipher will be allowed to send engineers to analyze the equipment to determine if the descramblers have been illegally modified and report their findings to federal investigative agencies.

The anti-piracy program also includes expanded investigative efforts in cooperation with the Motion Picture Association of America and Sahlen Associates (a detective agency specializing in investigations of counterfeiting of high technology products and abuse of communications networks). Furthermore, VideoCipher will utilize ongoing, satellite-delivered electronic countermeasures that shut off illegally modified descramblers.

Trilogy acquires Capscan Cable

PEARL, Miss.—Trilogy Communications recently acquired the Capscan Cable subsidiary from Burnup & Sims, thereby expanding the Trilogy product line to include foamed drop cable as well as MC² air dielectric coaxial cable. The acquisition includes a full line of foamed super low-loss trunk cables available in aluminum sheath, jacketed for burial, jacketed and messengered or jacketed and armored versions from 0.412 to 1 inch.

According to Trilogy, the company will now be able to supply a full line of cable, technical support and services to systems installed in the past, in addition to newer systems.

- Texscan Instruments is conducting its Spectrum 700A signal level meter (SLM) trade-in program, Feb. 1 through April 30. The company will take old SLMs (Texscan 727 series, Digitech or Wavetek 1, 2, 3, 4, or 5) in trade and apply $200 towards the purchase of the 700A.
- LPL Investment Group reported record earnings for the fourth quarter and the year ending Dec. 31, 1987. The unaudited results for the year showed revenues of more than $347 million with net income of $5.2 million. Unaudited results for the quarter ending Dec. 31 showed revenues of over $128 million and net income of $2.35 million.
- The Canadian Olympic Organization Technical Group, the technical arm of the 1988 Winter Olympics, recently evaluated, selected and purchased several Sadelco Super 600 signal level meters to satisfy measurement parameters with regard to RF and broadband local area network system needs. Product representation and technical assistance was provided by Sadelco's Canadian West Coast distributor, Select Com Supply.

HDTV—Who's on first?

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

So much of what I intend to cover in this column has been said before that I hope no one is bored with the telling of old tales, but the latter story is the Siamese twin of the first.

Amateur scientists with private funds were the principal fathers of radio. Long before Congress took control of the airwaves, the skies were alive with telegraph and voice signals, used and enjoyed by their inventors and launched without standards set by a bureaucracy. Even when commercial radio stations licensed by the Federal Radio Commission began broadcasting in the early '20s, many pundits dismissed them as inferior reproductions of live performances. After all, these widely separated stations could only offer scattered scheduling of entertainment as compared to the flexibility and variety provided by the phonograph.

Again, in the '30s, many experimenters and private corporations plunged into TV research with much publicity and many false starts. I remember, about 1932, seeing an experimenter's kit at Woolworth's radio counter—featuring Nipkow scanning disks, which transmitted on wires a very small image—placed under a sign proclaiming the arrival of television for the masses!

The art of television advanced rapidly in the '30s and, with the blessing of the Federal Communications Commission, the National Television Standards Committee (NTSC)—in one of the most serendipitous studies of the 20th century—formulated the NTSC standard for black-and-white broadcast TV. As technology advanced, political and public pressure prematurely persuaded the FCC to approve a CBS color system incompatible with NTSC for a best-forgotten period from 1950-1953.

Fortunately, a gutsy guy, David Sarnoff (may his tribe increase!), spent over $70 million on a compatible, fully electronic color scheme that was codified and approved by a reconvened NTSC in 1953. The first color sets cost upward of $1,000 compared to an average black-and-white price of $200. TV transmitters had to be rebuilt and color-capable studios outfitted at several times the cost of black-and-white installations.

Correspondingly, color TV homes grew at a much lower rate than the analysts predicted—a reaction by the public rather similar to the gradual introduction of color in motion pictures. The same indifference to supposedly radical improvements in technology may apply to high-definition television (HDTV). After all, TV stereo sound, teletext and AM stereo are not setting the public purse on fire.

The people's choice

The public perception of quality in the TV presentation is not hard to fathom. One doesn't need a bewhiskered herd of psychology professors and foreign-educated psychiatrists to push, poke and ponder the public for preference for HDTV; just look at the past. Color, which has to be by far the greatest increase in fidelity to the original scene, not only took off in a lackadaisical fashion, but even today 20 percent of the TV purchases are black-and-white. VCRs with a resolution one-third poorer than NTSC broadcast captured 60 percent of the households in record time. Large-screen projection TV attracts less than 5 percent of TV sales, probably as much stifled by the visible display of NTSC defects as by the price. One can safely project that HDTV, if priced out of reach as was true with the birth of color, will sell poorly even if the public is bombarded with cries of obsolescence because they didn't possess the new "wide" screen picture.

Because of my interest in multiplex TV (two or more programs on a single 6 MHz channel), I wanted to find out what quality level the American public is now watching. We would equip our thousands of MATV (master antenna television) installers with a simple quality measurement package and pay a fee for each customer interviewed on TV quality. In recognition of its universal value to all TV engineers, this proposal was

sent to the National Science Foundation in 1983. We were denied financing without peer review since "the proposal is principally for market research rather than research"! If I had a school, a beard and a Ph.D., the reply would have been respectful and negotiable.

NTSC was just about the last significant standard set by the FCC. In all new fields they are looking for marketplace standards to form and be blessed as a consensus standard but not as mandatory FCC standards. Realistically, how could one expect more from an agency without the research funds to design and specify new technologies, as happens in many other countries?

Thus the FCC, unable to do its own research on HDTV, set up a blue ribbon advisory panel composed of the CEOs of the TV industry. Everyone has read by now who was appointed to this gaggle of bottom-line budget busters—non-engineers, non-inventors, non-innovators, but all undeniably expert in public relations and merger mania. Without exception, none of this crowd spends more than a token buck on R&D. If you look at similar executives in other Western countries, they will allocate at least 5 percent of their gross income to R&D.

As one of the principal sources of new technology, this panel is counting on the money-starved ATSC committee. Without funds, what has this collection of prestigious engineers proposed after four years of deliberations? The Japanese NHK 1,125-line non-compatible system as the United States and world studio standard. ATSC can't be blamed for having only pennies to spend against the billion-plus dollars expended by the Japanese and thus failing miserably to match the excellent work done there. Europe has committed over $200 million to develop its own HDTV and is close to a worthy competitor to the NHK design.

So where do we go from here? If only we had a fraction of the deficit in foreign trade to spend on R&D, we could probably return the investment many times over in license fees and home-grown production of our own HDTV. A plea on bended knee to the blue ribbon committee: Spend 5 percent of your companies' gross income on R&D and bring TV design and production back to America.

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Over the years, Microdyne satellite receivers have earned a solid reputation for quality and reliability. There's good reason for it.

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Status monitoring: Hows and whys

By Colleen McGuire
Product Manager, Headend Products
Jerrold Distribution Systems Division, General Instrument Corp.

As equipment suppliers are quick to note, the reliability of distribution gear has improved dramatically over the last several years. At the same time, however, the use of status monitoring (SM) also has increased. Why? And just what does SM do?

The most commonly used SM in cable today is known as subscribers. These are installed at the end of every drop and upon loss of, or serious degradation to, the channel to which they are tuned, they alert the cable system's main switchboard via telephone line. The useful life of these subscribers varies, depending in part on how many times they are required to send an alarm. If they need to call the switchboard too many times, they cease to function, disconnecting from the system. Clearly, subscriber SM is the least expensive to install. It is, however, far from the quickest, most reliable or cost-effective available.

The growing size and complexity of today's cable systems, coupled with a shortage of highly skilled technical personnel, create a need for a support system to detect and troubleshoot failures. Toward this end, each of the major distribution equipment suppliers offers SM for its trunk gear. SM systems are designed primarily to service the distribution trunks. They allow for immediate identification of catastrophic failures, provide early warning to some potential hazards and serve as an aid in diagnosing or troubleshooting system faults.

In the first instance (the immediate identification of catastrophic failures) it can be argued that subscriber calls will make these failures known immediately. While this is true, it does not help the operator to quickly pinpoint the location and correct the problem with minimal downtime. SM significantly increases operator efficiency in locating and troubleshooting the outage. It complements the information received from subscribers by enabling the operator to narrow the focus of the search quickly and easily.

Perhaps more important than detecting failures is the ability of SM to provide early warning for potential failures, thereby completely avoiding an outage and its associated customer complaints and/or disconnects.

By plotting such parameters as level, temperature and current over time, an operator may detect various weak spots in the cable

Figure 1: SM three-tiered configuration

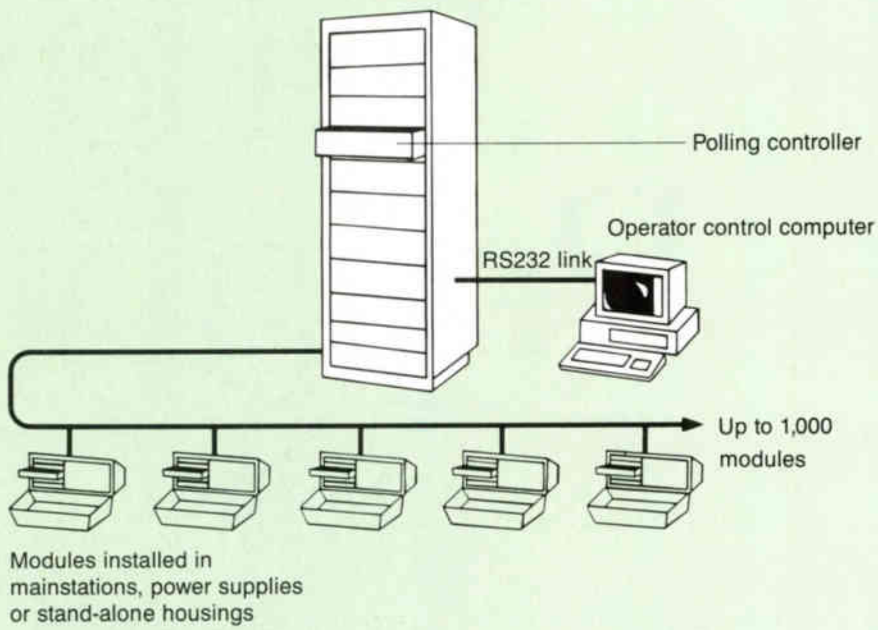
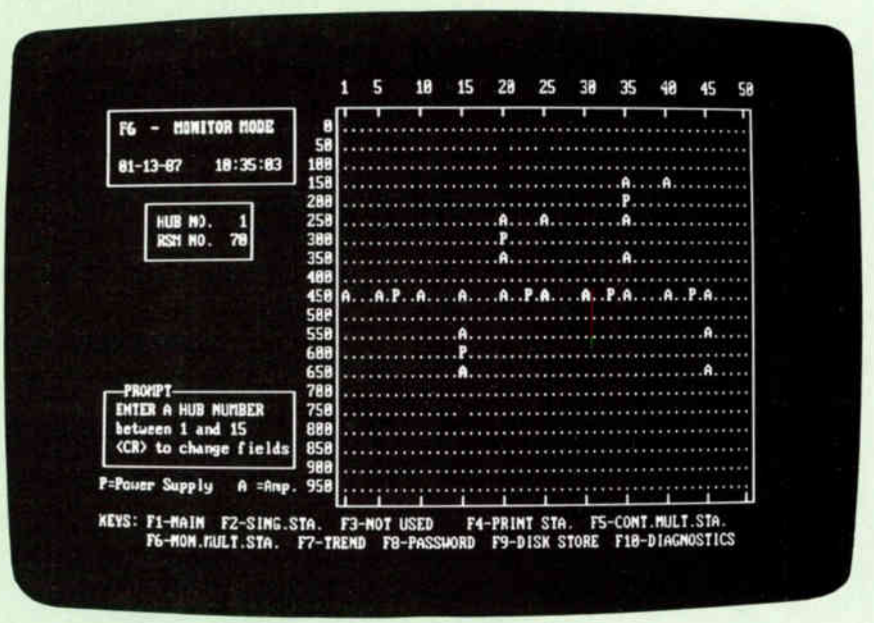


Figure 2: SM screen operating in network monitoring mode



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And you don't have to be Einstein to appreciate that.

For more information and the name of the nearest representative, call Wavetek at 1-800-622-5515. In Indiana call 317-788-5965.

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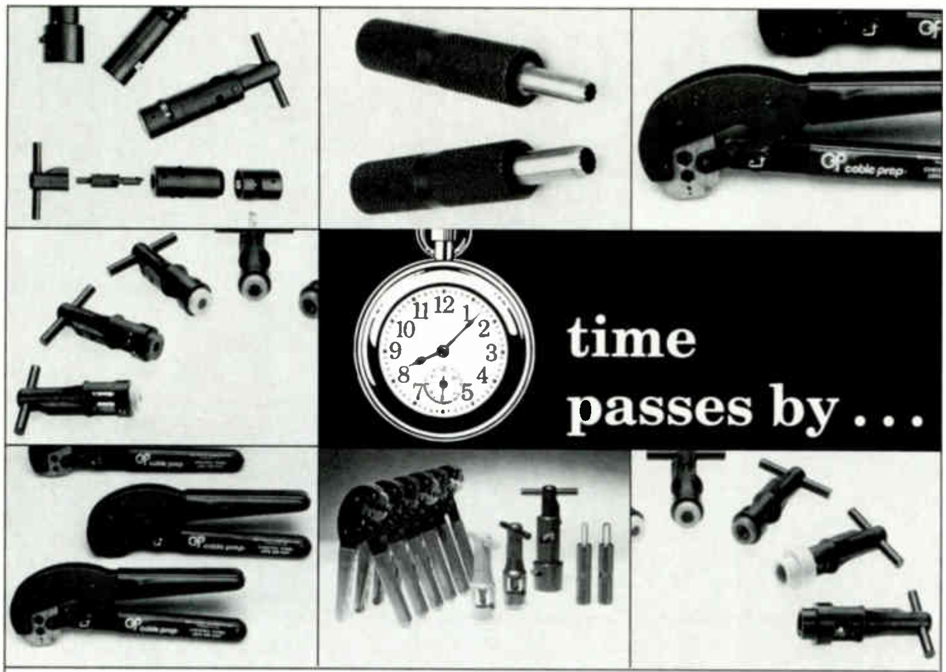

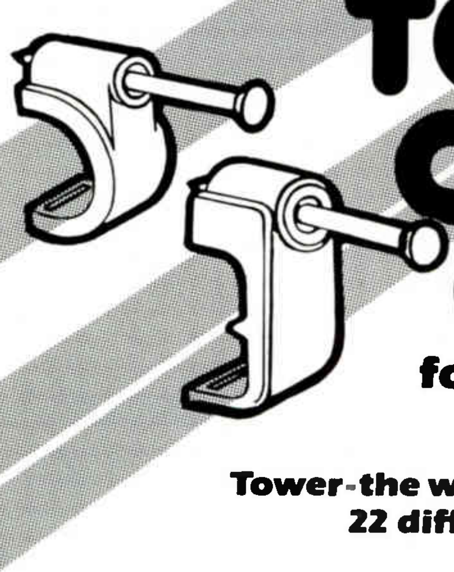

system before they become a chronic problem. In a recent experience of this kind, one operator was able to avoid an outage of over 10,000 subscribers. The commonly monitored functions in a trunk amplifier include: forward level, return level, temperature, DC power supply voltage, current, standby power supply status, AC power supply backup status and tamper switch.

The final, and in many cases most valuable, function provided by SM is as a tool in maintaining the return path. Some cable operators maintain a return system for the sole purpose of using SM. Most, however, have valuable services that use the return trunk, including impulse pay-per-view, meter reading and other institutional data/video services.

To protect these services, an operator must constantly fight ingress. Some operators employ several technicians to do nothing but hunt down and correct sources of ingress. With the help of SM, however, this effort can be dramatically reduced by allowing the operator to turn on, off or attenuate the feeders at each station. This greatly facilitates the hunt for ingress by narrowing the search to specific feeder lines.

How SM works

Most of the available SM systems operate on a three-tiered configuration (Figure 1). At the top level is a control computer, based generally on an IBM or compatible personal computer (usually requiring at least 20 megabyte hard drive and 640 K memory). From this, the entire system can be viewed (Figure 2) or the complete status of a single station. From the single-station screen, with the correct passwords, one may change any of the command switches or alarm limits. This control computer also provides access to a variety of utility functions such as downloading software to the polling computer or storing the data base of module parameters, such as addresses, alarm limits and switch settings.

At the second tier, a polling computer is located at the headend or hub of each trunk system. This computer translates the commands given it by the control computer and generates the forward signal that addresses the transponder modules at each station (in the Jerrold ASM system). The polling computer sequentially and continuously polls each module, sending the commands from the control computer and reporting back the readings and switch settings of that module. In a fully located hub with 1,000 modules, it takes roughly 30 seconds to poll each module.

The final tier of the system is the transponder module itself. This module is generally installed in a trunk station, but also may be used to monitor power supplies or end-of-line when installed in a stand-alone housing. As mentioned earlier, the module continuously listens to the forward data carrier until a command containing its address is received. It then responds to the control command and transmits a packet of data containing the status of all switches and measurement parameters to the polling computer.

While the installation of SM itself is a relatively simple task, the preparation can be somewhat difficult, because it requires the operator to balance the return trunk. However, with the increasing value of return services, many operators find that the effort is well worth it.

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12	26	40	54	68	82	96	110	124	138
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Status monitoring—It can be done

By Jerry Laufer
Director of Engineering

Bert Henscheid
Vice President, Research and Development

And Mark Harris
Digital Engineer
Texscan Corp., Communication Products Division

Status monitoring (SM) is a function that is either "sworn by or sworn at." What makes the difference between SM that will facilitate operations and one that will complicate them? Two things—the quality of the system and the user's understanding of system capabilities and limitations. The quality of the system, of course, depends on the vendor and proper installation. Understanding a system's capabilities and limitations comes from proper training and from asking questions. What does it do? What do you want it to do? Can you get a live demonstration? Is it more reliable than the equipment it is monitoring? Be sure to ask many questions before buying.

Status monitoring is the use of modern computers and communications to provide a way of measuring the quality of cable plant from the comfort of the office. Many modern SM systems selectively restrict the return data path to control ingress associated with two-way addressable converters. SM eliminates operating in the crisis mode by allowing its user to schedule maintenance and repair before problems get out of hand. Not only does this benefit overall sanity, but it also allows for better utilization of maintenance and repair personnel. This can affect the bottom line.

Modern SM integrates the personal computer with real-time software tied to a network of transponders located throughout the cable plant. Transponders measure the high and low pilot AGC voltage, the amplifier temperature and power supply voltages. They also may turn the reverse data path on and off and insert a 6 dB pad in the transmission path for troubleshooting purposes.

When connected to a standby power supply, transponders can measure the utility input voltage, AC output voltage, AC output current, battery terminal voltage and the power supply temperature, as well as force the unit into or out of standby mode and indicate the status of the power supply at the computer terminal. Transponders used with related equipment can provide a greal deal of insight into the well-being of the cable plant. They can measure the forward and reverse carrier levels, switch from A to B cable (a necessity in high reliability local area networks) and, with the proper interfaces, perform most of the measurement functions one would expect from high-level technicians in the field.

The information received from the field transponders is presented to the operator in a form that is meaningful from both a cable and LAN point of view. It is normally presented to the operator in the form of text and graphics displayed on a computer terminal equipped with a printer and an optional graphics map display of the cable plant.

System selection

One factor in selecting SM is the complexity of the return data path. A question that needs to be asked is whether a full or limited frequency path is required. The wider the return bandwidth, the more time will be need on return path maintenance. Another question that needs to be asked is whether the hardware and software allow for multiple user terminals to be located throughout the network. Multiple user terminals have become a basic requirement in the consolidation of networks because of multiple hub sites.

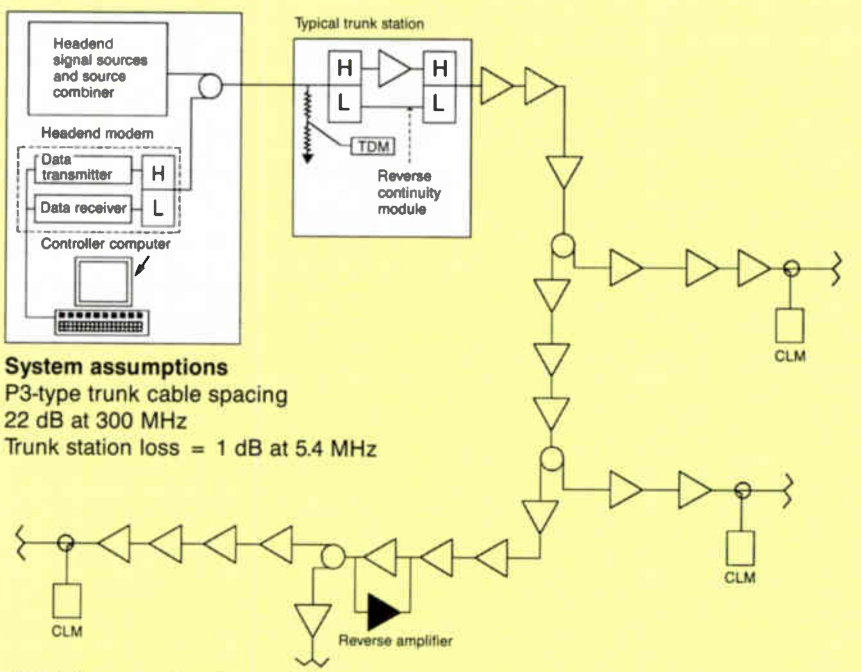
Yet another requirement increasingly important with the advent of addressable converters is the ability of SM to use bridger switch control to limit the amount of ingress. Not only is field hardware required, but also software must be capable of communicating with the billing computer to inform the SM which feeder legs to open. This necessitates a real-time software package that allows multiple functions to be performed simultaneously.

If SM is to be beneficial, the software must be flexible enough to allow the operator to configure the plant in a non-confusing manner. The format of the information presented to the operator needs to be very clear and should only contain the information required to achieve the task at hand. The software should provide a simple, overall view of the status and display detailed information about problem areas.

Tom Hodgett at United Video Cablevision of Monahans, Texas, has had an SM system since 1984, reducing his technician requirement by one person. Monahans is not a large cable system by big city standards: It has 47 trunk stations and 11 standby power supplies. The transponders have the bridger switch control option that allows him to turn off the reverse path of each bridger or to reduce it by 6 dB. This option is a powerful troubleshooting tool for ingress problems or "stuck" transponder transmissions from impulse pay-per-view converters.

The amplifier transponders also monitor the AC power voltage, DC voltage and AGC and ASC voltages. The AGC and ASC voltages indicate

One-way status monitoring



System assumptions
P3-type trunk cable spacing
22 dB at 300 MHz
Trunk station loss = 1 dB at 5.4 MHz

TDM—Transponder data module
CLM—Carrier level monitor
H—high
L—low

the pilot carrier input levels, which in turn indicate problems in front of the amplifier being monitored. AC power readings indicate potential connector problems or excessive loading. Checking amplifier stations on each side of the power supply will indicate which span is causing the trouble.

Hodgett is able to check standby power from his office. During normal SM, the status of the power supply is constantly reported. Should a power supply switch to standby, an alarm is sounded and time, date and location are printed on a trouble log. Knowing that he has three or four hours of battery capacity, he is able to visit and troubleshoot the power supply in the field. Should an overall power failure be the cause of the problem, he can call the power company to determine the nature of the power failure and the expected time the power will be restored. If the time it takes to restore power exceeds the battery capacity, he can power the location with a generator until utility power is restored. (His customers will never know there was a problem.)

On the other hand, cable operators having standby power (without an SM) in place have no means of knowing when a supply switches to standby until the batteries run down. By this time, inconvenienced customers will start calling to report the outage.

Hodgett also can determine *in advance* whether his standby power will function correctly in case of a power failure. Just by tapping the keyboard he can simulate a power failure to force the supply into the standby mode. The SM reports the switch and monitors the battery voltage and output voltage. He knows the load on each power supply, checks the battery voltage decrease over 30 minutes or so and determines the expected capacity of the batteries. He is able to detect and correct problems before they cause service interruptions.

Problems

Implementing SM does not present any substantial technical problems. The equipment is mature enough to have already worked out the expected "bugs." The biggest task is usually setting up the reverse transmission path. Full 5-30 MHz reverse system implementation is a fairly complex task. However, since most SM equipment is trunk-only, only the trunk reverse needs to be implemented—assuming, of course, that SM is the only use for the reverse system. Newer "one-way only" SM reduces the return complexity considerably, and thus reduces overall maintenance efforts. "One-way only" is a misnomer, since a reverse path is still needed. However, the circuitry is much simpler due to its narrower bandwidth. A bandwidth of 1 MHz (e.g., 5-6 MHz) is all that is needed. The filters are simpler and less expensive, since the stop band is much wider than conventional 5-30 MHz systems. With a narrow-band data signal at 5.4 MHz, signal ingress is not a major problem. When the reverse path is operating satisfactorily, SM setup can be quite painless.

The biggest help toward implementation and continued success of SM is a firm management commitment—not just mere approval, but full participation. The general manager should use status printouts to gauge the operation of the plant and the quality of work of the technical staff.

Computer fear is an obstacle in the use of SM. Fear of making a mistake and fear of not knowing what to do next are two common emotions many operators face. The computer should be regarded as just another tool, like the bucket truck and the spectrum analyzer. Unlike the truck, however, physical damage does not occur when a mistake is made on a computer keyboard. In fact, user-friendly software will lead the operator right through the process, from one step to the next.

Such user-friendly software is a great help. Modern SM that measures voltages, levels and physical condition allows the operator to display large amounts of data in a vast array of forms. If too much data is made available or if the displays are not well structured, the user will get confused and take much longer to become proficient.

As with any monitoring or test system, one must be careful to make sure that it is more reliable than the equipment being monitored. If more time is spent maintaining the monitoring equipment than maintaining the cable plant, SM is a wasted exercise.

Large, multihub systems need a well organized plan. A decision should be made on whether each hub site will have separate monitoring, and on how to prevent duplicating station identification numbers. If different hubs are using the same transmit and receive frequencies, they must be trapped at the hub interconnects to avoid interference.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Remote headend monitoring

By Eugene Fuller
Marketing Manager, Tone Signal Products
Monroe Electronics Inc

With the increasing use of unattended remote headend sites, cable operators are realizing the potential of cost savings through the application of remote controls, sensor/alarms and timers. Units are now available that operate on standard telephone lines using touch-tone DTMF (dual-tone multifrequency) signaling and provide the user with dial-up access to monitor points and control relays.

Figure 1

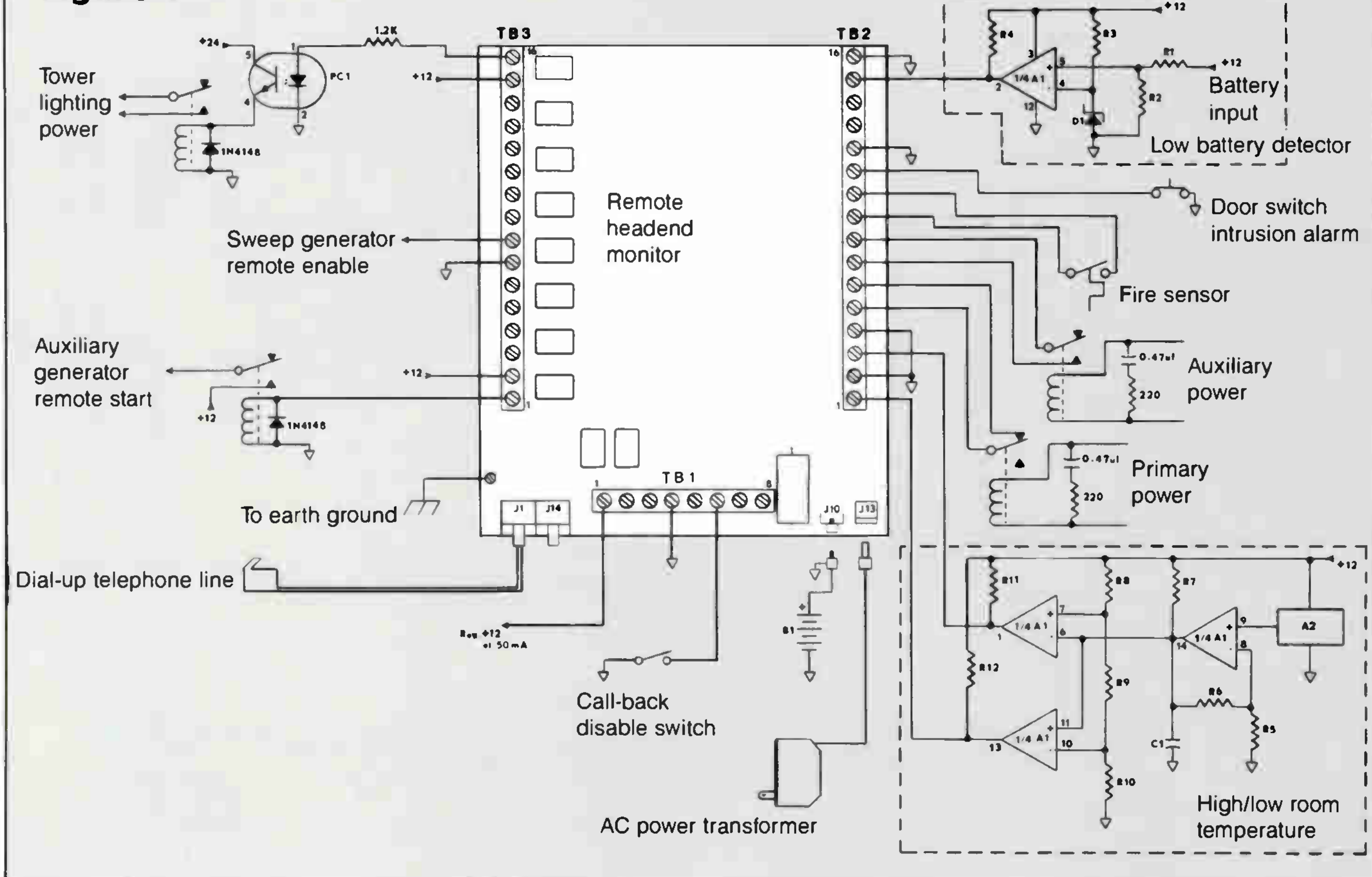
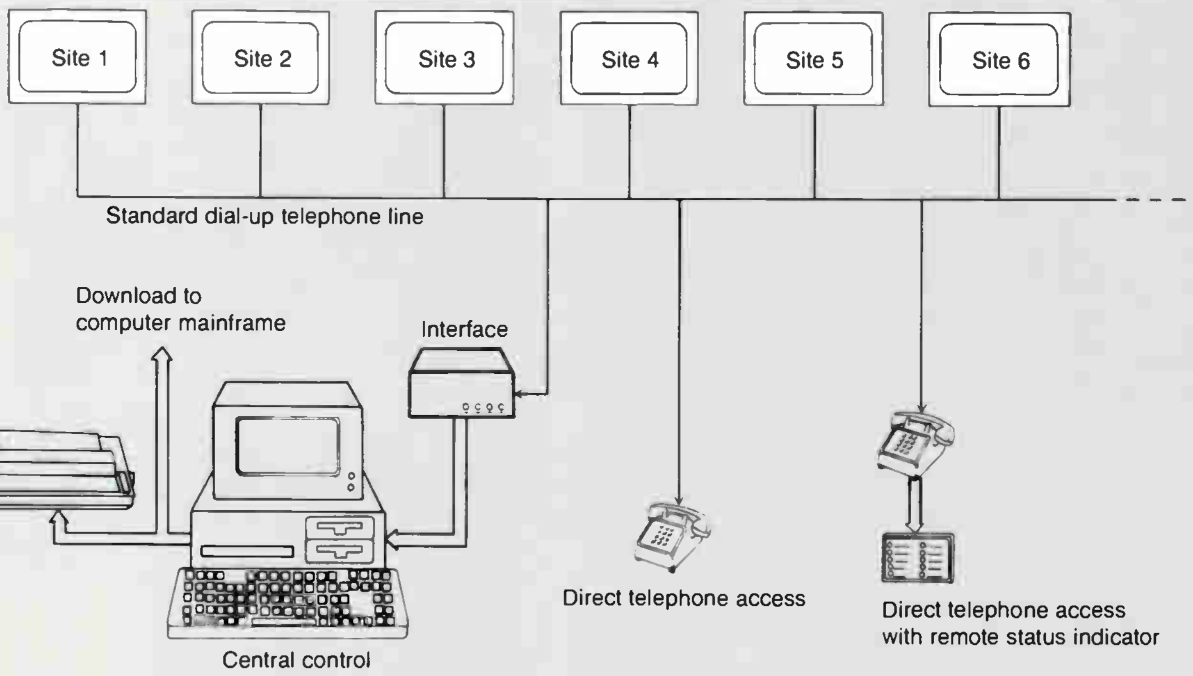


Figure 2



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Reader Service Number 17.

In addition, some of these units offer features such as an autodial alarm that can be enabled on selected input channels; programmable timers to allow automated performance of desired functions on a time-of-day, day-of-week or day-of-month basis; and central controllers that gather, sort, store, display and print information from a number of remote units. More importantly, in this age of the multiprocessor, these conveniences are available for a very affordable and cost-effective price.

Return-on-investment

Before undertaking any capital investment project, today's operator wants to know what will be the payback or return-on-investment. A few of the areas of savings to consider include the costs associated with the following:

1) equipment damage or malfunction from high or low temperature caused by failure of air-conditioning or heating units;
2) undetected, unauthorized entrance into the facility;
3) loss of primary power and/or failure of auxiliary power;
4) fire detection;
5) tower light failure;
6) low voltage on an auxiliary generator starter battery;
7) sending an engineer to the site to turn on a sweep generator or other test equipment;
8) resetting a tripped circuit breaker; and
9) turning site lights on to reduce vandalism.

After considering these costs as they apply to specific site locations, a typical cost of $1,000 to $2,000 per installation often becomes very attractive.

Figure 1 is an illustration of a basic monitoring system that can be used at a remote headend. Vital to this system are the earth ground connection—very important to minimize potential lightning damage; the connection to a standard dial-up phone line; +12 volt regulated DC for use by external sensor and control circuits; the circuit board ground connection; a call-back disable switch to defeat the autodial alarm circuit while carrying out maintenance, test or repair tasks at the site; a backup battery; and an AC wall-plug power supply transformer.

Some of the possible uses for control circuits are shown in Figure 1. These include such things as a tower light control circuit that has its control relay operated by an internal timer for sunset-to-sunrise operation. This circuit includes an optical isolator to help protect the unit from lightning or static discharges. Also available is a connection to turn on a sweep generator. This can be switched on or off by calling the remote unit and accessing the control relay by sending the proper touch-tone DTMF digits. Yet another circuit can provide for remote startup and test of the auxiliary generator in order to help ensure it will be operable in case primary site power is lost. In addition, remote units can provide for a number of other control circuits depending on the particular site/system requirements.

A number of uses of on/off status monitor inputs include a low-voltage detector for the auxiliary generator starter battery, connection to intrusion and fire alarm systems, relay circuits to monitor auxiliary and primary power, and high and low room temperature monitoring circuits. Analog inputs can furnish actual readings of voltage, current, power and temperature.

Figure 2 illustrates several possible control options for remote headend monitoring. The simplest and least expensive approach is direct telephone access. In a hypothetical example, the system engineer and others who are given the security code necessary to access the remote units can call any site from a touch-tone phone to determine the status of the monitor points and operate the control relays.

At the system office, selected supervisory personnel are given remote indicator boxes that use LEDs to show the status of the monitor and control circuits of any site called. At the maintenance office, a computer-based central control unit continually monitors and records the status of the sites. It polls all sites on the basis of a predetermined time interval, retrieves status information, stores the information in a data base and makes it available through a combination of CRTs, printouts and transfer to the operator's mainframe computer.

In addition, the central control interprets and displays analog information from the sites, configures the normal status of control circuits, sets up security access codes and alarm phone numbers, and receives and records alarm calls—along with the time of alarm, time of acknowledgment and time the alarm condition was corrected.

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Reader Service Number 19.

System sweep techniques on an FM transportation trunk

By A. William LeDoux
Marketing Manager, CaLan Inc.

System sweeping over the past 20 years has proven itself to be an extremely effective method of system maintenance. Currently, most systems with trunk cascades of greater than 15 amplifiers are either using system sweep or planning to begin sweeping in the next test equipment budgeting cycle.

The major line equipment manufacturers without exception use sweeping as a verification of system operation in their turnkey builds as the fastest, most thorough method for testing any type of extension being built. Compared to a signal level meter, a properly used system sweep can increase the efficiency of a line tech by sometimes as much as 200 percent! It's easy to see why this technique has become popular.

There have, however, been limitations to the system sweep. Initially, these included the severe degradation of the video quality when the sweep passed through. Technology has come to the rescue with newer microprocessor-controlled systems that eliminate this difficulty, even in these days of high-speed data and addressable converters. Nowadays, the sweep is no longer forced in above the carrier level; it is selectively inserted around the carriers, causing virtually no interference to the operational carriers on the system.

But we've been discussing standard, AM video carriers on a "traditional" AM trunk cascade. There are other difficulties when it comes to sweeping the same type of amplifiers across the same frequency band using FM video modulation. An FM transportation trunk with extremely wide channel bandwidth (typically 14 to 16 MHz) has simply not been as cooperative when it comes to sweeping. The low-level approach didn't cause any interference, but it wound up detecting excessive noise. The high-level approach offered a clean trace, but with an increased duration per channel (thanks to the wide FM deviation) the interference to the video became unbearable.

The only good news for maintenance on an FM transportation trunk, up until now, has been that it is remarkably immune to trunk level variations that would normally shut down a standard AM trunk. We've had to settle for making rough alignments with a signal level meter or a spectrum analyzer on the FM trunk and praising this remarkable system for its tolerance. While this does give us a method of alignment, there is some-

Figure 1

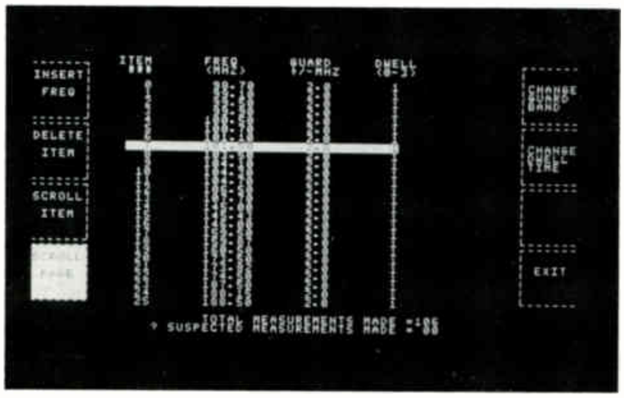

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Figure 2

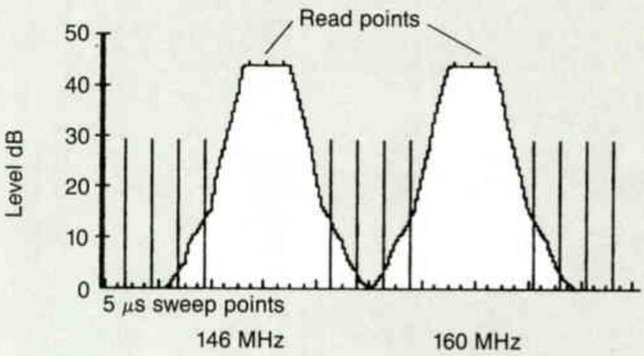
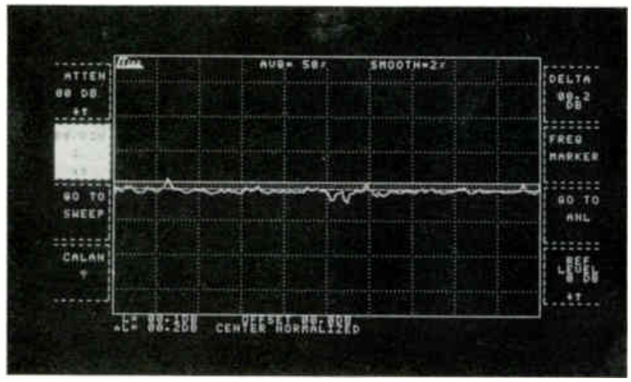


Figure 3



thing very irritating about limiting your maintenance resolution to every 14 MHz or so across the band. And it still does not solve the problem of the frequency response beyond the carrier locations. Eliminating a gap of 14 MHz can show some very neat frequency response variations that simply will not be seen when reading just the carrier levels.

Did I mention that this same trunk also will typically have the aural carriers loaded on? And, just for additional headaches, possibly some standard FM radio carriers? Great. Now we have carriers that range from a few kilohertz apart to 14 MHz.

Wouldn't it be nice if...

We're now to that familiar territory, the "wouldn't it be nice if..." land. In this case, we would complete the phrase with "...we could have the same resolution as a high-level sweep, but carefully avoid those broad FM carriers at the same time?" Once again, technology has come to the rescue. The latest version of a system sweep uses a programmable generator that "selectively" places the sweep reference points around the carriers. As it turns out, this works as well for an FM trunk as it does for a standard AM trunk, with a bit of careful setup.

In this example, the setup involved programming a 40-460 MHz sweep range on the sweep receiver/transmitter set, then programming specific frequencies that were to be "read" for level reference, with areas around these frequencies that were to be "guarded" (or protected) from the sweep transmitter energy, to minimize the interference. Figure 1 gives one page of the programming menu, covering some of the frequencies that were programmed in. This page happens to include some standard FM radio

(Continued on page 48)

Figure 4

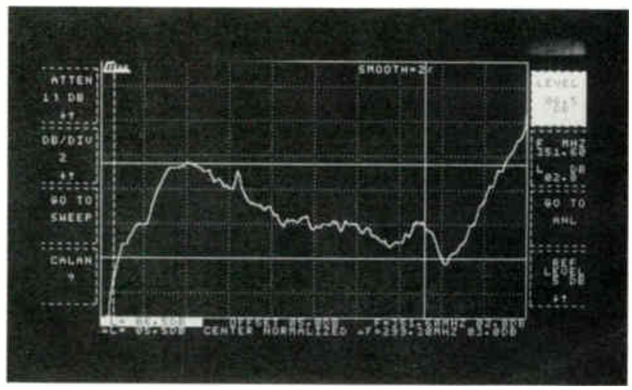
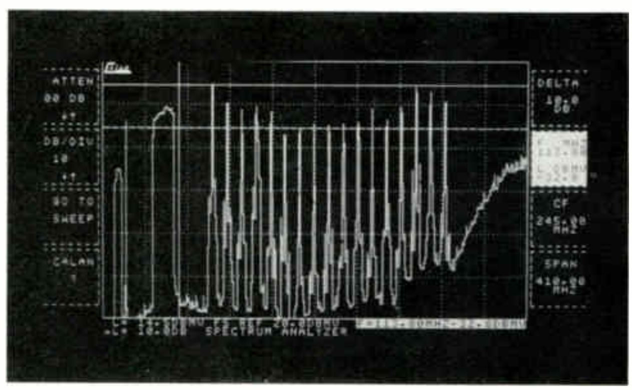
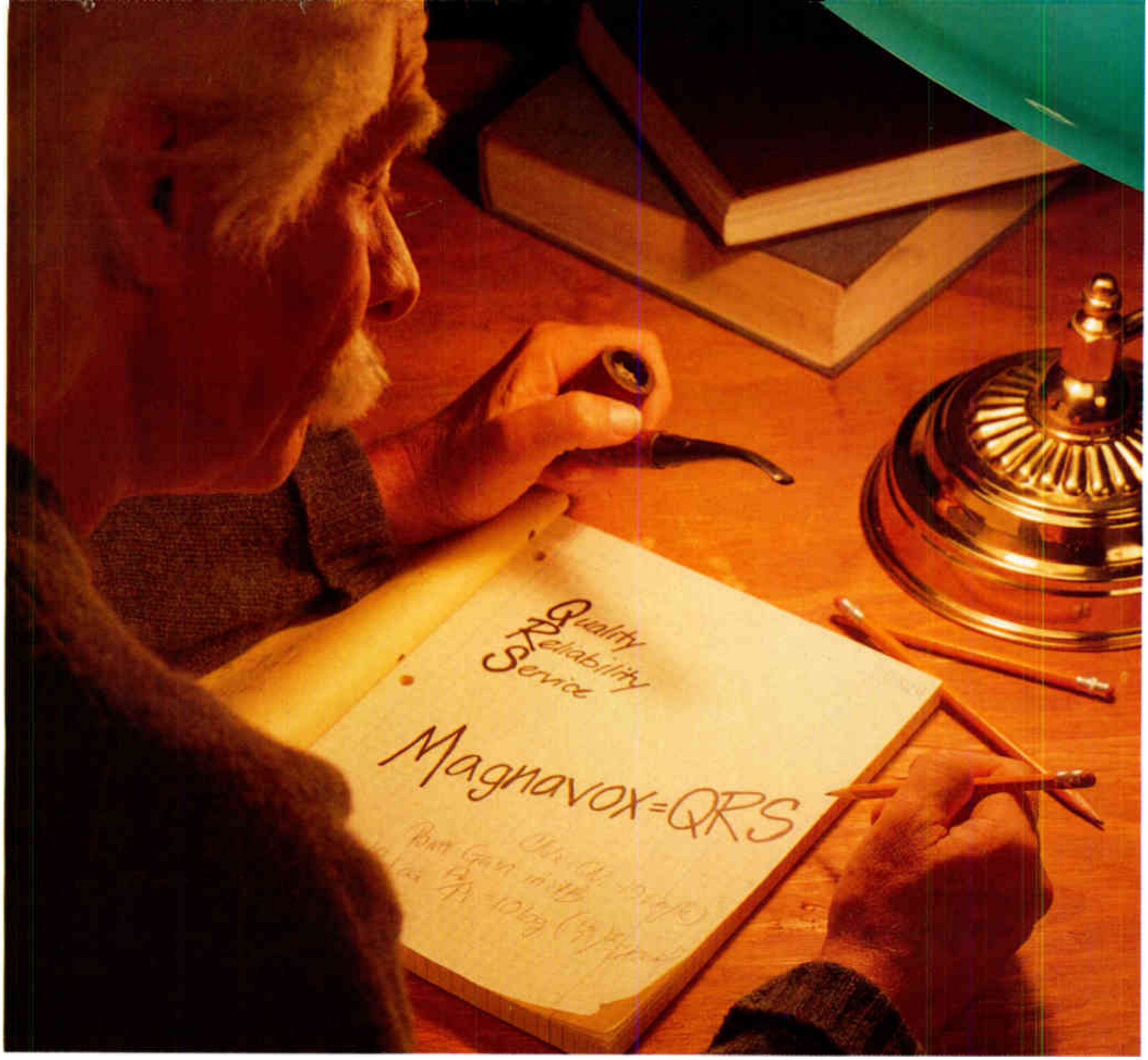


Figure 5





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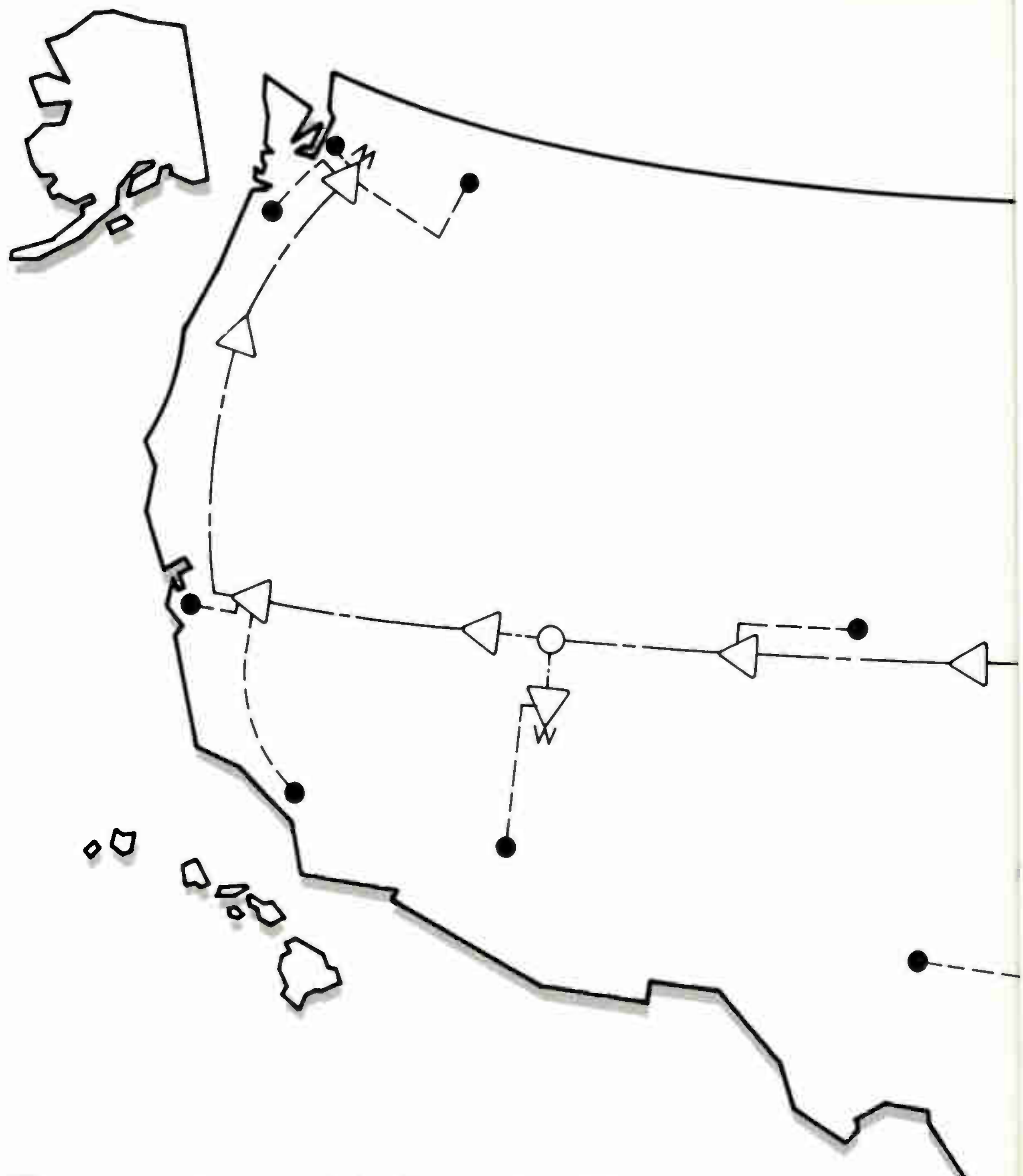

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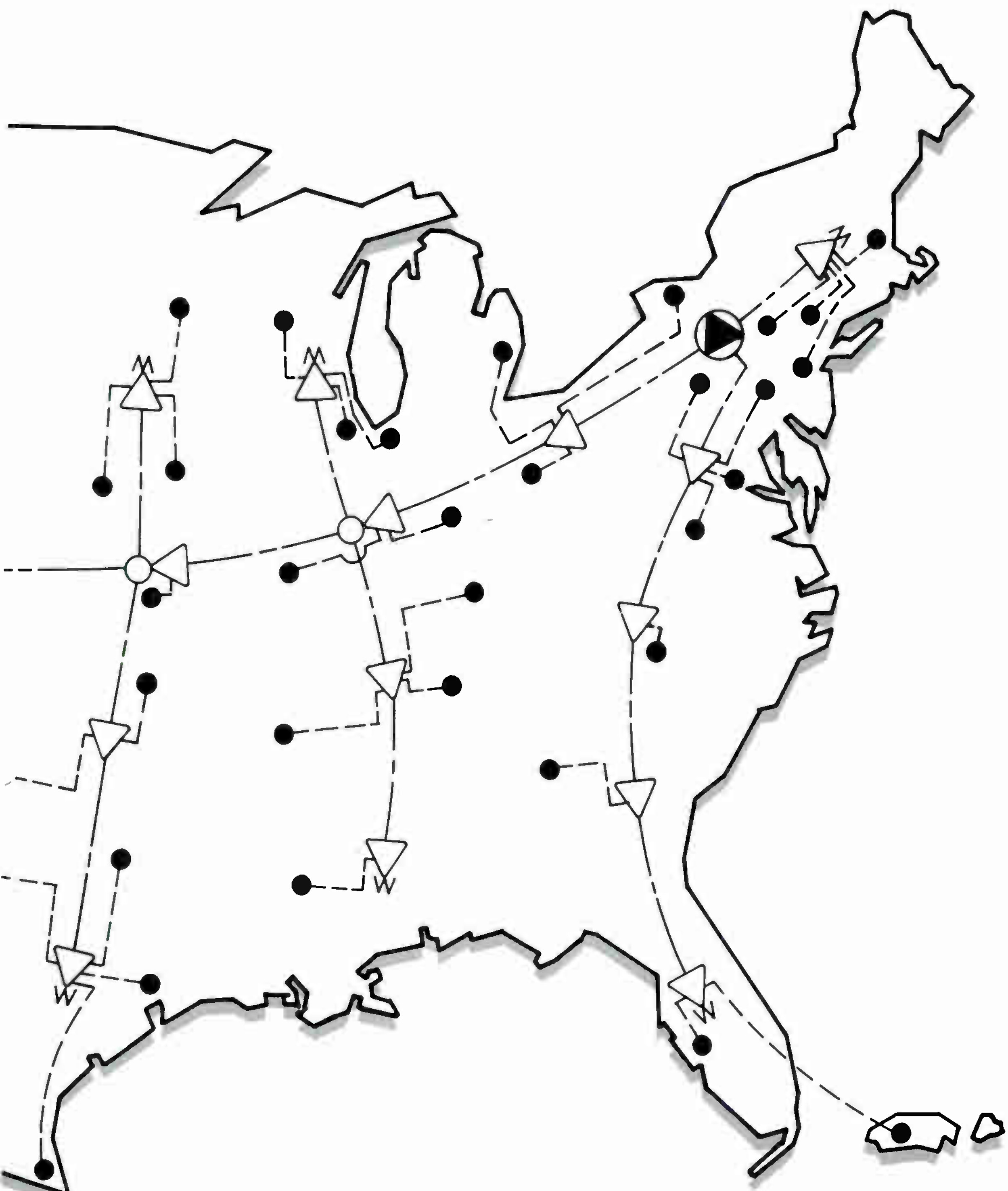

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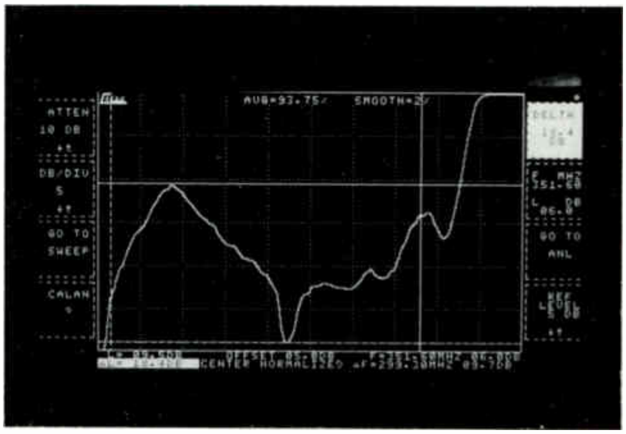
Figure 6



(Continued from page 28)

frequencies—from 98.70-107.70—and the first four FM video carriers.

Note that while these FM video carriers were designed to be set at 14 MHz intervals (in this case 146, 160 and 188 MHz) on this specific trunk, the older FM modulators had drifted, with actual center frequencies of 145.43, 159.87, 173.82 and 188.15 MHz. These frequencies were then programmed in, with additional read points set approximately 0.5 MHz on either side of these center frequencies. The actual read time for the receiver on these points was set at 100 μs each (listed as a dwell time setting of 1 on the table), with a guard band around each of the carriers of $\pm$2 MHz. Figure 2 provides an example of two of the FM video carriers, with the 5 μs sweep points shown injected between the centers of the carriers.

The completed programming of the sweep transmitter/receiver included the 17 assigned aural carriers (associated with the FM videos) from 50.1 to 57.3 MHz, 38 FM radio carriers in the standard 88-108 MHz band, and 17 FM video carriers from approximately 146 through 370 MHz, for a total of 106 carriers to be used as read points. In portions of the spectrum without carriers, the transmitter automatically injected additional sweep points approximately every 1 MHz to cover the entire frequency band selected.

Figure 3 shows the reference trace that was established at the first amplifier in the cascade, located at the headend injection point. Using the combination of the read points on the carriers and the additional sweep points, this reference was stored into non-volatile memory within the receiver, allowing a selected trace to be used for comparison when taking sweep readings in the field. As the input was received in the field, the receiver automatically did a comparison to this reference, displaying only the difference from the initial reference levels on the receiver screen.

The resultant trace variations taken nine amplifiers into the cascade are shown in Figure 4. At 2 dB/division, the misalignment is already very apparent, with a severe rolloff at 50 MHz (note the marker positioned there) and an extreme rise in the high end beyond 351 MHz.

Figure 5 provides the spectrum analyzer display of this FM transportation trunk, 42 amplifiers in cascade, at 10 dB/division. Some of the obvious difficulties show up immediately. The high end of the band continues to show the dramatic rise in the noise floor. This turned out to be caused by the combination of 300 and 400 MHz equipment on the line, which was halfway through an upgrade to 400 MHz.

Level variations are also readily apparent, with the level markers calibrated to show the difference in level of 10 dB. The group of FM aural carriers down near 50 MHz (extreme left) shows an even more serious loss in level. Figure 6 gives the same location in the sweep mode. While this was taken at 5 dB/division, a signature similar to the spectrum analyzer display is visible.

What is more apparent in the sweep mode is the extreme response variation. With a sampling resolution of only 14 MHz, the suckout in the center of the band (which happened to fall between two of the FM carriers) cannot be seen in the spectrum analyzer mode.

How BTSC brings stereo to the TV set

By Frank McClatchie
President, FM Systems Inc.

Why bother with stereo? All other sources of audio are now available in stereo. In short, the public *expects* audio programming to produce the "surrounding" effect of involvement and intimacy that stereo simulates. Stereo brings TV programming closer to the audience, thus greatly increasing the program (and advertisement) impact. The driving force for stereo TV audio is the viewers (listeners) on the one hand, and the advertisers on the other hand, as they discover the greater audience involvement created by stereo.

Much has been written, covering in microscopic detail, the technical side of the BTSC system. An excellent reference for those wishing engineering level details is the Electronic Industries Association's Television Systems Bulletin #5. A very good technician level description of the process may be found in the *Sencor News*, Issue 129.

This article is intended as an overview of the BTSC system, with particular attention to how the BTSC signal gets all the way to the ultimate viewer. Since more than one-half of these viewers are connected to cable, we'll not only include this end link, but also look at stereo originating from a satellite uplink for delivery to a subscriber through a cable system. In systems fully equipped with TV stereo, far more programs originate directly from satellite than from broadcast TV stations.

How is BTSC different from good old FM stereo? Not very much differs in the basic processes but what does differ creates dramatic problems at the transmitters, headend, set-top converter and the *monaural* TV sets. At first glance at Table 1, the only differences seem to be shifting the pilot and L−R carrier frequencies to accommodate the high-level horizontal line rate (15.734 kHz) harmonics that would otherwise induce excessive "whistles" in the received stereo. So the basic process is the same.

It is the difference between FM stereo and the BTSC system that causes most of the problems. The major difference is that the L−R channel is companded. Companding is necessary be-

Table 1: Comparison of FM stereo to MTS

FM stereo radio	**Multichannel television sound (MTS)**
Main channel audio (L+R)	Main channel audio (L+R)
Stereo subchannel (L−R)	Stereo subchannel (L−R)
Pilot (19 kHz)	Pilot (15.734 kHz or 1H)
Stereo subcarrier (38 kHz)	Stereo subcarrier (31.468 kHz or 2H)
Subsidiary communications authorization (SCA) (67 kHz)	Second audio program (SAP) (78.671 kHz or 5H)

Figure 2: Separation reduction caused by phase and gain error

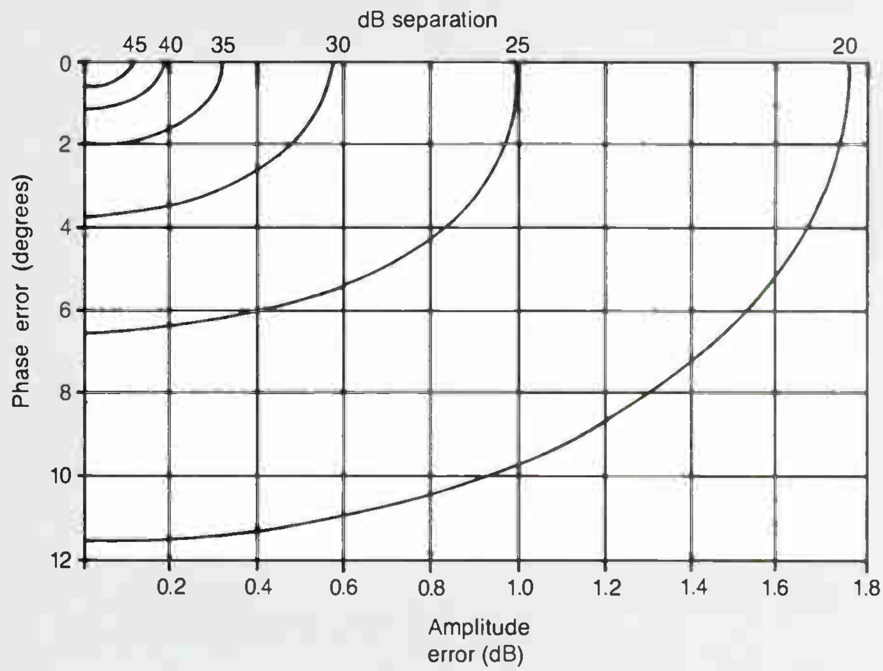
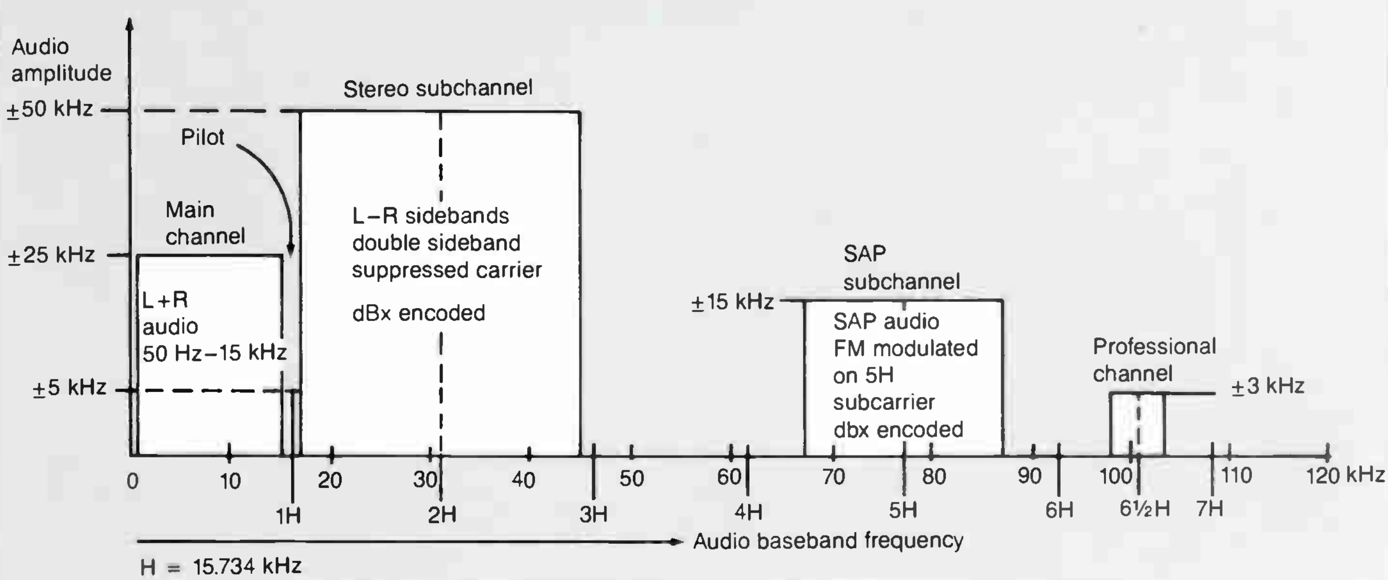


Figure 1: MTS composite audio spectrum



cause TV audio is only deviated ±25 kHz, while FM stereo has the FM advantage of ±75 kHz deviation. Since BTSC must be compatible with existing monaural TV sets, the L+R deviation must be ±25 kHz (Figure 1). The first step in overcoming excess noise in stereo was to double L−R deviation to ±50 kHz. The next step was to compress the dynamic range of the L−R signal at the transmitting end, then expanding back to the original dynamic range at the stereo TV receiver. All of this complication is really necessary to produce a good signal-to-noise ratio. This extra complication did place a very heavy emphasis on maintaining absolute level and phase continuity between the BTSC multiplexer at the transmit end and the demultiplexer in the TV receiver.

We are talking about ±0.05 dB and 0.1° accuracy for multiplexers and as yet unspecified tolerances for all other links in the system, with overall limits for all segments of the transmission system taken together to do no more than ±3° and ±0.4 dB to obtain 30 dB separation (Figure 2).

The dbx system used in BTSC compands the full audio spectrum by a 2:1 ratio, then adds spectral compression. This in effect compands the higher frequencies by 3:1, thus multiplying any high frequency transmission errors by a factor of three (Figure 3).

Real-world BTSC performance

BTSC performance is a tall order to be met every day in the real world. The consequence is that most TV stereo tends to be closer to 10 to 12 dB separation at the TV set. Each part in the transmission system can lend to this degradation.

In a cable system receiving BTSC from a TV station, the main problem once the TV transmitter is correctly aligned tends to be at the headend. Two main types of off-air converters are in use. The baseband-conversion type typically blocks BTSC altogether, although new designs could be capable of passing BTSC. The RF-conversion variety can transmit BTSC to varying degrees of fidelity. In this case it is the sound carrier trap that induces phase shift of varying severity, as seen in Figure 4. The sound carrier amplitude must be reduced to 15 dB below video carrier amplitude. Monaural sound is not affected, but stereo separation can be reduced to nil even by RF conversion. The best solution is to transmit stereo by land line or microwave to the headend and encode there.

The set-top converter can seriously affect BTSC stereo. Existing baseband converters (such as Z-TAC and Tocom) completely kill BTSC. Newly modified versions of these baseband converters can pass BTSC stereo reasonably well, but at only one setting of the remote volume control. At other settings of this control, the BTSC level continuity is upset and stereo separation becomes nil. In general, RF set-top converters do not effect BTSC stereo separation.

Most satellite stereo is sent on separate left and right channels, either within the video signal (such as B-MAC or VideoCipher) or on two extra subcarriers. Thus the stereo arrives at a headend as left and right channels that must be encoded into BTSC and modulated onto the 4.5 MHz sound carrier. Thus a cable system may have 10 or 20 BTSC multiplex-modulators instead of only one as in a TV station. The operator has all the same problems with AM-PM and PM-AM conversions, as well as ICPM (incidental carrier phase modulation) and crosstalk that the broadcaster has, but has 10 or 20 times as many to care for.

Some cable systems receive TV channels through frequency modulated links (FML) or amplitude modulated links (AML) from some other signal receiving location. The AML will pass BTSC essentially unimpaired, except for some decrease in signal-to-noise ratio. The FML will usually transmit the sound channel at 4.5 MHz, and would pass BTSC with some impairment of stereo separation, depending mostly on the phase characteristics of the video low-pass filters used in the system. Other FML systems transmit TV audio at 5.8 MHz or other subcarrier frequency. In this case special arrangements must be made at *both* ends of the microwave to pass BTSC signals. This process is now in use in Canada.

How good is good enough?

After the real world difficulties of transmitting stereo by BTSC became manifest, a number of papers cited various studies that purported to show that not much stereo separation is needed anyhow. Some studies have shown that listeners could localize sound sources with as low as 7 dB separation; however, not many people would consider that good stereo. On the other hand,

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few people would notice a significant improvement in stereo if the stereo separation was increased from 25 dB to, say, 40 dB. The minimum target for an overall system should be about 20 dB. As we have seen, even 20 dB is a lofty goal for the overall system.

All stereo transmission systems are an attempt to synthesize the original acoustic environment. The more channels (each carrying different versions of the original), the better the illusion can be. Witness the various "quad" systems that have been tried. As in most such things, two channels create 80 percent of the illusion, and more only close the gap slightly while increasing the cost of the transmission system greatly. Most successful commercial systems now use two channels.

There is nothing magic about "left" and "right." In fact, in most of today's recordings, there is no "left" and "right" microphone. Most likely there are about 16 microphones and the person who mixes all these sources together does so to produce a pleasing effect to the ears. In practical fact, this person is producing two *different* sound channels, that when reproduced by two sets of speakers sounds pleasing to the ears. There is usually no relationship between left and right and sound coming down the channels so designated. The main ingredient is that the two channels contain different waveforms. If the waveforms are identical, the sound will be perceived as monaural, even though they emanate from two speakers. If the waveforms are somewhat coordinated, but yet different in detail, the sound will be perceived as stereo. The greater the difference in detail, the greater the perceived stereo separation.

All of this leads to some interesting conclusions. First, identifiable left and right channels are not necessary to the perception of stereo. Second, the perception of stereo is related to the degree of non-identity of the two received channels. And third, there may be ways of transmitting two non-identical channels that would be less sensitive than BTSC to amplitude and phase shifts in the transmission system, yet would decode on the BTSC demultiplexing system in the stereo TV set. It turns out that there are many such algorithms, some of which are remarkably insensitive to amplitude and phase variations in the transmission facility. Such MTS multiplexers can be decoded very well in a BTSC receiver, yet can deliver a very strong perception of stereo under conditions of amplitude and phase shift in the transmission system sufficient to all but destroy stereo separation in a signal originating from a BTSC multiplexer.

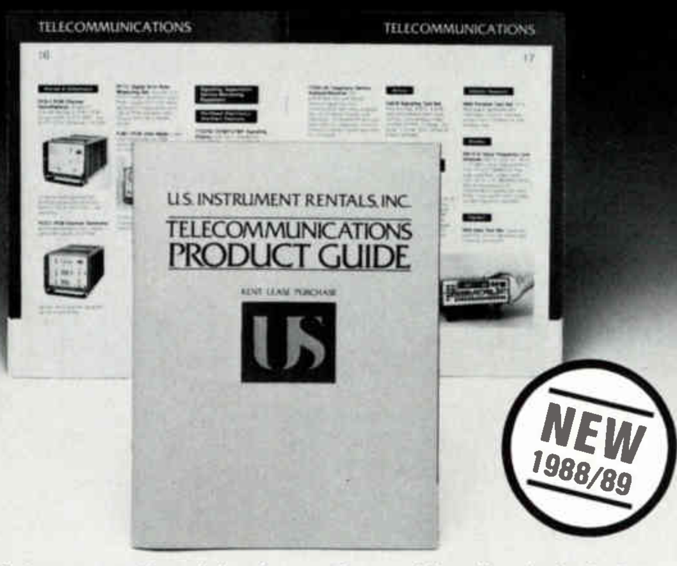
MTS multiplexers, compatible with BTSC receivers, are in operation in many cable systems in the United States. One particular advantage of these multiplexers is that they are able to deliver stereo over a large range of volume settings of the baseband type of set-top converters, as well as operating through RF converters.

Stereo and the mono set

One of the important criteria of the Broadcast Stereo Committee that devised the BTSC system was that a stereo signal must not impair the reception on monaural TV sets. Many tests were performed to this end. Unfortunately, some existing mono TV sets are in fact impaired with stereo signals. This comes about because monaural TV audio requires a minimum received bandwidth of 80 kHz, while BTSC will occupy 203 kHz when only L+R, L−R, and pilot are transmitted, and can require up to 350 kHz with stereo plus SAP (second audio program) and the professional channel. When the FM signal deviation exceeds the receiver bandwidth, noise and distortion will occur. TV set manufacturers naturally assume (prior to the advent of BTSC) that only 80 kHz bandwidth would be required for the TV audio channel and did not necessarily design-in 350 kHz of bandwidth.

Thus it comes to pass that not all mono TV sets react well to stereo TV audio. Cable operators are particularly vulnerable to this situation. Subscribers know exactly where to call when their reception is not as good as they think it should be. Certain models tend to distort when full separation stereo is applied. One solution is to cross-mix the audio, thus reducing both the stereo effect and total deviation. The other solution is to fix the TV set. Usually retuning or replacing defective parts fixes the distortion, but the real problem is convincing a subscriber that the set is defective, when it worked just fine before stereo was put onto the cable system.

In some ways, stereo TV audio is a little like the introduction of color TV. Lots of people need to



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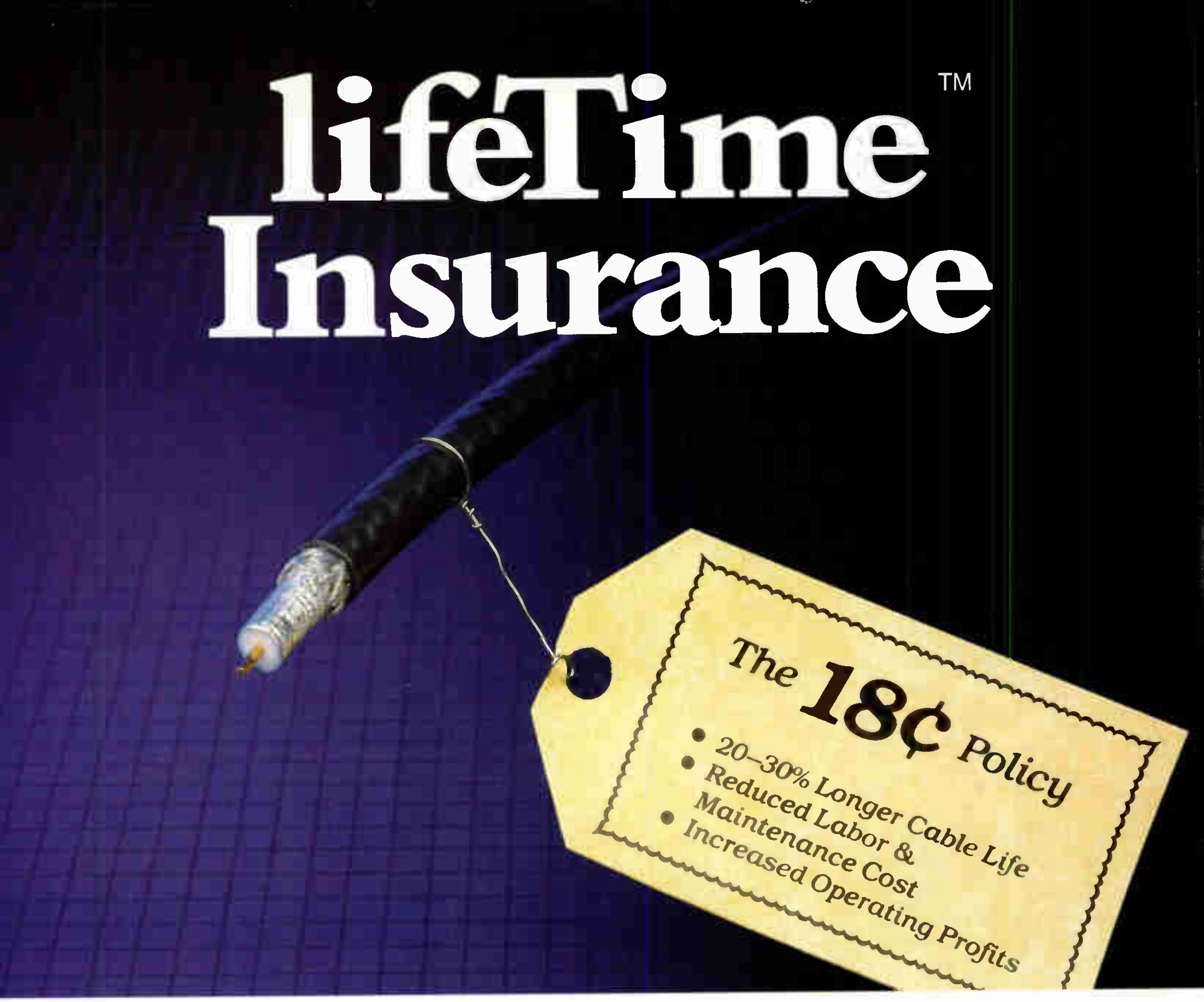

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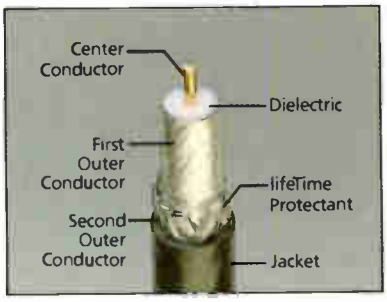

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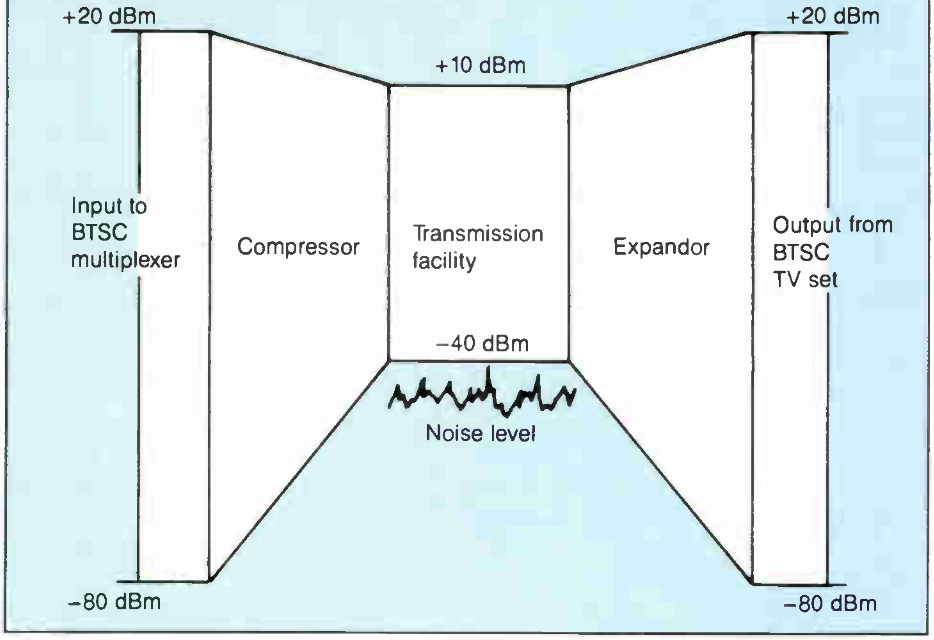

Figure 3: 2:1/1:2 compandor

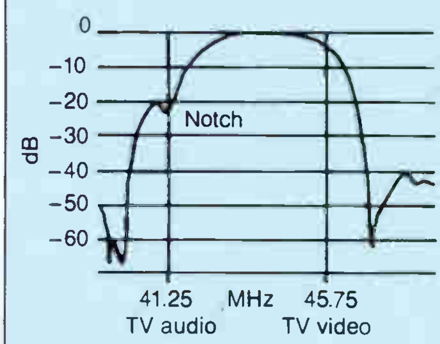

Figure 4

study a whole new technology. After all, who knew about such things as differential phase and differential gain before color TV? Now we all need to know more about peak vs. average program level, companding, spectral overflow, spectral compression, MTS equivalent mode and the forms of transmission impairments that involve sync buzz, noise and reduced stereo separation. After all, what is stereo, except separation?

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Standby power supplies

By Gene Faulkner
Sales Manager, CATV Products, Control Technology Inc.

Over the years, standby power supplies have been either a godsend or a curse. There are so many horror stories about standbys failing at critical times that one wonders if any power supply exists that really works. It can now be said that the current generation of standby power is a fairly reliable breed of product. But several questions remain: What is standby power? Why do we need it? How does it work? And more importantly—what can make it fail?

Cable TV systems use AC power. In many towns the AC power for the city is divided into grids (Figure 1). Let's assume the AC is lost in Grid #2. This loss includes the cable system, and as a result the people who live in Grid #3 will have no cable even though they have power. Standby power will keep the plant active for all customers downstream of the electrical outage. Having standby power is even more critical if data is being transmitted in a system. Any AC loss means an interruption of the data stream, which can have disastrous results.

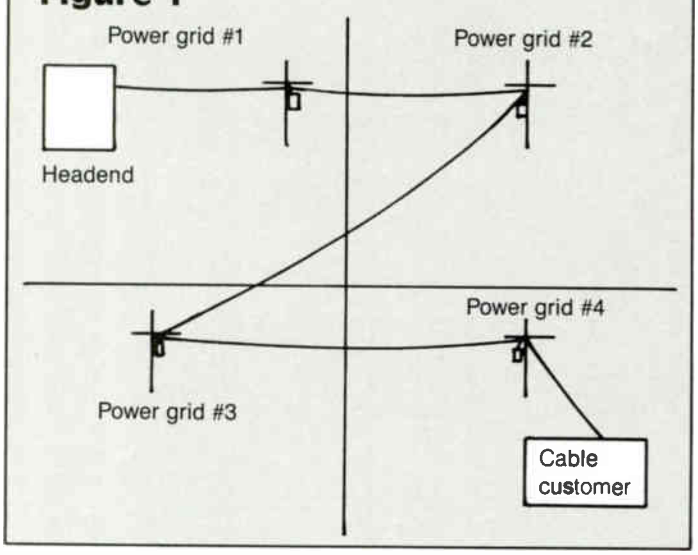
Standby power has been used in cable systems less than 20 years. As with all technologies, it has evolved from modest units with rudimentary features to very sophisticated units with extremely complex functions. Today these units are capable of almost anything, but can suffer from the same common problem: Little or no maintenance will eventually cause any power supply to fail. Murphy's Law of Averages says that this failure will be at the worst time and under the worst possible conditions imaginable. To get a better understanding of standby power, let's look at its component features and how it all comes together.

A standby power supply is several components working together for a common goal: This goal is 60 volts AC to power the cable system. Each component plays a vital role in achieving this goal. These components include:

1) *A ferroresonant transformer*—The ferro takes 120 volts AC and converts it to 60 volts. It provides the regulation needed to supply 60 volts under a variety of operating conditions, absorbs spikes and dips that may be present in the AC line and will ultimately try to protect the power supply in the event of a lightning strike or if the cable is accidentally shorted.
2) *An inverter*—This is the electronic part of the standby power. It takes the DC voltage provided from a bank of 12-volt batteries and converts it to 60 volts AC. The transformer used in the inverter can be either the same ferro used for normal AC operation or a linear transformer designed for standby use only. The inverter also has the circuitry for the battery-charging system on it.
3) *The battery charger*—This is one of the most crucial items in standby power. The charger is needed to keep the batteries at the proper voltage so the maximum amount of standby time is available. The two most popular types of chargers are *float* and *cycle* charging. A float charger is always on, putting a very small amount of charge voltage to the batteries on a continual basis. A cycle charger turns itself off completely after the batteries reach full charge and comes on periodically to maintain the charge. Each has been refined over the years, and both are very reliable in terms of not overcharging the batteries. The constant voltage applied to a battery in float applications requires slightly more maintenance, since it can evaporate battery electrolyte faster than cycle charging.
4) *Batteries*—The most important part of standby power, batteries often get the least amount of service. Many "maintenance-free" batteries can have water added to them, and all batteries should have their terminals cleaned periodically. Unfortunately, this is seldom done. The job of running a cable system puts so many demands on field techs that they seldom worry about batteries in standby power supplies. This usually results in a battery failure, creating an extra service call, probably during a storm, to work on a power supply that has failed in standby mode. There are several excellent batteries currently available on the market. The most reliable is the lead calcium type. A pure lead antimony battery (like a marine-type) does not handle the demands placed on it in CATV service as well as lead calcium.

When all these items are working properly, standby power can be very reliable, but the failure of only one of them will almost totally disable the supply and send a tech into the field.

Figure 1



Features and options

When choosing a standby, some key questions must be considered. There are several areas where the units operate differently, and knowing the difference is important. An important feature of a standby supply is regulation in the standby mode. All power supplies offer good regulation in normal AC operation but in standby it may be totally different. When the unit is in standby, the batteries will start to lose DC voltage in an unregulated or poorly regulated standby power supply. This can cause serious problems in amplifiers. For example, a 3 volt loss of AC at the power supply is close to a 7 volt loss of AC at the fourth amplifier away. If that amp is at the lower end of the voltage requirements you have tapped it for, the amp could brown out, with the associated noise and other problems seen with insufficient AC. A 3 volt gain in AC could have similar results. Good regulation will give you 60 volts output until just before the batteries are depleted.

Currently, there are two methods of providing total regulation. Some units use their ferro to offer the regulation needed; these are called "driven ferro." The other is to use a transformer designed specifically for operation in standby mode. Both offer good regulation, but the efficiency of the driven ferro is not quite as high as the two-transformer method.

Transformers are designed to offer the highest efficiency rating for the mode in which they most often will be operating. Even for a standby unit, this is the AC mode. If this same transformer is designed to be more efficient in DC operation, it will use much more line voltage and the electric bills will probably rise. The standby transformer in a two-transformer method is more efficient in DC. A two-transformer, two-battery system operates longer in standby than a driven ferro two-battery system at the same load. This is why driven ferros are typically three-battery systems.

How a standby operates after the batteries are depleted is also critical. Many units use a hysteresis for their low voltage cutoff. The inverter is adjusted so that the batteries must reach a certain voltage before the inverter can come on again. When the power supply goes to low voltage cutoff, the batteries will immediately start to drift to a higher voltage.

This is similar to running down a battery when starting a car. We all know if we wait a little while we will get a few more turns of the starter before

the battery runs down again, but we also think maybe the car will start, so we continue to try and start the car. In a standby power supply, if the unit restarts, several things happen—but none of them good. Since the battery is already depleted, the unit will only run a little while before shutting down again. This will discharge the batteries further than they were meant to be discharged. If it keeps restarting, the unit could start to chatter, which can damage the final output transistors.

Other units use an electronic latch for their low voltage cutoff. When the latch is engaged, the unit is unable to restart until AC power is restored. After AC is restored the latch is cleared until it is next needed.

The standby power supply should be modular. Older power supplies were hard-wired in. If a problem developed the unit would have to be taken off-line for an undetermined amount of time to switch out the electronics. Today, power supplies are modular; some will run no matter which module you have plugged in. Many offer the ability for the inverter to be removed without disturbing line power.

Also today, all power supplies offer fast switching speed. In fact, one can argue the point that since today's standbys switch faster than the amplifiers can bleed off signal, they are more like uninterruptible power supplies than switching systems. This was not always so. More than one unit failed when its switching speed was so slow it failed to switch into the current generation of amplifiers.

A standby that monitors itself is an asset to a cable system. It should be capable of determining if its charger has been on too long and shutting it off to prevent possible damage to the batteries. It should be able to give you an idea where a problem occurred when a technician opens the case, to make troubleshooting easier.

Manufacturers of standby power supplies have different ideas when it comes to options. These are probably the most important to have:

1) *Self-test*—This option automatically puts the unit in standby for a predetermined time periodically. Any failure of the batteries or the inverter will switch the unit back to AC and will light an alarm. (Battery manufacturers say the best way to make a battery last is to exercise it occasionally and not overcharge it.) You could send a tech up the pole to switch the unit manually, but this may not always be convenient.
2) *Auxiliary power input (API)*—This is the best bet for keeping a power supply on-line in an extended outage. With the API a tech can hook up a portable generator to the supply until AC is restored in the area and can even recharge the batteries in the unit while it is still operating. The key item here is to be absolutely sure the API is isolated from the standard AC input to avoid possible backfeeding of voltage into the utility power lines.
3) *Lightning protection*—This is a nebulous option. Who hasn't seen a power supply loaded with every option for lightning protection get blown up by a direct hit? While having some lightning protection is a must, the question is raised about spending money on something that may not do any good. Lightning has such a quick rise time it seems to get everything, despite the best efforts.

Maintenance tips

There are very few books about how to maintain a standby power supply. The best bet is to contact the manufacturer. However, there are a few things that should be standard for all power supplies:

1) Train technicians to look at power supplies. The biggest problem seems to be that very little time is ever spent at a standby power supply. Standbys have complex circuitry in them, like an amplifier does. Most power supplies have a way of telling an alert technician it has a problem.
2) Set up and use an adequate log system for power supplies. One MSO used a log for its standbys and was able to watch the available battery voltage decline in one supply gradually—the mark of one battery going bad. The battery was changed, however, before any serious problems developed.
3) Set up a routine for going to each power supply on a regular basis. use the log to record any pertinent info, such as AC input, AC output and DC voltage available both in and out of standby mode. Just because it says 25 volts while the unit is in AC doesn't mean it can go to standby. A battery can have the right numbers until you load it down. Remember that AC output voltage is RMS (root mean square). If a voltmeter wasn't designed for RMS measurements it will have a higher reading (typically about 10 percent).

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☐ MDS, STV or LPTV Operator
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A case study of assets security

By Sam Street
President and General Manager, United Cable of Baltimore

When United Cable Television won the franchise for Baltimore, we were elated. The celebration was short-lived, however, as getting the project under way immediately became a priority to stay on track with corporate growth plans and tight city deadlines.

Construction was progressing, rights-of-way were being acquired, contractors were cooperating, signal reception was good, installation of the hub site on the west side was going well and customers were signing up. But there was a problem—theft of materials, supplies and personal items.

We brought in a security access control company. A needs assessment meeting was held between the company and United Cable; it was relatively short and to the point. The conclusion was that the system was highly vulnerable to a variety of threats; the security company put forth some solutions to these problems.

Due to the number of floors and doors in the building and the requirement for employee freedom of movement once inside, the company developed a program on the basis of "defense in-depth." Access would be limited more and more as key internal locations were approached. Although every door was considered, only those that controlled access to the perimeter or business essential areas were recommended for control. The following criteria were established:

1) Keeping unauthorized personnel outside the building was foremost in eliminating the external sabotage, burglary and other violent criminal threats.
2) Limiting access to such areas as the cash room, computer room, headend room, antenna yard and emergency generator room would reduce the risk of internal sabotage threat.
3) By limiting access and recording all activities in the areas where pilferable goods were stored, the threat of theft would be reduced if not eliminated completely.
4) The safety of personnel would not be jeopardized. Fire, safety and electric codes would be strictly enforced.

Enhancing security

Converting these criteria into hardware was the designer's job. Several meetings were held between United Cable and the security company to work out the details of the design. Thirty-one doors were addressed; the requirements for them went from the simple "close and lock" to the complex "rehang to swing out, install a card reader with keypad, install a door status contact, program reader for anti-passback and record all activity at this door, including sounding an alarm if the door is open longer than seven seconds."

Special consideration was given to the headend room since it was accessible from the ceiling. Two strands of razor ribbon were strung at the top of the wall to prevent access from a ladder or scaffold.

The main employee entrance also presented interesting problems because the entrance was adjacent to two overhead garage doors where the vehicle traffic entered and exited the warehouse area of the building. The problem was how to keep foot traffic from the garage doors where the guard would have difficulty seeing if people were carrying out any small items. We solved this problem by installing two barrier arms, one across each opening. Under the arms an infrared beam projected that, if broken while the arms were down, would sound a klaxon inside the warehouse.

The second problem with this entrance and exit was that employees crowded together, making it difficult for the guards to see who was entering or leaving. This was solved by installing a full-height turnstile with a card reader, with each employee required to insert a valid card to unlock the turnstile.

By reducing this observation workload on the guards, it allowed them to take more frequent tours of the building. Typically, by enhancing personnel traffic control through the use of machines, security can be improved by better utilizing the guards.

A large overhead door in the converter storage area of the warehouse created yet another challenge. Since the door was not visible from the guard office, a camera was installed to observe the activity in that area. The monitor was installed at the receptionist's desk. To prevent the requirement for constant monitoring, a chime was installed; it sounded an alarm at the monitor station when activity was about to occur. If the receptionist observed any activity considered unauthorized, guards were contacted immediately.

As a general rule, each card reader was individually programmable from the central computer so that a cardholder could be eliminated from access to any or all doors. Specifying periods of time when each cardholder was permitted access was also possible.

Minding the store

"Minding the store" in an urban cable TV environment is more complicated today and requires more attention to internal security and outside experts. We can now spend more time running the business instead of watching profits slip out the doors.

Hooking up multiple dwelling units

By Glyn Bostick
President, Microwave Filter Co. Inc.

Hookups to MDUs (multiple dwelling units) have accelerated over the past several years. During the rapid CATV growth years, cable systems often avoided marketing to MDUs, preferring to concentrate on individual subscriber penetration. In the recent years of slower growth, however, many cable operators began to cultivate this important source of additional revenue. Increased attention to MDU sales is expected as a result of deregulation.

Figure 1: Batch descrambling of premium channel

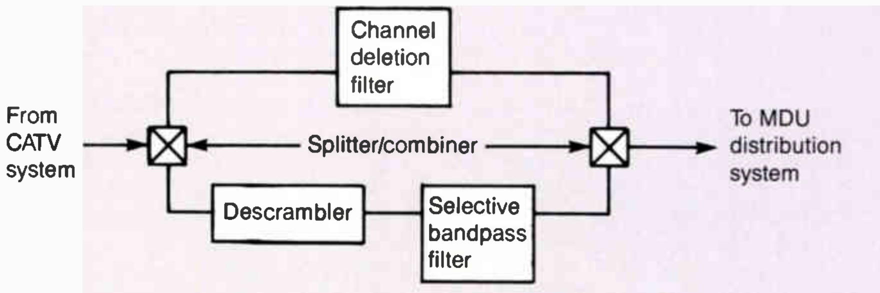
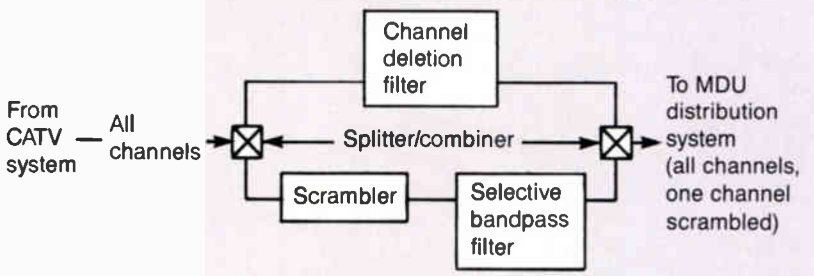


Figure 2: Deletion of undesired channel

Figure 3: On-premises scrambling of incoming channel



Needs of MDU clients

As practiced by many cable systems, MDU sales efforts go far beyond multiple *residential* buildings. Similar hookups also are made to local schools, universities, hospitals, hotels, motels and private clubs. Therefore, the hook-up techniques must include the ability to satisfy a wide range of client needs, such as:

Batch descrambling. Many of these establishments wish to avoid individual set descramblers. For example, many motels prefer to pay bulk rates and adjust their room rates accordingly (Figure 1).

Channel deletion. Some MDUs prefer to delete an objectionable channel without impact on other channels (Figure 2).

Local scrambling. In other cases, it is desired to scramble an incoming objectionable channel at the MDU entry and allow tenants the option of individual descrambling. Or, if the CATV system uses a negative trapping method, a change over to the positive trapping system would avoid digging out cables to install negative traps (Figure 3).

Descramble/rescramble. For premium channels, it is often desired to change the scrambling method to one more compatible to building wiring and landlord preference. For example, standard sync suppression may be changed over to positive scrambling to reduce decoder cost (Figure 4).

Mid-band to numbered channel conversion. In a non-converter building, it is sometimes possible to include a mid-band channel. This is done by vacating a numbered channel, converting the mid-band channel to the numbered channel and reinserting it on the "numbered" channel spectrum (Figure 5).

Closed-circuit provision. The tenant often desires an incoming channel to be vacated for closed-circuit use for security surveillance, local entertainment or instructional use. Here a channel must be deleted and provisions made for inserting the output of a local modulator in its place (Figure 6).

Channel detour. Occasionally a client may want an incoming channel blocked from the distribution system and routed to a specific location only, like a medical channel in a hospital (Figure 7).

Basic circuit elements

Circuits for accomplishing all of the functions can be contrived from a small group of components: a channel deletion filter, bandpass filter and the necessary interconnecting cables, 3 dB

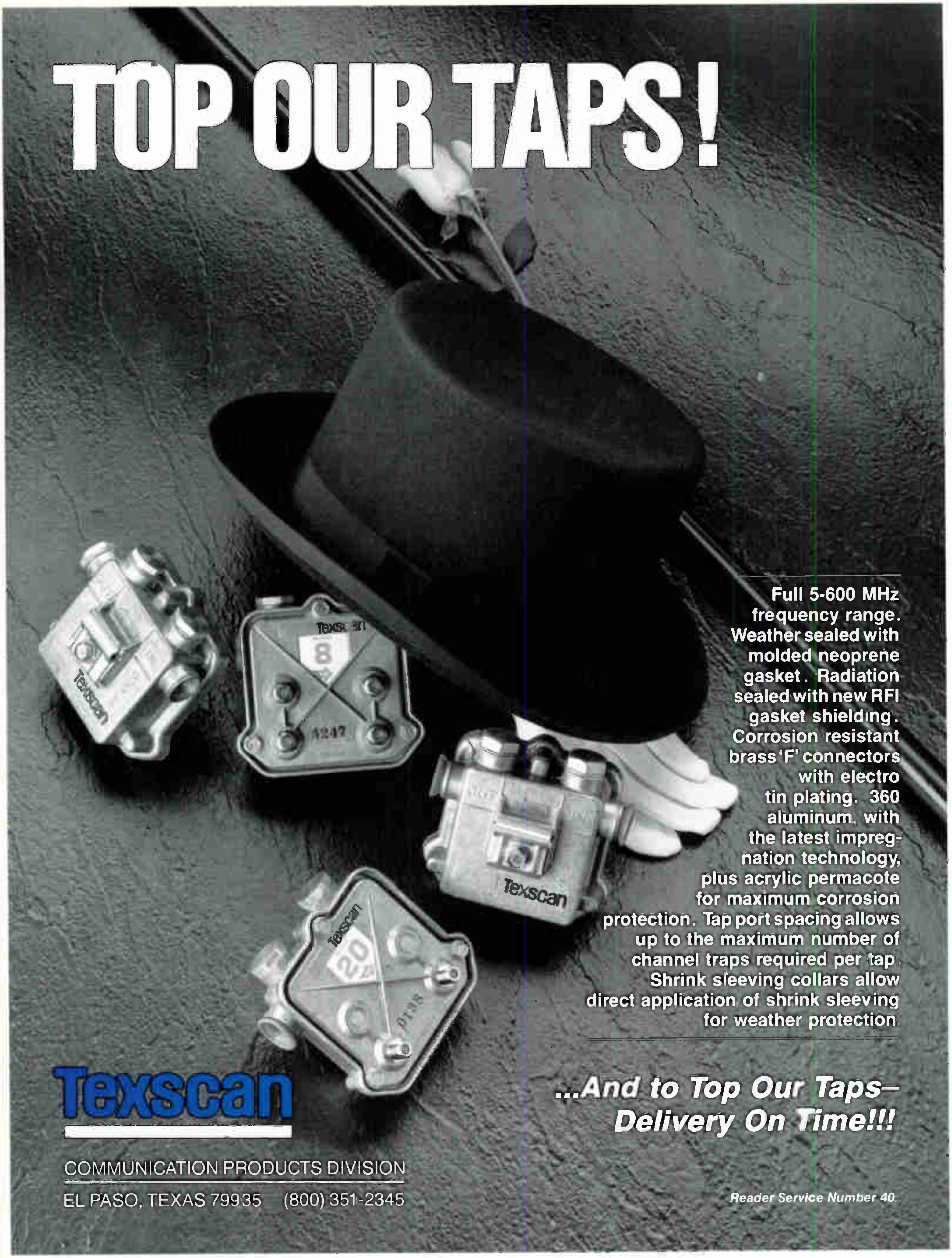

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Figure 4: Changing scrambling method to positive traps

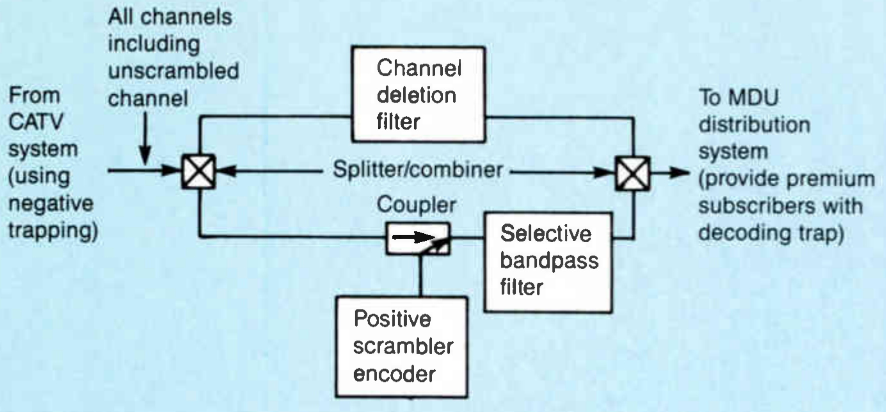


Figure 5: Mid-band to numbered channel conversion

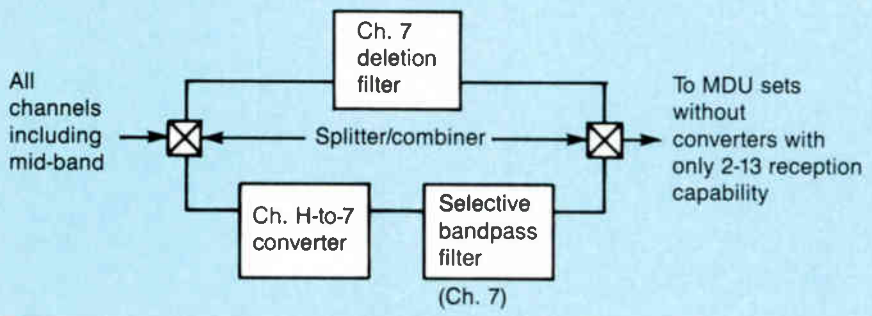


Figure 6: Deletion of channel for closed-circuit reuse

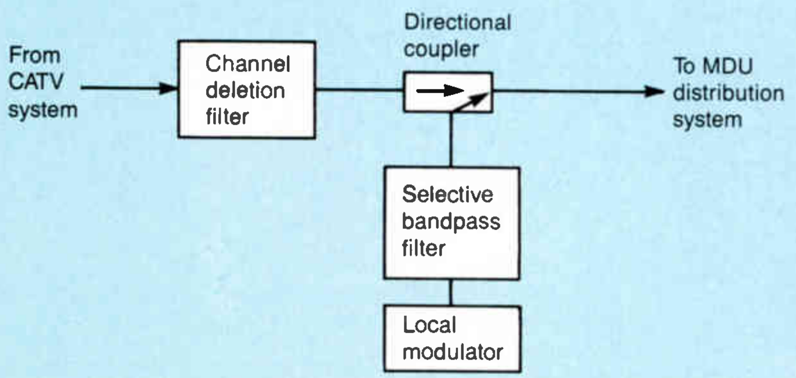
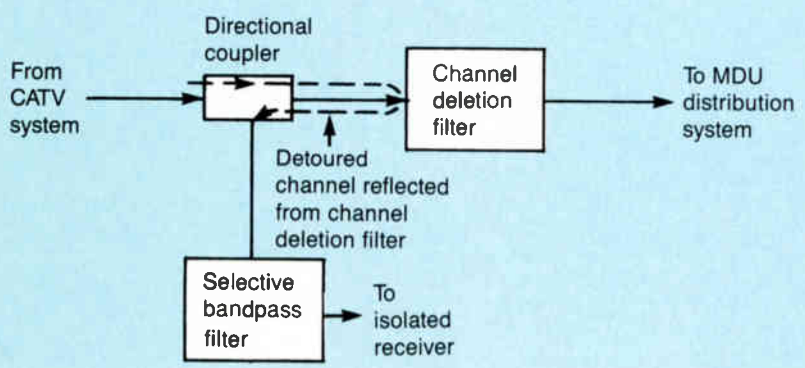


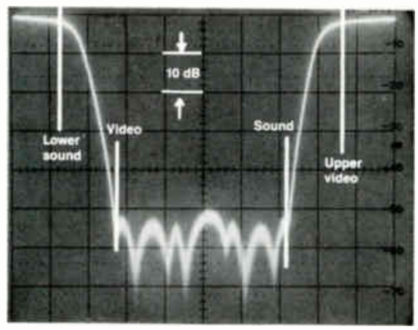
Figure 7: Detouring of selected channel

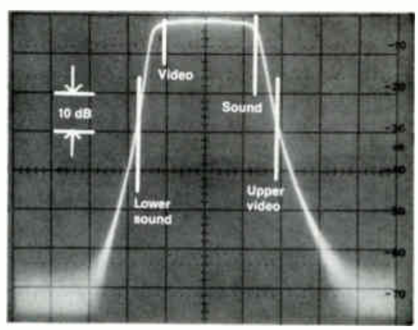


"As practiced by many cable systems, MDU sales efforts go far beyond multiple residential buildings."

splitters, and directional couplers.

The channel deletion filter should suppress the entire active channel spectrum (video-to-audio carrier) with no serious attenuation on adjacent channels (Figure 8). The suppression level should be about 50 dB or better to obviate any co-channel effects when reinserting new programming. The channel bandpass filter should suppress the nearest carriers of adjacent channels and beyond to avoid "bandspreading" into adjacent channels, which sometimes occurs in modulator, descrambler or converter outputs (Figure 9).





Reader Service Number 41.

FO cable tools

Now available from Neptco, Safeguard break-away fittings and swivels protect fiber-optic cable from excess pulling tensions. The tools feature a field-replaceable double protection link providing a retestable link when separation occurs in the field, and strengths from 200 to 2,000 pounds.

For more details, contact Neptco Inc., Box 2323, 30 Hamlet St., Pawtucket, R.I. 02861-0323, (401) 722-5500; or circle #123 on the reader service card.

Headend monitoring

RF Superior introduced three new features for its CAT System headend status monitor, including automatic level measurements from +54 dBmV to −30 dBmV and precision frequency measurements at levels of −20 dBmV to 54 dBmV. This system also has a remote controlled RF A/B switch with isolation 80 dB in the frequency range of 4 to 555 MHz and insertion loss of less than 0.3 dB. Eleven auxiliary analog channels were added to facilitate remote monitoring of AML microwave receive sites.

For further details, contact RF Superior, 1023 State St., Schenectady, N.Y. 12301, (800) 382-2723; or circle #119 on the reader service card.

RF switch bank

Trilithic announced its Model 7RSABM RF switch bank with an RS232 listener/talker interface, in a 5¼-inch (3U) rack-mountable case. It consists of a mainframe/power supply, an addressable control card and up to 16 individually addressable A/B (SPDT) RF switch cards on a common parallel bus.

The modular switch card design enables switching of video through UHF signal traffic in CATV headends and hubs. The switch bank, in conjunction with application specific software, may be used for drop signal switching, video source changes, test instrumentation path routing and almost any other switching requirement for headend automation.

For further details, contact Trilithic, 6840 Winona Dr., Indianapolis, Ind. 46236-9506, (317) 823-4719; or circle #127 on the reader service card.

Cable clamps

Available from Ziptape Identification Systems, Zetclip wire and cable holding devices have a self-adhesive base for mounting on clean, flat surfaces. According to the company, the wire clips can be opened for easy access to wiring and cables, snapped shut to provide a secure lock and reopened at any time. They come in nylon and polypropylene and are manufactured in a variety of shapes and sizes to fit almost any cable or wire bundle, including flat ribbon cables.

For additional information, contact Ziptape Identification Systems, 2122 W. 5th Pl., Tempe, Ariz. 85281, (602) 966-2999; or circle #117 on the reader service card.

Grounding guide

A 116-page book from PolyPhaser Corp. contains an analysis of proper grounding and protection against lightning and nuclear electromagnetic pulse radiation (EMP) for all types of communications equipment. *The "Grounds" for Lightning and EMP Protection* covers radio communications, Ethernet, TVROs and cable TV.

For more information, contact PolyPhaser Corp., 1425 Industrial Way., P.O. Box 1237, Gardnerville, Nev. 89410-1237, (702) 782-2511; or circle #113 on the reader service card.

Security box

According to Midwest CATV, its Matrix System cable security box offers the industry a secure means to combine standard traps and filters with addressability. The system can switch up to eight traps of any brand and can be controlled from a central business office computer. Also, the box is installed in a readily accessible service box on the outside of the home, eliminating entry problems.

For additional information, contact Midwest CATV, P.O. Box 271, Charleston, W. Va. 25321, (304) 343-8874; or circle #128 on the reader service card.

Sub-band diplexer

Qintar's Model SBS-25 sub-band to low-band VHF diplexing filter allows the use of an RF line for data, sub-band video and other sub-band signals for a two-way system. The crossover frequency is below Channel 2, allowing the sub-band channel to exist anywhere between 38 MHz and 5 MHz with 40 dB of isolation to the common port and 60 dB of isolation between the common port and the low-band VHF spectrum.

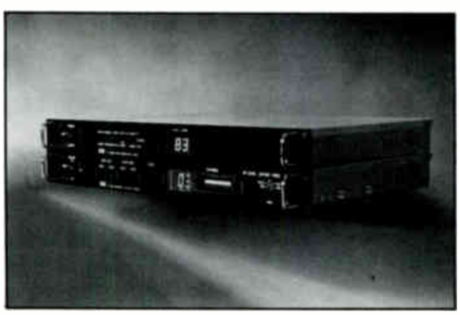
For more details, contact Qintar, P.O. Box 6579, Westlake Village, Calif. 91359, (800) 252-7889; or circle #125 on the reader service card.

Tier switcher

CableCom Specialists introduced an automated pay-per-view tier/tag switching device for controlling Jerrold, Regency and other brands of scrambler/encoders. An IBM compatible-based program and interface card control the headend encoder tier level through a menu-driven program. The product is programmable up to 31 days with unlimited events per day, fully addressable through a standard phone line and controls up to eight channels simultaneously.

The program contains default tiering for between PPV movies or events. Also, the interface card includes outputs of BCD and Binary for controlling scramblers/encoders and satellite transponders as well as a variety of outputs to control video, RF and IF switchers and momentary contact closures.

For additional details, contact CableCom Specialists, P.O. Box 5031, Wilmington, Del. 19808, (302) 239-5201; or circle #121 on the reader service card.



Agile processors

According to ISS Engineering, its Magnum Series agile processors utilize a demod/remod process to provide a cleaner video signal than is possible with a conventional heterodyne processor. The product features a full range input regardless of source, full agility from Channels 2 through WW with required offsets on FCC designated channels, and a rear panel switch for added stereo bandwidth.

For further details, contact ISS Engineering, 104 Constitution Dr., #4, Menlo Park, Calif. 94025, (800) 351-4477 or (800) 227-6288; or circle #118 on the reader service card.

FO connectors

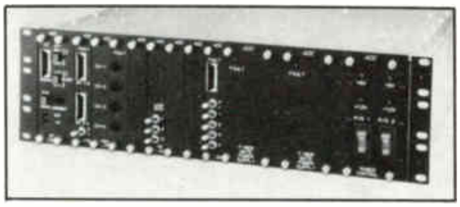
The 708 Series single- and multi-mode biconic connectors from Methode Electronics are designed for multiuse applications ranging from long distance transmission, data links and LAN interface. The connectors provide less than 1 dB loss (average 0.5 dB) and are available as preterminated fiber-optic cable assemblies or as field-installable components. No special end face surface preparation is needed beyond normal polishing methods.

For more information, contact Methode Electronics, Connector Division, 7447 W. Wilson Ave., Chicago, Ill. 60656, (312) 867-9600; or circle #120 on the reader service card.

Bandsplitter/combiner

Microwave Filter Co.'s Model 3329-186/222 bandsplitter/combiner for high-split local area networks and CATV systems has been redesigned to provide a 40 dB mutual isolation instead of the 25 dB of the original model. It can be used to split or combine two VHF bands, 5-186 MHz and 222-450 MHz, with passband insertion loss of 1 dB maximum and return loss of 14 dB minimum. The 75-ohm combiner comes with type F connectors.

For more details, contact Microwave Filter Co., 6743 Kinne St., East Syracuse, N.Y. 13057, (315) 437-3953; or circle #131 on the reader service card.



FO conversion

ADC Telecommunications introduced its Fiber Mate electro/optic conversion system for various types of electrical input/output equipment to communicate over multimode fiber-optic cable. It utilizes an EMI/RFI design for use in secure communications environments.

The system offers modules to convert both digital signals at low- and high-speed transmission rates (DC to 64 kbps and DC to 20 Mbps) and analog signals (300-3,400 Hz), and modules allowing front panel monitor and test access to the circuits. The system also features remote alarm output, fault indication, redundant power supply, signal activity and aggregate loop back to separate the optics from the electronics.

For additional details, contact ADC Telecommunications, 4900 W. 78th St., Minneapolis, Minn. 55435, (612) 835-6800; or circle #114 on the reader service card.

Power line detectors

Metrotech Corp. introduced Model 50/60 and Model 50/60-480 power line detectors that locate and trace 50 and 60 Hz power lines and other conductors carrying the 50/60 Hz stray current. Features include a twin antenna design to distinguish between underground and overhead power lines, a visual signal strength meter, controllable sensitivity, a bubble level for estimating depth and a weatherproof loudspeaker.

The dual-function feature of the Model 50/60-480 allows it to operate as a loaded power line tracer or inductive probe with the Metrotech 480 pipe and cable locator. Powered by a 9V battery, the 4-pound instrument has automatic shut-off and battery check.

For more details, contact Metrotech, 670 National Ave., Mountain View, Calif. 94043, (415) 940-4900; or circle #129 on the reader service card.

Stereo tuner

Catel's Model TX-2 quartz synthesized AM/FM stereo tuner contains Carver Corp.'s asymmetrical charge coupled FM stereo detector to reduce noise and distortion caused by multipath interference. The product can provide from 10 to 23 dB improvement in the L–R component and includes a 16-memory preset (8 FM and 8 AM) and full range up/down manual tuning or automatic tuning. A signal strength indicator, large frequency display window and indicators for station lock and stereo provide indication of tuner status. The noise reduction and multipath circuits are individually controlled by front panel pushbuttons.

For further information, contact Catel Telecommunications, 4050 Technology Pl., Fremont, Calif. 94537-5122, (415) 659-8988; or circle #130 on the reader service card.

Noise

By Ron Hranac and Frank Eichenlaub
Jones Intercable Inc.

At temperatures above absolute zero, the random motion of atoms in any device creates thermal noise. This thermal noise can be measured as a voltage. A resistor's open circuit thermal noise voltage is calculated with the formula

$$E = \sqrt{4kTBR}$$

where:

E = open circuit noise voltage
k = Boltzmann's constant (1.38×10^{-23})
T = temperature in degrees Kelvin
B = bandwidth in Hertz
R = resistance in ohms

The following chart compares bandwidth with the thermal noise floor (in dBmV) for a 75-ohm impedance at room temperature. An explanation of how the values in this chart were calculated is on the next page.

75-ohm noise floor at 68°F (293.15 K)

Bandwidth (MHz)	Noise floor (dBmV)	Bandwidth (MHz)	Noise floor (dBmV)
0.1	−75.18	2.2	−61.76
0.2	−72.17	2.3	−61.56
0.3	−70.41	2.4	−61.38
0.4	−69.16	2.5	−61.20
0.5	−68.19	2.6	−61.03
0.6	−67.40	2.7	−60.87
0.7	−66.73	2.8	−60.71
0.8	−66.15	2.9	−60.56
0.9	−65.64	3.0	−60.41
1.0	−65.18	3.1	−60.27
1.1	−64.77	3.2	−60.13
1.2	−64.39	3.3	−59.99
1.3	−64.04	3.4	−59.86
1.4	−63.72	3.5	−59.74
1.5	−63.42	3.6	−59.62
1.6	−63.14	3.7	−59.50
1.7	−62.88	3.8	−59.38
1.8	−62.63	3.9	−59.27
1.9	−62.39	4.0	−59.16
2.0	−62.17	4.1	−59.05
2.1	−61.96	4.2	−58.95

To change degrees Fahrenheit to degrees Kelvin, you must first convert from Fahrenheit to Centigrade. This is done by using the formula

$$°C = (°F - 32) \times 5/9$$

Then add 273.15 to the Centigrade temperature reading.

Problem
What is 68°F in degrees Kelvin?

Solution
Using the above formula, change 68°F to degrees Centigrade.

$$\begin{aligned} °C &= (68° - 32) \times 5/9 \\ &= (36) \times 5/9 \\ &= 20°C \end{aligned}$$

To obtain degrees Kelvin, add 273.15 to the Centigrade reading (273.15 + 20 = 293.15). 68°F is 293.15 K.

Noise calculation

In the case of a 75-ohm resistor at room temperature, the open circuit noise voltage over a 4 MHz bandwidth is calculated using the formula

$$\begin{aligned} E &= \sqrt{4kTBR} \\ &= \sqrt{4 \times (1.38 \times 10^{-23}) \times 293.15 \times 4{,}000{,}000 \times 75} \\ &= \sqrt{(5.52 \times 10^{-23}) \times 293.15 \times 4{,}000{,}000 \times 75} \\ &= \sqrt{(1.62 \times 10^{-20}) \times 4{,}000{,}000 \times 75} \\ &= \sqrt{(6.47 \times 10^{-14}) \times 75} \\ &= \sqrt{(4.85 \times 10^{-12})} \\ &= 2.2033075 \times 10^{-6} \\ &= 2.2033075 \text{ microvolts} \end{aligned}$$

When this noise source is terminated by an equal value resistance (e.g., connected to the input of a CATV amplifier), the thermal noise is E/2, or 1.10165375 microvolts. This voltage is converted to dBmV using the formula

$$\begin{aligned} \text{dBmV} &= 20\log_{10}\left(\frac{\text{microvolts}}{1{,}000}\right) \\ &= 20\log_{10}\left(\frac{1.10165375}{1{,}000}\right) \\ &= 20\log_{10}(0.00110165375) \\ &= 20\,(-2.957954883) \\ &= -59.1590976 \text{ dBmV} \end{aligned}$$

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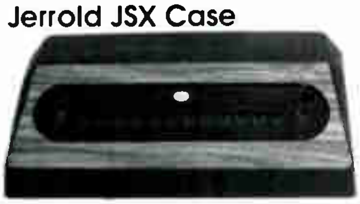

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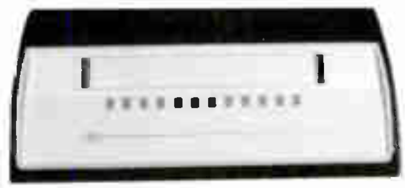

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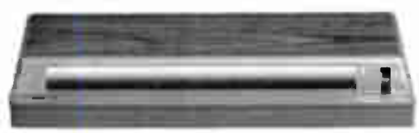

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Krisbergh

General Instrument's **Jerrold Division** named **Hal Krisbergh** president. Prior to this, he was vice president and general manager of Jerrold Subscriber Systems Division.

Anthony Aukstikalnis was promoted to vice president and general manager of the Jerrold Subscriber Systems Division. He was formerly vice president of engineering.

Also, **Lemuel Tarshis** was appointed vice president and general manager of the Jerrold Distribution Systems Division. Previously, he was vice president of corporate technology. Contact: 2200 Byberry Rd., Hatboro, Pa. 19040, (215) 674-4800.

Times Fiber Communications appointed **Craig Scalzo** director of sales and marketing. He was formerly director of marketing for the company.

Ralph Hillburn was promoted to national territory sales manager. Prior to this, he was regional sales manager. Contact: 358 Hall Ave., P.O. Box 384, Wallingford, Conn. 06492-0384, (203) 265-8500.

William Lambert was elected chairman and CEO of **Texscan Corp**. Prior to this, he was vice president and general manager of the Jerrold Distribution Systems Division. Contact: 10841 Pellicano Dr., El Paso, Texas 79936, (915) 594-3555.

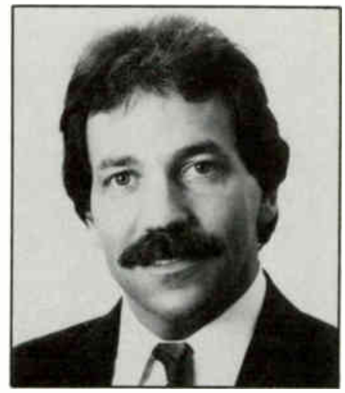
Texscan MSI appointed **Dennis Campo** vice president of sales and marketing. He was formerly with TV Decisions, a subsidiary of Scripps-Howard.

Phyllis Torres was named in-house sales supervisor. She has an extensive background in telemarketing, sales and public relations. Contact: 124 Charles Lindbergh Dr., Salt Lake City, Utah 84116, (801) 359-0077.

The **National Cable Television Association** announced the members of its Research and Development Committee.

The committee members are: Chairman **John Malone**, president and CEO, Tele-Communications Inc.; **Gary Bryson**, executive vice president, American Television and Communications Corp.; **Edward Horowitz**, senior vice president, technology and operations, Home Box Office; **Richard Leghorn**, president, Leghorn Telepublishing Corp.; **John Rakoske**, senior vice president, Continental Cablevision; **Joseph Gans Sr.**, president, Cable TV Co.; and **Brian Roberts**, executive vice president, Comcast Corp.

Serving as liaisons from the committees they chair are Tele-Cable President and CEO **Richard Roberts** of the Blue Ribbon Committee on HDTV and Cox Cable President **James Robbins** of the Telecommunications Committee. Contact: 1724 Massachusetts Ave., N.W., Washington, D.C. 20036, (202) 775-3629.



Meltzer

Michael Meltzer was named as vice president of sales and marketing for the **VideoCipher Division** of General Instrument Corp. Prior to this, he was vice president of national marketing and sales for the Consumer Video Products Division of Sony Corp. of America. Contact: 6262 Lusk Blvd., San Diego, Calif. 92121, (619) 455-1500.

CALENDAR

March

March 22: Scientific-Atlanta seminar "The engineering economics of channel expansion," Denver. Contact Russell Paul, (404) 441-4714; or Perry Tanner, (404) 925-5674.

March 22: SCTE Hudson Valley Chapter technical seminar, Holiday Inn, Kingston, N.Y. Contact Bob Price, (518) 382-8000.

March 22-24: Magnavox CATV training seminar, Birmingham, Ala. Contact Amy Costello, (800) 448-5171.

March 22-24: C-COR Electronics technical seminar, Indianapolis. Contact Shelley Parker, (800) 233-2267.

March 23: SCTE Golden Gate Chapter technical seminar. Contact Walter Reames, (408) 998-7333; or Terry Cotton, (415) 588-9646.

March 23: SCTE Greater Chicago Chapter BCT/E testing. Contact John Grothendick, (312) 438-4200.

March 25: SCTE Heart of America Chapter BCT/E testing, American Cablevision of Kansas City, Kansas City, Mo. Contact Bob Marshall, (913) 841-9241.

March 27: SCTE Old Dominion Meeting Group technical seminar and BCT/E testing. Contact Margaret Harvey, (703) 248-3400.

March 27-29: Virginia Cable Television Association annual convention, Williamsburg Lodge, Williamsburg, Va. Contact Lorraine Whitmore, (804) 780-1776.

March 29: SCTE Satellite Tele-Seminar Program on signal leakage detection, 12-1 p.m. ET on Transponder 7 of Satcom F3R. Contact (215) 363-6888.

March 29-31: Magnavox CATV training seminar, Jackson, Miss. Contact Amy Costello, (800) 448-5171.

March 30: SCTE Ohio Valley Meeting Group technical seminar. Contact Charles Hanchett, (614) 221-3131.

April

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

April 11-15: Hughes Microwave technical training seminar on channelized AML equipment, Torrance, Calif. Contact (213) 517-6244.

April 12-14: Magnavox CATV training seminar, Tulsa, Okla. Contact Amy Costello, (800)448-5171.

April 12-15: Arkansas Cable Television Association and **Louisiana Cable Television Association** joint L'Ark convention, Sheraton Hotel, New Orleans. Contact (501) 372-1756.

April 16: SCTE Midlands Cable Training Association technical seminar on video and audio signals, Omaha, Neb. Contact Herb Dougall, (402) 330-2314.

April 16: SCTE Rocky Mountain Chapter technical seminar on terminal devices. Contact Steve Johnson, (303) 799-1200.

April 19: Scientific-Atlanta seminar "The engineering economics of channel expansion," Philadelphia. Contact Russell Paul, (404) 441-4714; or Perry Tanner, (404) 925-5674.

April 19-21: Magnavox CATV training seminar, Santa Fe, N.M. Contact Amy Costello, (800) 448-5171.

April 20: SCTE Greater Chicago Chapter technical seminar on long haul transmission options. Contact John Grothendick, (312) 438-4200.

April 26-28: Magnavox CATV training seminar, Los Angeles. Contact Amy Costello, (800) 448-5171.

April 30-May 3: NCTA Show, Convention Center, Los Angeles. Contact (202) 775-3550.

May

May 10-12: Magnavox CATV training seminar, Bellingham, Wash. Contact Amy Costello, (800) 448-5171.

Planning ahead

June 16-19: SCTE Cable-Tec Expo, Hilton Hotel, San Francisco.

July 11-14: New England Show, Cape Cod, Mass.

Sept. 7-9: Eastern Show, Atlanta Merchandise Mart, Atlanta.

Sept. 27-29: Great Lakes Expo, Cobo Hall, Detroit.

AD INDEX

An HDTV committee road map

By Walter S. Ciciora, Ph.D.
Vice President of Technology
American Television and Communications Corp.

There is no topic in recent memory that has spawned as many committees as ATV (advanced television systems). High-definition television (HDTV) leads the pack in number of committees. The first question facing the cable technologist is whether to participate. If the answer is affirmative, the next question is on which committee(s).

I believe cable needs to participate actively in many of these committees to ensure its interests are protected and promoted. It is important to be present to hear and understand what is going on, since much of it impacts cable's future. It is also important to speak up when things seem to be going the wrong way or when others don't understand the cable point of view. It is very important to be there when voting takes place to defend cable's position. In some committees strict voting qualification rules are enforced, requiring attendance in at least two of the most recent three meetings. Stuffing the meeting for voting purposes is not possible.

So which committee meetings are appropriate for cable participation? There are so many meetings that setting priorities is important.

Three broad categories

Three broad categories of committees exist for cable participation: NCTA, ATSC and FCC. The National Cable Television Association Engineering Committee has an HDTV subcommittee chaired by Nick Hamilton-Piercy of Rogers Cablesystems and co-chaired by Paul Heimbach of Home Box Office. The Advanced Television Systems Committee (ATSC) is an interindustry committee whose purpose is to choose the next TV standard(s) for recommendation to the Federal Communications Commission. The FCC itself has set up an elaborate system of advisory committees to help it decide what to do about advanced TV systems for the United States.

An "others" category also should be mentioned. The Society of Motion Picture and Television Engineers (SMPTE) has a collection of committees primarily concerned with production standards. Massachusetts Institute of Technology has a Center for Advanced Television Systems (CATS) program for research into future TV technology. Its goal is fundamental research rather than product development. New CATS membership is restricted to those approved by current members; yearly dues are $100,000 per member.

It is important to note that only the FCC can approve enforceable standards in the areas under its control. Industry groups such as the ATSC can only create voluntary standards and propose formal action to the FCC. There is at least one important difference between the current situation and the one that gave us monochrome and color TV. During the NTSC days, the only way for consumers to enjoy video was through FCC-approved over-the-air transmission. Today, over-the-air broadcast transmission is only one of the many ways to enjoy video. Other methods are less controlled by the FCC. An example of a delivery means that doesn't fall under any FCC control videotape and videodisc. A recent experience brings this into clear focus: The FCC had no input or control over the introduction of Super VHS. The same would be true of the introduction of a potential HDTV tape or disc system.

NCTA Engineering Committee

The goal of the NCTA committee is to define those aspects of cable transmission and practice that are relevant to HDTV and communicate them to other appropriate committees and system proponents. Inventing a new HDTV system is beyond the scope of the group's efforts. The committee is supported in its work by another subcommittee concentrating on signal quality over cable, headed by Dan Pike of Prime Cable. The NCTA committees are probably the most important for cable technologists since they are the source of input to other committees.

Currently, the NCTA committee is quantifying parameters for typical cable systems and creating a model using computer-aided design. This model will be used to study the impact of various HDTV proposals on cable practice and to inform proponents of cable system parameters. About half of the parameters identified as relevant to HDTV transmission on cable have not been adequately measured in the past; phase noise is presently being studied in great detail. These groups can use help in carrying out their important work through contributions of manpower, equipment and expertise.

ATSC committees

The ATSC was founded in 1982 by the Joint Council on Inter-Society Coordination, whose members include the NCTA, the SMPTE, the National Association of Broadcasters (NAB), the Electronic Industries Association and the Institute of Electrical and Electronic Engineers. New ATSC membership is restricted to applicants approved by the current membership and yearly dues are about $12,000. ATSC voting rules are strict, with voting eligibility restricted to those who attended at least two of the last three meetings. The hope is to ensure informed balloting.

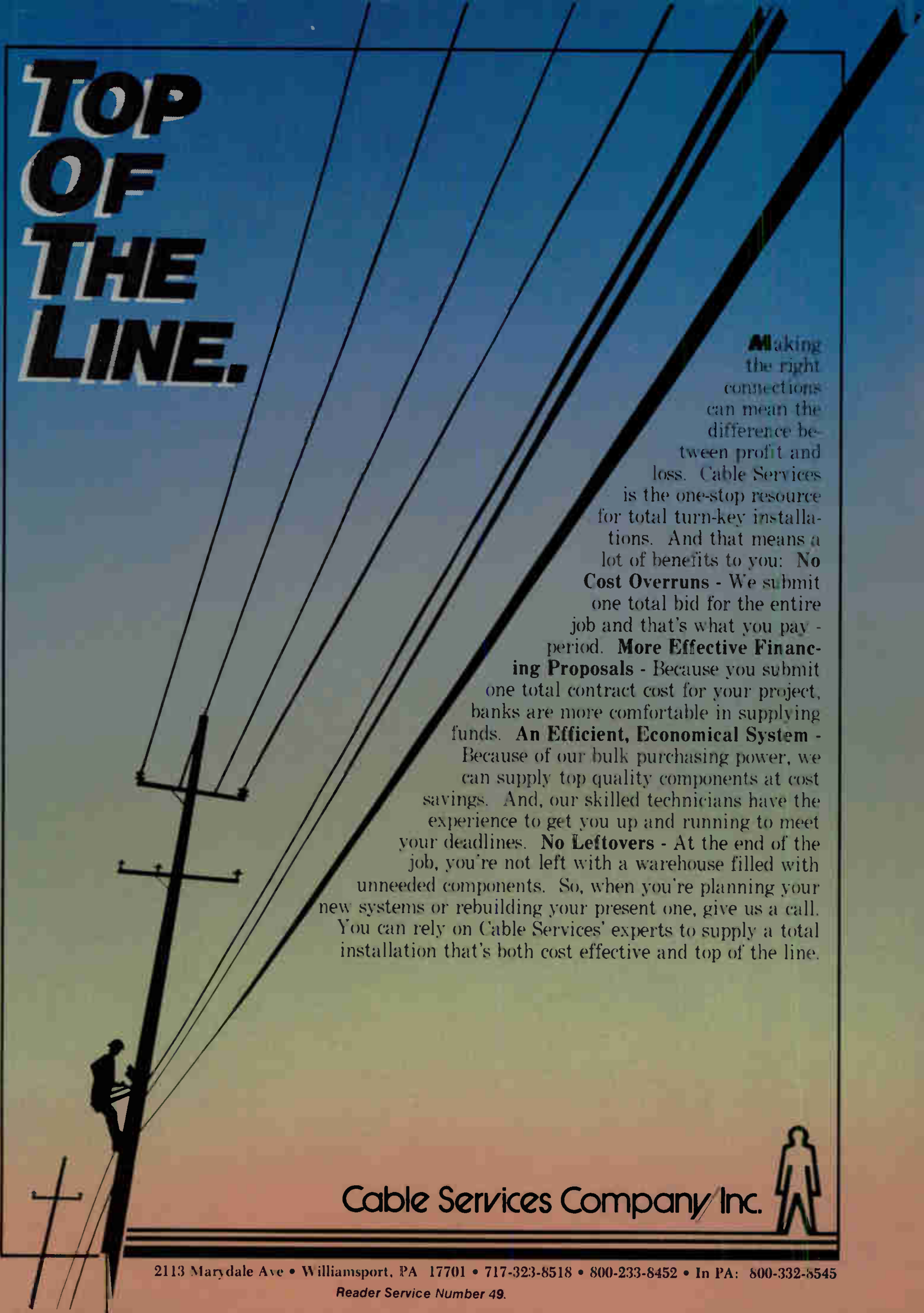
ATSC follows the tradition of the NTSC (National Television Systems Committee), which defined the current monochrome TV standard and its modification to include color information. The founders of ATSC hope that the tradition of cooperative industry effort pioneered by the NCTA can be carried forward one more step in the HDTV work.

Membership in ATSC's executive committee is rotated among the members. This committee sets policy, goals and objectives and handles the administrative affairs of ATSC. There are three main technical committees: T1 (Improved NTSC), T2 (Enhanced NTSC), and T3 (HDTV). Committee meetings are held approximately every six weeks. Improved NTSC involves those changes that can be made at the receiver and allows no incompatible changes in the transmitted signal. Enhanced NTSC is not restricted to compatibility with existing NTSC, incorporating any changes to the transmitted signal that give better performance using 525 scan lines. The reason for this restriction is that adapter boxes can be added to feed baseband inputs on modern TV receivers. These existing receivers would display a superior picture when fed through their baseband terminals. DBS (direct broadcast satellite) interests provided some of the drive behind Enhanced NTSC. HDTV has had no restrictions placed on it and both compatible and incompatible systems have been proposed.

Each of the technical committees has specialist subgroups. The group of most interest to cable is T3S4, the specialist group on transmission testing headed by Ben Crutchfield of the NAB. This group is considering cable transmission in its work and is strongly supported by the NCTA Engineering HDTV Subcommittee.

Next month I'll expand on the FCC committees and report on their progress. But for now, important action items for the cable technologist include supporting the NCTA so it can in turn support T3S4 and the other committees that need cable input.

"Cable needs to participate actively in many of these committees to ensure its interests are protected and promoted."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