—SPECIAL 100TH ISSUE—

Pull-out F-Fitting chart

COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers

1992 Service in Technology Award recipients — ATC's...

Signal leakage — past and present

System powering considerations

National Show news and product wrap

June 1992

The New FP Series Power System from Alpha

For heavy loads, you need a Workhorse.

Alpha's industry standard-setting AP Series.

For lighter loads, you still need a Workhorse.

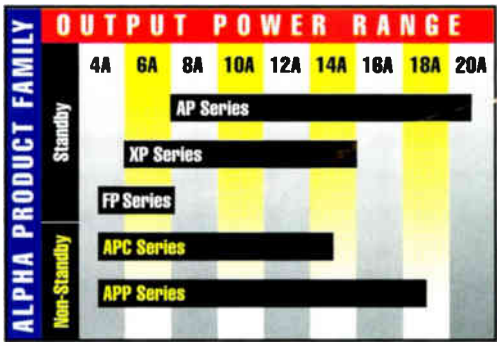
The New Alpha FP Series for AC/DC power in the 4 to 7 Amp range.

Alpha's AP standby power system has earned a reputation as the workhorse of cable power, especially for traditional coax systems. But cable distribution is evolving; fiber networks and hybrid designs have different power requirements. That's why you need the FP Series standby power from Alpha Technologies.

The FP provides uninterrupted AC or DC power with all the important advantages of the workhorse AP Series—reliable single ferro transformer design, regulated output and built-in line conditioning. The AC version provides high efficiency performance in the 4 to 7 Amp range, while the DC Power module allows direct powering at the 7th Port—another innovation introduced by Alpha.

- **AC version for wide area and local area powering in 4-7 Amp range.**
- **DC version for dedicated fiber-node powering.**
- **"Quick-connects" for batteries, power output and battery remote temperature sensor.**
- **Front Panel LEDs for System Status.**
- **Proven reliable single ferroresonant design.**
- **Pole or ground mount.**
- **Modular design and compact size ideal for upgrades and retrofits.**

More cable operators around the world rely on Alpha than any other power supplier for one simple reason: **Alpha Works.** With the new FP Series, you can have Alpha reliability working for you no matter what cable system you design.



Alpha's family of products provides a full range of reliable power systems ranging in output from 4 Amps to 20 Amps.

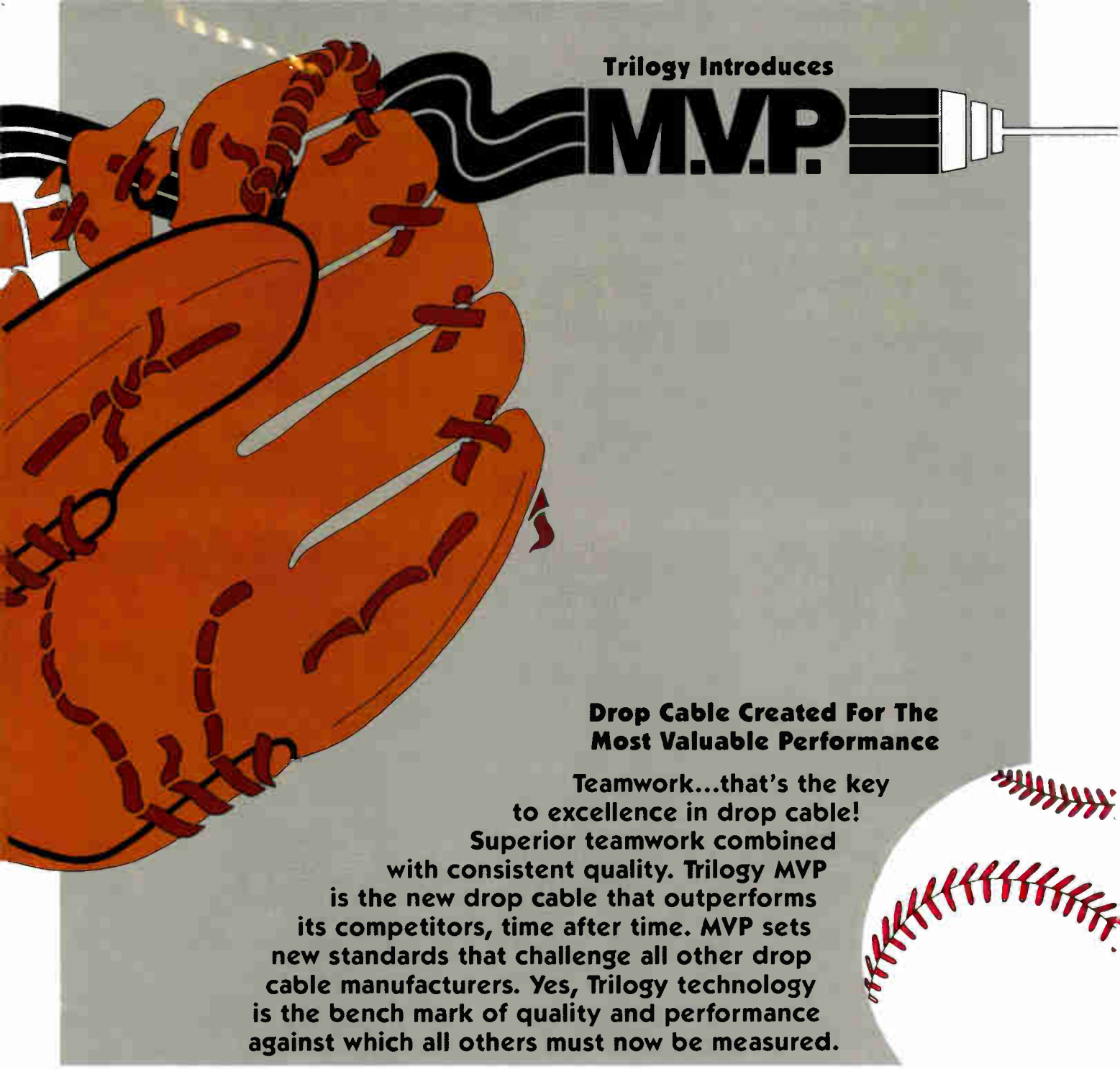
Reader Service Number 2

Alpha Technologies—
3767 Alpha Way, Bellingham, WA 98226 Tel: (206) 647-2360 FAX: (206) 671-4936
5700 Sidley Street, Burnaby, B.C. V5J 5E5 Tel: (604) 430-1476 FAX: (604) 430-8908
Sales and service offices also in the U.K., Germany and the Middle East.

ALPHA TECHNOLOGIES

We're Here to Back You Up™

See us at the Cable-Tec Expo June 15 & 16 Booth 302/304



Trilogy Introduces

M.V.P.

Drop Cable Created For The Most Valuable Performance

Teamwork...that's the key to excellence in drop cable! Superior teamwork combined with consistent quality. Trilogy MVP is the new drop cable that outperforms its competitors, time after time. MVP sets new standards that challenge all other drop cable manufacturers. Yes, Trilogy technology is the bench mark of quality and performance against which all others must now be measured.

Nothing eludes Trilogy quality-assured technology – from its expert selection of raw materials to its rapid delivery of the finished product.

For the Most Valuable Performance, It's MVP.
The drop cable that only Trilogy teamwork could create!

Trilogy
COMMUNICATIONS INC.

Call or write for free sample and brochure:
Trilogy Communications, Inc., 2910 Highway 80 East, Pearl, Mississippi 39208.
800/874-5649 601/932-4461

Reader Service Number 3

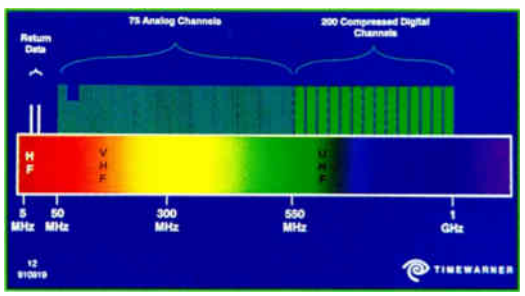
CONTENTS JUNE 1992

Departments

Geri Saye

Back to Basics 99

Correspondent's Report 92



CATV's evolution 42

Features

ONI OPTICAL NETWORKS INTERNATIONAL

Optical Network News

The following highlights are from Optical Networks International's quarterly newsletter.

■ YAGLink outperforms initial tests

The use of externally modulated transmitters has taken a step forward with the first system activation of a Harmonic Lightwaves' YAGLink by Suburban Cable in East Orange, New Jersey. Boasting field performance of 54dB C/N and 70dB CSO/CTB over 12dB optical loss, the YAGLink has proved in as a significant tool for driving fiber deeper into the cable plant.
(See related story in the Summer issue of ONN.)

■ AT&T debuts NTSC compression system

AT&T's new end-to-end NTSC digital compression technology enables system operators to expand channel capacity by 3-13 times. Introduced at the NCTA show in May, the technology is based on the algorithm AT&T developed for HDTV, and has far-reaching implications for the cable industry.
(See related story in the Summer issue of ONN.)

■ Multimedia coming of age

Multimedia technology offers graphics, data, stationary and moving video, and audio, all on a single computer. What exactly is this technology and what does it mean for cable television? As digital compression advances bring more capacity to cable networks, applications for multimedia could lead to exciting new possibilities for cable.
(See related story in the Summer issue of ONN.)

■ ADSL technology—new hope for twisted pair?

The cable television infrastructure is viewed by many as the key to cable's advantage in providing future services. However, a new technology, asymmetrical digital subscriber line, could allow the telcos to provide video on twisted pair copper wire, and enable them to carry video entertainment services. What does this mean for the cable industry? Will ADSL really equip telcos to compete on their existing networks?
(See related story in the Summer issue of ONN.)

To receive your free subscription to ***Optical Network News*** please complete and mail this coupon to: ONI, 8101 East Prentice Avenue, Englewood, CO 80111, or FAX it to ONI at: 303-694-0127.

Name _____

Title _____

Company _____

Address _____

City _____ State ____ Zip _____

Phone ( ) _____

AT&T Technology Integrator

ONI OPTICAL NETWORKS™ INTERNATIONAL

1•800•FIBER•ME

Our Service in Technology Award recipients

Congratulations go to American Television & Communications for implementing the most advanced 1 GHz cable system to date. The Queens, N.Y., system architecture boasts the most advanced fiber-optic and coaxial equipment in use today. Because of their foresight and high-quality standards, *Communications Technology* magazine is proud to present its 1992 Service in Technology Award to ATC.

The principal people spearheading the rebuild/upgrade as recipients of the award are: Jim Chiddix, senior vice president, engineering and technology, ATC; Dave Pangrac, director of engineering and technology, ATC; Jim Ludington, project director of advanced cable systems, Time Warner; Jay Vaughn, senior project engineer, ATC; and Roosevelt Mikhail, senior vice president, engineering and technical operations, Time Warner's Brooklyn Queens Division (BQ Cable).

Chiddix has been a CATV veteran for 21 years, the first 15 of which were spent in Honolulu, Hawaii. In recognition of his leading role in exploring the use of optical fiber technology for ATC, he was named "Man of the Year" by *CED* in January 1989. He is currently leading the upgrade of Time Warner's Queens, N.Y., system.

Pangrac has been in the cable arena for 25 years. He joined ATC in 1982 as vice president and chief engineer for American Television of Kansas City and in 1987 joined the ATC corporate staff as director of engineering and technology. Pangrac was made vice president of engineering in 1992.

Ludington joined ATC in 1982 as a project administrator in the construction division. As ATC developed concepts for the use of fiber-optics techniques, Ludington implemented the new architectures to complete some of ATC's first fiber backbone and fiber-to-feeder projects.

Vaughn has been in cable for 15 years. He spent four years with Rogers' U.S. cable operations as regional engineer for its California and Texas systems and was chief engineer for the San Antonio system. He joined ATC as project engineer in 1988. Currently his activities center around the development of system architectures and upgrade strategies.

Mikhail has 20 years of extensive and diverse management experience in the technical and operational aspects of the cable industry. He joined Warner Cable in 1974 as regional engineer where he directed technical operations for 40 systems. He quickly rose through the ranks until he was named assistant vice president for new system development. He joined the management team at BQ Cable in 1985.

No man (or cable company) is an island, and ATC had the assistance of the following suppliers and their contributions:

1) Nexus Engineering — headend modulators.

2) Pioneer Communications — set-top converters.

3) Jerrold Communications — laser transmitters and optical receivers. The AM laser component used in these systems was developed by Jerrold and Ortel.

4) C-COR Electronics — amplifiers employing its new 1 GHz technology.

5) Augat Communications — in-home distribution amplifiers.

6) Regal Technologies — indoor splitters and couplers.

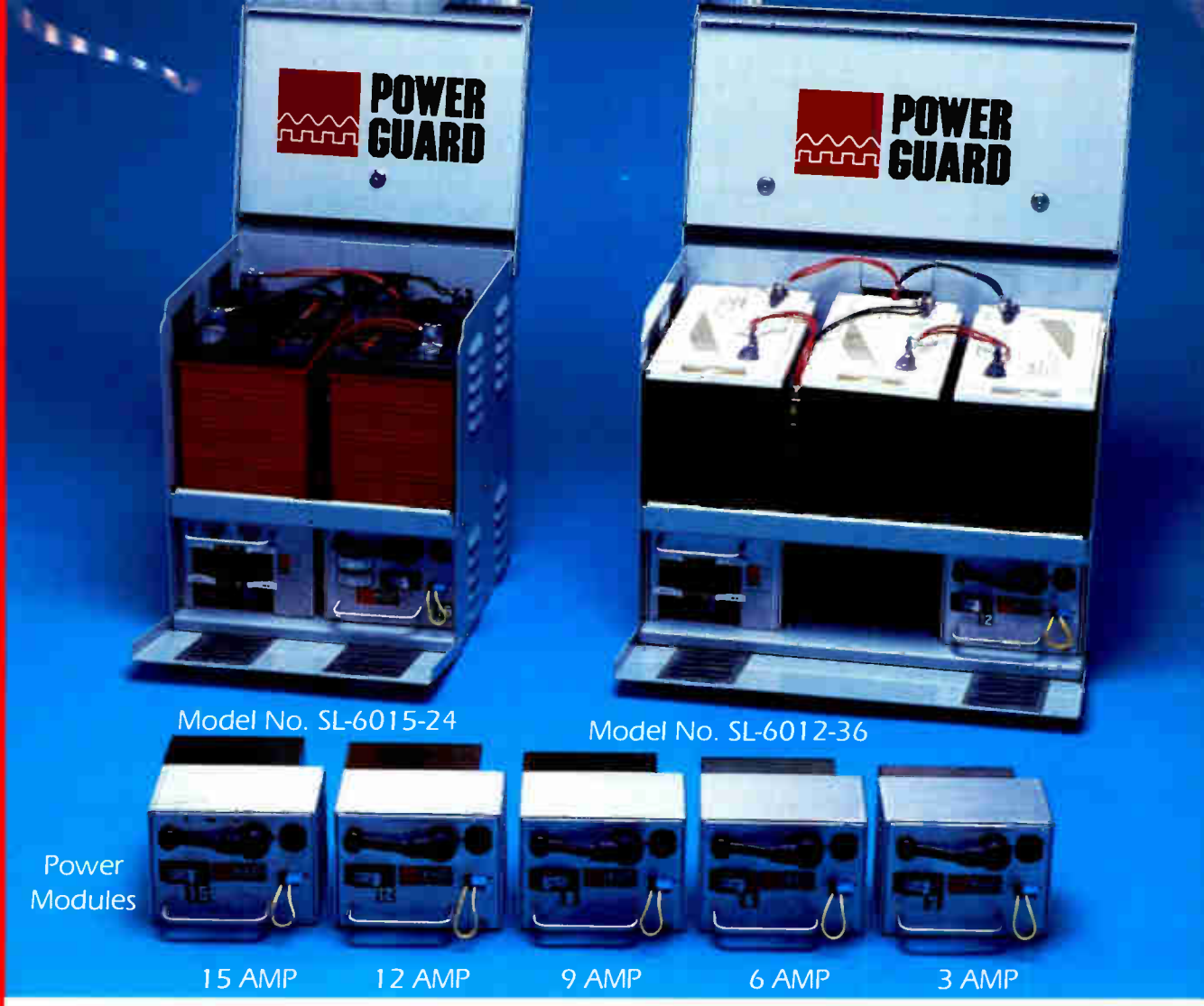
Our 100th issue

With a little (read a lot of) help from our friends, I am excited to announce that this is the 100th issue of *CT*. Back in early 1984, we launched a new technical publication for cable TV. Some friends said we were headed for trouble — there already was one technical book for CATV. And, how could we get enough good material for more than one year?

Looking back, our formula for success was simple: We started with a staff of four (with years of cable experience), good friends who provided more than enough excellent material and the endorsement of the Society of Cable Television Engineers. By the way, we're also proud to announce that we just renewed our contract with the SCTE — *Communications Technology* is still the official journal of the Society.

Paul R. Levine
President/Group Publisher

Power by Design



Standby Power Supplies Engineered for Today's Cable TV Networks

Small Simple Standbys™ from Power Guard will save you money, short and long term.

Since SSS™ is available in 3-6-9-12 or 15 amp ratings and in two or three battery configurations, you can maximize efficiency and reduce your power bills and battery costs by choosing the right model for each power supply location. If your power requirements change - simply upgrade the power module. Small Simple Standbys™ will grow with you.

And because our studies have shown that most power supply locations actually use less than 9 amps of power - we strongly recommend that you consider our 24 volt units for those locations. You get an immediate 33% savings in battery costs and still have up to four hours of standby run time.

Small Simple Standby™ - The right product at the right time for the right price. No wonder we continue to be the fastest growing power supply company in Cable TV.

1-800-288-1507

POWER GUARD

Reader Service Number 7

FAX 205-742-0058

Available Nationwide from Anixter Cable TV

A pretty good show

For the past several years, the NCTA's annual National Show has for the most part been dominated by the software side of the business. In 1991, however, technology without a doubt stole the show.

At the '91 gathering, Skypix demonstrated its DBS compression system using actual programming received from a satellite dish outside the convention center. This is a consumer-quality compression scheme that was really quite impressive. Other manufacturers working on broadcast-quality compression — which is aimed more at the satellite transportation market rather than direct-to-home — were anticipating availability around the end of the year, or perhaps during the first or second quarter of the following year. The field of potential HDTV candidates was being narrowed to a few "finalists" for ultimate evaluation as a national standard, and AM fiber was truly seen as something more than just another technical buzzword.

So how was this year's show? Pretty good, but I don't think technology made the splash that it did at 1991's confab. AM fiber is really no longer making headlines, having been truly accepted by the cable industry. A handful of HDTV technologies have been undergoing testing at the Advanced Television Testing Center, so there was nothing new on this front (although a several companies had some great HDTV demos). As for broadcast-quality compression to be used by the satellite transportation market, well, availability is anticipated to be around the end of the year or perhaps during the first or second quarter of the following year (déjà vu!). And as one engineer at this year's show confided in me, "PCN is still smoke and mirrors." (For more on the National Show, see "News" on page 16 and "CT's Daily wrap" on page 145.)

One item really did catch my attention, though. It was a vehicle-based leakage detection and mapping system introduced by Cable Leakage Technologies. What's interesting about CLT's new Wavetracker package is that it ties together Wavetek's CLM-

1000, a computerized map of a system's service area, appropriate software and interface, and global positioning system satellite technology for accurate vehicle location. As well, it has the ability to compensate for the vehicle's distance from the cable, providing enhanced measurement accuracy. The result, after a system ride-out, is a map that shows which streets the vehicle covered as well as leak locations and approximate levels.

Early indications are that it seems to work well. Shortly after the National Show, a test was done on a small (65 miles of plant) Post-Newsweek system in Bonham, Texas. System techs rode-out the entire plant and made manual leakage measurements using their own equipment, while CLT personnel simultaneously rode-out the plant using the Wavetracker. Both groups identified the same six >50 µV/m leaks (which have been fixed), and measured levels from both were within a few microvolts per meter of each other (remember that the Wavetracker measurements were made from a moving vehicle). The Wavetracker also found a couple leaks the system's techs missed, and was very accurate at pinpointing all of the leak locations. See page 32 for an article by CLT's Ken Eckenroth — and stay tuned for more on this!

Ronald J. Hranac
Senior Technical Editor

Light up your fiber with the best broadcast quality video possible.

With more broadcasters and CATV operators realizing the benefits and switching to fiber optic networks, the demand for "signal purity" and higher signal quality transmission has increased.

DX sheds a new light on high performance for today's cable operators with the new DIR-657 integrated receiver/descrambler. With a long list of features, including RS-250B broadcast quality performance and optional RS-232C interface for remote operation, the new DIR-657 outshines all other satellite receivers in delivering the sharpest video and soundest audio signals possible.

For more information write to DX Communications Inc., 10 Skyline Drive, Hawthorne, NY, 10532 or call (914) 347-4040.

DX ANTENNA

See us at the SCTE Cable-Tec Expo, Booth 540. Reader Service Number 9

COMMUNICATIONS TECHNOLOGY
A CT Publications Product

Vice President-Editorial, Toni I. Barnett
Executive Editor, Wayne H. Lasley
Associate Editors, Shelley L. Bolin
Laura K. Hamilton
Editorial Assistant, Eric Butterfield
Senior Technical Editor, Ronald J. Hranac
East Coast Correspondent, Lawrence W. Lockwood

President/Group Publisher, Paul R. Levine
Vice President-Sales, Charles M. Casteliani
Account Executives, Barbara Bellomo
Patricia Linster
Bill Parker
Linda Sommer
Classified Sales Manager, Mike Elmer
Advertising Coordinator, Marla Sullivan
Sales Support Manager, Paula Turner

Art Director, Brad Hamilton
Circulation Manager, Mary Sharkey
Production/Traffic Manager, Mary Felker

Controller, Kenneth W. Edwards Jr.
Assistant to Controller, Sharon Hamilton
Administrative Assistant, Maureen McDonald

Managing Director, Harry C. Gerhart

CT Publications Corp.
A subsidiary of Transmedia Partners-I, L.P.
50 S. Steele St., Suite 500, Denver, Colo. 80209
(303) 355-2101 FAX (303) 355-2144

Soar into the future with Digital Compression.

Philips Compressed Digital Video takes your system to new heights with cutting edge technology.

Just as Philips revolutionized digital audio with the invention of the CD, a revolution is beginning to take flight in the world of digital video. Philips Broadband Networks has tapped into the vast resources of its sister companies to bring you the most superior compressed digital standard definition system available. This technology multiplies your channel capacity giving you even greater potential to offer more diverse programming, new tiers of services, and increased pay-per-view capability including "near-video-on-demand"...and that means more opportunity for you to profit.

Philips Compressed Digital Video is designed to accommodate present and future technologies.

Working with other giants within the consumer electronics industry, Philips is designing an open system architecture based on proposed standards for the delivery of compressed digital standard definition television signals over satellite links and cable television systems. This consumer electronics approach will benefit the industry by providing multiple vendor sources for sub-systems, and in turn, enable early market acceptance. Additionally, it will be compatible with both HDTV and 16 X 9 displays, and will allow for the integration of digital signals directly into consumer receivers. The long-term result of this exceptionally user-friendly system, with no set-tops to be stolen or abused, will be a decrease in your capital expenditures. Plus, our conditional access control allows for use of "smart card" technology. Not only will you be assured of the highest security available for your services, you'll also maximize revenues while minimizing the investment into your subscribers' homes.

To find out more about how Philips Compressed Digital Video can help you rise to meet the challenges for the 21st century, contact your Philips Broadband Networks representative.

For more information contact:

Philips Broadband Networks, Inc.
(formerly Magnavox CATV Systems)
100 Fairgrounds Drive, Manlius, NY 13104
Ph: (315) 682-9105, Fax: (315) 682-9006
(800) 448-5171 (in NYS (800) 522-7464)

Philips Broadband Networks, Inc.

PHILIPS

PHILIPS

Reader Service Number 12

The inventor in us

As an avid reader of *CT* and other trade magazines, I have a suggestion that could be beneficial for the whole industry.

As you probably know, there's an inventor in every one of us. We constantly have ideas that, if workable, could lead to improved operations, products, developments or new business opportunities.

The problem most of us have, is being in a position to do something with the idea. For example, if a person comes up with a concept for a new device, they have to have enough electronics background to design entire circuits, have enough money for production and enough business savvy for sales and marketing. A daunting task for any would-be entrepreneur.

My suggestion is to create a forum for new ideas in *CT*. They would then have the attention of the circuit developers, the businessmen and the end users. One other important fact is that the originator of the idea would get the credit, if not financial reward, for the concept.

To get the section going, I would like to offer you a few ideas of my own. What if:

1) CableLabs pursues the installation of ghost canceling devices in new TV sets. Right now our feelings seem to be that if ghost cancellers are installed at the cable headend, then subscribers won't need them in their TV sets. But what about the DPU problem that plagues systems in areas close to broadcast stations? If ghost cancellers were installed on the TV sets, they could cancel the signal that's arriving at the set through the air, before the one arriving through the cable system. That off-air signal is a major problem in many areas, which better tuner shielding alone might not cure!

2) The first phase of compression, which is aimed at the satellite portion of the link, could easily be adapted to wideband FM microwave for links that are already in existence. This could:

- Save hard to get spectrum allocations.
- Eliminate the need for additional earth stations at multiple sites, which could be served by adding a program to existing channels.
- Digitize the signal and improve already good characteristics of long cascaded FM systems.
- Enable the addition of more remote stations without adding expensive microwave transmitters and receivers to each hop.

3) Use the concept of cells in PCN systems for dispatch and routing. There are many supervisors in cable plants, and I'm sure other industries, that would very much like to be able to poll their fleet, and find out which area their trucks are in. It is very easy for less than honest employees to say they are doing a

Technology For Real World Applications

First Place Innovative Technology

Critical applications in diverse physical, chemical, and environmental conditions are the real world of communications systems. Fiber optic cables from Optical Cable Corporation outperform all competitors in broad based applications. Optical Cable Corporation — We take communications systems to the extreme around the world.

COMMERCIAL GRADE TIGHT BUFFERED LAN FIBER OPTIC CABLES

	Operating Temperature Range	Core-Locked™ Jacket	Indoor Use	Indoor/ Outdoor Use	Fungus Resistant	Sunlight Resistant	Breakout Riser Cables Maximum Fibers	Distribution Riser Cables Maximum Fibers	Breakout Plenum Cables Maximum Fibers	Distribution Plenum Cables Maximum Fibers	Custom Manufactured Product Delivery
AT&T	-20°C to +70°C		▼				0	36	0	12	10–12 weeks
SIECOR	-20°C to +70°C		▼	▼	▼		50	144	36	24	3–4 weeks
OPTICAL CABLE CORPORATION	-40°C to +85°C	▼	▼	▼	▼	▼	108	144	102	48	2–3 weeks
COMPANY X	-20°C to +80°C		▼				?	?	?	?	?
COMPANY Y	-20°C to +65°C		▼				?	?	?	?	?
COMPANY Z	-10°C to +50°C		▼				?	?	?	?	?

OPTICAL CABLE CORPORATION

P.O. Box 11967 • Roanoke, VA 24022-1967
PHONE (703)265-0690 • TELEX 705-290 • FAX (703)265-0724

job, when in fact they are elsewhere. Cell identification codes could easily be transmitted upstream from each cell. Not only would this accomplish location ID, but could be used in place of radio dispatching by handling information through the PCN rather than through the two-way radio services.

These are just a few of my own ideas. I'm sure there are many, even better than these, out where we least expect them. Why don't you give them a place to be expressed?

Maximo V. Morales
Area Engineer
TCI Cablevision of Florida

Editor's note: Has SCTE got a deal for you! The Society has a program called the Field Operations Award that was originally suggested to its board of directors by Telecrafter Products' Peter Mangone back in 1989. The intent of this award is to recognize individuals who have developed or improved a tool, procedure or idea to enhance the work performed primarily by installers, technicians and linemen — in other words, the folks in the field. Entries are submitted to SCTE and the winner is determined by a consensus of the Field Operations Award Subcommittee. The winner then receives free airfare, hotel and registration to that years' Cable-Tec Expo, in addition to $1,000. All of the entries are published in "Interval," SCTE's monthly newsletter. (This year's entries will be published in July.) For more information about the Field Operations Award, contact SCTE headquarters at 669 Exton Commons, Exton, Pa. 19341, (215) 363-6888.

Hats off to you

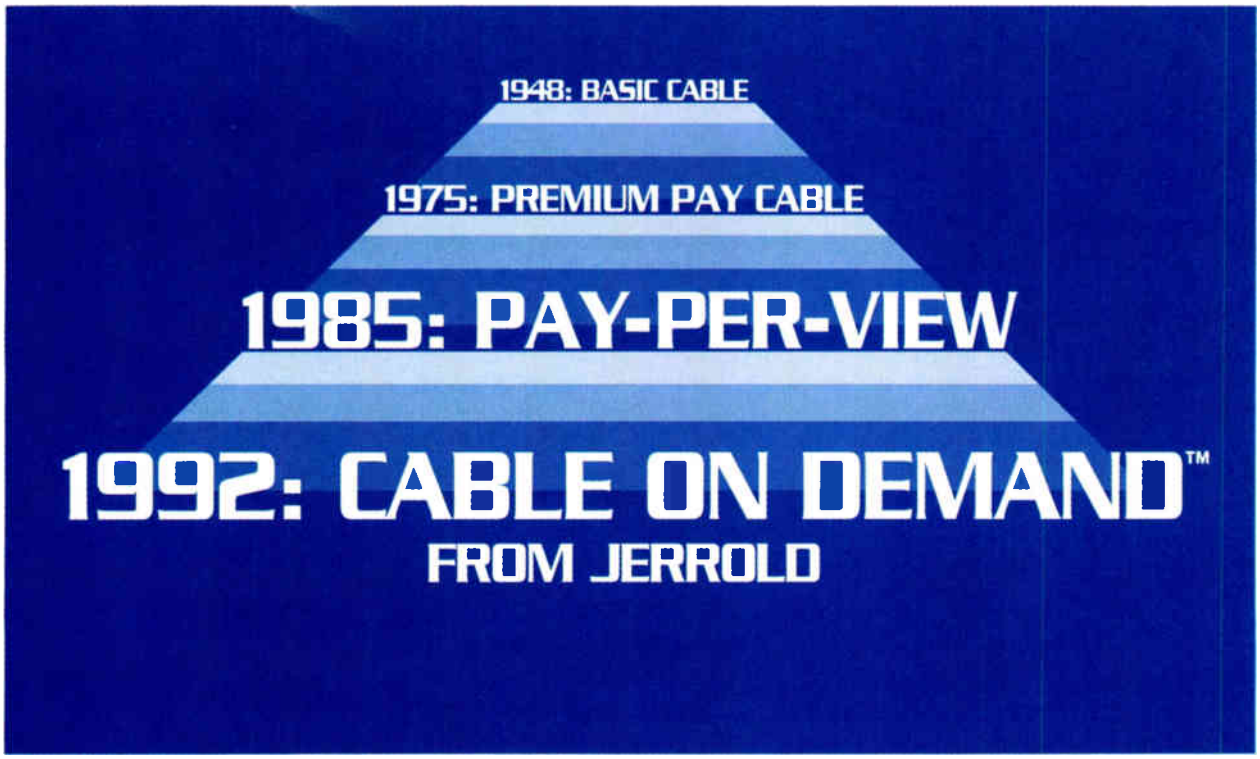
I would like to take this opportunity to publicly thank Antec, Jerrold Communications and Showtime Networks for their outstanding generosity to the men and women veterans in the Livermore Valley (Calif.) Veteran's Administration Hospital, and the 120 residents living in the nursing home facility.

Because executives of these three major corporations truly care for these deserving people who have served our country as far back as World War I, they will now be able to enjoy a wide array of cable entertainment programming, plus, with the technical assistance of Viacom Cable's East Bay system employees, off-air TV can now be received.

Hats off to you, Bill Krempasky, Hal Krisberg and Ray Boyce! Thank you from all the veterans of today and tomorrow.

Michal Dittrich
Manager, Community/Government Affairs
Viacom Cable

Editor's note: Because the hospital is located five miles beyond the East Bay system's reach, cabled delivery of programming wasn't an option. Viacom Cable employees solicited support from cable suppliers and community groups. Jerrold provided more than $30,000 of headend and related equipment, Antec donated a 3.8-meter satellite dish, Showtime contributed its satellite programming package and local groups are trying to raise money to purchase over 136 color TV sets.



What you want, when you want it.

Jerrold Communications, from the beginning a leader in cable TV, offers you an opportunity to take your business right into the future with CABLE ON DEMAND.

CABLE ON DEMAND is the most exciting breakthrough the industry has seen. With this completely new video landscape, Jerrold offers your subscribers convenience to match their personal schedules — movies on demand, interactive CD ROM, video phone.

And CABLE ON DEMAND provides you the chance to earn significantly increased revenues – without changes in your system architecture and without major capital investment beyond most current plans.

This remarkable new system challenges and surpasses the concept of video dial tone. Whether you have a conventional coax cable TV system or a fiber hybrid system, ask your Jerrold representative about the possibility of equipping your operation with a CABLE ON DEMAND demo package. Or contact Jerrold Communications today, at 1 800 523-6678 (in the U.S.), (215) 674-4800 (outside U.S.), or (215) 956-6497 (fax — anywhere).

Cable On Demand

JERROLD COMMUNICATIONS

News wrap: National Show

The following is a wrap-up of technical news announcements that ran in the "CT Daily" at the 1992 National Show in Dallas. A product wrap-up from the show starts on page 145.

☛ Oak Communications received a multimillion dollar initial order for its Sigma cable headend system and 5,000 of the new Oak 2001 decoders with impulse pay-per-view and full on-screen display. Western Coaxial of Hamilton, Ontario, will take initial deliveries in October 1992.

☛ Scientific-Atlanta announced the Continental Cable system in Rolling Meadows, Ill., received the first several hundred of its Zenith Z-TAC-compatible Model 8600s. In related news, the company said that any system using the 8600 will be provided promotional messages and a program guide for the Olympics Triplecast to help facilitate increased buy rates.

☛ Philips Broadband announced it will supply about 1,400 miles of 550 MHz distribution products for the rebuild of Continental's system in Henrico County, Va.

☛ Optical Networks International's Tests Measurements & Restoration (TM&R) group said it is offering a new five-day course to prepare CATV personnel for future business considerations in understanding digital technology. ONI also announced that the first Harmonic Lightwaves externally modulated YAGLink HLT transmitter has been delivered to Storer's Hollywood, Fla., system. In marketing news, ONI's Digital Services Group made an agreement with Newbridge Networks to market its line of 3624 MainStreet Intelligent T1 channel banks. Finally, ONI announced the installation and activation of Harmonic Lightwaves' YAGLink transmitter at Suburban CableVision's East Orange, N.J., system.

☛ In Regal Technologies Ltd. sales news, several ATC systems have committed to use the company's second-generation 1 GHz upgradable taps and Viacom Cable selected the non-power passing taps for its 1 GHz rebuild of the Castro Valley, Calif., system. The system will build a portion of the plant at 1 GHz bandwidth with the remainder to be upgraded to 1 GHz later. The first shipment of non-power passing taps was delivered to Castro Valley in April. Regal also will provide the taps and line passives for Century Cable Communication's Laurinburg, N.C., system, which will install 600 MHz taps initially (allowing for the easy migration to 1 GHz). As well, Regal is supplying 1 GHz taps to Cox Cable's Roanoke, Va., system and Metrovision's Killeen, Texas, system.

☛ Contec announced the opening of

MEMBERSHIP APPLICATION

Make check payable to SCTE.
Mail To:

SCTE®
669 Exton Commons
Exton, PA 19341

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

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

SCTE is a 501 (c) (6) non-profit professional membership organization. Your dues may be tax deductible. Consult your local IRS office or your tax advisor.

APPLYING FOR: ☐ INDIVIDUAL @ $40 SUSTAINING @ $250

Please print or type information. Data will be used exactly as it is submitted here.

☐ MR. ☐ MRS. ☐ MS. TITLE:_____

NAME:_____ TEL. #:_____
First Initial Last Area Code-Number

EMPLOYER:_____ FAX #:_____
Company Name Area Code-Number

CO. ADDRESS:_____
Street/PO City State Zip

USE HOME ADDRESS?_____
Street/PO City State Zip

YOUR SIGNATURE:_____ DATE:_____

Complete the information. Enclose full payment or charge to MasterCard/VISA shown below.

NAME ON CARD:_____ EXP.:_____

MASTERCARD NO.:_____

VISA NO.:_____

SIGNATURE FOR CHARGE AUTHORITY:_____

Applications without payment will be returned. Applications from outside U.S., enclose additional $20 (U.S.) to cover mailing expenses.

☐ I am also an SCTE Installer Member. My Member Number is #_____.

*** SPONSORING CHAPTER OR MEETING GROUP:_____ ***

CT 6/92

Name _____

Company _____

Address _____

City _____ State _____ ZIP _____

Phone _____

PLACE
STAMP
HERE

MHz
MEGA HERTZ
6940 South Holly, Suite 200
Englewood, CO 80112

Place
Stamp
Here

SCTE®
SCTE
669 Exton Commons
Exton, PA 19341

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 1218 DENVER,CO

POSTAGE WILL BE PAID BY ADDRESSEE

COMMUNICATIONS TECHNOLOGY
Transmedia Partners
50 S. Steele, Suite 500
Denver, CO 80209-9941

Automated A/V Playback and Coffee-Making

By John Gerstenberg
Applications Engineer
And Wesley Brown
Customer Service Engineer

More Than Just Ad Insertion

Best known for its random access ad insertion capabilities, the Adcart Channel Control Unit may be overlooked when it comes to some of its other useful applications, like automated program playback on LO channels, or Pay-Per-View/Barker channels.

In fact, any television application that requires local or remote control of A/V sources for automatic playback on selected channels, can definitely use an Adcart.

Program Playback

Playback of programming from an A/V source, e.g. VCRs, laserdisc players, or digital file servers, is the same as inserting commercials...the programs are just longer. An Adcart Channel Control Unit (CCU) provides all the necessary audio and video switching and VCR control required to play back programs from up to four VCRs, plus four auxiliary inputs, into one or two satellite networks. All of the switching is performed automatically, according to a schedule that is preprogrammed using a terminal or PC.

A typical Local Origination channel might use an Adcart CCU as illustrated in Figure 1. Four VCRs can provide up to eight hours of continuous playback, using two-hour Super-VHS tapes. The CCU's four auxiliary inputs can support a variety of peripheral A/V sources, like a character generator with music, a satellite feed, and even a live studio feed.

Switching among these many sources can be activated by a real-time schedule or event, by encoded tones, or manually. Adcart's scheduling flexibility allows you to mix day-parts or repeat schedules, black out programs or delay events, just by keying in simple commands.

Adcart's schedule processor holds 16 schedules per channel, containing up to 2400 events total. And each event can comprise up to eight actions, for example, AVS: AUX 1 (switch to AUX 1), VCR 1: PLAY, VCR 1: STOP. Which means you can schedule two week's worth of complex instructions, and let Adcart do the rest.

Pay-Per-View

Adcart's two-channel support can be a lifesaver in a PPV operation, when the show absolutely must go on. As illustrated in Figure 2, the CCU's second channel can serve as a redundant "fail safe" program source. The same movie is scheduled to play on both sets of VCRs. If Adcart's automatic video quality sampling feature detects any VCR problems or any degradation of video quality, it automatically switches to the back-up source machines, unnoticed by the viewer.

What's more, the CCU's auxiliary inputs are perfect for delivering barker information. A character generator can display pay instructions and movie schedules, while alternating with a VCR running movie trailers.

Even Makes Coffee!

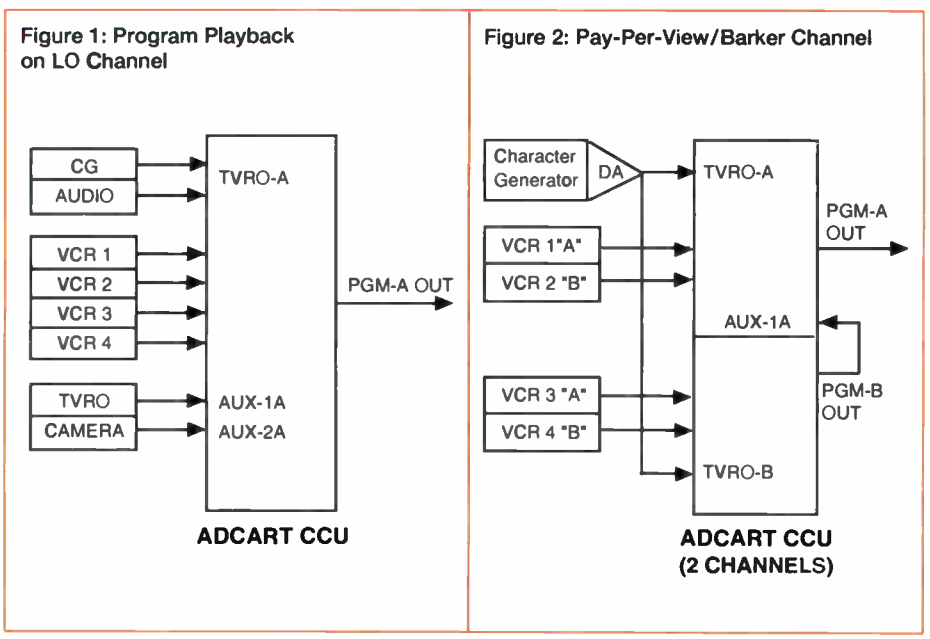
We learned from one customer that the CCU's ability to control external devices is not limited to A/V source machines. He plugged in a coffee maker and scheduled his Adcart to brew a fresh pot just before he arrived each morning!

Automation Solutions

Channelmatic designs, manufactures and installs complete automation systems that improve operating efficiency and on-air signal quality. With a complete line of over 200 modular units and A/V accessories, we can enhance your system with virtually any feature you could want or need.

If you have an automation application that could be simplified by using an Adcart, give us a call. We'll be happy to design a custom solution to your problem...free of charge!

See our new digital Adcart at Cable-Tec Expo Booth 417



its Super Service Center in Bloomington, Ind. The center is designed to deliver technical service for all brands of cable TV converters.

☛ The National Cable Television Association announced the winners of the 1992 Vanguard and President's Awards. Among the winners were Nick Hamilton-Piercy of Rogers Cablesystems for the science and technology category. The NCTA also made available the *1992 NCTA Technical Papers*. The price is $40 for members and $50 for non-members (includes shipping). The papers can be ordered from the NCTA Science and Technology Department. Only pre-paid orders are accepted.

☛ CableData teamed up with AT&T to offer enhanced digital communications through AT&T's fiber-optic digital communications network and new line of communications equipment. In addition, Tele-Communications Inc. renewed its contract with CableData to provide MIS and subscriber management services over the next five years.

☛ Gemstar Development Corp. introduced Direct Response and Direct Sale marketing programs. They were developed to offer operators a choice of selling VCR Plus + to earn sales commissions or to use the device in a variety of promotional activities.

☛ Tektronix' Television Division signed TVC Horizon of San Clemente, Calif., as its latest representative to the cable marketplace. TVC Horizon will market Tektronix' current and future CATV and fiber-optic product lines in Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.

☛ Channelmatic said operators interested in selling local advertising on The Weather Channel can purchase ad insertion equipment from Channelmatic at a special discount price.

CATV vendors involved in law suits

MANLIUS , N.Y., and PHOENIX, Ariz. — Production Products Co., a division of John Mezzalingua Associates, filed patent infringement suits in New York against LRC Electronics (a unit of Augat) and Pyramid Connectors Inc. The suits charge that certain F-connectors made by LRC and Pyramid infringe on a patent issued to PPC for its "universal" F-connector. LRC responded by releasing an announcement that stated it did not believe its F-connectors infringe any valid claims of patent and added it "believes that the assertion of this patent by Mezzalingua is in retaliation for previous litigation against Mezzalingua that was successfully pursued by Augat."

In other litigation news, Jensen Tools filed a suit in Massachusetts against Contact East, its president and two of its managers. It alleges that Contact East paid a former Jensen Tools employee to reveal confidential, trade secret information about Jensen Tools' business and its products.

SCTE requests EBS information

EXTON, PA. — The Society of Cable Television Engineers Emergency Broadcast System Subcommittee formed two groups to research EBS hardware available to CATV operators and current EBS activity at all levels. →

See us at the SCTE Cable-Tec Expo, Booth 153.

HEAD-END SUPERVISOR

A further step towards fully automated unmanned head-end operation

- Programmable carrier measurements
- Checking presence of modulation
- Automatic alarm generation
- 200 presets
- Remote use via modem or PC
- Compatible with all equipment brands
- Multistandard
- Frequency range 47 - 860 MHz
- Supervision of external parameters (temp., power, fire alarm, etc.)
- 19" rackmountable
- Basic remote software included
- Also for RF transmitter control

Reader Service Number 21

BARCO

For further information, please contact:
Barco n.v., Belgium Tel +32 56 233 291 Fax +32 56 233 334 - Barco Inc., USA Tel +(404) 590 7900 Fax (404) 590 8836

The Society requested any manufacturers that make EBS equipment for cable and/or broadcast applications to forward a brief outline of the benefits and method of activation to: Ron Upchurch, United Artists Cable, 6850 S. Tucson Way, Englewood, Colo. 80112, phone, (303) 790-0386; or Steve Dozier, Hughes Aircraft Co., 7775 W. Ontario Place, Littleton, Colo. 80123, phone (303) 973-3869.

Individual cable systems, local EBS groups, regional EBS groups, federal EBS groups, cities, states, etc., that participate in EBS are requested to forward a brief outline of activities or EBS plans to: Mike Smith, Adelphia Cable, 11 Middlebrook Ave., Staunton, Va. 24401, phone (703) 886-3419; or Bill Richards, Falcone International, 120 E. Sunset Ave., Pensacola, Fla. 32507, phone (904) 456-5018.

Cox completes second PCS test phase

SAN DIEGO — At its cable TV system here, Cox Enterprises completed its second phase of personal communications services tests that reportedly illustrate that CATV systems can efficiently provide the vital microcell linking function necessary to speed PCS portable telephone service to the public.

Using wireless telephone equipment, the tests included centralized modulation, cell-to-cell handoff and various tests of propagation and reliability.

TV Answer completes hub site

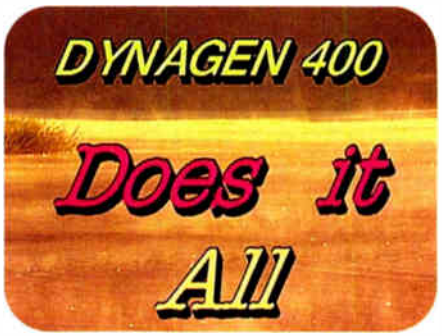
RESTON, Va. — A $2.1 million satellite network hub site was completed here at the headquarters of TV Answer, the wireless two-way TV service. It houses technology needed to collect, process and transmit infor-mation between product/service providers and local cell sites. As well, the company signed a contract with Sequoia Systems in which the Sequoia Series 400 fault-tolerant system will be the main computer system at the center of the first national interactive (two-way) U.S. TV system. The contract is valued at $2.4 million and component add-ons could equal as much as $8.5 million over the five-year contract, according to the company.

In other news, TV Answer was granted an exclusive patent by the U.S. Patent and Trademark Office that allows the company to tie together its nationwide network of cell sites. In related news, TV Answer's vice president/general counsel issued a cease and desist letter to IN in response to certain statements made to the media by IN's president. The letter said that the statements made to the media misrepresent the scope of some of IN's patents and that IN is incorrectly charging that TV Answer's proposed system would infringe on IN's patents.

Finally, Wunderman/Cato Johnson, the largest direct marketing and sales promotion company in the United States, will be the first major U.S. agency to offer TV Answer's interactive TV to its clients.

News notes

- Photon Kinetics merged with IFR Systems. IFR will own 100 percent of the common stock of privately held Photon Kinetics.
- Jensen Tools was acquired by Stanley Works. Jensen's interests were transferred from Axia Inc.
- Klein Tools released information in relation to Buckingham Manufacturing's recall of certain pole straps with non-locking straps. (In few reported in-



Finally, a character generator that gives you practically everything for practically nothing.

Unlike some character generators, the new PC-based DynaGen 400 Series won't cost you a bundle. It will, however, provide a significant increase in automated text and graphics features for entry level advertising and promotional activities or bulletin boards at a fraction of the cost of traditional units.

The DynaGen 400 Series Character and Graphics Generator is composed of circuit board sets which fit into a standard IBM® PC/AT compatible computer to produce up to four independent channels of text, graphics, and machine control. Two channels provide external video input for genlock titling and machine control, and two channels are standalone character generators. You can also use one channel as an edit channel.

With DynaGen, it's even possible to link an AT chassis for up to 68 channels in one local system. Better yet, you can link up to 250 channels through a telephone dial-up network, with a maximum of 16 channels per dialed location.

And just to keep things lively, DynaGen offers 10 standard disk loadable fonts with up to five different typefaces. That way your finished document will have all the right points emphasized and all the important titles prominently and attractively displayed. In addition, with six screen divisions, you'll be able to integrate multiple message formats for headers, crawls, rolls, page wipes, time and calendar, graphics, and logos.

What's more, DynaGen is so easy to use that anyone can learn to create professional looking ads and promos. If your artistic ability is limited to stick figures, you can always import clip art or scan existing images from virtually any source by connecting your computer to a hand-held scanning device.

If you're a cable operator, you just won't find another character generator that offers such dynamic text and graphics for such a low price. Which is precisely why you should consider DynaGen. In fact, you'd be crazy not to.

DYNATECH
CABLE PRODUCTS GROUP

VISION VALUE

DYNATECH
VIDEO GROUP

DYNATECH Cable Products Group
4750 Wiley Post Way, Suite 145
Salt Lake City, Utah 84116
(801) 359-3205
FAX (801) 359-3554

DYNATECH Video Group
Asia Pacific
19/F Kailey Tower
16 Stanley Street
Central
Hong Kong
852-868-1993
FAX 852-525-8297

DYNATECH Broadcast Group
Graphics Division
Turfstekerstraat 22
P.O. Box 289
1430 AG Aalsmeer
The Netherlands
011-31-2977-23473
FAX 011-31-2977-41158

IBM is a registered trademark of International Business Machines Corporation

See us at the SCTE Cable-Tec Expo, Booth 547. Reader Service Number 23

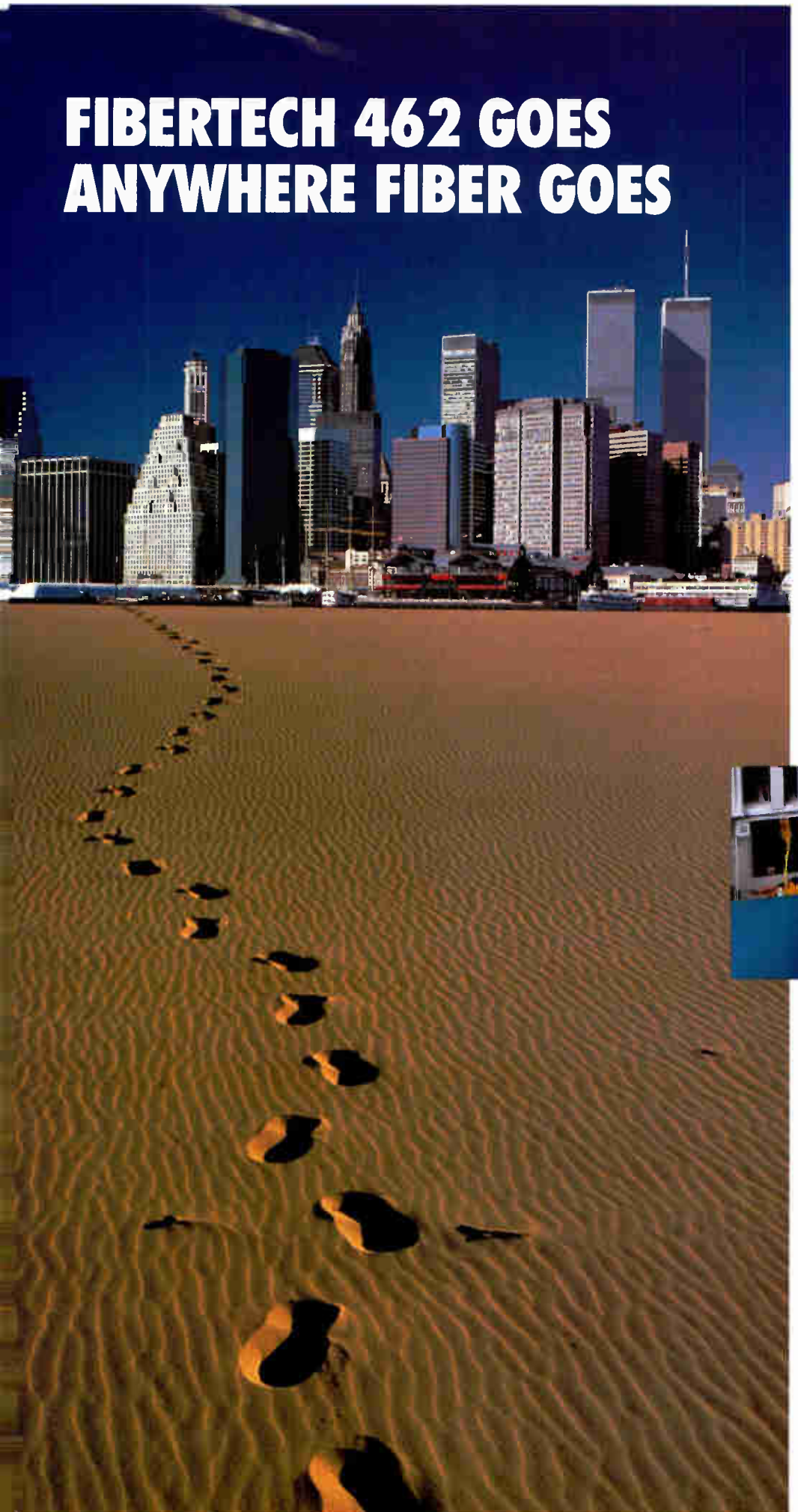
cidents, Buckingham's snap hooks rolled-out from D-rings if the strap was twisted, which is improper use.) The recall stated that in certain incidences, Buckingham's pole straps were used in conjunction with Klein's lineman belts containing S-shaped D-rings. Klein asserted that the problem lies with Buckingham's hooks and not any Klein belt.

- Mediatech plans to install the industry's first operational digital compression satellite delivery and insertion system for TV advertising, Scientific-Atlanta's Vector Quantization system. As well, S-A announced its 550 MHz single distributed feedback laser was chosen by Continental Cablevision for delivering targeted programming and advertising to four of its New England systems.
- Nexus Display Systems moved to 8644 Commerce Court, Burnaby, B.C. V54 4N6, Canada. The phone is (604) 421-1424.
- US West and Cable and Wireless PLC agreed to merge their separate activities in the development of personal communication networks in the United Kingdom. The US West-led venture Unitel and Mercury Personal Communications, a wholly owned subsidiary of Cable & Wireless, will merge into a co-managed operation licensed to build and operate the system.

Keeping track

- The Society of Cable Engineers' Of-Counsel Stephen Ross joined Ross & Hardies as a partner resident in the Washington, D.C., office of the Chicago-based law firm.
- Power Guard appointed of Marty deAlminana to the post of international sales engineer. He previously was with Lectro.
- Comm/Scope promoted three sales executives. Gene Swithenbank and Stan Lindsay were promoted to senior vice presidents/national account executives and Mark Manning was named vice president, sales and marketing.
- Koki Matsumoto was promoted to president and Ken Mosca was promoted to vice president at DX Communications.
- Noyes Fiber Systems promoted Richard Tyler to national sales manager from eastern regional sales manager.
- Trilogy Communications announced the following appointments: Tony Zara to the new post of international sales representative; William Lutz and Jeffrey Mason as application engineers; and Albin Roland and Roger Lique in product process development.
- Scott Zajdel was named director of sales for US Electronics.
- Donald Keck, director of optoelectronics research for Corning's Technology Group, was named inventor of the year for 1992 by the Central New York Patent Law Association.
- Contec appointed Jim Orwick vice president of national accounts. As well, the company promoted Patricia Kehler to national account manager and appointed Wendy Springer sales manager of the CATV products division.
- Stephen Jaworski joined the NCTI as a training representative and Nina Bondarook-Belofsky assumed the new position of marketing support specialist.
- R. Don Cowan, active in the CATV industry since 1960, died in February. He was vice chairman of the board of TCA Cable at the time of his death.

FIBERTECH 462 GOES ANYWHERE FIBER GOES



RUGGED, LIGHTWEIGHT, AND PORTABLE

As your CATV cable plant converts to fiber optics, you've got to venture into the urban maze and the suburban frontier to perform fiber acceptance testing. Take the rugged and portable FIBERTECH 462 SMARTS (Singlemode Attenuation/Reflection Test Set) with you for easy and accurate loss and return loss measurements, wherever you have to go.

COMPLETE LOSS AND RETURN LOSS TESTING IN ONE TEST SET

Optical cable systems and components in CATV networks can be tested accurately from top to bottom with these features:

- Two laser stable optical sources for dual wavelength measurements.
- Easy-to-read backlit LCD.
- Stored reference for direct loss measurements.
- First connector nulling to isolate components for return loss measurement.
- Rugged, weathertight case and rechargeable lead acid battery.

YOU CAN DEPEND ON FIBERTECH

Expect Excellence from TTC's FIBERTECH 462 SMARTS. Reliability, ease of use, and our 3 year warranty go with you anywhere. To find out more, write Telecommunications Techniques Corporation, 20410 Observation Drive, Germantown, MD 20876, or call **800-638-2049** or 301-353-1550 (MD).

Telecommunications Techniques Corporation®
A DYNATECH COMPANY

. . . EXPECT EXCELLENCE

TTC Sales Companies: In the UK, call (0293) 617700; in France, call (01) 47.11.83.00; in Germany, call (06172) 77055; in Ireland, call (01) 251.355; in Canada, call (416) 507-4117.

Reader Service Number 25

Cable-Tec Expo '92 floor sold out

All exhibit space has been reserved for the 1992 Cable-Tec Expo, to be held June 14-17 at the San Antonio Convention Center in San Antonio, Texas.

Sponsored by the Society of Cable Television Engineers, *Cable-Tec* expo is a fully technical conference and trade show offering a wide variety of educational programs, hands-on training sessions and workshops.

Almost 200 exhibiting companies have rented space on the exhibit floor. The exhibit hall has been carefully coordinated to provide industry suppliers with the opportunity to present live technical demonstrations of their products in a relaxed atmosphere. An added feature on the floor will be the Technical Training Center offering additional equipment demonstrations.

This marks the sixth year in a row that the exhibit hall has sold out. Cable-Tec Expo '91 showed a significant increase in attendance over the previous year, attracting 1,850 registered attendees and 1,600 exhibitor personnel to Reno, Nev. SCTE is expecting attendance at Expo '92 to equal and possibly surpass last year's record-breaking figures.

Besides numerous training opportunities, this year's expo will offer a variety of activities and special events planned to make it the most memorable one yet. Noteworthy happenings will include the Society's first golf tournament, as well as the second national Cable-Tec Games, in which contestants will compete in a series of events designed to test their cable TV technical skill and aptitude.

Also planned is the third annual Classic Cable Equipment Competition. Co-sponsored by the National Cable Television Center and Museum and SCTE, expo attendees can participate in this contest by bringing with them what they consider to be a classic piece of cable TV equipment. These pieces will be judged on the basis of historical value and uniqueness by a panel of experts. Winners will receive cash prizes, and the equipment will be considered for possible acceptance into the NCTCM collection.

For further information on Cable-Tec Expo '92, please contact SCTE at (215) 363-6888.

Member directory to be shipped soon

The 1992 edition of the *SCTE Membership Directory and Yearbook* will be shipped to members soon. This latest installment of the Society's annual publication, which covers the entire preceding year and provides a wealth of information on the Society's history as well as its current programs and services, was produced by the SCTE national headquarters staff in cooperation with *CED* magazine. It contains a complete listing of the Society's membership, including phone numbers to facilitate communications between members.

ANNOUNCING

WAVETRACKER™

Digital RF Tracking / Mapping System

At last, an affordable solution to plant monitoring that will take you into the next century. The Wavetracker utilizes state of the art GPS technology and incorporates Wavetek's CLM 1000 for precise RF measurements. Hand held, hot key technology allows for fast, easy remote control of the CLM 1000's variable distance abilities. This ensures accurate meaningful monitoring.

See us at the SCTE Cable-Tec Expo, Booth 116.

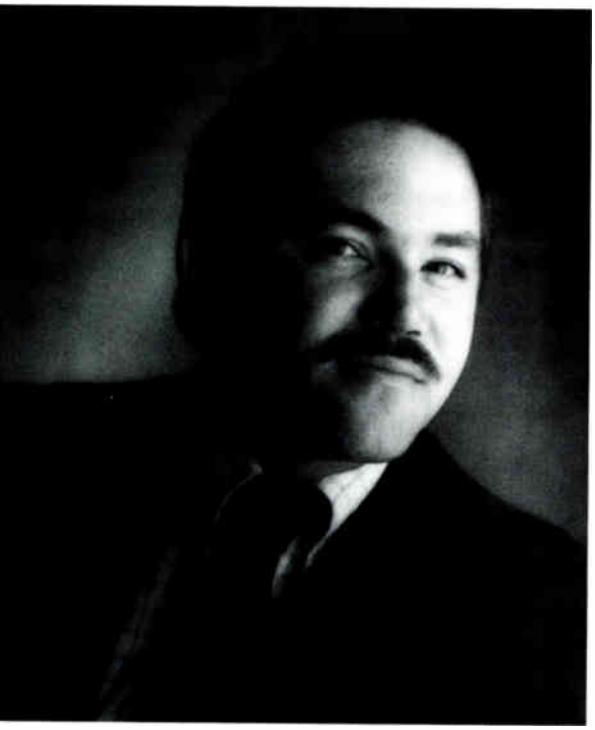
CLT CABLE LEAKAGE TECHNOLOGIES

1209 Executive Drive East, Richardson, Texas 75081
214-907-8100 • 1-800-783-8878 • Fax 214-669-8659

Wavetek is a registered trademark of Wavetek Corporation

Reader Service Number 27

"OUR GOAL...TO M STAND-ALC SYSTEM USI TECHNOLC



Jerry Neal
Senior Software Engineer
Pioneer Communications of America
Cable Systems Division

When Pioneer developed the Pioneer LaserDisc Universal System (PLUS), our goal was to simplify operations and increase revenue for the cable operator. We know that system automation and increased customer programming selection are both good economic moves.

So, we created PLUS to provide pre-programmed, uninterrupted entertainment. PLUS can control multiple pay-per-view channels of laserdisc players or autochangers. Laser technology translates into a durable maintenance-free, high quality video and audio program source. PLUS is backed by the reliability of Pioneer technology.

Because your business demands performance...

PIONEER COMMUNICATIONS OF AMERICA, INC. ***CABLE SYSTEMS DIVISION***
600 East Crescent Ave. • Upper Saddle River, NJ 07458 • (201) 327-6400 • Outside New Jersey (800) 421-6450

AKE A VERSATILE NE PAY-PER-VIEW NG LASERDISC GY."

NOW WITH VTR CONTROL

LD-V8000 LaserDisc Player—single sided disc player for blockbuster movies and reliable 24-hour operation.

LC-V330 Autochanger—72 disc capacity for a diverse selection of movies or as an on-line backup for single LD players.

PLUS Controller—IBM AT/Compatible for flexible movie definition and scheduling, allowing control of multiple pay-per-view channels using laserdisc-based technology.

Visit us at booth #523 at the SCTE show.

Reader Service Number 28

PIONEER®

Signal leakage: How far have we come since July 1, 1990?

By Robert V.C. Dickinson
President, Dovetail Surveys Inc.

It hardly seems possible that it has been almost two years since we all had to prove we were operating under the Federal Communications Commission's leakage compliance rules. It isn't hard to remember the first time around when no one was really sure of anything. "How bad is my system, really?" "Will it take a lot of work and expense to bring it up to standards?" "How does this monitoring stuff work?" "Should I use I_{∞} or $I_{3,000}$?" "How about a flyover instead of a ride-out?" "How do I fill out my FCC forms?" "Will I be inspected by the FCC?" There were so many unknowns to be confronted with no pat answers and no one who had done it before. It was a new experience for us all.

Is it really old hat?

Well, like everything else, we plowed ahead and hacked out a trail through the jungle and now it is routine — all old stuff. But is it really? Have you mastered the situation and achieved the desired end point of the whole program? By the way, what is the end point of the whole program? In case you have forgotten, it is to reduce the leakage from cable TV systems so that it will not interfere with any over-the-air radio service. Not just aircraft communications and navigation, or amateur, or fire and ambulance, or taxicab, etc., but any radio communications on the outside of the cable system.

Even though the whole thing started in connection with the aircraft services and is still driven by the Federal Aviation Administration and other aviation interests, the FCC regulations prohibit interference with any licensed service under the rules. Even beyond that it is our basic responsibility to keep our act cleaned up so as not to bother anyone else. This makes sense on the basis of the "Golden Rule" and is generally accepted. So, we all do it that way, but how successful have we been? Are we settled in on our methods and procedures?

There are a number of areas we should examine to evaluate our progress in leakage management. These include our techniques, our results and our commitment. Let's take the last one first. If there is a low level of commitment to the basics, the job will be done poorly and the goals only partially achieved. This will lead to leaky systems, increased expense and probable FCC action.

My travels in the industry have shown traces of this syndrome. Some folks are getting sloppy in their performance. This is sometimes a matter of priority. They let other tasks reduce or preclude leakage control activities. Please recall that a tight system is "worth its weight in gold" (i.e., customer satisfaction and things that go with it like more revenue). Some operators have developed incentive programs to generate more enthusiasm in the performance of the job. Lack of commitment also can show up in a reluctance to properly support leakage control with the required manpower and equipment. These factors are degenerative. As the system integrity gets lower, it becomes harder to locate and repair leaks due to their increased numbers and the general deterioration of the system hardware. Neglected things have a habit of being much worse than expected.

Then we come to techniques. As my father used to say, "There are many ways to skin a cat." Serious cable operators have all developed their own leakage control programs that work (well we hope). Perhaps this is the time to review and re-evaluate yours.

Monitoring is the heart and soul of the process. The basics of what the FCC is really after is an ongoing monitoring program covering the entire cable system to locate leaks as soon as they appear so that they may be rapidly repaired. The obvious extension of this is to quickly repair the leaks that are found and thereby maintain a clean, leak-free system. Evaluate your program in this light. Have the things that you have done to integrate monitoring and leak reporting into your other maintenance programs in any way compromised this end? Have you used the latitude given by the brevity of the rules in a way that tends to dilute the effectiveness of the exercise? Surely the costs of doing leakage monitoring are important and you have every right to be minimize them but care should be taken not to miss the worthy aim of the whole program while cutting costs.

Advances in the art

There have been numerous technical developments that have added to the efficiency of the monitoring process. These include better measuring and automatic recording equipment. Units made by CaLan and ICS automatically record leaks and their locations from a moving vehicle.[1,2] Their data outputs include location information on maps of the area. The CaLan Alan even indicates the side of the street and the approximate distance off of the right-of-way and generates repair work orders. This equipment is designed to be used by unskilled personnel and allow for automatic monitoring in conjunction with other travel-related tasks like necessary transportation or going for the mail and coffee. As well, this type of equipment often is capable of discriminating between multiple leaks that are not separable by traditional means. These units can be a great boon to the monitoring process and, although modestly expensive, they are less costly in the long run when labor costs and lost time are calculated.

Obviously, our results are of utmost importance to meeting the program goals. The FCC is sorely aware of this fact but finds itself unable to police our performance in a comprehensive manner. Therefore, they ask us to do it formally, once per year through the annual qualification requirement.

As is well known, there are three acceptable ways to measure the cable system leakage to prepare the annual report. These are I_{∞}, $I_{3,000}$ and flyovers.[3,4] For ground-based qualification I_{∞} is commonly used and is usually sufficient although it does not usually give as favorable results as $I_{3,000}$. It is somewhat disturbing to see $I_{3,000}$ used just because its better results are required

to pass. True, this may be required in large systems because of the distance insensitivity of I_{∞}, however, the amount of leakage allowed by either calculation of cumulative leakage index (CLI) is substantial and it could be expected that by this time cable systems should be cleaned up and pass with ease using the tighter criterion. If it is necessary to strain to pass the CLI test, perhaps it is time to get that rebuild going or to replace your leakage control staff.

Flyover advantages

Flyovers are now used by many systems including several of the large MSOs. They have proven to be very comprehensive in that they measure what is really going on up there. The results from flyover testing often reveal higher leakage energy in the denser (usually the "downtown") parts of the system. This is surely due in part to the high density (i.e., the greater number of possible places to leak). It also may be due to the difficulty of monitoring and locating leaks in the complex parts of the system where cable goes through alleys, hangs high on buildings and runs inside and up to the higher floors. Locating these leaks is quite a challenge. Nevertheless, these leaks release energy that is capable of interference to outside users of the same spectrum. Consequently, one important advantage of a flyover is in locating hot spots that you were not able to observe on the ground. This can be important when you refocus on the intent of the leakage rules. The flyover has greater credence with the FCC since it is a direct measurement of the energy that could interfere with aircraft flying through the same area.

Other advantages of flyovers include the non-partisan nature of this service when provided by an outside vendor and the possible cost savings by virtue of the immediate nature of the process. Even though the costs of aviation services are high, the flyover substitutes for many hours of manpower and vehicle time that can be extremely expensive and divert cable system personnel from other duties. Whether to use a flyover is a decision to be made by each system operator based on his local conditions and the appropriate answer varies from system to system.

In the performance of a flyover, great care must be exercised to assure the validity of the data for submission to the FCC. Calibration routines must be carried out methodically and the entire procedure, including verification of the setup and instrumentation, must be checked frequently. The whole value of the test hinges upon the validity of the calibration and the transfer of this information into the analysis of the data.

"If it is necessary to strain to pass the CLI test, perhaps it is time to get that rebuild going or to replace your leakage control staff."

In addition, tracking of the actual flight path is important, but not so much in terms of the precision of position indicated as in the coverage of the actual passes. If the flight path is approximated by straight lines, actual deviations caused by wind, navigation errors, etc., will be obscured and there will be the possibility of areas that are not properly surveyed due to unexpected course variations.

Lastly, care should be taken in interpreting the results in the sense that actual leaks are not always exactly beneath the energy peaks located (since the energy sensed in the air is the summation of as many leaks as are in the area each diminished by a distance factor). There also may be small errors in the location indicated by the LORAN, GPS or other navigation system. These errors are not significant in the overall survey of the cumulative leakage although they too can cause misinterpretation of the analyzed data relative to the exact location of leaks.

12.5 kHz spacing

There is another important observation of the "big picture" that bears repeating. Within the next several years the FAA is expecting to subdivide the VHF communication channels (118-137 MHz) so that the channel spacing will be 12.5 kHz rather than the existing 25 kHz. This will place offset CATV carriers directly on the new frequencies thereby compromising the protection that the present offset system provides. When this occurs, the FCC's desired position is to say that the cable TV industry has leakage under control so that offsets are no longer necessary. Should our performance not warrant such a declaration by the FCC, it will not be able to stand behind us and we will be back to square one where we may be forced to vacate frequencies because of FAA pressures. This, obviously, would be a disaster and would undo all of the industry effort over these several years. To be one of the operators that caused such a situation would not be an enviable position. Please do your part to maintain cable's image relative to cable signal leakage control.

There are some that look to fiber optics to end the leakage problem while improving overall cable system performance. The use of fiber optics is becoming common in major CATV upgrades and will eliminate signal leakage as we know it. Bear in mind, however, that at present the majority of fiber is used to replace trunks (not distribution). The trunk system is generally the smaller part of the cable system and runs at lower signal levels. It also is better maintained so that its replacement by fiber will have only a small effect on the overall leakage. The remaining distribution still needs the tender loving care required to assure its leakage integrity. Only when fiber-to-the-home becomes a reality will we be able to relax our signal leakage control efforts.

So, enough of the pep talk. Let's review some of the progress. We have seen, with great delight, a great deal of serious effort within the industry to curb signal leakage. We have seen good reports on what used to be "bad" systems. There have even been a few flyovers in which we could not find detectable leakage — what a great feeling and what a great job! There has been much progress made over the past few years and the cable industry is the better for it. Congratulations are due to those who have spent the required effort in achieving their local successes. Everyone in the CATV industry is rooting for the systems and we really appreciate your efforts. Keep it up — it is of utmost importance! **CT**

References

[1] Dickinson, R.V.C. "CLI: One if by land two if by air," *Communications Technology*, July 1991, page 16.

[2] Becker, G. "Effective leakage management without red ink," *Communications Technology*, November 1991, page 89.

[3] Dickinson, R.V.C. "Basics of Cumulative Leakage Index," *CED*, Signal Leakage Supplement, June 1989.

[4] Dickinson, R.V.C. "Or You Might Consider a Flyover," *CED*, Signal Leakage Supplement, June 1989.

Leakage instrument calibration and verification

By Terry Bush
Vice President, Instrument Products
Trilithic Inc.

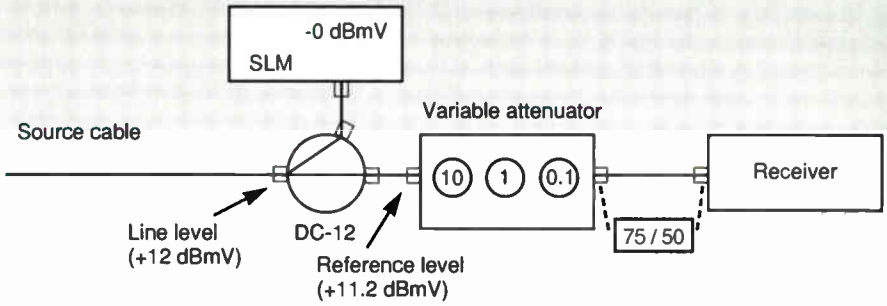
It has been about three years since testing for a passing cumulative leakage index (CLI) figure of merit became one of the everyday series of tests performed on cable systems. Over this period, the equipment used to verify CLI performance has been well exercised. To assure continued accuracy, the test equipment should be periodically inspected to verify that it operates as it should. Most cable systems have some form of verification procedure, often using calibrated fields or in-house test points, but in general, few cable systems have adopted a detailed verification process. In this article, we will review several processes that may be used for confirming leakage measurement accuracy and outline specific techniques and explanations for each.

To better understand the total process, we will break the equipment inspection program into the following three steps:

1) RF port testing
2) Testing in the vehicle
3) Testing at 3 meters

This approach will verify every aspect of the CLI testing endeavor and instill a great deal of confidence in the technicians who are actually performing the measurements.

Figure 1: RF port testing setup



RF port testing

This test is generally reserved to the bench where precision signals are available. The object is to verify the ability of the test instrument to read the correct level when a calibrated level is applied to the RF entry port. If the instrument gives readings of microvolts per meter (µV/m), the level used should simulate the output of a dipole antenna.

To set up this test, first select an area of the building that is relatively RF-quiet. The area may be evaluated by using any of the available leakage equipment to test for the presence of signal. For a test signal it is better to use the actual signals carried on the cable system rather than the output of a signal generator since most commercial leakage gear will read CW (carrier wave) signals differently. Run a low level (+10 to +20 dBmV) cable drop into the test area, using the best possible RF connection practices in this process of removing the possibility of leaks. Verify that the headend transmit frequency to be used for the test is the same as the equipment to be tested, since frequency errors will cause calibration errors and other problems.

To perform the actual test, we will need a set of precision attenuators in steps of 10, 1, 0.1 dB; a freshly calibrated signal level meter (SLM); a directional coupler (DC); and a short RF test lead with the proper connector to match our leakage receiver. If the leakage instrument's input impedance is other than 75 ohm, a matching pad also is required. Remember, a 75-to-50 ohm resistive matching pad will introduce 5.7 dB of added loss into the system and must be adjusted from the measurement. Transformer-based matching pads also are available and offer much less loss, on the order of 0.2 dB or so. In any case, respect the leakage instrument's input impedance to avoid significant errors.

Connect the components as shown in Figure 1. If the receiver to be tested operates at 50 ohms, remember to use the matching pad. Tune the SLM to the appropriate channel or frequency and read the level. It is recommended that the SLM remain on during the test to continuously monitor the level, since even minor drifting will introduce test errors. Once this level has been obtained, we must determine the level at the input of the attenuators. In Figure 1, this is identified as the "reference level" and will be used in the calculations to follow. To calculate the reference level, subtract the through-loss of the directional coupler from the signal level measured at the drop. In the example shown in Figure 1, an SLM reading of 0 dBmV would indicate that the line level is +12 dBmV. The reference level, after subtracting 0.8 dB of DC through-loss, would be +11.2 dBmV.

To calculate the attenuator setting that will produce the desired test signal level, use the following formula:

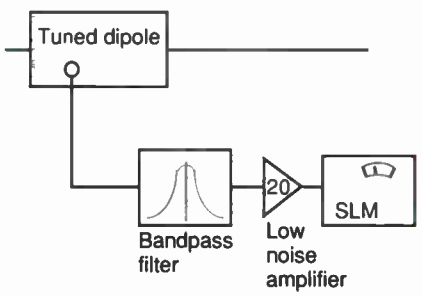
dB = D - 20log[V/(20.68 x F)] for 75 ohm receiver
dB = [D - 20log(V/[20.68 x F])] - M for 50 ohm receiver

Where:
dB = Precision attenuator setting
D = Reference level in dBmV
V = Desired source level in µV/m
F = Source frequency in MHz
M = Matching pad loss

For example, if it was desired to pro-

(Continued on page 52)

Figure 2: SLM testing setup



YOU'RE S·A·F·E...

... Because Winning Performance Counts!

Get "Grand Slam" quality in converter & CATV equipment service. Unparalleled craftsmanship makes CONTEC "The Favorite" of cable operators...nationwide.

Get a "Home Run" in satisfaction.
"Close Calls" always go to our customers.
No "Wild Pitches" and you're never "Put Out."

In exchange for your loyalty, we guarantee "All Star" products and service. Experience has shown.....

Only Winning Performance Counts!

- Schedule "Major & Minor" service work.
- "Steal" our low cost, quality replacement remote control units, and
- Avoid all unnecessary service "Errors."

Call 1-800-382-2723 Today!

CONTEC™
INTERNATIONAL
THE LEADER IN CONVERTER TECHNOLOGY+

NATIONWIDE SERVICE CENTERS:
Bloomington, IN • Fenton, MI • Longview, TX • Schenectady, NY • Seattle WA • Tampa, FL • West Columbia, SC • San Diego, CA (1992)

See us at the SCTE Cable-Tec Expo, Booth 517, 519. *Reader Service Number 29*

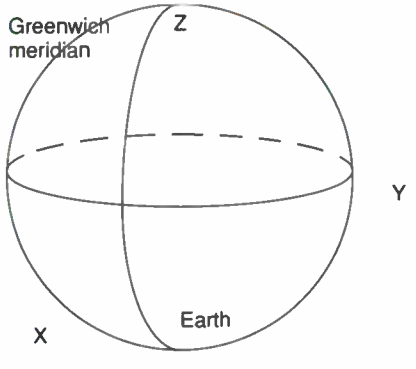
A CLI dialogue on digital RF tracking/mapping

By Ken Eckenroth
Vice President, Engineering
Cable Leakage Technologies

I can't help but remember listening intently to discussions by Bob Dickinson, Ted Hartson and Bob Saunders at a cumulative leakage index (CLI) seminar in Memphis, Tenn., three years ago. This industry is like a magnet. It captures your attention, as does the possibility of a CLI tool employing digital RF tracking/mapping (DRTM).

DRTM is a system developed for quarterly monitoring for signal leakage. According to Federal Communications Commission regulations, cable operators are required to "provide for a program of regular monitoring for signal leakage by substantially covering the plant every three months." Currently, a technician must stop the ride-out to manually record each leak by finding the closest physical address. DRTM significantly speeds up this process by automatically recording the latitude/longitude location so no stopping is necessary. Different methods have been developed for optimum speed and quick pole-line distance changes for meaningful monitoring. Other articles have been written on these procedures, therefore we'll focus on some new topics.

Figure 1



What is DRTM?

There are four basic components to a DRTM system: 1) RF receiver, 2) navigation system, 3) the interface module, and 4) digital mapping program. We'll concentrate on the navigation portion of the system by explaining global positioning system (GPS) fundamentals, history and specifications as well as the near-future potential for CATV applications.

GPS is a $12 billion satellite-based, worldwide navigation system developed by the U.S. Department of Defense. The system utilizes a time-based, spread spectrum signal that produces a Cartesian earth-centered, earth-fixed set of coordinates.

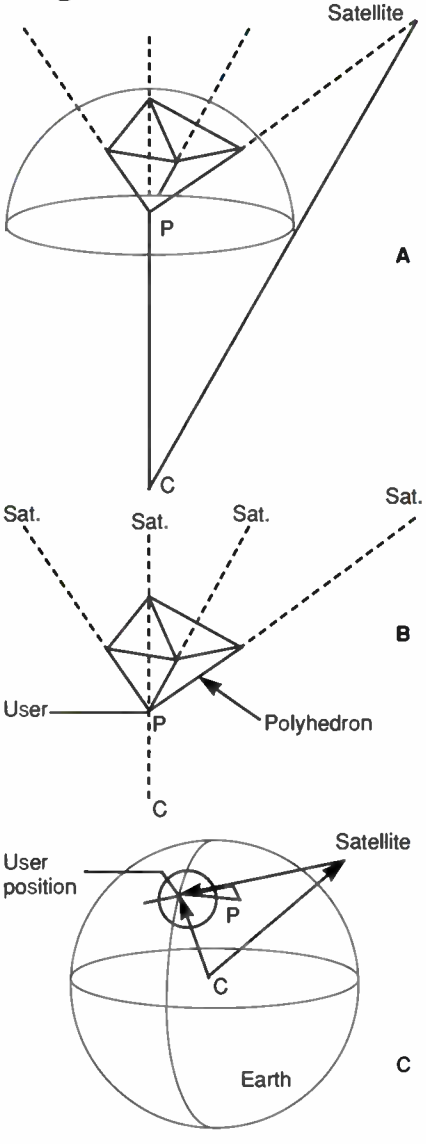
This is the most accurate method of positioning to date. The satellites ephemeris (earth orbits) are monitored by a government control segment twice a day. The satellites orbit the earth every 11 hours and 58 minutes. The control segment consists of four monitor stations strategically positioned around the world, an uplink station and a master control station. Any deviation from a satellite's ephemeris is immediately detected and included in a data system health message from the satellite.

The GPS signal is transmitted in the L-band (RF spectrum from 390 MHz to about 1.5 GHz), which was chosen because the bandwidth allocation was more readily available than other bands. Also, the ionosphere or space losses to an isotropic antenna are less for L-band as opposed to C-band.

The GPS system (Navstar) was preceded by a Navy project known as Timation. This is the application of atomic clocks for satellite navigation. Several earlier versions were consid-

(Continued on page 56)

Figure 2



MEN OF THE GREAT OUTDOORS. . .

MEET THE ALL WEATHER ALL-TERRAIN LASHER THAT DANCES ON A WIRE.

Linemen know about the tough jobs. Working at night. In miserable weather. Everything's an emergency, and there's never enough time. Linemen need the best, most rugged cable lasher they can find. Now they've got it—THE LINEMAN from Cable Spinning Equipment Co.

Fast, easy transfer

- Transfers around poles quickly and easily to continue lashing—that's important when you're paid by the foot.
- Handle-mounted drive system clutch release trigger for easy, one-hand engagement and release of wire

The most versatile lasher ever

- Lashes single and multiple cables up to 3 in. o.d.—single- and double-overlashes, too
- Lasher holds up to 1200 ft. per coil of .045 in. wire without reloading
- Compatible with up to ½ in. strand or any size in between
- Lashes CATV and fiber optic cable with the new non-metallic material

Lashes in any weather

- Doesn't require strand traction to drive the lasher, even in dusty, wet or icy conditions—*a Cable Spinning exclusive*
- Tough, precision drive system needs no adjustment
- Strand brake maintains wire tension—lasher will not move backward if forward motion is halted

The Lineman from Cable Spinning Equipment Co. It'll go the distance for you

Cable Spinning Equipment has been manufacturing rugged, versatile cable lashing equipment for over 40 years. The lashing jobs may change, but not the conditions under which they need to be done. . .and done right. . .the first time. If your crews have to go the distance, do them a favor. Get the lasher that takes on the worst conditions and just keeps dancing on a wire. . .THE LINEMAN from Cable Spinning Equipment Co.

Call 1-800-428-9267.

In Minnesota, call (612) 354-2081. We'll do the rest.

cable spinning equipment company

100 W. Central • P.O. Box 308
New London, Minnesota 56273
FAX 612-354-2083

See us at the SCTE Cable-Tec Expo, Booth 133.

Reader Service Number 30

Grounding, sheath current and reliability: A CATV power distribution analysis

This article will review CATV powering and grounding characteristics as well as the causes and effects of external influences on the system.

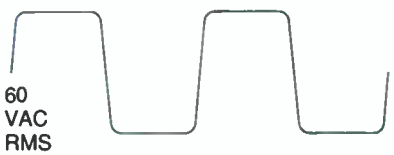
By Tom S. Osterman
Director of Research and Development
Alpha Technologies Inc.

There has been much attention given to the topics of powering, grounding and sheath current characteristics in recent years because of the continued susceptibility of electronic equipment to damage as well as the increased emphasis on outage reduction. These areas are some of the most fundamental in terms of system design, reliability and performance, but are often misunderstood or overlooked.

Powering fundamentals

The cable TV powering system has evolved over the years into the current North American standard of a 60 volt RMS, 60 cycle AC, square wave power transmission network.

Figure 1: Quasi-square wave ferroresonant transformer output



Before I go any further, the term "square wave" needs to be defined. It is not a true square wave with perfectly symmetrical "square" dimensions, but rather a modified waveform that is produced by the unique characteristics of the ferroresonant transformer. It has been called a "quasi-square," "pseudo-square," "trapezoid," "new wave" or "modified-square wave" by different equipment manufacturers over the years. You can pick your favorite name but since the wave shape is closest to a square than to anything else, I will refer to it as a square wave for the purposes of this article. (See Figure 1.)

The square wave has been used for CATV powering for over 30 years starting with the early low voltage (30 volt) equipment and evolving to the present 60 volt standard. The ferroresonant transformer design was selected initially for this application due to its rugged, reliable reputation as a constant-voltage regulator. An AC oil-filled capacitor is the only component required in addition to the transformer to provide the advantages of this design. In the CATV plant environment there is considerable stress applied to any component, particularly power conversion devices. The power provided by the utility grid can exhibit transients and spikes, dropouts, high frequency noise and can conduct very high voltages from lightning strikes (and near strikes) or utility faults. The ferroresonant transformer is very effective at filtering high frequency noise, transients and dropouts so that the output waveform is clean and well regulated. The input voltage from the utility can fluctuate as much as ±20 percent of normal with minimal change of output voltage. The primary to secondary normal mode isolation is better than 60 dB and the spike attenuation is typically 1,000:1.

The other significant advantage of the ferroresonant transformer is its tolerance of output overload. The output can be short-circuited for long durations without damage to the transformer. These characteristics are ideal for the outside plant environment and this is why the ferroresonant design was selected initially for non-standby power supply use and then later for standby use as well.

Figure 2: Peak voltage duration (quasi-square wave vs. sine wave)

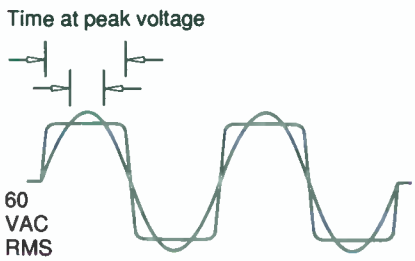
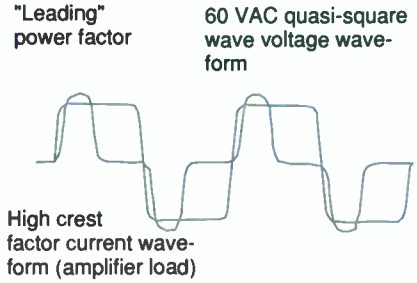


Figure 3: Voltage vs. current



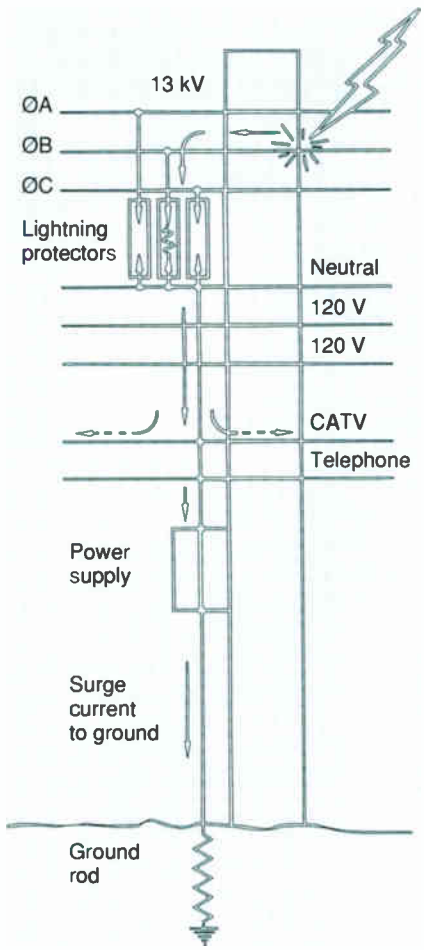
The standard ferroresonant transformer operates from an AC sine wave input voltage. Due to the magnetic saturation characteristic of the secondary winding area of the steel lamination core, the output waveform is a square wave. A sine wave ferroresonant transformer can be created by the addition of either a third winding (known as a sine wave correction coil) or an external inductor, which essentially filters the significant odd harmonics of the square wave to produce a low distortion sine wave. This design is commonly used in uninterruptible power supply (UPS) applications for backup of computer and headend equipment that typically requires a 120 or 240 volt sine wave like the utility provides.

For the outside plant active equipment, a square wave is actually preferable because it provides better transmission efficiency than a sine wave. This is not because the square wave is any more efficient in a conductor than a sine wave or exhibits less voltage drop, but rather it provides the amplifier power supply a higher voltage for more time during each half cycle of the waveform than a sine wave. (See Figure 2.)

However, a very "square" waveform can cause problems in the system. Recently, it has been determined that under certain conditions, the pure square wave output of some linear transformer inverters can cause a reaction in power-passing subscriber taps. The ferrite core transformer in most taps can be saturated by the high harmonic content of the fast rise and fall times of the square wave power supply output. The visual effect of this is several lines of high intensity rolling through the subscribers' picture at a fast rate. Although a pure square wave is desirable for maximum powering efficiency, the high harmonic content can cause a signal quality degradation under certain conditions. The quasi-square wave still provides good powering efficiency but has reduced harmonic content due to the slower rise and fall times.

The power supplies in the active equipment in the cable system have one common characteristic: they all must convert the 60 cycle AC voltage into a regulated DC voltage for use by the internal amplifier circuitry. To do this they must "rectify" the voltage by the use of rectifier diodes into "pulsating DC," which is then filtered by a large electrolytic capacitor into smooth DC that can be regulated down to the required voltages for the amplifier circuits.

Figure 4



By providing a square wave voltage through the coax to each amplifier power supply, the delivery of power is more effective than it would be with a sine wave. This is because the amount of time the voltage is high (or at the "peak") is longer and allows the amplifier power supply more time to draw current during each cycle. (See Figure 3.)

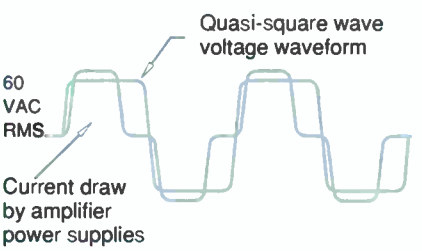
Power supply variations

There are several variations on the theme of the ferroresonant transformer power supply in use today. One of the variations for standby powering is the single transformer design. Here, the same ferroresonant transformer provides both normal AC operation and standby operation by the use of either an AC line primary winding or an "inverter" primary winding. The cable system is connected to the output of the secondary winding and benefits from the filtering, regulation and short-circuit protection of the ferroresonant transformer in both AC and standby operation.

Other designs use a ferroresonant transformer for AC operation only, and switch the cable system with a relay over to a "linear" transformer inverter module that produces a typically unregulated square wave output for use in standby.

Most non-standby power supplies are simply ferroresonant transformers in enclosures that operate from the 120 volt utility sine wave and provide the regulated 60 volt square wave output at typically 15 amperes.

Figure 5



Load characteristics

The load for the AC power supplies in the cable system is the internal power supply in the amplifier or line extender housing. As mentioned before, the purpose of this device is to convert the incoming AC square wave to DC and to provide the appropriate regulated DC voltages (such as 24 volts) to the amplifier circuitry. This power supply usually provides some over-voltage protection and either electronic or thermal current limiting in case of a short circuit. Over the years there have been several types of amplifier power supplies produced. The earliest design was the "linear" regulator (otherwise known as a series-pass transistor regulator). It is a simple and fairly rugged design but since it essentially regulates by dropping the excessive voltage by dissipating it as heat, it is not very efficient and can have reliability problems because of the higher operating temperature of the solid state components. Linear regulators are still produced today for some small amplifiers and line extenders where the power requirements of the amplifiers are fairly low.

It is important to note that the linear power supply behaves as a linear load (such as a resistor, for example). The

(Continued on page 60)

Our fiber lets you deliver CNN, HBO and MTV. ASAP.

When your technicians are under pressure to restore service, the one thing they don't need is a fiber that's difficult to work with.

They need a fiber that will help them get the job done as quickly and efficiently as possible. The fiber that fits that description: Corning™ fiber.

It's easy to work with and splice because of its excellent geometry, and because it's consistent—reel after reel, year after year. And it's consistent because we're very, very nit-picky. So much so that, during manufacturing for example, we measure our fiber diameter 500 times per second to within a fraction of a micron. (You don't get more nit-picky than that.)

What's more, we're constantly looking for new ways to improve our fiber. We twist, bend, snap and otherwise torture fiber, testing it in our harsh environments so it'll measure up in yours.

We'd also like to help technicians by helping them share what they've learned about handling fiber. If you or any of your people would like to let us know of an unusual or especially tough fiber-handling challenge (and its solution, if you have one), we'll spread the word.

Make your people's jobs easier by making sure they work with Corning fiber. The fiber designed to be as hassle-free as possible—no matter how tough the job might be.

For more information (or to share your real-life fiber experiences) write to Corning Incorporated, Opto-Electronics Group, MP-RO-03, Corning, N.Y. 14831, or call (800) 525-2524, extension 501.

Corning. Fiber you can count on.

CORNING

Reader Service Number 31

Selection, installation and maintenance of standby batteries

By Lee Dusbabek
Vice President, Engineering
Cableware Electronics

Batteries are an integral part of the standby power supply system. This represents an often overlooked cost element in the cable TV operator's budget. This cost is the sum of initial battery cost, replacement cost, maintenance cost and the hard to quantify (but very real) cost of customer dissatisfaction if the system should fail to perform during a loss of power. The objective then, is to select a battery with an optimum trade-off between first cost and expected life, and maintenance of the battery to assure a maximum life with a minimum failure rate. What follows are some factors to consider in reaching that objective.

Selection

There are basically two types of batteries from which to choose for a standby power supply system: sealed and unsealed. The trade-off is between the higher cost of the sealed (or gel) type and the higher maintenance cost of the more standard, lead acid battery. The higher maintenance cost of the latter is due to the frequent need to add water to the battery cells. Water is lost through evaporation at a rate determined by battery temperature as well as during "equalize charging." Vehicle-type lead acid batteries are not designed to be operated in a stationary environment. As a result, over a period of time, the electrolyte stratifies into horizontal layers of unequal density. This reduces the ability of the battery to hold a full charge so the electrolyte must be "stirred" every few weeks. This is accomplished by the equalize charge, which is actually an overcharge to produce a rather violent gassing between the plates to agitate the electrolyte. Besides increasing water loss, this burst of outgassing can carry sulfuric acid vapor through the vent caps and cause corrosion at the terminals.

Overall, the higher initial cost of the sealed battery is more than offset by the lower maintenance cost. Maintenance of a sealed battery standby power supply system consists only of checking to see that the battery voltage under load is sufficient.

Installation

The primary concern with battery installation is temperature. As with most electronic devices, lifetime is degraded at high temperatures. In addition, water loss increases with temperature and, as discussed previously, leads to higher maintenance cost. Since the battery is located in the outside environment it will be subjected to ambient temperatures over which the operator has little control.

The operator can, however, minimize the impact of other heat sources on battery temperature by locating the batteries below the ferroresonant transformer. The large transformer in the power supply generates considerable heat which, if the batteries are located above it, can be transferred by conduction through the cabinet shelf and by convection air currents to the batteries. If, for some reason, the batteries must be located above the transformer, they should be placed on wooden spacers to insulate them from the cabinet and to allow outside air to be drawn under and around them. The cabinet should be adequately vented, of course.

Maintenance

The need to maintain electrolyte level and periodically check on the batteries' ability to deliver sufficient voltage under load is not all that maintenance implies. After all, the maintenance of an adequate charge in the batteries is of primary concern and must be done with a minimum impact on battery life or system reliability.

All of these considerations should be factored into the selection of the appropriate charging cycle. Here, again, temperature is an important consideration. For example, a nominal 36 volt lead acid battery is normally charged to a "float voltage" of 40.8 volts. As the temperature increases, a battery requires a lower voltage to achieve a full charge. The recommended compensation coefficient is -0.09 volts per °C. Then, at 120° F, the float voltage would be 38.65 volts and at 10° F it would be 44.5 volts. Without temperature compensation, the batteries would be overcharged at high ambient temperatures resulting not only in increased water loss but also distortion of the plates. This can shorten the life of the battery.

As the battery is being charged, it will increase in temperature as it approaches a full charge since less power is stored in the chemical process. If the charging system is not temperature-compensated, this can lead to thermal runaway, which can cause battery swelling and in some cases explosion. On the other end of the scale, an uncompensated temperature charging system will result in a battery at 10° F being undercharged by 3.35 volts. In this condition the batteries will be unable to deliver power during a prolonged power outage, lose lead sulfate from the plates and become prone to freezing.

Besides providing temperature-compensation during the charging cycle, the system should have a thermal cutoff at 120° F. Any charging at these high temperatures will cause excessive gassing. The more sophisticated chargers will allow the batteries to be charged at temperatures above 120° F but only if the standby power supply experienced a power outage of more than one hour duration. And even then it will charge only to a reduced float voltage. This feature will permit some standby time to be restored should a long power outage occur on a hot summer day.

Since the proper charging cycle characteristics are so dependent upon the accurate measurement of the battery temperature, it is important that the temperature-sensing probe is placed next to the battery case and away from any extraneous source of heat. And, since the temperature probe output controls the charging voltage, it is imperative that a failure of the probe (open or short circuit) result in a safe charger response. If the charger should fail to detect a faulty probe, for example, it will overcharge the batteries leading to reduced life or worse, a battery explosion. **CT**

How we stack up for smart buyers of CATV equipment

In the complex process of selecting and purchasing high-tech hardware, few assets are more valuable than an ongoing relationship with a competent dedicated distributor. Hundreds of knowledgeable buyers fill this need by turning to Power & Telephone Supply.

Why Power & Tel? Because a unique combination of resources results in superior price, service and product availability.

An 11-site national network of warehouses disperses our multi-million-dollar inventory to the places where it's needed. Customer deliveries and warehouse restocking are optimized by a company-owned truck fleet.

Nearly 30 years' experience helps us select the suppliers who offer what smart buyers need; negotiating as a nationwide distributor helps us achieve the prices smart buyers can live with.

World-class experience, nationwide coverage, local attention to customer needs. No wonder Power & Tel stacks up as number one for smart buyers. Contact us for the local outlet nearest you.

Power & Telephone Supply Company
2701 Union Extended, Suite 300
Memphis, TN 38112-4417 USA
800/238-7514 • FAX 901/320-3082

See us at the CABLE TECH SHOW: Booth No. 211-213. ***Reader Service Number 32***

Simplified return path helps reduce cost of status monitoring

This article is base on AM Communications' Application Bulletin #9102 and covers an implementation scheme for activating a return path for status monitoring in which a return amplifier is installed in only every third to fifth trunk amp location. Many of the ideas presented here should be easily adapted to other manufacturers' products.

By The Engineering Staff
AM Communications Inc.

Considering the traditional two-way approach, let's first review some fundamentals of system design. The components used to transport and deliver the RF signals in a broadband coaxial system cause a loss of signal power as the signals travel through them. To compensate for these losses, we use amplifiers at intervals along the path that boost the signal power back to useful levels. The precise spacing of these amplifiers is determined by the sum of the losses encountered in the span. If we are designing a return system, the physical spacing of the amplifier housings has already been determined by the losses and required gains of the forward system. Normally, forward systems are laid out using the "unity gain" concept: 1 dB of gain for 1 dB of loss.

The principal cause of signal loss is

(Continued on page 68)

Figure 1

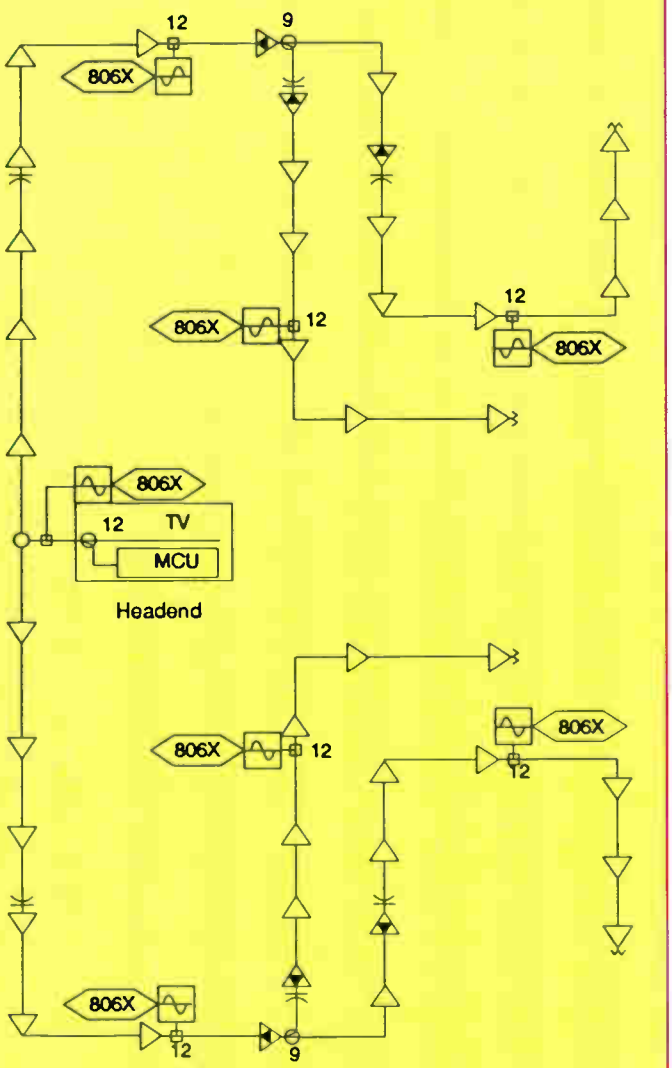
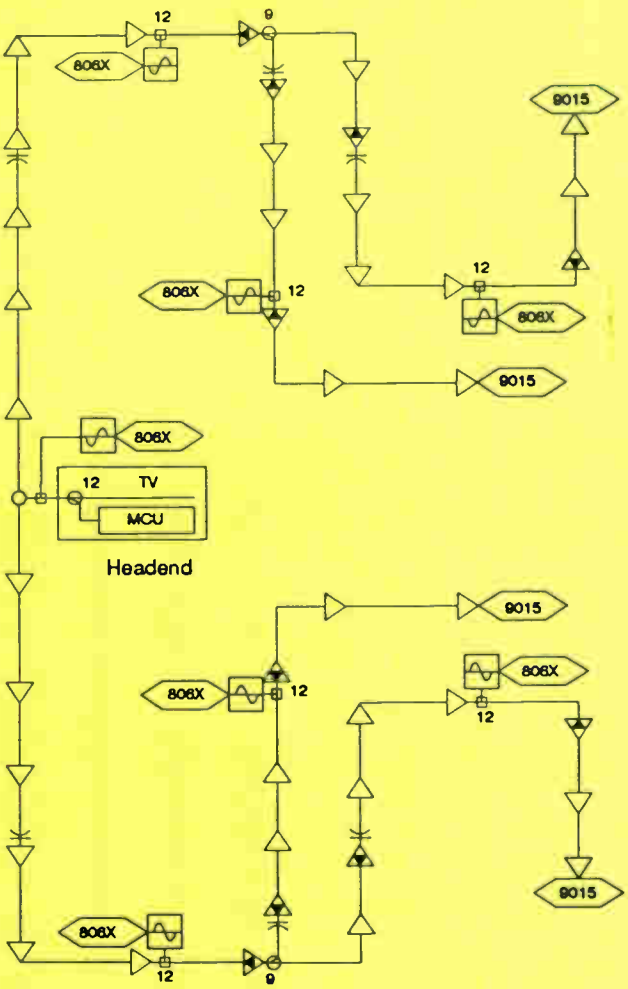


Figure 2



Standardize your installation

Before

SACHS ULTIMATE DROP SYSTEM

Sachs integrated system

The SACHS SYSTEM provides:

- Quality products with excellent corrosion resistance
- UL and CSA approved grounding
- Products that meet today's cable system's needs
- Seminar on techniques and specifications
- Training on method and application
- On site inspection on application
- Custom design products

TWO DECADES OF INNOVATION AND SOLUTIONS FOR YOUR CABLE SYSTEM PERFORMANCE

SACHS®

See us at the SCTE Cable-Tec Expo, Booth 382.
Reader Service Number 33

Sachs Canada Inc.
PLANT AND SALES OFFICE
745 Avoca Avenue, Dorval, Quebec H9P 1G4
Tel.: (514) 636-6560 Fax: (514) 636-0794

Sachs Communications Inc.
PLANT AND SALES OFFICE
211 Stonewall Street, Cartersville, Georgia 30120
1-800-829-7224 Fax: (706) 386-5482

Ham operators in the CATV industry

The following is a list (in alphabetical order) of amateur radio operators employed in the CATV industry. It was compiled by Steve Johnson of American Television & Communications Corp. Please send any additions or corrections to Johnson, c/o ATC, 160 Inverness Dr. West, P.O. Box 6659, Englewood, Colo. 80155-6659; or fax (303) 799-5651.

Name	Call	Company	City, State	Modes
Acevedo, Nelson	KP4FEN	CATV Noroeste	San Antonio, Puerto Rico	SSB,FM,CW
Adams, Mark	KA4WCB	S-A	Atlanta, Ga.	
Adel Sr., John	W5RR	Precision	Richardson, TX	SSB
Alexander, Gary	KE5BS	Post-Newsweek	Altus, Okla.	2FM,SSB
Alfred, Arvid	KA7GFQ	Glacier Cablevision	Deming, Wash.	HF
Allen, Fred	KA0YAE	TCI	New Hope, Minn.	FM,SSB,Newsletter?
Allen, Steve	KC6VCC	Jones	Roseville, Calif.	
Almeyda Jr., Bill	KN4BX	Prestige Cable	Cartersville, Ga.	CW,SSB,FM
Amos, Alan	KN1O	Jerrold	Stow, Mass.	
Andrews, David	N1ESK	Storer	New Haven, Conn.	2FM,10FM
Atkins, Gary	W0CGR	CSU Tech Service	Fort Collins, Colo.	HF/CW
Bailey, Wendell	KC3BU	NCTA	Washington, D.C.	
Baker, James	N6WRV	USATEC	Jolon, Calif.	
Baker, Steven	KA1EX	Continental	St. Paul, Minn.	
Bannister, David	KK4FL	Fairfax County	Fairfax, Va.	
Barnes, Richard	W4IXN	S-A	Atlanta, Ga.	
Barnes, Ron	N0PDC	Triad Comm.	Littleton, Colo.	
Barnhart, Bill	AA5HH	Cadco	Garland, Texas	SSB
Bartlett, Dave	N0CQC	TCI	Englewood, Colo.	
Baur, Wayne	WB9HIE	TCI	Cahokia, Ill.	
Baxter, Frank	K2ZLA	Cable Mgmt. Svcs.	Schenectady, N.Y.	2FM,HF/SSB/CW
Beckham, Chuck	N4XZV	Voltex Batteries	Doraville, Ga.	VHF,HF
Beeman, Paul	KA2MUM	Viacom	Smithtown, N.Y.	
Bentley, Bill	KB5HOX	Times Mirror	Midland, Texas	HF,VHF,UHF,SSB,CW
Beuret, Kit	KH6JDE	ATC	Honolulu, Hawaii	
Biggar, Norm	VE3MTV	Maclean Hunter	Owen Sound, Ont.	HF/VHF CW,SSB,FM
Blackstone, Larry	W8FZ	Dantron	Milton, Fla.	SSB/CW,80M-10M
Blanchard, David	KA0HIB	Municipal Utilities	Coon Rapids, Iowa	CW,SSB,QRP,2FM
Blumberg, David	N1HHI	ACS	Manchester, N.H.	
Blumsack, Harvey	W1VIK	Superior Optic	Marietta, Ga.	
Bohnhoff, Mark	WB9UOM	M. Bohnhoff	Wheeling, Ill.	
Borchert, Marshall	KD0DU	Riser-Bond	Aurora, Neb.	
Bourne, Dave	WB8TMP	Pioneer	Columbus, Ohio	HF20-10,SSB,Packet
Bowen, Todd	KB5OVM	Textel Cable	Austin, Texas	2FM,HF,SSB
Bowick, Chris	WD4C	S-A	Atlanta, Ga.	
Bowles, Tom	W7VA	King Video	Seattle, Wash.	
Boye, Greg	WB8NGA	ATC	Columbus, Ohio	
Bray, James R.	W0FBC	ATC	Kansas City, Mo.	HF/CW,SSB
Brillhart, Scott	N5JJZ	TCI	Tulsa, Okla.	
Brown, Bob	N0EUH	Westec	McLouth, Kan.	6M & above
Brown, Charles	KD4BCX	ATC	Greensboro, N.C.	
Brown, John H.	W7CKZ	TCI	Olympia, Wash.	160M-70CM, AMSAT
Brown, Philip	WA0ZFE	Sumner Cable TV	Wellington, Kan.	
Brownell, Eric	KC6YI	Sonic	W. Sacramento, CA	
Bryan, Tim 0.	WH6CAD	Jones	Hilo, Hawaii	HF
Burton, Jack S.	WB2CJS	Cablevision	Woodbury, N.Y.	2FM,440FM
Butts, John	N2JUG	MCTV	New York, N.Y.	
Bybee, Jerry	KG7GQ	TCI	Portland, Ore.	160-M,SSB,RTTY/2M,70CM
Caci, Joe	KA2OCF			
Cady, Jerry	KC4HPU	King Video	Tujunga, Calif.	
Cappe, Roger	WA4PEA	Cox	Gainesville, Fla.	2FM
Capron, John	WB2RUQ	Phillips	Manlius, N.Y.	
Carey, Bill	KC4BPK	ATC	Fayetteville, N.C.	
Carr, Mike	N4PON	Paragon	St. Petersburg, Fla.	2FM
Carr, Peter	WB3BQO	Montague Cable	Montague, N.J.	
Carvis, Timothy	WB9ULP	NYT Cable TV	Cherry Hill, N.J.	2M,440
Cerino, Charles	WB3HVH	Comcast	Philadelphia, Pa.	FM
Checketts, Rick	KA0KZB	Jensen Tools	Phoenix, Ariz.	10M SSB,2FM
Chesney, Tom	WH6CED	ATC	Honolulu, Hawaii	
Christensen, Joe	WB7WTS	White Pine Cable	Ely, Nev.	
Ciciora, Walt	WB9FPW	ATC	Stamford, Conn.	
Clayton, Francis	AH6X	Kauai Cable	Kekaha, Hawaii	SSB,FM
Cohen, Jeff	N1ACQ	Harron	Bourne, Mass.	2M,CW40-80
Colegrove, Tom	WA6OBQ	Lectro	Canyon Country, Calif.	220FM,2FM,440FM,Packet
Colter, Dave	WA2ZCN	Block Island Cable	Block Island, R.I.	2FM,220,HF,ATV
Coombs, Gary	N4OJW	S-A	Atlanta Ga.	
Cordero, Francisco	KP4CJ	CATV Noroeste	Aguadilla, Puerto Rico	SSB,CW,FM
Crown, Ron	KH6JI	Kauai Cable	Kalaheo, Hawaii	HF-SSB,2FM,450FM
Danekind, John	WD8PXI	Charter Cable	Cincinnati, Ohio	@KC8TW.OH
Davidson, Alan	G4PSU	ABP Ltd.	Bramley, UK	HF/SSB
Davis, Gary	WD8LTS	Antietam Cable	Hagerstown, Md.	
Davis, Keith	N9IBS	Comcast	Paducah, Ky.	UHF/VHF,FM,Packet@ W4NJA,HF
Dawkins, Al	K0FRP	ATC	Denver, Colo.	
Dean, Brad	K1KEK	TCI	S. Yarmouth, Mass.	FM,SSB,CW
DeHart, Steve	N2PFB	Phillips	Manlius, N.Y.	HF,CW,2M
Deierlein, Peter	KD2LN	Phillips	Manlius, N.Y.	
DellaGuardia, Joe	WB2WLY	TCI	Baltimore, Md.	2FM,80-10AM,SSB,CW
Dickinson, Bob	W2CCE	Dovetail	Bethlehem, Pa.	HF/SSB,CW,VHF,Packet, AMSAT
Dickinson, Ed	WA2FAC	Dovetail	Bethlehem Pa.	
Dineen, Jim	WB7RIQ	TCI	Aberdeen, Wash.	10,15SSB
Ditlow, Doran A.	WA8EOW	TCI	Grand Rapids, Mich.	2FM,6SSB/CW,80-10SSB/CW
Drydan, James	W6KIS	Buckeye Cable	Toledo, Ohio	
Dudziak, Ted	WA1GPC	EIP Microwave	San Jose, Calif.	2FM,HF/SSB,CW
Dusbabek, Lee	WB6KAJ	Cableware	Brea, Calif	80M-70CM,All modes
Duval, Joe	AA4JV	Hillsborough County	Tampa, Fla.	HF/SSB/CW/AMTOR/RTTY, 2FM,PKT
Dzuban, Mark	KB2IT	Cross Country	Warren, N.J.	HF-75,20,15MM/10 GHz
Ehman, Roy	VE6EV	Retired		
Eide, Joe	KB9R	ATC	Eau Claire, Wis.	CW,P,RTTY,AMTOR
Emig, Tim	KK4YU	Storer	Louisville, Ky.	
Engleman, Paul	N6KZW	Continental	Stockton, Calif.	
Epling, Jack	KC6HMP	Ventura County	West Lake Village, CA	2FM,220
Evanko, Steve	N2HCR	Blonder-Tongue	Old Bridge, N.J.	10M-80M CW/SSB,2FM
Evans Jr., Bernie	W6JMK	TeSCO	Topanga, Calif.	
Evanyk, Walt	W8KSW	Precision	Richardson, TX	SSB,AM,FM,CW,FSTV, Packet
Everett, Chris	KB5GGY	Cox	Oklahoma City, OK	2FM
Faber, Randall	WA1NSL	American Cable	Beltsville, Md.	
Farmer, Jim	K4BSE	S-A	Atlanta, Ga.	
Farmer, Jim	N4IBW	Superior Telecomm.	Atlanta, Ga.	
Felker, Lex	N4LF	Time Warner	Washington, D.C.	
Ferguson, Jan	W4REN	ATC	Cocoa, Fla.	SSB,FM,CW,Packet, VHF,UHF
Ferguson, Michael	KQ2K	Cable Tech	Syracuse, N.Y.	CW,SSB,FM
Figal, John	WB0CUC	TCI	Denver, Colo.	
Filipponi, Barry	N6OGE	Siskiyou Cablevision	Fort Jones, Calif.	2FM,10M
Fischer, Dave	W0MHS	Superior Cable	Atlanta, Ga.	
Fitch Jr., William A.	KA2AFG	New Channels	Troy, N.Y.	80-10,6,2
Flessner, Andy	KA9ARM	Multivision	Hendersonville, N.C.	2FM,Packet
Flynn, Mike	KA3DDQ	County Cable	Clarion, Pa.	40CW, 10 SSB
Foley, Red	KN4EZ	TCI	Fort Pierce, Fla.	80-10M SSB/2FM,Packet
Forbes, Celus	N4TDW	ATC	Raleigh, N.C.	2FM
Forer, Dennis	KC6WXK	Viacom	Pleasonton, Calif.	
Forrest, Mark	WB4HJG	S-A	Atlanta, Ga.	
Fort, Tom	WD4HPE	S-A	Atlanta, Ga.	3M
Fournier, Ray	KA1ODQ	Continental	Concord, N.H.	
Friedman, Ken	WA1PIR	ALS	Wallingford, Conn.	2FM,80-10SSB
Friend, Neil	W2AMY	Phillips	Manlius, N.Y.	
Gall, Don	N0CPN	ATC	Kansas City, Mo.	
Gardner, Dale	N7RNX	Enterprise Cable	Enterprise, Utah	
Garner, Rodney	WB4ZWK	S-A	Atlanta, Ga.	
Geer, Jeff	N7GFR	Alpha	Bellingham, WA	HF, Packet,AMSAT
Genochio, Frank	W6RXU	Retired	Santa Clara, CA	CW/SSB/HF
Goldsworthy, Steve	KB6TMT	Crescenta Valley	La Crescenta, CA	2M/220
Goodman, Dale	KD4CVR	Viacom	Nashville, Tenn.	2FM,440,Packet@WA4JUB
Gordon, Neal	WA1TDA	Continental	Portsmouth, N.H.	40,80CW,2-6SSB, 440SSB/CW
Graalman, Mark S.	WB8JKR	Buckeye Cablevision	Toledo, Ohio	160-2/SSB,CW,FM
Grant, Chris	W0LA	Wavetek	Indianapolis, Ind.	
Greco, Vincent	KD2TG	Phillips	Manlius, N.Y.	
Green, Alan	WB2WQY	Paragon	New York, N.Y.	
Greene, Doug	NO9I	Jones	Englewood, Colo.	2FM,ATV,Packet,HF
Grunewald, Peter B.	KA2ZHA	Cablevision	Hudson, Mass.	CW
Gunter, Kenneth S.	W5ZJ	Columbia	San Angelo, TX	CW/SSB-40-20
Gur, Eugene A.	W4TFM	Central VA	Winchester, Va.	SSB,CW
Guth, Eric	WA6IGR	Advanced Cable	Denver, Colo.	440 FM
Hahn, Richard	KA2FXH	MCTV	New York, N.Y.	
Haithcock, Gene	N4MYR	ATC	Ashboro, N.C.	
Hamilton, Howard	N2ESK	Service Electric	Sparta, N.J.	
Hammond, Bill	KK4YQ	Cable Exchange	Signal Hill, Calif.	
Hampton, Jim	WA3YXX	Starview	Claymont, Del.	2M,10M,UHF,ATV
Hanneman, Jerry	WA1PCP	Wander Telecom.	San Francisco, CA	HF,VHF
Hansen, Tom	N8DGD	TCI	Grand Rapids, Mich.	2FM,SSB,CW
Hanson, Ron	WA0OGS	S-A	Norcross, Ga.	
Hare, Ed	KA1CV	ARRL	Newington, Conn.	
Harlin, Michael	WA7AID	TCI West	Bellevue, Wash.	HF/SSB,RTTY,Packet, 2FM,40m
Harrington, Joel	N7KOJ	KBLCOM	Portland, Ore.	440,2M,Packet
Harris, Jerry	K7JPF	Tektronix	Beaverton, Ore.	
Harris, Michael G.	N6MH	Century Comm.	Brea, Calif.	HF,UHF
Hart, Gaylord	WB7ODD	Regal	Englewood, Colo.	
Hart, Jim	N4SV	S-A	Doraville, Ga.	CW
Hartson, Ted	WA8ULG	Post-Newsweek	Phoenix, Ariz.	
Hassler, Ed	N3HDS	Armstrong Utilities	Butler, Pa.	
Hatch, Earl	AB4AO	ATC	Melbourne, Fla.	HF-SSB,Packet,VHF,UHF
Hawks, Ros	WB0GKL	Hermosa Cablevision	Durango, Calif.	HF,2FM
Haworth, Jim	WA4QPP	ATC	Maitland, Fla.	2FM
Hay, Roger	VE3BTH	CableLabs	Boulder, Colo.	
Hayashi, Ichiharu	JA3ILI	DX Antenna	Kobe-City, Japan	20-10SSB/CW/Rtty,P, Amtor,AMSAT
Hayden, Joel	7J1AHJ	Coaxial International	Fukuoka, Japan	
Hayes, Al	WB6YIY	Continental	Stockton, Calif.	VHF
Hayes, Keith	KD4KDG	Georgia Cable TV	Decatur, Ga.	
Haywood, Doyle T.	KC9FJ	Applied Instruments	Beech Grove, Ind.	CW,SSB,FM
Heim, Bob	K8HLH	Erie County	Sandusky, Ohio	SSB,FM,CW,Newsletter? →

IN AN ERA OF LIMITS BELDEN EXPANDS YOUR OPTIONS.

New Belden® Fiber Optic Supertrunk presents another option in a full line of cables for CATV. Since the 70's, when Belden first integrated fiber optic technology into large-scale communications networks, Belden innovations have kept customers a step ahead of technological and product requirements. Now the proven benefits of Belden fiber optic technology expand the options available to Cable Television Systems.

Full line selection, combined with unsurpassed service and technical support, give you the *Belden Quality Advantage*. That means long-term savings for your business. Compare Belden's documented performance benefits to those of any other cable manufacturer:

- **Guaranteed structural return loss values** of 23dB minimum on RG-6, RG-11 and RG-59 cables.
- **100% sweep testing** of every reel of Belden drop cable, from 5 to 750 MHz for RG-6, 5 to 550 MHz for RG-59 and RG-11.
- **SuperDrop™** Cables are 100% sweep tested from 5 to 1,000 MHz, with guaranteed structure return loss of 26dB minimum.
- **Complete corrosion protection** provided by unique non-drip gel barrier in Belden's new line of aerial drop cables.
- **Highest shield effectiveness in the industry** provided by Belden's DUOBOND® PLUS . . . even greater than quad shield designs!
- **Fewer call-backs** because of Belden's tight dimensional controls and easier termination. Saves you money over the long run.
- **Turnkey system design and installation capabilities** with Belden's nationwide network of Authorized Systems Integrators.

For a FREE copy of Belden's CATV Catalog, FAX your business card to 1-319-395-9719 or call toll-free:

1-800-BELDEN-4

COOPER

Belden

Quality from Cooper Industries

Reader Service Number 34

Name	Call	Company	City, State	Modes
Heimbach, Paul	WA2YHO	Viacom	New York, N.Y.	
Hemmings, Brian	KA3CTP	Continental	St. Louis, Mo.	2M,440,ATV,All bands/modes
Henley, L. Lynn	KB4JXY	American Cable	Columbus, Ga.	
Henscheid, Bert L.	WA7CBO	Beta Engineering	Glendale, Ariz.	
Herman, Jim	WB7SFP	HCC	Bridgewater, N.J.	
Herrman, Tony	KD0ZE	ATC	Kansas City, Mo.	HF/CW,SSB
Hill, Tommy	KD4EN	Comcast	Meridian, Miss.	HF,VHF,Packet
Hochman, Mike	KX6F	Multimedia	Norman, Okla.	2FM
Hodge, Warren	KC4OOS	ATC	Rockledge, Fla.	
Hodges, Marsha	KA0UIN	ATC	Kansas City, Mo.	2M
Hoffman, Kurt	NT8T	Warner	Akron, Ohio	CW/HF
Hoffman, Hans	WA6CXN	Western Comm.	Monterey, Calif.	HF,220,2FM
Holmes, Fredrick W.	N1GIQ	NE Cablevision	Ayer, Mass.	SSB,CW,FM,RTTY,Packet, ATV
Honnold, Fred	W6YKM	King Video	Jackson, Calif.	
Hopengarten, Fred	K1VR	Lawyer	Lincoln, Mass.	HF
Horn, Ancel D.	W7DLQ	Satellite Systems	Falls Church, Va.	
Horvath, Robert	N8KPS	Continental	Findlay, Ohio	2FM,80/40M,CW
Hranac, Ron	N0IVN	Coaxial International	Denver, Colo.	ATV, Packet,2M,6M,HF
Huf, Ted	K4NTA	Adelphia	Rivera Beach, Fla.	
Hunt, Bill	KC4ILF	Marion Cty. Schools	Ocala, Ill.	
Idler, Steven	KA9UIE	S-A	Atlanta, Ga.	
Imbody, Don	N4PFS	Power Guard	Elmhurst, Fla.	
Jackson, William G.	W8GHK	Cable America	Phoenix, Ariz.	
Jage Jr., Richard M.	N5LCR	Texscan	El Paso, Texas	VHF,UHF
Johnson, Glenn	WB7UXS	ATC CARS	Emporia, Kan.	HF,2M
Johnson, Kenneth	WA7YHN	Cablevision	Moscow, Idaho	HF/SSB,2FM
Johnson, Rey	K8JCB	TCI	Denver, Colo.	2FM
Johnson, Steve	N0AYE	ATC	Englewood, Colo.	2FM,10SSB,Packet
Johnston, Bob	WB7AHL	TCI	Lander, Wyo.	SSB,FM,Packet
Jones, Herb	KA4NIF	ATC	Melbourne, Fla.	2FM
Jordan, Peter	KA2HIG	Phillips	Manlius, NY.	
Jordan, Robert	KB5HPG	Times Mirror	Midland, Texas	HF,VHF
Joyner, John	KB2IPC	ATC	Albany, N.Y.	10M/CW,SSB,Packet
Jubon, Jan	K2HJ	Moffett, Larson	Falls Church, Va.	
Kallina, Henry	WA5VSG	ATC	Englewood, Colo.	
Karr, Randy	KC4I0T	Channel Master	Clayton, N.C.	HF,2M
Kasekamp, Marion L.	KK3L	TCI	Cumberland, Md.	HF/SSB,VHF/UHF/FM,10FM
Kaser, Gary F.	AB8Y	Adelphia Cable	Richland, Mich.	160-10/SSB/CW,2FM
Kaylor, William	W9DSM	Phillips	Knoxville, Tenn.	HF/CW/SSB,2FM
Kean, Peter	K2AXI	Mystic Star	Rock Tavern, N.Y.	CW,SSB,FSK
Keller, Robert	KY3R	Fleischman & Walsh	Washington, D.C.	Packet@N4QQ
Kellough, Larry	WB9AZQ	Cox	Harahan, La.	80-10,SSB,CW,AM,FM
Kelsey, Charles	WB2EDV	Village of	Mayville, N.Y.	UHF/VHF/FM
Kessler, Steve	WA8ZMC	Cedardale Sat.	Springboro, Ohio	
King, R. Michael	WB0NCB	Circuit Doctor	Frisco, Colo.	
Kirby, Dave	N8JOX	Cablevision	Maple Heights, Ohio	
Kirsche, Richard	N1CBW	Greater Media	Chicopee, Mass.	

Name	Call	Company	City, State	Modes
Kittelson, Jerry	KF0CL	Lakes Cable	Spirit Lake, Iowa	
Kline, Ron	WD7R	TCI	Boise, Idaho	
Knies, Mike	WB8MMR	ATC	Columbus,Ohio	HF,UHF,VHF
Kolins, Jerry	K2PFW	Professional Electric Co.	Schenectady, N.Y.	Voice,Data,Video
Kosek, Bill	WA2KXY	ATC	Albany, N.Y	SSB,AM,FM,CW,AMSAT
Kramer, Harold	WJ1B	Tele-Media	Seymour, Conn.	2FM,HF/SSB,CW
Kramer, Jonathan	KD6MR	Communications Support	Lake Forest, Calif.	2FM,Packet
Krebsbach, Ed	KF7KE	TCI	Klamath Falls, Ore.	HF/SSB,CW-2FM,Packet
Krom, Ed	WD4KHP	Media General	Fairfax, Va.	
Kujat, Matthew C.	WB3FNZ	CATV Service	Freeland, Pa.	SSB,CW,FM,2M,432,6M
Kuzmanoff, Chris	WH6CEQ	ATC	Honolulu, Hawaii	
Lambert, Matt	KC4NYO	Continental	Richmond, Va.	
Lampman, Don	N9JEY	TCI	Madison, Wis.	
Land, Ed	N3GSU	Sammons	Oil City, Pa.	HF,2FM,Packet,440FM
Langevin, Larry	K1GXU	Greater Media	Chicopee, Mass.	160-10 CW,SSB/2M CW,SSB
Large, David	WZ6V	Intermedia	Santa Clara, Calif.	75SSB,VHF,UHF
Lazzaro, Tom	VE3KZJ	Lindsay	Lindsay, Ontario	80-20 SSB/CW,2FM
Lemon, Gary	N0IZF	ATC	Gastonia, N.C.	
Levy, Bob	K2LET	NY Cable Commission	Albany, N.Y.	Silent key
Lewis, Jon	KH6MS	ATC	Honolulu, Hawaii	
Leyrer, David	K8HMF	Aero-Tec	West Warwick, R.I.	
Lies, Gene	NN5A	Jones	Albuquerque, N.M.	2FM
Lipoff, Stu	W1GRI	A.D. Little	Cambridge, Mass.	20mSSB,2FM, Packet@ W1MX
Lloyd, Tom	K0CPI	Vantage	Kirksville, Mo.	
Lonn, Robert	WA6PHN	Cox	San Diego, Calif.	2FM,220,Packet
Louie, Dom	VE7CKL	Rogers	Vancouver, British Columbia	
Lozoro, Tom M.	VE7KJ		Lindsay, Ontario	
Luff, Bob	W3GAC	Jones	Englewood, Colo.	2FM,AMSAT
MacFarquhar, Ian	VE3OS	CUC Broadcasting	Scarborough, Ontario	
Mackenzie, Kevin	WB6BVW	J.D. McKay Corp.	Aloha, Ore.	
MacLeod, Doug	N8ASM	Comcast	St. Clair Shores, Mich.	2FM,80-10 SSB
MacPhedran, Don	WA2ZOZ	Cablevision	Cresskill, N.J.	CW,20/15
Maes, Craig	WD8NJS	Omnicomm	Plymouth, Mich.	
Malo, Butch	KK4CU	Adv. Satellite	Ormond Beach, Fla.	2FM
Malson, Tom	N6RLN	Eagle Comtronics	Torrance, Calif.	
Mannikko, Roy	WB9PKN	Cox	Macon, Ga.	
Maples, David	WB4FUR	SVT	Stennis Space Ctr,MS	HF,6M,2FM-Packet & Voice
Marquart, Hugo	N0DYZ	Bismark-Mandan	Bismark, N.D.	80,40,15,10 CW/SSB
Marriam, Scott	KB2BDB	Phillips	Manlius, N.Y.	
Marsh, Stephen	KB9DTC	Cable Exchange	Chicago, Ill.	
Martin, George E.	WD0FJH	S.W. Mo. CATV	Carthage, Mo.	SSB,CW,HF
Massey, Larry	KU7C	Cooke Cablevision	Tucson, Ariz.	2FM
Mauney, Bob	WB4RPM	Bell South	Atlanta, Ga.	
Maziarz, Joe	K8BIU	NASA Lewis	Cleveland, Ohio	FM,Packet
McArthur, Len	VE3KSU	Cablesystems	Don Mills, Ontario	
McCoy, Cecil	WB4CTF	Cox	Norfolk, Va.	

→

SYSTEM CONSTRUCTION: ON TIME, ON BUDGET.

Whether your system measures three miles or 3,000, you can be sure of one thing: we'll construct it for you on time, on budget. That's because Cable Services has been building cable systems almost since the industry began, both aerial and underground.

Now we're ready to help you incorporate fiber optics and other advanced technologies into your operation Not ten years from now. Today.

See us at the SCTE Cable-Tec Expo in San Antonio, Booth 411.

Reader Service Number 37

SERVING THE CABLE INDUSTRY SINCE 1964

THAT'S SERVICE. THAT'S

Cable Services Company/Inc.

2113 MARYDALE AVENUE, WILLIAMSPORT, PA 17701-1498
ONE NUMBER NATIONWIDE: 1-800-326-9444 □ FAX 717-322-5373

Name	Call	Company	City, State	Modes
McDonald, Stan	WA4IZI	S-A	Atlanta, Ga.	
McDonough, Tom	N4YKK	ATC	Cocoa, Fla.	2FM,10M-SSB
McFadyen, Brian	N9HJR	MetroVision	Palos Hills, Ill.	2M FM
McMillan, John	KA4SSB	ATC	Lumberton, N.C.	
McMonigle, Dan	N3IXQ	Suburban Cable	Linwood, Pa.	HF/CW,2M,220 MHz, 70 cm
Mellring, Chuck	K3GDZ	Capital Cable	Columbus, Ohio	CW,AM,FM
Mersinger, Tom	KB4VQX	Prime	Atlanta, Ga.	
Meyer, Ken	WB9YUY	Door Cablevision	Sturgeon Bay, Wis.	2FM/440FM/Packet
Michael, Tracy N.	AA9Z	TCI	Hartford City, Ind.	CW,SSB,FM,P,RTTY
Michaels, Joe	KA0GIB	ATC CARS	Emporia, Kan.	HF,2M,Packet
Midkiff, Randy	WB8ART	Continental	Kettering, Ohio	HF,VHF,UHF,SSB,CW,FM
Miller, Rick	WB4WPI	Storer	Sarasota, Fla.	2FM,10M
Miller, Ronald	K4NGQ	Frankfort Plant Bd.	Frankfort, Ky.	CW,SSB,RTTY,2FM
Milner, Ed	WA4OHW	Flight Trac	Glen Ellyn, Ill.	
Money, Marshall	N4SIO	Summit	Woodstock, Ga.	
Monroe, Jerry	KC2UT	Phillips	Manlius, N.Y.	
Moore, Doug	KA0TQJ	ATC	Kansas City, Mo.	HF/CW,SSB
Moore, Marc	KB6HMO	King Video	Tujunga, Calif.	
Moore, Marcus	N4RYD	S-A	Atlanta, Ga.	
Morris, Steven	N4ZUX	Rock Hill Cable	Rock Hill, S.C.	
Mortimer, Walt	WA6ELI	Viacom	Redding, Calif.	
Mountain, Ned	WC4X	Wegner	Duluth, Ga.	
Mullan, John	KD2LQ			
Mundy, David	N0MYU	Continental	Overland, Mo.	
Musser, Dennis	KA5GTM	ATC	Denver, Colo.	2M,10M,SSB,Packet
Myers, Ron	KH6JQP	Commband Tech.	Virginia Beach, Va.	
Nakashima, Ray	WH6CEO	ATC	Honolulu, Hawaii	
Nelson, Barry	KA9YIS	Warner	DeKalb, Ill.	2M,10M
Nelson, Jim	N5IZT	Power Control Tech.	San Antonio, Texas	
Newell, Steve	KA8USS		Owosso, Mich.	CW-80M,2FM,440FM
Newlin, Jeff	N4UPS	Continental	Richmond, Va.	
Newton, John	KA2ZZL			
Norman, Tom	WA7HFY	UWTV	Laramie, Wyo.	
Nusco, Fred F.	WA2DWO	ATC	San Diego, CA	80-20M/SSB,2FM
Nydegger, Charles	WA9HCU	Cardinal	Crawfordsville, Ind.	75SSB,2M,6M,FSTV
Obert, Paul	K8PO	Microwave Radio	Lowell, Mass.	160-10,2FM,440,Packet
Orwen, John	KB0XE	Metrovision	Lincoln, Neb.	
Osterland, Derick	AH6KC	ATC	Honolulu, Hawaii	
Ottinger, Michael A.	NX9Q	TCI	Lebanon, Ind.	FM,AM,SSB,HF,VHF, UHF,P,RTTY
Oyama, Blaine	NH6FM	Jones	Hilo, Hawaii	2M
Panetta, Carlo	AG2C	Eagle	Clay, N.Y.	
Pangrac, Dave	WA0RNP	ATC	Englewood, Colo.	2FM,HF/SSB
Parmiter, Donald	N8LJF	TCI	Zanesville, Ohio	FM
Pastor, Tom	N8HUS	Continental	Painesville, Ohio	
Patrick, Al	WA4URT	S-A	Atlanta, Ga.	

Name	Call	Company	City, State	Modes
Payne, Tim	N6DRA	Cox	San Diego, Calif.	
Pearce, Grant	K8BKT	TCI	Grand Rapids, MI	160-10,2FM,UHF FM
Perry, Buck	K4ITT	Moffet, Larson	Falls Church, Va.	
Peterson, Michael L.	KA0YAD	TCI	New Hope, Minn.	FM,SSB,Newsletter?
Peterson, Par	KC6QMM	Western Comm.	San Francisco, Calif.	
Phelps, Alan	KA4DXM	Jones	St. Leonard, Md.	
Piccolo, Tony	WD9GCJ	Texscan	El Paso, Texas	CW,SSB,2FM
Pience, Roger	KA4ATI	NCTA	Washington, D.C.	
Pike, Dan	N5TLM	Prime	Austin, Texas	
Pincombe, Scott	N2NNR	Phillips	Manlius, N.Y.	
Potter, Greg	NM2L	NewChannels	Syracuse, N.Y.	CW,DX,Contesting
Preston, Charles	N4SXM	N. Georgia Comm.	Norcross, Ga.	HF/SSB,V,U,P,ATV,SAT, AMTR,RTTY
Prince, Bradley	N3GMT	Adelphia Cable	Plymouth Mtng., PA	2M
Pringle Jr., J. Leon	W5NA	Pine Belt	Hattiesburg, Miss.	
Proctor, Ken	N2DQD	Mobile Diagnostics	Bricktown, N.J.	2FM,440
Pruitt, Michael	KC4FMJ	Cablevision Ind.	Danville, Va.	20M SSB/CW
Radzik, Jack	N2RK	LRC	Horseheads, N.Y.	75SSB
Raimondi, Steve	W2QUU	TCI	Englewood, Colo.	40SSB
Reed Jr., Oscar	W3FFQ	Reed Associates	Silver Springs, Md.	160-10,2M
Reihs, Warren A.	WB6QKA	ISS Comm.	Thousand Oaks, CA	2FM
Reno, Larry	N0NPM	Mile Hi	Denver, Colo.	Packet@WOLJF
Reynard, Rand	N0DYQ	Anixter	Englewood, Colo.	2FM,Packet,CAP
Rice, Charles	KD4SS	Glasgow EPB	Glasgow, Ky.	2FM,SSB,CW,VE,10
Richardson, Earl	W1NIC	Moosehead	Greenville, Maine	
Rivera, Phil	KM4OP	Gold Coast	Miami Beach, Fla.	HF,2M,UHF,ATV
Robertson, Bill	N6VLR	Continental	Lakewood, Calif.	2meter
Rocci, Joseph	WA3CMQ	AM Comm.	Quakerton, Pa.	
Rodgers, Gregg	KJ9X	Trilithic	Indianapolis, Ind.	
Roman, Geoff	WA2DTL	Jerrold	Hatboro, Pa.	
Rosenberg, Eric	WA6YBT	C-SPAN	Washington, D.C.	VHF/Packet,AMSAT
Roush, Sam	KA8OOT	Rifkin	Point Pleasant, WV	SSB,DX,SSTV,FSTV
Runkle, Fred	K4KAZ	S-A	Atlanta, Ga.	
Rupert, J. Scott	N3DDZ	TCI	Apollo, Pa.	FM,SSB,2M,440
Sabraw, Martin F.	N8IWQ	Starion	Ada, Mich.	CW,SSB,FM,AFSK,ATV
Sambol, Don	K7CS	ATC	Englewood, Colo.	HF/CW
Sanchez, Nestor	N4UJZ	Storer	Miami, Calif.	2FM,10M,ATV,Packet, AMSAT
Sandgathe, Michael	WB9VTX	CableLabs	Boulder, Colo.	
Schmidt, Bill	KF4CQ	Superior Telecomm.	Atlanta, Ga.	
Schmidt, Jim	WB9EPW	ATC	Appleton, Wis.	CW/HF
Schmig, Gene	(awaiting)	ATC	Greensboro, N.C.	
Scott, Noel	KA0TWQ	ATC	Kansas City, Mo.	HF/SSB/CW,2FM/SSB, Packet
Seal, Thale	WB7CWB	TCI	Billings, Mont.	
Seale, Richard	VE2FEL	Infinity	LaSalle, Quebec	
Sell, Bob	WB4OEZ	ATC	Melbourne, Fla.	450 & 6M Repeater owner
Sellers, Mike	KI6ED	Comcast	Fullerton, Calif.	HF,SSB,RTTY →

So far ...and yet so near

CALAN *Comet* Remote Monitoring brings your broadband network right into your office.

Monitoring your cable network's status has never been easier, faster, or more effective.

Until *Comet*, you had to dispatch fleets of technicians to take signal measurements out in the field. Too often, you were forced to react . . . rather than prevent problems.

Now you can routinely, automatically watch *every* critical point in your broadband network's trunk and feeder lines . . . from anywhere.

CALAN's *Comet* system enables you to take measurements of all carrier levels . . . of all components in your broadband system.

That means you can monitor deviations and take corrective action before the system goes down. You'll know exactly what and where the problem is—instantly!

Comet is a total system consisting of instrument-grade hardware and proven software that opens a whole new era in cable system performance monitoring. And, it's universally compatible with any broadband cable network.

Call for information today—the problem can be anywhere out there in your network, but the solution is so near!

CALAN COMET

CABLE AND LOCAL AREA NETWORKS

CALAN, INC. Dingman's Ferry, PA 18328 1-800-544-3392 • In PA: 717-828-2356 FAX: 717-828-2472

See us at the SCTE Cable-Tec Expo, Booth 511, 513, 515. Reader Service Number 39

Name	Call	Company	City, State	Modes
Selwa, Paul	NB9K	Trilithic	Indianapolis, Ind.	40-10 SSB/CW,2FM
Serafin, Neil	KE0XL	Elect. Metal Products	Englewood, Colo.	2FM/10FM & SSB
Sexton, Burl	KO4V	S-A	Atlanta, Ga.	
Seymour, Andy	N0JPD	Telecable	Springfield, Mo.	SSB,CW,FM,Packet
Shaw, Bob	KB8BIY	Pioneer	Columbus, Ohio	2M,220,ATV,10SSB,Packet
Shimko, Gary P.	WA8OTR	Precision	Richardson, Texas	SSB
Shine, Daniel	K1NJX	M/A-COM MAC	Chelmsford, Mass.	
Sicard, Don	K1OSG	CommSpec	Haverhill, Mass.	
Siebring, Gary	KA0DWE	Siebring	George, Iowa	HF/CW,2M,Packet
Sigler, Glenn E.	N8IJY	NaCom	Columbus, Ohio	SSB,CW,2M,Packet
Simoneau, Wayne	WA1WSM	Aero-Trac	West Warwick, R.I.	
Skinner, Russ	WA8EQX	TCI	Montvale, N.J.	6M,2FM,ATV
Smith, Bill	W5USM	Cadco	Garland, Texas	SSB,CW,FM,Packet
Snopko, Paul	K9VUD	Zenith	Chicago, Ill.	
Sokola, Ray	K9RS	Wavetek	Indianapolis, Ind.	
Spence, Jeff	K0OEJ	US Cable	Merrillville, Ind.	6M,80,40,2FM
Spencer, Ron	N4VOS	Spencer Constr.	Stanton, Ky.	
Spilka, Jesse	N2HYR	BQ Cable	Flushing, N.Y.	
Squires, Steve	WB9LKT	TCI	Galesburg, Ill.	
Stahlman, Greg	KJ6KO	King Video	Placerville, Calif.	
Staiger, Jay G.	KA2HYA	Phillips	Manlius, N.Y.	
Standridge, Jim	KB2PH	Jerrold	Lakeland, Fla.	
Stanek, Matt	N0OBE	ATC	Denver, Colo.	
Stannard, Chris	KB4GAA	Storer	Miami, Calif.	2FM,10M,ATV,AMSAT
Stelle, Raleigh	NY0Y	Phillips	Austin, Texas	HF/CW
Stephens, Bill	N9HEP	ALM	McHenry, Ill..	2FM,440FM,HF,Digital
Stewart, Columbus	KA8QVZ	TCI	Grand Rapids, Mich.	SSB
Stigberg, Chuck	NT4U	Eastern Technical Comm.	Richmond, Va.	HF DX,2M, FM/SSB,RTTY
Stofer, Ray	K7JNK	Columbia Cable	Gardnerville, Nev.	
Strahan, Dave	N7LSD	TCI	Seattle, Wash.	
Strebel, Rich	KA3ANO	Adelphia	Macedonia, Ohio	SSB,CW,FM
Surkiss, Arie	4X6UO	Intermil Ltd.	Azor, Israel	HF/AMTOR/Packet,40-10M
Sutton, Dave	WA9J	TCI	Galesburg, Ill.	
Swanson, Pete	KA2IAY	Cable Exchange	Liverpool, N.Y.	10,15,20,80,2FM,Packet
Tash, Gill	WB6WNN	Times Mirror	Irvine, Calif.	
Tauiliili, Sumatala	WH6CDN	ATC	Honolulu, Hawaii	
Taxdahl, Tax	W7KCZ	Telecomm Assoc.	Ferndale, Wash.	80-10/CW/SSB
Taylor, Jim	K9JT	The Video Term	Milwaukee, Wis.	HF/CW/SSB,VHF/UHF/FM
Thomas, Ray	WB6RUO	Telecable	Springfield, Mo.	
Thompson, Mike	KA0WJQ	ATC	Kansas City, Mo.	
Timberlake, Herb	W5TQI	Sammons	Fort Worth, Texas	
Tinggaard, Neil	WA0HJI	TCI	Englewood, Colo.	
Tobin, Greg	WA2SFT	Paragon	Torrance, Calif.	
Todd, Stephen	WB6ELD	Multivision	Lemoore, Calif.	
Tonge, Tim	KA0MWA	ATC	Englewood, Colo.	2FM,Packet,HF/CW/SSB
Troutman, Edwin L.	WA3TFX	Adelphia Cable	Winchester, Va.	
Tschirner, Alan	KA0TQH	ATC	Kansas City, Mo.	SSB,CW,2FM,440FM, Packet,CAP
Tyler, Mike	N5OLP	Weather Scan	Olney, Texas	
Tyrrell, George	K0CPT	HP	Englewood, Colo.	
Ulrich, Dale	N4BZZ	Multivision	Rohnert Park, Ill.	
Unverzagt Jr., John R.	N8MCQ	Pioneer	Columbus, Ohio	OSCAR,VHF,UHF,HF
VanBuren, R.H.	W5ILH	Cablecom	Kirksville, Mo.	2M,10M
VanDamme, Michael M.	N6MOF	Heritage	San Jose, Calif.	VHF/UHF/FM,P,RTTY, HF/AM/P/SSB
VanDyke, Dave	KF2DT	Cable TV of	Jersey City, N.J.	2M,440,HF
Vaughan, Jim	K4TXJ	Storer	Louisville, Ky.	
Vaughan, Ray	KD4BBM	Colony	Hialeah, Fla.	
Voiles, Art	N5BZL	Texscan	Fort Dodge, Iowa	
Voorman, Jim	WA2GSX			
Vyverberg, Chuck	WB7NNF	Cox	Spokane, Wash.	VHF,Packet
Wagenblast, Rich	WA2BWP	Falcon Cable	Big Bear Lake, Calif.	
Wagner, John S.	N3IYN	Service Electric	Pottsville, Pa.	
Walker, Dane	WB6JNP	Hughes	Torrance, Calif.	2FM,Packet
Wallpole, Bill	VE3WNW	Maclean Hunter	Owen Sound, Ontario	HF/VHF/UHF CW,SSB,FM
Wanderer, Bob	AA0CY	TCI	Denver, Colo.	CW/SSB/160-10,2FM, 440FM
Warburton, Peter	G8UGK	ARCOM	Syracuse, N.Y.	
Warren, Larry	N4ZE	Anixter	Bensenville, Ill.	2FM,80-10 SSB
Wasleske, Bruce	WB9YVT	Jones	Mosinee, Wis.	
Watt, Philip	KB7IQO	TCI	Anaconda, Mont.	
Weeks, Randy	KB9BFZ	DH Satellite	Prairie duChien, Wis.	
White, Thomas	KB9ACX	Heritage	South Bend, Ind.	AM,FM,SSB,CW
Wicks, Wayne	WA2KEC		Littleton Colo.	2FM,HF/SSB
Wightman, Gary	WA8MCD	Cablevision	Kalamazoo, Mich.	2FM
Wilke, Allen	KE0EN	ATC	Kansas City, Mo.	HF/CW,SSB
Wilkenson, Mike	N5IQP	Precision	Richardson, Texas	SSB,Packet,FM
Williams, Robert T.	K5BFT	Century	Portsmouth, Ohio	
Williams, Steve	KA1WAM	Continental	Beverly, Mass.	
Wiltshire, Dan	KB8BKF	Pioneer	Columbus, Ohio	SSB,CW,Novice bands
Winn, Al	KA9CAS	ATC	Terre Haute, Ind.	2M,10M,Packet,HF NET?
Witherspoon, Brian K.	KB4RAB	Alert Cable TV	Clayton, N.C.	CW
Witt, Scot	N9AZI	Col. of Dupage	Glen Ellyn, Ill.	
Wolcott, Mike	WB4OEX	S-A	Atlanta, Ga.	
Wolford, James	WB8FAX	Texscan	El Paso, Texas	
Wonn, Jim	W3GCZ	Avantek	Folsom, Calif.	
Woods, Emmitte	KA7NEH	Cooke Cablevision	Cle Elum, Wash.	SSB,FM,AM
Wouw, Tony	VE7CCI	ComLink	N. Vancouver, British Columbia	
Wyatt, Tim	KA0TYE	ATC	Kansas City, Mo.	
Yorks, Sal	WD4NZX	Phillips	Manlius, N.Y.	
Young, Mark	N2MTT	Phillips	Manlius, N.Y.	
Young, Scott	N4HLA	ATC	Memphis, Tenn.	
Younker, Dennis	NE6I	Jones	Spring Valley, CA	CW,SSB,FM,160-2
Zeidler Sr., David H.	WB6TBT	LucasFilm	San Rafael, Calif.	2FM,HF/SSB
Zhorne, Brent	WB9FHI	TCI	Galesburg, Ill.	HF/SSB,RTTY,Packet, 2FM,440FM

Instument calibration and verification

(Continued from page 30)

duce 20 µV/m at 133.2625 MHz to a 75 ohm receiver, the formula would specify an attenuator setting of approximately 54 dB. In preparation for performing the instrument evaluation, pre-calculate the various attenuator settings that will be used to verify the squelch break point and meter linearity.

Instrumentation that was not designed to be utilized with a tuned dipole antenna or to offer quantitative readings, such as relative detectors that squeal or warble, may require somewhat different techniques and units of measure. Consult the manufacturer for technical guidance prior to performing the verification test.

Commercial equipment is available that automatically performs the previous calculations and sets the test signals to the desired levels. Such equipment greatly simplifies the port verification task and will work with almost all current leakage receivers.

Testing in the vehicle

Testing the patrol vehicle may prove to be somewhat aggravating. Many variables exist that can alter or disrupt the RF field around the antenna, invalidating the readings. Undesired ground planes, ladders and other routine equipment acting as parasitic reflectors and directors, and field polarization effects can all accumulate to produce readings that are either higher or lower or directive. This may be acceptable in the monitoring mode where the technician desires only an indication of the presence of the leak, but may severely hamper the process of quantifying the severity.

The best approach to this problem, although not all-inclusive, is to evaluate the patrol vehicle by driving it into the presence of a field of known intensity, preferably caused by an actual leak. Drive the vehicle toward and away from the leak from as many directions as possible while making measurements using the prescribed techniques defined by the Federal Communications Commission. Verify that, in all cases, the vehicle will receive the leak from the desired range, and learn the oddities of the vehicle's pickup patterns. It will have them!

Calibrated leaks at the headend or office have limited value since they do not have all of the characteristics of a naturally occurring leak, but do ease the mind that the receiver is working. When setting up a calibrated leak, use a directive antenna as the radiating element because it focuses the energy into the general test area rather than spraying it through the environment. A dipole antenna is not recommended. Place the antenna in the horizontal plane, and direct it toward a point where it will be convenient to drive vehicles for testing. Select this point to be relatively close to the radiating antenna. Using the same equipment as used for CLI measurement, adjust the power to the transmit antenna until a low level field, such as 10^{-19} µV/m, is achieved at the point of vehicle reception. Once the calibrated leak is set up, make a practice of driving the vehicles through the field as they leave the lot, noting any extremely erroneous reading or a change in indication day-to-day. While not precise, this technique will help weed out defective or degraded receivers before faulty data is taken and ensure the reliability of your monitoring campaign. (Remember to turn off the test system when not in use.)

Testing at 3 meters

All tests of which the results are to be submitted for CLI calculations should be taken from 3 meters, as prescribed by

Most injuries aren't from falling off a ladder.

Unfortunately, they occur when technicians struggle to load or unload ladders from old-fashioned, roof-top carriers.

Fortunately, Crown has designed a product that can help prevent those twisted ankles, banged up knees and pulled back muscles. It's the Slide-Down™ Ladder Rack, widely acclaimed by both safety personnel and on-the-job employees.

Popular with small and big fleets alike, the Slide-Down™ Ladder Rack puts the ladder "Within Arms Reach™"... enabling the ladder to slide from roof top to the side of the van for sure-footed ease of loading and unloading. It goes back up just as easily!

For information on the Slide-Down™ Ladder Rack and Crown's full line up of interior products, call toll free: **1-800-321-4934** (In Ohio: **1-800-525-2485**).

CROWN

THE CROWN DIVISIONS
of THE ALLEN GROUP INC.
1654 Old Mansfield Road
Wooster, Ohio 44691

Visit Crown at Booths 168, 170 at the SCTE show. *Reader Service Number 44*

Part 76 of the *Federal Code of Regulations*. Most commercial suppliers conform to this requirement when outlining the test process in their manuals. Since the general techniques are relatively simple and easy to understand, there is no need to review them here. However, one problem can arise that should be considered: On occasion, two different instruments may give differing readings and it is often difficult to decide which reading is most accurate. A simple way to solve the problem is to compare both readings to a third set taken with a SLM, which functions as a "judge."

A modern SLM functions fairly well as a precision receiver, but, like any technical device, in any particular application it displays a mix of pluses and minuses. The receiver's bandwidth and other characteristics make the SLM an excellent instrument for peak level detection, whether the carrier is modulated or not. On the other hand, these same attributes reduce the overall sensitivity of the receiver for low-level detection. The SLM's frequency agility is useful if the leakage receivers are not on the same frequency, but beware, the SLM may confirm both readings since a natural leak may not be a flat radiator. If these facts are taken into consideration, an SLM can be very helpful in solving correlation problems when used properly.

Figure 2 (on page 30) shows the proper instrument setup. The dipole should be cut or adjusted for the proper frequency. A filter or preselector should be inserted between the output of the antenna and the preamplifier to guard against overloads due to strong nearby broadcast channels (such as that 50,000 watt rock-and-roll FM station five miles from the test site). The amplifier will improve the noise floor of the SLM by the amount of gain. Now we're ready to take readings.

To secure a reading, rotate the antenna 180° and record the peak level in dBmV. The technician must now correct the reading to reflect the levels at the output of the dipole antenna. Use the following formula:

$$D = S - A + F + C$$

Where:
D = Level at the dipole connector
S = Level at the signal level meter
A = Gain of the amplifier
F = Loss of the filter at the test frequency
C = Cable loss at the test frequency

This formula will correct the reading for gains and losses of the test setup and yield a reading ready for unit transfer.

Since the SLM gives readings in dBmV and leakage measurements are in units of μV/m, we must use the following formula to correct the readings:

$$E = 20.68 \times F \times \log\text{-}1(D/20)$$

Where:
E = Reading in μV/m
F = Frequency in MHz
D = Level at the dipole in dBmV

Most of these mathematics can be worked out in advance and a table created for quick reference.

Conclusion

Other techniques also are available to ease the task and improve the precision of field intensity measurements. In general, if responsible policies are enacted that are based on good engineering practice and procedure, the cable operator should have few problems meeting and exceeding the current regulations. But one should consider the task involved as much an art as a science. **CT**

WHAT YOU WANT IN SERVICE TRUCK EQUIPMENT

You want **versatility**. Masterack modular construction allows you to design a service vehicle to fit your own needs. Pre-planned interior kits, ladder racks, and a full line of accessories are available. You want **dependability**. Masterack parts are proven day and night, through many years of rugged service. Whether you need to upfit one vehicle ore one hundred, our goal is complete customer satisfaction. You want **value**. Masterack equipment is economical because we manufacture parts for thousands of users and we stock parts so you can quickly get yours. For innovative, quality products and complete installation services combined with custom design services and in-stock pre-planned vehicle interior systems, **you want Masterack**.

masterack

DIVISION OF LEGGETT & PLATT, INC.

masterack

905 Memorial Drive, SE
P.O. Box 100055
Atlanta, Georgia 30348
(404) 525-5501 • 1-800-334-4183

Reader Service Number 123

Digital RF tracking/mapping

(Continued from page 32)

ered according to size, weight and accuracy. One of these is the rubidium clock, which is accurate to one part in 10^{12} (1 nanosecond). This progressed to what is used today. The cesium atomic clock is accurate to one part in 10^{13} (0.1 nanosecond). The time is so precise it's almost magical. It is based on the universal coordinated time (UTC), which also is known as Greenwich mean or Zulu time. (See Figure 1 on page 32.)

Two frequencies are transmitted: L-1 at 1,575.42 MHz and L-2 at 1,227.6 MHz. These frequencies are then modulated by pseudo-random codes. The course acquisition (C/A) or gold code is at 1.023 Mbps and the precise (P) code is at 10.23 Mbps. The C/A code repeats every millisecond and the P code repeats every seven days. L-1 and L-2 frequencies were not randomly chosen (10.23 x 120 = 1,227.6 and 10.23 x 154 = 1,575.42). Most GPS receivers utilize the L-1 frequency and the C/A code.

The next utility

Communications and navigation. They go together like salt and pepper. The GPS community is calling this new navigation phenomenon the next utility because of its ability to let you know where you are anywhere in the world. It seems inevitable that this GPS utility will integrate with other utilities. Cable is a logical choice since it has many resources that qualify it for this alliance.

First of all, let's discuss GPS accuracy as it's applied to digital mapping. Eighteen satellites are in place now. There will be 24 satellites in six orbital planes, inclined 55° to the equator, spaced 60° apart. Six planes x 60° = 360° circle. This constellation is scheduled for completion in 1993.

Right now we have 2D or horizontal coverage for 22 hours a day. Even though there is coverage for 22 hours, at times the geometric dilution of precision (GDOP) isn't the best. There is a nominal scale for this. Anything below six is good. The 24 satellites in orbit will provide a constant GDOP of two, which is great. Right now, if the GDOP gets to around eight, which it occasionally does, the horizontal picture will wander somewhat, but you can still see what streets you drove on.

The earth-centered ranging (along with the GPS user's location) produces a special polyhedron that influences the GDOP based on its volume. As the volume increases, the GDOP decreases. (See Figure 2 on page 32.) As more satellites go up, the GDOP and the resolution of digital mapping will improve. This is comparable to TV or computer monitors' resolution improving — e.g., high definition TV or Super VGA, respectively.

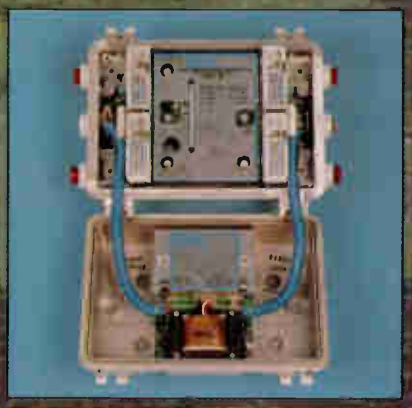
Another thing to remember is that the GPS community is in the process of remapping the world using GPS. Most of the inaccuracies of our current maps are vertical because of the varying effects of gravity. Isaac Newton was on to this when he predicted a pendulum clock set in Paris would lose time at the equator. As the remapping is done, the horizontal as well as the vertical accuracy will improve. It would be wise to make sure the digital mapping program allows for free upgrades so the remapping can be realized.

Differential GPS

All this leads our discussion to a very hot topic in the GPS world right

Imitation is the sincerest form of flattery.

But wouldn't you rather have the original?



Texscan's leadership in Opto/RF broadband network technology has made the **Pathmaker Plus+** family of system amplifiers the industry's most flexible and cost-effective products for use in all architectural applications. Texscan's commitment to development in the integration of optics and RF has resulted in a long list of outstanding achievements.

- The **"Flamethrower"** Series of high performance system amplifiers based on the industry's **first true** 1 Gigahertz platform. The **"Flamethrower"** system amplifier features **unequalled** RF output **capability** and **flexibility.**
- The industry's **first** and **only fully** integrated Opto/RF amplifiers based on the **FMX** Series optical mainframe with "plug-in" optical modularity for optimum performance, flexibility and serviceability.
- The industry's first high isolation A/B Opto/RF switched fiber node.
- The **PAL** Series system amplifiers built around a common platform with features such as gain versions to **40 dB** in fixed pad/equalizer or vernier control, bandwidths up to **750 MHz** with **1 Gigahertz** when available, **ASG, AGC** or manual versions; **dual output** capability with **internal plug-in passive** splitter/coupler; modular upgradeability for AM optics with full optical video return.
- The **Pathmaker Plus+ FTDA** Series of high performance system amplifiers and mini-trunk bridgers with unequalled output capabilities, available in bandwidths to **750 MHz** and a **1 Gigahertz** platform for future expansion.
- The **SSA** (Subscriber Service Amplifier) and the **S-PAL** system amplifiers designed for pedestal or cabinet applications with no 90 degree connections or external passives. The **SSA** is **modularly upgradeable** for fiber to the subscriber node applications.
- The **"Tex-Cell" Network Architecture** based on Texscan's **Pathmaker Plus+ "Flamethrower"** system amplifiers. This architecture allows the least amount of actives per mile while addressing the applications of future revenue opportunities such as PCN, video on demand, etc.

These Texscan "originals" have proven themselves in actual system applications with power enough to integrate tomorrow's technologies without reconstruction, reconfiguration or reinvestment. Like other "works of art," they have spawned many "copies."

Don't accept a "copy;" find out more about these Texscan originals.
Contact your local Texscan representative for more information.

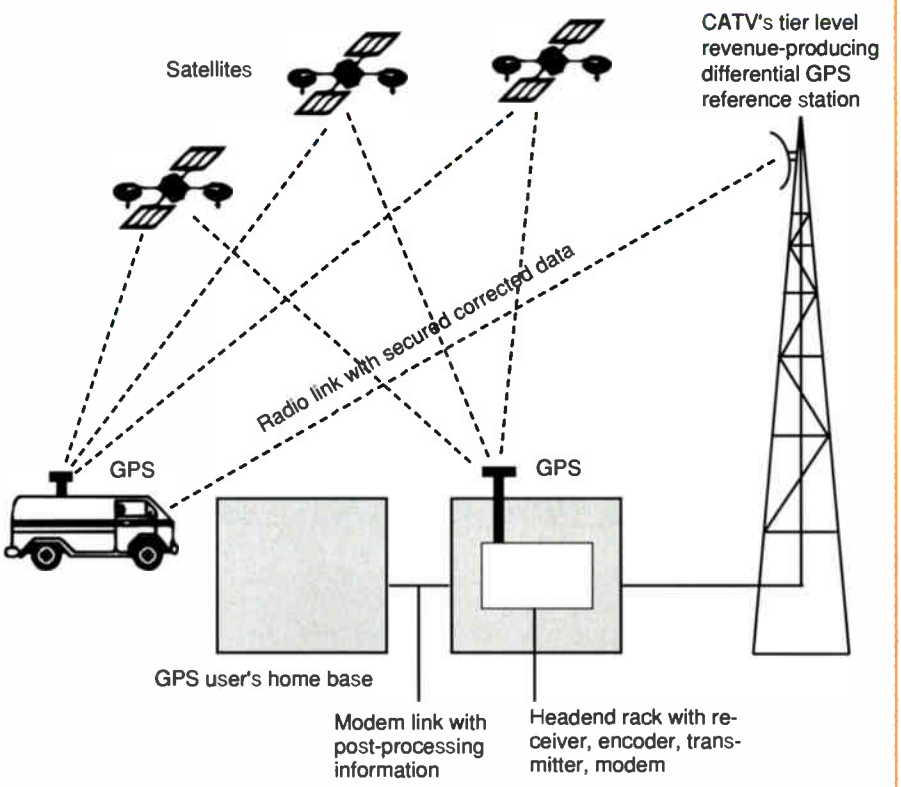
=Texscan "firsts"

Texscan

Communication Products Division
10841 Pellicano Dr. El Paso, Texas 79935
(915) 594-3555 or 800 351 2345 Fax (915) 591-6984

Reader Service Number 48

Figure 3



now — differential GPS (DGPS). DGPS will provide an average GPS user with 2-5 meter accuracy. Think about this for a moment — it is accuracy under 15 feet. Centimeter accuracy also is possible. This would be a topic for a whole other article.

Differential GPS reference stations are the ticket. What this station does is a simple concept. It compensates for all inaccuracies (including selective availability). The DGPS receiver is placed at a known location. A surveyor provides this information working off a known benchmark. The receiver now knows the following two things: where it is physically located and what it is receiving from the satellite. Every subsequent measurement taken is mathematically corrected. This data is the same correction needed for all GPS users in an immediate area of about a 100-mile radius. Since GPS time stamps all of its measurements, it is a simple procedure to correlate the data.

Now this brings us to the delivery of this corrected data. The two methods are post-processed vs. real-time. Post-processing applies corrected data to the gathered data (from a vehicle in

the field) at the end of the day or gathering session. The corrections are made before the data is entered into the digital mapping program. The map then displays 2-5 meter accuracy.

The other side of the coin is a real-time application. The corrected data is transmitted to the immediate 100-mile radius area via UHF or VHF telemetry. The users in the field receive this data with their radio links and the corrections are applied in real time. This is valuable for fleet management situations like police, fire, ambulance, etc.

There are currently only a handful of these differential reference stations in the country. The Coast Guard has set up most of them, but there also is a private company in Tennessee offering this service on the subcarrier of an FM station. The correction signal is a small amount of data that takes very little digital room. What we're talking about here is a service that is provided to authorized users for a fee. It will be desirable for this service to be available nationwide.

CATV has a natural infrastructure already in place to provide this service. Nearly every CATV franchise has a headend tower that would be perfect for transmitting real-time corrections to an area and CATV's close affiliate ties with TV and radio stations won't hurt either. As well, a headend computer environment is perfect. Backup power supplies and lightning-fast switches equal redundancy and integrity. All of this is possible along with the benefit that it would be under the watchful eye of a headend tech instead of at an unattended remote location. The post-processed corrected data could be delivered by telephone modems. One cable company could provide this service to all the other cable companies in the area as well as other GPS users like police, fire fighters, surveyors and ambulances. The list of users is growing every day. Also the CATV world has the necessary expertise to secure this service to authorized users only.

"Nearly every CATV franchise has a headend tower that would be perfect for transmitting real-time corrections to an area."

CATV is always looking for new sources of revenue as the recent example of digital audio services shows. Here is a tremendous opportunity right now during differential GPS's formative years for CATV to get involved.

Government support looks good. An official at the Department of Transportation agrees that the cable industry is the perfect choice for GPS. (See Figure 3.) A DOD official approves of this expedited civilian application of a military creation. Maybe CATV's lessons of peaceful coexistence with aviation also could apply to the GPS's military and civilian communities. An official at the FCC says there are no restrictions to CATV from providing this service. This seems to echo the challenge: "Go for it!"

The time is now. Opportunities are usually timely by nature. This reminds me of the "Larry King Live" session at last month's National Show. King talked about Yogi Berra's solution to a fork in the road. Yogi says take it! Let's continue to define this new industry and realize its full potential to enhance and serve the CATV community. **CT**

CATV power distribution analysis

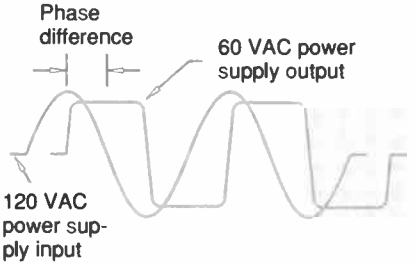
(Continued from page 35)

amount of current drawn by the amplifier power supply increases when the AC voltage increases, and decreases when the AC voltage decreases (just like Ohm's law predicts). This will become important later when we discuss stability with the presence of sheath currents.

The majority of the larger amplifiers now use a power supply design known as the "switching or switchmode" power supply. The switchmode power supply (SMPS) provides the same AC to DC conversion and voltage regulation as the linear regulator, but is much more efficient and reliable.

The term "switchmode" is a description of the technique of pulse width modulation where the "on-time" of a transistor switch is automatically adjusted every time it is turned on at a high frequency (20-50 kilohertz) to conduct an adjustable amount of current to always maintain the right output voltage. Because the transistor "switch" is either off or fully turned on (which is its lowest loss conductive state) it operates very efficiently. It is typically 85 to 90 percent efficient where the linear regulator can be 50 to 70 percent efficient. The SMPS also can operate over a wider range of input voltage. Higher efficiency amplifier power supplies allow more amplifiers to be fed by each AC power supply and of course reduce power costs.

Figure 6: Ferroresonant transformer input-to-output phase shift



It is important to note that the switchmode power supply is not a linear load but a "constant power load." Due to the characteristics of the regulator, it is constantly adjusting its input current draw relative to input voltage in order to maintain a constant power output to the amplifier. For example, if the input voltage to the SMPS is decreased, the input current draw increases by the same percentage in order to maintain the constant power output to the amplifier. This is opposite to the behavior of linear power supplies.

Grounding

Grounding and bonding are required for several reasons, safety being the primary one. It is necessary to ensure that there is no difference in potential between the sheath and strand combination and the utility neutral (and ground risers) to prevent electric shock to personnel. Grounding also provides a low impedance path for fault currents to discharge through. The National Electrical Safety Code (NESC) requires that the CATV strand be bonded to the utility company neutral conductor several times per mile. While this requirement provides a reasonable guarantee that there will be no dangerous voltage potential developed between the utility neutral and sheath/strand for operator safety, it also can cause a significant problem for system reliability. →

The fight was called in Round 5 because of snow.

Right now, your subscriber doesn't care if it's after dark and 5° below.

Neither should your test equipment.

Keeping subscribers happy means keeping cable on the air.

Day or night. Weather not withstanding. From Albuquerque to Oslo.

That's why you need test equipment that's built for efficiency around the clock, 365 days a year, anytime, anyplace.

That's the *new SAM 1500* signal analysis meter.

Now with lighted displays for easy reading day or night. Plus a built-in calibrator for added accuracy and reliability, whatever the working environment. Plus custom channel plan programming for international applications, and enhanced internal electronics that send other meters down for the count.

Whether you're buying new or buying to replace, buy right. Ask your sales representative for the SAM 1500. Or call Wavetek at **1-800-622-5515**.

SAM 1500 *For added reliability and convenience, the new SAM 1500 signal analysis meter features lighted displays and a built-in calibrator.*

See us at the SCTE Cable-Tec Expo, Booth 600-606.

Reader Service Number 52 For Literature Reader Service Number 134 For Demo

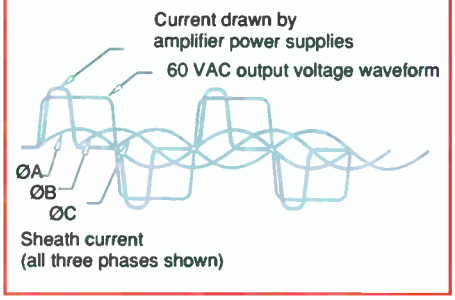
WAVETEK

What is ground?

Traditional wisdom on grounding has been "more is better." The mental picture of "electrical ground" as an equal impedance current sponge is hard to abandon. The truth is that because of varying soil conditions (conductivity), varying ground conductor lengths, impedances and surface conduction, ground is really a relative concept. The effectiveness of contact with "ground" to conduct electrical current is extremely variable and complex.

The purpose of grounding the wye connected three-phase utility neutral is primarily for fault current conditions (to open fuses and circuit breakers) and to guarantee a common reference. Ideally, if the load on all three phases is the same, there should be no current flow through the neutral conductor. In reality the utility companies attempt to balance the phase load within 20 percent under normal circumstances. Whenever a storm moves through a particular area and either causes a phase imbalance by a lightning strike or by a wind-downed tree that opens one or more phase conductors, excessive current will flow through the neutral conductor back toward the utility substation.

Figure 7: Waveform seen in areas with sheath current



Longitudinal sheath currents

The problem of course is the electrical connection (safety bond) of the sheath/strand and utility neutral conductor. The high current flowing in the utility neutral will seek the lowest impedance return path that may be entirely or partially through sections of the CATV sheath and strand as facilitated by the bond connections. In reality the neutral return current will divide through several paths relative to each paths' resistance. Several hundred amperes of current flow under these circumstances is not uncommon, with a percentage of that current flowing through bond connections, down the sheath/strand and back out to the neutral or ground rods at downstream bond locations.

It is not only storm activity that can initiate this condition. Vehicle collisions with poles, overload of only one of the three phases by a large industrial user (such as large motor start-up), irrigation pumps, power factor correction capacitors, utility routing switching, or even permanent phase imbalance in some locations can result in steady-state high neutral current.

I have been at cable systems where there were two separate utility companies serving a community with the cable sheath and strand providing the interconnection path between the two utility neutral networks. Sheath currents in the order of 10 to 30 amperes were measured continuously with evidence of transient current pulses 10 times those amounts.

More is not necessarily better when planning ground locations. This contradicts traditional thinking, but many operators are grounding to minimum

code requirements and no more than that. As can be seen from the analysis of the network, additional ground locations can actually increase the likelihood of damage due to voltage spikes (generated by sheath current flow through cable resistance and inductively and capacitively coupled to the center conductor) as well as over-current damage to connectors, equipment chassis, etc.

Typically the CATV grounding network (at power supply locations) is more recent and of lower impedance than the older utility ground system and is one of the preferred paths for fault current to take to ground. Also beware of the pole locations with the "horn" type lightning protectors on the high voltage conductors. When these are subjected to a high voltage transient such as caused by lightning, they ionize and conduct the transient and high voltage currents from possibly all three phases to neutral and down the ground riser. This is a location to avoid for any CATV power supply, sheath/strand bond or CATV ground rod. (See Figure 4 on page 35.)

In addition to carefully selecting minimized grounding and bond locations (when possible), active transient protection can be employed with good results. Crowbar devices are very effective at literally "crowbarring" transient voltages to near zero at active locations. The fast response solid-state clamping action provides essentially a voltage triggered short-circuit that activates at about 110 volts peak (the normal 60 VAC square wave is 72 volts peak) and dissipates the transient energy. Use of crowbars with attention to grounding and bonding has reduced spike and surge-caused outages by as much as 80 percent, especially in cable systems located in the high lightning areas in the southeastern United States.

There have been several excellent articles written on sheath currents over the years that go into greater detail about the topic than this discussion. However, most of the attention given to sheath currents is in reference to the over-voltage and over-current damage they can cause. Unfortunately this is not the only possible effect.

Measuring sheath current accurately

Longitudinal sheath currents not only cause damage by generating voltage spikes and brief over-current conditions during utility overload conditions. Sheath current can be present at a steady state level that can seriously affect the stability of the CATV power supply cascade. The only effective way to accurately measure sheath currents in the plant is by the use of an oscilloscope (preferably digital storage type) and an oscilloscope current probe adapter.

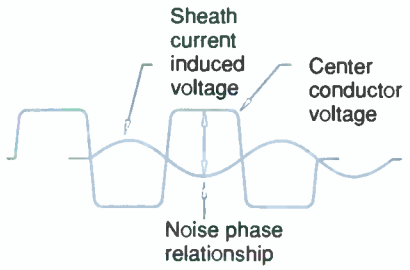
Although a common clamp-on ammeter can indicate neutral current flow in the strand or ground risers, it usually is not accurate when clamped around a coaxial conductor. This is due to the unpredictable effect of power supply output current being canceled by power supply neutral current flowing in the opposite direction. If 14 amperes were flowing out of the center conductor at the power supply and exactly 14 amperes were returning to the power supply on the sheath, a clamp-on ammeter would read zero because the two equal currents cancel each other out. If this was the case and there was utility return current

present on the sheath, the ammeter reading would be accurate in indicating the amount. I have not seen a power supply location yet where the hot and neutral currents were identical; usually the measured power supply return current is 50 to 70 percent of the outgoing center conductor current. This is because of the multiple other return paths (ground rods, strand, etc.) for the power supply return current to take.

When an oscilloscope current probe is clamped around either the power supply output lead, the strand or the coax itself, various current waveforms can be observed and quantified. It is easy to visually distinguish between the center conductor, power supply neutral and sheath current waveforms. I realize that many systems do not have access to this equipment, but by using a low-cost clamp-on ammeter to detect the problem initially, an oscilloscope can later be rented or borrowed for a short time to fully diagnose an area with a serious problem. When viewing the scope, the highest amplitude current waveform will usually be the current supplied to the amplifiers by the AC power supply.

Since the typical load on an AC power supply is about 70 to 90 percent of its nameplate rating (for example a 15 ampere supply x .80 = 12 amperes RMS), look for the waveform in-phase with the square wave output voltage of the AC supply. Depending on the type of amplifier power supplies in use (linear or switching) the current waveform will either be similar to a square wave, or will be a narrower pulse with a high "peak." (See Figure 5 on page 35.)

Figure 8: Power supply voltage and sheath voltage phase difference



Sheath current is caused by utility neutral return current from one, two or all three of the phases in the utility grid. Since the utility voltage is a sine wave, any utility return current will be close to a sine wave as well, and can be seen with the oscilloscope as lower in amplitude and shifted in phase from the AC power supply output current waveform.

There is a normal phase shift from primary to secondary in a ferroresonant transformer that varies depending on load and input voltage. If you were to look at the input voltage sine wave with one trace of the scope and the output square wave with the other trace at the same time, you would see the phase shift of the two waveforms. (See Figure 6 on page 60.)

By looking for the presence of current waveforms other than the normal output current of the AC power supply you can detect, measure the amplitude and even locate the particular phase that is most prevalent and it could possibly be reduced by the utility company. You also can observe any changes to the amount of sheath current when you remove, add or relocate a ground or bond in that general vicinity. The important thing to note is that sheath current can change on an hourly or daily basis depending on utility conditions, soil moisture (ground rod conductivity), or a multitude of other factors. The objective is to reduce the average amount of steady state current as much as possible for the reasons that follow. (See Figure 7 on page 62.)

Power network stability

Sheath current can cause damaging voltage transients for brief time periods when there is a sudden overload or imbalance somewhere in the utility grid that caused the fault current to flow. What happens when there is a certain amount of sheath current always present in a particular section of trunk cable? Remember that current flowing in a conductor with resistance (sheath/strand) generates a voltage across that conductor.

This "sheath voltage" can be up to several volts or even tens of volts depending upon the amount of current and resistance present. This is a 60 cycle AC voltage comprised of one or all three of the utility phases. Depending on the phase relationship of the sheath voltage and power supply voltage and direction of utility neutral current through the sheath and strand, the voltages can be additive. This can result in a higher than normal voltage in certain sections of the cascade. This may not be a problem because the system was designed with a worst-

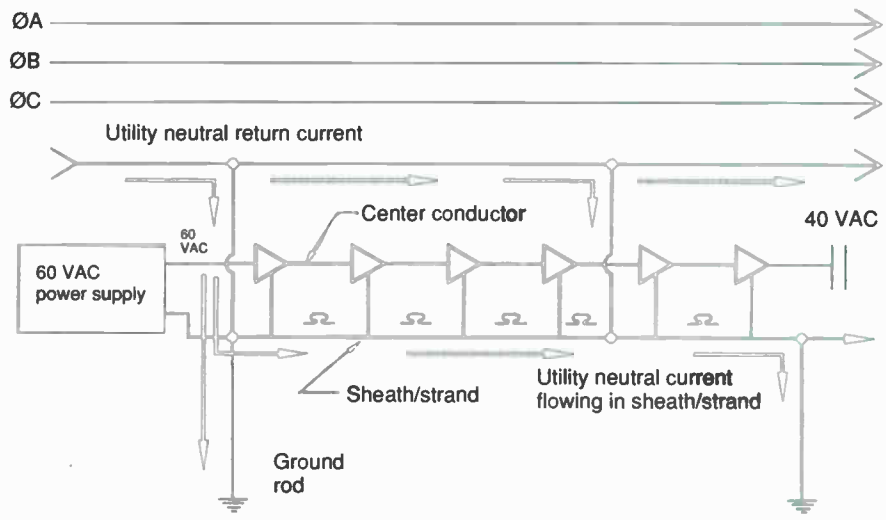
case minimum voltage at the last active and any slight increase in voltage due to sheath voltage effects is not going to hurt anything. This phenomenon explains why some of you have measured a voltage higher than the output terminals of the AC power supply the further downstream you measure!

If this condition persisted with no change, there would be no cause for alarm but due to the unstable nature of sheath current levels and what particular phase is most prevalent at a given time, this condition most likely will change often. (See Figure 8.)

The real problem occurs when the sheath and power supply voltages become additive under certain phase conditions. As in the previous example, the system was designed with an end of line voltage at the last active in cascade of let's say, 40 VAC. This is a safe margin to prevent hum modulation (due to the amplifier power supply dropping out of regulation). When the two voltage waveforms are in-phase, they subtract from each other and the result is a lower than expected voltage at the last active (perhaps now 30 volts instead of 40 volts).

Hum modulation could now occur at this location due to the low voltage. If this amplifier has a linear power supply, then because the voltage is lower the input current draw will decrease. This will reduce the IR drop somewhat from the AC power supply through the cascade producing a "self-stabilizing effect." If all the amplifiers in this example utilized switchmode power supplies with the previously described constant power characteristic, the result would be worse.

Figure 9: Utility current distribution in bonded CATV plant



The voltage decrease seen at the last active would result in a corresponding increase in input current. This increased current draw through the cascade would result in an increased voltage drop at the next to last amplifier causing increased current draw that causes a further drop in voltage for the next device upstream and so on. What usually happens is within 5 to 10 seconds the entire cascade draws so much excessive current that it collapses the ferroresonant transformer output in a similar fashion to a short circuit. (See Figure 9.)

It is important to note that even a lightly loaded AC supply can be overloaded by this effect if the amplitude of the sheath voltage was high enough and in-phase with the AC power supply output. This problem can be observed with standby or non-standby power supplies where the majority of the amplifiers are equipped with switchmode power supplies and there is significant sheath voltage present. In many cases, the problem is only observed when a power supply goes into standby. All standby supplies operate the inverter at a slightly different frequency than the AC utility. Some fluctuate more than others. Often an outage may occur only on the utility phase that is powering a particular power supply causing it to transfer into standby. This is quite common in windstorms where a tree branch may fall only on one of the utility phase conductors. Now the power supply is in standby but there may still be sheath voltage present from the other

two phases that are still active. Perhaps the sheath voltage may even be higher due to the imbalance condition caused by the downed line. Due to the inverter running at a slightly different frequency than the remaining sheath voltage, the power supply output will "drift" slowly in, then out of phase, with the sheath voltage causing the previously described increase and then decrease of voltage and corresponding change in current drawn by the cascade.

This condition can be a noticeable movement back and forth of the AC power supply ammeter indicating the changes in current flow to the system or a complete overload causing the transformer to foldback and drop the system out of operation. This is not an AC power supply problem since most supplies can operate in excess of their nameplate rating with no difficulty. Rather, it is a system design issue. In areas with minimal or no sheath current problems, this phenomenon will not occur. In systems that have overloaded the AC power supplies and experience excessive sheath voltages from time to time, this problem could happen. Even if the supplies are loaded at 70 to 80 percent of their output rating, this situation could occur given certain conditions such as excessive sheath voltage and phase shift occurring in either AC mode or standby.

"By providing a square wave voltage through the coax to each amplifier power supply, the delivery of power is more effective than it would be with a sine wave."

Conclusion and recommendations

Cable system powering can be a complex network to analyze, consisting of many variables that are often interrelated. For maximum system performance and reliability, the following coordinated approach to system design and maintenance should be adhered to:

1) Ground to code requirements and minimize any additional ground locations.

2) Be aware of poor power supply and bonding locations due to utility lightning protectors, poor utility grounds, circuit breakers or reclosers that can cause power interruption to power supply locations, and large industrial load connection points.

3) Be aware of a potential sheath/strand connection of two different substations, utility companies or grid sectors and avoid if possible or install approved ground isolators.

4) Utilize crowbar-type transient protectors in locations with repetitive sheath current induced transients or lightning prone areas.

5) Be aware of the "constant power" characteristic of the switchmode power supply topology. While this is an improvement in efficiency and reliability in the amplifier, it can be a cause of outages in areas of high sheath current under certain circumstances.

6) In system design, always provide for additional margin in AC power supply load calculations to accommodate future growth, changes in coax IR drop over temperature and in areas with poor utility grounding that could aggravate sheath currents when the CATV conductors, grounds and bond locations are added. Typical initial installation maximum load is 70 to 80 percent of the nameplate rating. In most designs there is a limitation of load anyway due to the maximum distance and actives powered within voltage drop limits.

7) For maximum reliability, ensure that the end of line actives fed by an AC power supply have enough operating voltage margin to avoid hum modulation and drastic increases in current draw if significant sheath current is present.

8) Verify sheath current characteristics in troublesome areas with an oscilloscope and current probe adapter for maximum accuracy. Remove or add selected ground/bond connections temporarily while observing the sheath current amplitude to pinpoint problem locations. Be cautious of personnel shock hazard during this procedure and never violate the NESC requirements. **CT**

The author wishes to thank Greg Zediker and John Kilcrease for their assistance with this article.

If you're like many cable systems, you're paying way too much for cable. Too much in rebuilds because of moisture and corrosion damage. Too much in truck rolls because of cold weather conductor pullouts. Too much in upgrades because the bandwidth couldn't live up to the demand. Too bad. Because it doesn't cost any more to specify 1 GHz bandwidth, triple-bonded Times Fiber trunk and feeder cable up front. And then reap the rewards of superior cable technology all the way down the line. Call 1 (800) 677-CATV.

TFC TIMES FIBER COMMUNICATIONS, INC.®
an
LPL company

358 Hall Ave. • P.O. Box 384 • Wallingford, CT 06492

See us at the SCTE Cable-Tec Expo, Booth 366. Reader Service Number 59

Simplified return path

(Continued from page 40)

the coaxial cable itself. One of the characteristics of cable loss is the relationship between the loss factor and the frequency of the signals. The lower the signal frequency, the lower the amount of loss of power. To compensate for this characteristic, equalizers are installed periodically — usually at each amplifier. These devices introduce additional losses at the lower frequencies so that the signal power is then equal across the entire band of frequencies passing through the system.

When installing a bidirectional system, the separate bands of frequencies are divided and directed to separate amplifier modules by diplex filters. There must be one of these devices at both the input and the output of each amplifier location. The filters also add to the loss of signal power; typically around 1 dB per location (two filters). There also are likely to be some losses associated with the coupling of signals from status monitor transponders and the feeder reverse path signals. It would be wise to allow 3 or 4 dB of return path loss for each amplifier station.

As well, there are some losses associated with splitting the signal path. Splitters and directional couplers have varying degrees of loss, anywhere from about 1 to as much as 16 dB. In many systems, this will be the majority of the loss in many of the spans, particularly in the more urban settings. Splitter loss is often called "flat loss," since the loss vs. frequency curve is very flat compared to that of cable. These losses do not normally require equalization.

In some instances amplifiers are placed where the combined cable, splitter and equalizer losses are not as great as the operational gain of the amplifier being used. This may be for convenient access to the amplifier or simply a result of the locations of utility

Table 1: Component costs
Return amplifier module

Return amplifier module	$300
Diplex filters, pair	100
Amplifier jumper	25
TMC-8052 C-COR amplifier monitor	595
TMC-806x power supply monitor	410
TMC-9015 headend/system monitor	1,195
LANguard master control unit and software	12,100
Miscellaneous pads and equalizers (per amp)	30

Table 2: Losses for passives

DC-16	
Through loss	1 dB
Tap loss	16 dB
DC-12	
Through loss	2 dB
Tap loss	12 dB
DC-9	
Through loss	2 dB
Tap loss	9 dB
Amplifier station with return jumper	4 dB
Cable loss at 5.5 MHz = .1106 x loss at 450 MHz	

poles. In any event the additional loss needed to provide optimal input power to the amplifier module is provided by installing an attenuation pad. The pad is also a flat loss type device and does not require further equalization in the amplifier location.

In recent years, implementation of return systems has been oversimplified to make the designer's job easier — by installing a return amplifier in every forward amplifier location, and using pads and equalizers to create losses equal to the amplifier gains. In the sub low (5 to 30 MHz) range, typical amplifier operational gain is about 15 dB.

If we now recall the frequency vs. loss curve in cable, we note that the difference in loss at 5.5 MHz (a typical status monitor return frequency) compared to 450 MHz (a typical forward design frequency that determines amplifier spacing) is 89 percent. In a cable-only amplifier spacing, the 450 MHz loss often will be about 22 dB, which is the amplifier's operational gain. At 5.5 MHz the total loss is only about 2.4 dB. Hardly enough to require an amplifier with 15 dB of gain.

Also in this span, the difference in loss in the sub-low band means the loss at 30 MHz is about 5.8 dB. If the system were laid out for full spectrum use, an equalizer would be used to add about 3 dB to the 5.5 MHz loss, yielding a loss of about 5.5 dB. The designer would then have called for a 9 dB pad to yield 14.5 dB of loss to approximately equal the gain of the amplifier.

Two-way simplified

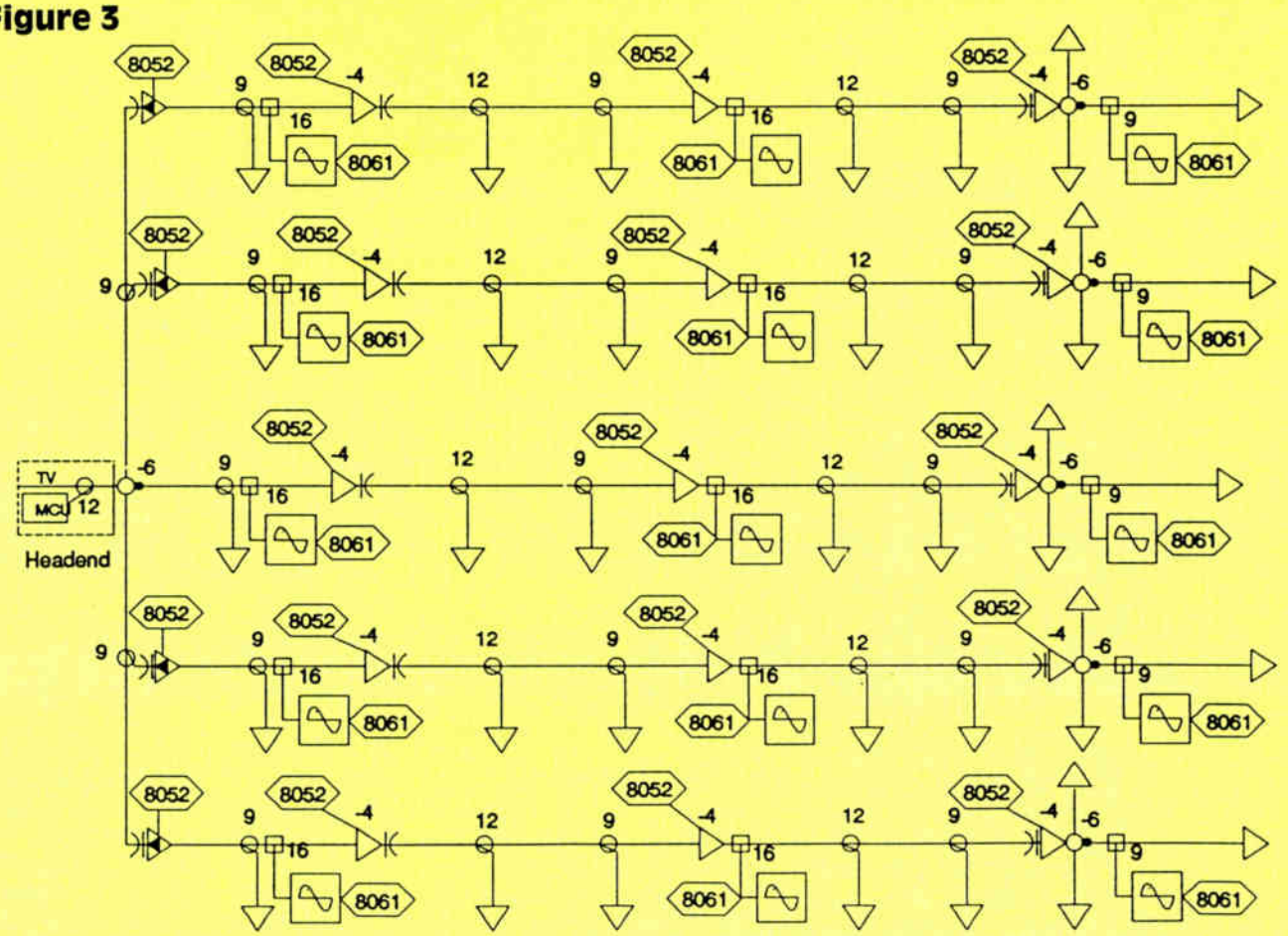
All of this raises the question: Is it really necessary to install all of the return amplifiers, equalizers and pads just to operate a status monitoring system? Happily, the answer is no, absolutely not. In fact, the performance of a status monitoring system will be enhanced by not using amplifiers where they are not required, and by not connecting unnecessary parts of the system to the return path; e.g., feeders that do not have monitoring transponders in them. This is in fact the approach that was generally used in the early days of two-way, when very few services/devices were active in the reverse path, and was due to the reduction in the amount of noise and distortion introduced by the amplifiers themselves as well as the exclusion of undesired signal ingress encountered in the feeder portion of many plants.

Since there is only one frequency to be concerned with equalizers are not a necessary item and only on rare occasions will a pad be required. So, if we need an amplifier only to compensate for cable and splitter losses, how many amplifiers can we expect to eliminate? In our earlier pure cable example, we would need an amplifier only after four spans, or forward amplifier spacings, thus reducing the number by three-fourths.

Of course, the likelihood of four consecutive pure cable spans is not very high. We can, however, expect that the splitter losses on average will cause the need for an amplifier in only one out of every three or four locations, depending on the density of the homes passed (the higher the density, the more splitters). Many suburban and rural systems can expect return amp spacings at about every fourth or fifth location. Adding the 3 dB of internal losses for each amplifier station, we will in all probability need to amplify at every third location.

This means that, on average, most systems could expect to implement a return system with only one-third of the reverse amplifiers installed. On aver-

Figure 3



age, two out of three amplifier locations can be made to pass the reverse signal by installing a simple RF jumper cable in place of the return amplifier module, and jumpers in place of the pads and/or equalizers. This means substantial reduction in the cost of materials and labor required to activate a return system.

While this may not seem like a great deal to some, to many system operators it can be the difference between being able to monitor their standby power supplies or not. If you've spent all that money on standby power supplies and don't monitor them, you've found a pretty expensive means of delaying the inevitable outage for a couple of hours — and of eating a lot of batteries in the bargain.

If power supply monitoring is all that is required, it may be possible to reduce return amplifiers even further. The LANguard TMC-806x transponders for monitoring various makes of power supplies have a 50 dBmV output capability. This, coupled with the sensitivity of the master control unit's receiver (with an optimal receive level of -10 dBmV) allows for a path loss of 60 dB from the first unit in the system to the headend. At 5.5 MHz, that can be a very long span, particularly if it's almost all cable.

As for maximum spacing from a transponder to an amplifier, that would be dependent on the carrier-to-noise requirements of the system as a whole, and the noise figure of the amplifiers. A typical return system would require an input level to the return amplifiers of about 20 dBmV. If a transponder were connected via a 12 dB directional coupler, and considering that the status monitor data carrier typically runs about 10 dB below video, there could be a cumulative loss of 28 dB from there to the nearest return amplifier. In our all-cable model, that would be the sixth amplifier location. Practically, we would expect to see a splitter or two in the path, so the amplifier module would probably be needed at the third or fourth location.

Considering the robustness of the LANguard communications system, the fact that most, if not all, of the feeders will *not* be connected to the return system, and that there will only be one-third of the trunk locations with return amplifiers contributing noise, it is most probable that return system noise and distortion will not be a factor, and can be ignored. Further considering the communications system incorporated into the LANguard system, it should be noted that in conjunction with the Master Control Unit receiver's wide dynamic range and low threshold, the transponders are capable of an output level that is variable over an 18 dB range. This provides the flexibility to push return signals through widely varying lengths of cable, including some very long spans, which can be easily tolerated.

How it works

To illustrate the possible savings using this technique, the following examples, albeit optimized for the purpose, clearly show that in several possible scenarios, a very substantial reduction of the number of return amps is probable.

For the examples, we are going to assume the costs shown in Table 1 (on page 68) for the various components being considered. The amplifier component costs are rough estimates. Different manufacturers and discount structures prohibit listing all of the possibilities. The LANguard costs are based on list prices. →

We also will assume the amplifiers are spaced at 22 dB at 450 MHz, and that the losses associated with the passive devices are as shown in Table 2 (on page 68). Return amplifiers are assumed to provide a station gain of 15 dB.

The first example, as depicted in Figure 1 (on page 40), represents a rural system that has long trunk runs with few splits, and a scenario wherein the operator has chosen to monitor standby power supplies only. In the area shown, there are 42 trunk amplifiers fed by seven standby power supplies. The reverse cascades are two at nine amps each and two at 12 amps each, with a total of 30 amp locations in the required paths. Taking full advantage of the high output levels of the return transmitters, and using various values of directional couplers to optimize that advantage, we are able to monitor all seven power supplies using only six return amplifiers in the 30 locations. The other 24 locations require only diplex filters and jumpers.

Initial analysis shows that monitoring the seven power supplies using the conventional return system will cost $27,870. Using the simplified technique it would cost only $20,370. (See Table 3 on page 74.) In this case, the operator has saved about $7,500 over the old technique of installing a return amp module in every trunk location. This could be the difference in being able to monitor any of the system at all, or could allow the addition of end-of-line monitoring at the four trunk ends and a headend monitor, without exceeding the budget.

Figure 2 (on page 40) shows the same system with the end-of-line monitoring installed. Adding the four end-of-line monitors requires the addition of four more return amps. This is still eight less than the 12 amp locations otherwise required. Installing the headend monitoring equipment does not require any additional return amps, diplex filters, or jumpers, but will cause the cost to exceed the original estimate of $27,870 by $1,075.

Table 4 (on page 74) shows the cost analysis of adding the headend and end-of-line monitoring. Note that the simplified approach represents a savings of 25 percent over the conventional method of installing return systems. The savings for the power supplies-only scenario is nearer 27 percent.

For those of you interested in the technical advantages, the simplified

FiberFone® brand talk sets are the first optical field telephones designed for real world conditions. Even in the dirt and the rain, FiberFones give technicians fast, reliable communications between work locations. Used during the installation, maintenance and restoration of fiber optic cables, FiberFones are the "butt-ins" of the fiber world.

Just connect one spare single mode or multimode fiber and press the CALL button. When the other end answers you have a perfect full duplex communications channel that is good for distances up to 100 km. Multiple work locations can be conferenced together over one fiber so everyone can talk and listen at the same time.

Other features like built-in fiber identification tone, stabilized CW source for loss measurements, optional headset and operation from a variety of power sources make FiberFones useful on any fiber operation . . . even on a nice sunny day.

THE FIRST FIBER OPTIC FIELD TELEPHONE TRULY ENGINEERED FOR DIRT RAIN HEAT MUD SNOW AND HUMIDITY

Industrial Technology, Inc.
P.O. Box 190
2001 FM 1821 South
Mineral Wells, Texas 76067
Tel (817) 325-9461
FAX (817) 325-2255

Industrial Technology

Reader Service Number 66

Table 3: Cost analysis for Figure 1 system

Conventional technique	
30 return amps @ $300 ea.	$9,000
30 pairs diplex filters @ $100 ea.	3,000
7 TMC-806x power supply monitors @ $410 ea.	2,870
1 LANguard control system	12,100
Miscellaneous pads and equalizers	900
Total materials cost	$27,870
Simplified technique	
6 return amps	$1,800
30 pairs diplex filters	3,000
24 return amp jumpers	600
7 TMC-806x power supply monitors	2,870
1 LANguard control system	12,100
Total materials cost	$20,370
Materials cost savings	$7,500

Table 4: Cost analysis for Figure 2 system

Simplified technique	
5 TMC-9015 monitors @ $1,195	$5,975
4 return amps @ $300	1,200
12 pairs diplex filters	1,200
8 return amp jumpers	200
Total added cost	$8,575
Original estimate	$20,370
Complete system monitoring	$28,945
Conventional technique	
42 return amps @ $300 ea.	$12,600
42 pairs diplex filters @ $100 ea.	4,200
42 miscellaneous pads and equalizers	1,260
1 LANguard control system	12,100
7 TMC-806x power supply monitors @ $410 ea.	2,870
5 TMC-9015 end monitors @ $1,195 ea.	5,975
Total materials cost	$39,005
Compete system cost savings	$10,060

technique obviously (in the complete system model) results in a maintenance saving of 32 amplifiers (42 the conventional way and only 10 using the simplified technique) or in other words, a 76 percent reduction. This also means no labor cost to maintain, since the amps are run at full gain and tilt, and the monitoring system itself will alert the operator to any malfunctions.

Additionally, the return amp noise contribution is 6 dB less, resulting in an improvement in overall carrier-to-noise performance for the reverse system. For the power supply-only scenario, the maintenance loading reduces from 30 amplifiers to only six, while the carrier-to-noise improves by a very close 7 dB.

In the next example we will look at a more urban/suburban model where an operator wishes to monitor power supplies and some key amplifier locations. The model is configured assuming C-COR amplifiers with LANguard TMC-8052 transponders and RTS-2A return trunk switches, and Alpha power supplies with TMC-8061 transponders. The TMC-8052 requires either an RTS-2 or RTS-2A return switch to complete the return path. The switch is included with the transponder. It should be noted that the RTS-2A has considerably less injection loss than the RTS-2, and is ideally suited to the objective of providing only key location monitoring and minimum use of return amplifiers. The RTS-2 is designed for use in those systems that are already activated with return amps in every trunk amp location. Again, the model is optimized for the purpose of clarity.

Figure 3 (on page 70) shows a system having 59 amplifiers and 15 power supplies. The operator wants to monitor all of the power supplies and any amplifiers that feed three or more additional amplifiers. Assuming the losses shown in the figure, this system requires only four return amplifiers to accomplish the monitoring. Again, comparing this to the conventional return design, the cost savings is $4,695. (See Table 5.) If this operator wished, he could add the end-of-line monitoring at the ends of three of the trunks for just under the amount of the savings.

Table 5: Cost analysis for Figure 3 system

Conventional technique	
19 return amplifiers	$5,700
19 pairs diplex filters	1,900
Miscellaneous pads and equalizers	570
1 LANguard control system	12,100
15 TMC-806x transponders	6,150
19 TMC-8052 transponders	11,305
Total materials cost	$37,725
Simplified technique	
4 return amplifiers	$1,200
19 pairs diplex filters	1,900
15 jumpers	375
Same LANguard equipment	29,555
Total materials cost	$33,030
Savings in return system	$4,695

Although the savings in this model are only about 12.5 percent of the total cost, the amount represents a 60 percent reduction in the cost of the return system. The amounts in the first and second models represent return system cost reductions of 50 percent and 48 percent respectively.

Conclusions

Aside from the reduction of materials costs and maintenance costs, the simplified technique will save the operator on installation labor costs, since there will be no balancing or sweeping of the return system required during activation. And another operating cost saving resulting from the lower number of return amps is the reduced power consumption. From this we can conclude that the simplified technique will save on both installation and operational costs compared to the conventional technique.

From the examples, we can further conclude that the savings in materials alone can range from 25 percent to as much as 60 percent. For many operators, this means that more status monitoring can be done. For some, it may mean simply that status monitoring can be done **CT**

- Signal Level Meter
- Leakage Detector
- Data Logger

Tricorder

From Trilithic

It's all in the palm of your hand.

Equip your CATV technicians with the new **Tricorder** — a convenient, hand-held instrument weighing less than three pounds but packing three big functions — at a price competitive with instruments that only measure signal levels.

Signal Level Meter Tune from 5 to 1000MHz with a spin of the digital tuning knob. Choose IRC, HRC, NCTA and UHF channel plans, or tune through 10 channels you program in the Tricorder's memory.

Leakage Detector Switch to this mode and verify installed connections are leakage-free. Slip the Tricorder into the optional vehicle mount and survey your system while travelling between jobs.

Data Logger Automatically record the level of every picture and sound carier on the system at dozens of sites, then download the data to a printer or PC for a permanent record.

FCC 24 Hour Test The Tricorder measures and stores the level of every carrier, at user-settable intervals, for up to 30 hours, on internal power — automatically and unattended. When the test is done, download data to a PC or printer for a permanent record.

... all this functionality in the palm of your hand.

Call us today for the full story on the new Tricorder, from Trilithic.

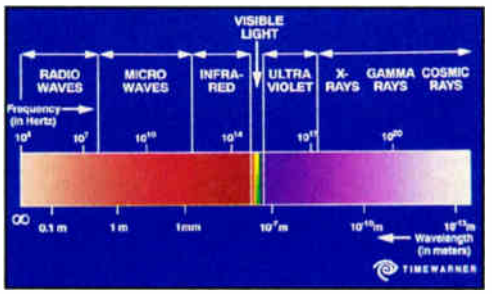
See us at the SCTE Cable-Tec Expo, Booth 335, 337.

TRILITHIC

9202 E. 33rd Street
Indianapolis, Indiana 46236
317-895-3600 800-344-2412 FAX: 317-895-3613

Reader Service Number 50

Figure 2: Radio spectrum allocation



Evolution of CATV

(Continued from page 43)

magnetic spectrum. This ranges from radio waves at relatively long wavelengths down to X-rays and cosmic rays at very short wavelengths. These radiations are most useful in that information can be impressed on them, and transmitted from one point to another. For transmission through the air, however, it is really only radio waves that are useful, and a fairly narrow portion of the radio spectrum at that. Figure 2 illustrates the radio spectrum. Radio frequencies that are too low (like those used in the AM radio band) cannot carry a significant amount of information — certainly not enough for TV pictures. Radio signals at very high frequencies cannot penetrate objects and therefore are limited to line-of-sight communications, as in microwave and satellite links.

There is an increasing amount of competition for the use of the prime bands of radio frequencies. Because TV signals contain lots of information, they require the use of large portions of the radio spectrum. Relatively few over-the-air TV channels can be authorized in any one locality. Negroponte's point is that this is a socially inefficient use of the over-the-air spectrum, which could be used much more effectively for portable and mobile communications.

Even satellite technology is, at best, a transition strategy. While satellites can make use of much higher line-of-sight radio frequencies, there are a limited number of stationary satellite orbits available to any one nation, and therefore a finite limit to even satellite capacity. That capacity is very expensive and will be subject to increasingly competitive demands as well. Satellites are further limited in that it is difficult to use them as a bidirectional communications medium to many users. As television becomes more interactive, this will be an increasing problem.

As Negroponte points out, the real solution, which is probably inevitable in the long run, is to increasingly limit the use of over-the-air frequencies for the delivery of television to people's homes in order to free up those frequencies for other uses. The cables that carry television to the home may be either coaxial or fiber.

Because the capacity to transmit TV channels over-the-air has been so limited, television has always been a medium of scarcity. Today's adults are the first generation in the history of the world to grow up with television. We tend to think of television as a medium where a few dozen channels should be more than sufficient for all of society's needs, but that is because we have been conditioned in this way. This is in sharp contrast to how we think of books, for example, where we expect to have huge selections available to us at our convenience in libraries. We have just begun to think of television in this way with the advent of videotape distribution of programming.

I firmly believe that people will eventually demand immediate access to large libraries of TV material and that cable TV systems that deliver hundreds or even thousands of channels will be the best way to provide that service. In the future, I think that people will look back to today's era of television as being quite primitive by comparison with the tremendous amount of TV information that they will have at their fingertips. This will act tremendously in favor of the further growth of the cable TV industry.

Untapped "plumbing" potential

When people ask me what I do for a living, I tell them I am basically a plumber. Cable TV engineers run a special kind of pipe around a community. We place our plumbing on utility poles or in the ground, until we get it up and down every street. Then we use it to deliver TV signals. We have been doing this for decades. There is enormous untapped potential in this plumbing. Coaxial cable can transport

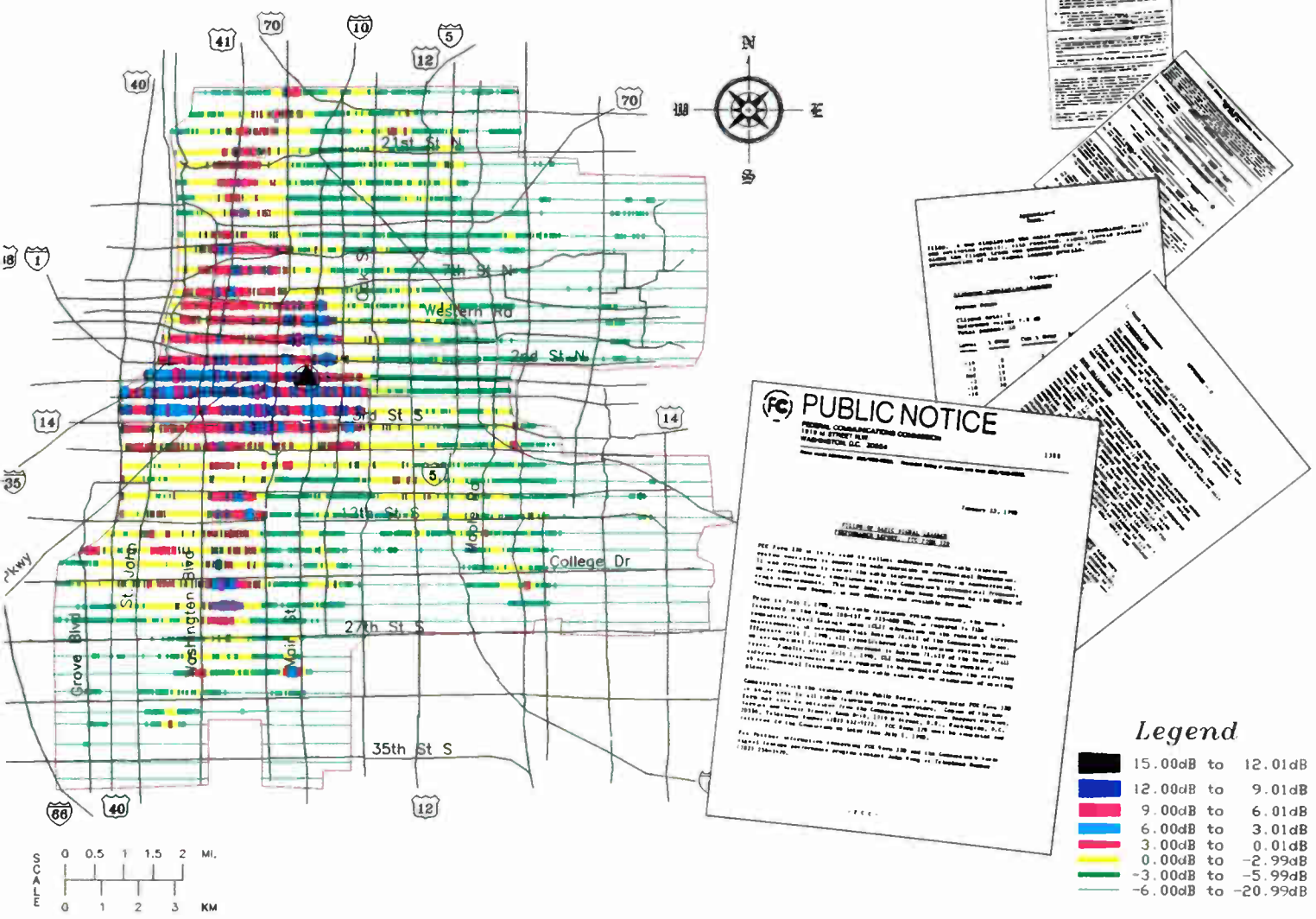
When the task is as critical as

Airborne CLI Testing...

Make Your Choice As Simple As 1, 2, 3...

1. Simply the most advanced technology: The "Rogers System"
2. Simply the most useful reports: 4 color on detailed franchise map.
3. Simply the most experience: Over 400,000 cable miles flown in 1990/1991.

And all of it with <u>never</u> a missed deadline or additional fee. <u>Ever!</u>



That's why Flight Trac has been the choice of more MSO's year after year than all other companies combined. Simply call or write Chris Duros for your free brochure today.

FLIGHT TRAC INC

10108 32nd Ave. West
Everett, WA 98204

Phone: (206) 290-9800
FAX: (206) 290-9338

...We'll help you pass with flying colors.

See us at the SCTE Cable-Tec Expo, Booth 302, 304. Reader Service Number 69

well over 1 GHz (1,000 MHz) of bandwidth, which is enough for over 150 TV channels and can carry rivers of entertainment, education and information.

Why haven't we taken advantage of that? Why aren't we offering 150 channels today? It is because of one key limitation of coaxial cable: radio signals get weaker rapidly as they travel through it. In fact, after they go only a few hundred feet, they grow weaker by half. That leads us to make extensive use of amplifiers to restore signal levels and that leads to some real limitations on how we can use this coaxial medium.

Optical fiber also is a kind of plumbing. It carries information on light instead of on radio waves, but contrary to popular belief, fiber does not have the capacity (with today's electro-optical device technology) to carry significantly more information than coaxial cable. What it does have is much lower transmission loss. That is a very valuable characteristic. There also are some drawbacks to fiber, one of which is that it is very expensive to get really large amounts of information modulated onto light for transportation by fiber and to recover that information to usable form.

What we have discovered is that if we combine the best characteristics of both coaxial cable and optical fiber, we get something very interesting. Fiber is very useful for transmission over long distances, while coaxial cable is very cost-effective for short distances. What makes sense is to design a communications system that uses fiber to get from the center of our cable systems deep into each neighborhood and then go the "last mile" through coaxial cable. The wonderfully good news is that we already have the coaxial cable in place to do that.

The key to making cost-effective use of fiber in cable TV plant is finding ways to avoid the need to reprocess each channel individually as it is converted from the optical domain to the radio frequency domain at the fiber/coax interface. The dream is to build this interface so that it is physically small and relatively inexpensive. Ideally, it should be a weatherproof housing that can be mounted on the strand supporting the fiber and coaxial cable plant, which receives optical signals at its input and is able to directly feed broadband RF signals to the coaxial cable on its output.

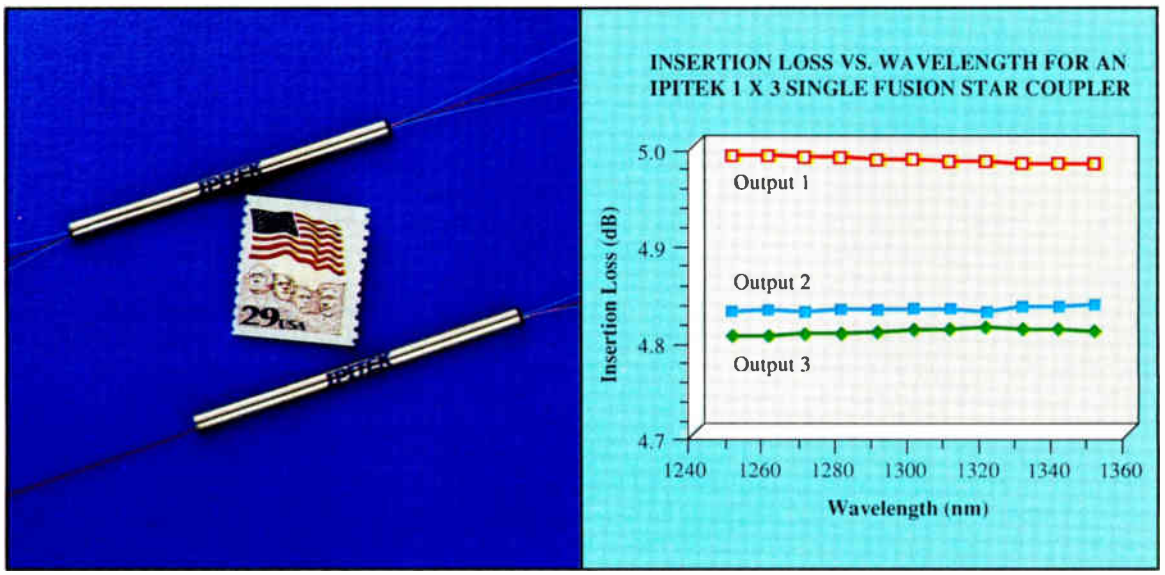
Cable TV systems, of necessity, must deliver broadband AM-vestigial sideband TV signals to the home. This will continue to be true for a long time, as there are nearly 200 million installed TV sets that require this kind of video modulation at their input. Until recently, however, the terminal devices required for use with fiber, the lasers and detectors, would only function with either digital or wide-deviation frequency modulation, which made for a requirement for channel-by-channel remodulation at the fiber terminus.

In 1987, at my company's laboratories in Denver, we demonstrated the transmission of 40 AM-VSB TV channels through 10 miles on a single fiber by intensity-modulating a high performance laser diode with a signal consisting of the broadband RF spectrum. This allowed the use of a simple optical detector to convert from intensity-modulated light back to broadband RF, which is suitable for amplification and transmission over coaxial cable. While the signal-to-noise (S/N) and signal-to-intermodulation (S/I) specifications of that first link were not good enough to use commercially, they showed that this approach could be practical. We challenged our vendors to develop commercial products using this approach and they obliged. Today, virtually all major new construction and upgrade activity in the cable industry makes use of fiber trunking using this kind of direct broadband, analog, intensity-modulation. The cost of the optoelectronics involved has dropped to the point where it makes great economic sense to employ the technology where the cost of fiber terminal equipment is spread over only a few hundred homes in a neighborhood.

CATV's needs in the '90s

While cable in the United States has achieved a fair measure of success, no situation is static. Successful businesses always attract the attention of potential competitors and that is certainly true in the video distribution business. Cable TV always faced competition from free off-air signals, at least in most urban markets. We also have faced increasing competition from videocassette rentals and sales over the last five years. It is estimated that the gross revenues of the video-

INTRODUCING SINGLE MODE STAR COUPLERS from IPITEK



Now IPITEK offers *Single Fusion* N × M single mode star couplers. Using our *Single Fusion* approach to N × M configuration provides several advantages when compared with conventional tree couplers. Fewer splices increases system reliability. Excess loss is lowered. Best of all, the whole package fits in the same space as a standard 1 × 2 coupler. Clean up your splice tray and improve system performance with quality *Single Fusion* star couplers from IPITEK.

- **1 × 3 Single Fusion Star**
- **3 × 3 Single Fusion Star**

In addition, IPITEK offers an optically broadband version of these products. These devices provide constant coupling over a wide passband. This allows simple system upgrades to 1550nm in the future.

- **1 × 3 Optically Broadband Single Fusion Star**
- **3 × 3 Optically Broadband Single Fusion Star**

PLEASE CALL FOR PRICES
AND OTHER PORT CONFIGURATIONS

Made In The USA

IPITEK®
A TACAN COMPANY

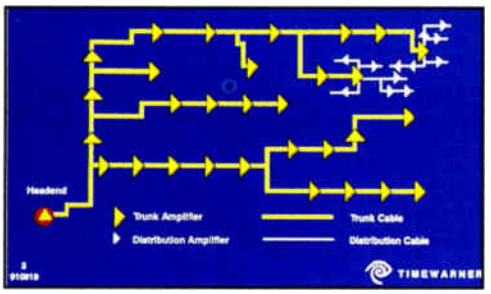
Quality is the Difference

IPITEK®
2330 Faraday Avenue
Carlsbad, CA 92008
Phone: (619) 438-8362
FAX: (619) 438-2412

In Switzerland call Ascom Kablevision (01-823-1111)

See us at the SCTE Cable-Tec Expo, Booth 218. Reader Service Number 71

Figure 3: Conventional coaxial plant



cassette rental business in 1991 will be $10 billion. By comparison, the gross revenues of the cable industry will be $17 billion.

A variety of other competitive video delivery technologies are on the horizon as well. Satellites provide direct video service to almost 3 million homes in the United States today and, in some areas, competition from multichannel microwave distribution service (MMDS) has emerged as well.

In addition to these sources of competitive video delivery, the cable industry also faces the potential entry of local telephone companies into the video delivery business in coming years. The legislative and regulatory barriers that have prevented this in the past are currently being reviewed. Many telephone companies dream of building fiber-optic networks to the home that could carry video as well as voice and data services.

Given all of this, we are giving considerable thought to ways in which technology and improved operations can keep our business healthy in the face of increasing competition. In addition, we are looking at new businesses that may be available to us — particularly expanded delivery of PPV movies, which leads ultimately to true switched access to large video libraries and perhaps to telecommunication services.

In examining these challenges, it is worth cataloging our current strengths. We are a highly cost-effective, high-capacity video delivery system with the ability to tailor our programming to local markets and we have the potential to provide our signals in a form directly and conveniently useful by today's consumer electronics. We also have the only extant broadband communications medium in the local loop as well as into the home.

It also is worth looking at the technologies that lie at our disposal if we need them to meet the challenges that are on the horizon. In addition to broadband coaxial cable technology, national satellite programming distribution and addressable set-top tuner/decoders, we have (as has been mentioned) a very powerful form of optical transmission technology at our disposal.

There also are a variety of high-speed data transmission protocols and modulation schemes that could be quite useful to us in transporting various kinds of data to and from our customers. Powerful microprocessors are now relatively inexpensive and certainly could be used in the terminals we deploy in our subscribers' homes. Digital video compression offers the possibility of multiplying the effective channel capacity of our spectrum many times. Powerful video processors, in addition to allowing signal compression, give us the potential to manipulate the images we deliver to our customers in a variety of ways. Text generation technology is available on very inexpensive chips and certainly can be woven into our video customer interface. The key to our prosperity in a changing and competitive age is integrating these new technologies into the assets we already have, in a way that leaves us able to compete effectively on price as we offer an array of services that remain attractive to customers faced with many choices.

System architecture considerations

The key to understanding how to meet this challenge lies in understanding cable system architecture — what it is, where it is going and what kinds of businesses that will allow us to explore. Figure 3 shows a generalized schematic of today's cable TV plant architecture. Our video programming is gathered at the headend from satellite, off-air antenna and videotape sources. These signals are then modulated at separate radio frequencies using 6 MHz, AM-VSB channels and all of these RF signals are combined onto a single coaxial trunk cable that leaves the headend.

The coaxial trunk then goes through

WELCOME TO THE FUTURE

WITH

Viewsonics

Platinum & Platinum Plus

The Industry's Most Comprehensive Line of

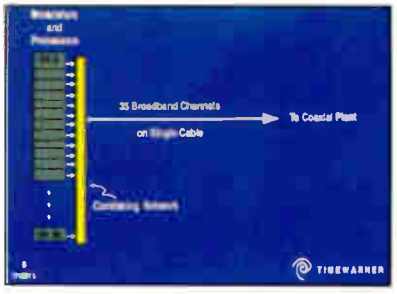
600MHz/1GHz 130dB RFI

WE STOCK OVER 200 PRODUCTS

Viewsonics Inc.
6454 E. Rogers Circle
Boca Raton, Florida 33487 USA
800 645-7600 • 407 998-9594
Fax 407 998-3712

See us at the SCTE Cable-Tec Expo, Booth 307. ***Reader Service Number 73***

Figure 4: 300 MHz headend



many splits as it branches out to reach into every neighborhood in the community. Because of coaxial cable losses, as well as splitting losses, broadband trunk amplifiers are required every 1,000 to 2,000 feet.

Within each neighborhood, some of the broadband energy is split off at a trunk amplifier, and then feeds the local "distribution plant" that transports signal on coaxial cable up and down every street, past every home. Here again, amplifiers are used to overcome cable and splitting losses, and signal tap-off devices provide service to each home.

This is a highly efficient structure, since only one or two cables are run along any one street. It is referred to as "tree-and-branch" architecture and has been the basis of plant construction in the cable industry for decades. It is, by its fundamental nature, a broadcast architecture. That is, all of the signals leaving the headend go to every point in the system. It is thus wonderfully suited for communitywide TV signal distribution, but poorly suited to providing individual services to individual customers and very limited in its return signal capabilities for two-way applications.

It also involves the use of many amplifiers (often several dozen) in series or cascade. Since each amplifier contributes both noise and intermodulation distortions to the signals passing through it, maintaining high-quality signals at the end of these cascades has always been a challenge. In fact, in order to deliver usable signals, the bandwidth and channel capacity of the system with these long amplifier cascades must be limited far below the bandwidth of the coaxial transmission medium itself. The use of these active devices in series also significantly limits the attainable signal quality and reliability of this kind of distribution system.

Figure 4 shows a schematic of the

ANTENNA TECHNOLOGY

Be Ready for G-5 - 3.8m & 5.0m Antennas Available Now!

- Large Aperture Antennas - Both New & Used
- Parabolic Antennas from 1.8 to 32 Meters
- Satellite Spectrum Analyzer- New Design
- Parabolic Retrofit Systems
- Audio, Voice & Data Systems
- Earth Station Heating Systems
- Headend Electronics

Simulsat - America's Most Popular Multibeam!

The SIMULSAT multibeam, with its 70° view arc, views 35+ C & Ku-Band Satellites . . . Simultaneously!

This Antenna Farm views just 13 Satellites

SIMULSAT SEES THEM ALL...

35+ C & Ku-Band Satellites Simultaneously!

1128 East Greenway - Mesa, AZ 85203
Phone: 602-264-7275 Fax: 602-898-7667

Figure 5: Current network spectrum

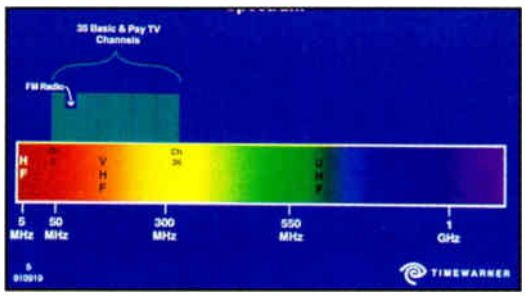
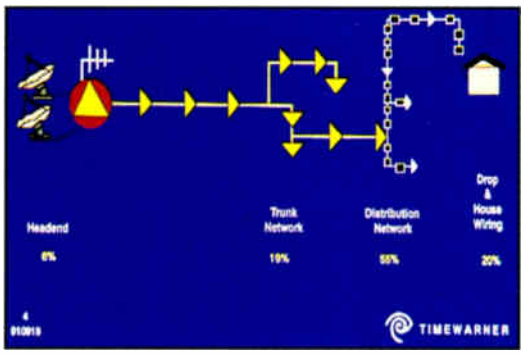


Figure 6: Plant investment percentages



equipment in a 35-channel cable headend with 35 separate modulators, each on a different frequency. Figure 5 shows the radio spectrum carried by this plant with 35 individual TV carriers (as well as the FM radio band) from 50 MHz to 300 MHz.

Figure 6 shows today's cable plant in a different manner, divided up in terms of existing plant investment. We can see that a full 75 percent of our historical investment is in the distribution plant and the drop cables providing service into each home. Less than 20 percent of our investment is in the trunk portion of the plant.

This is very good news indeed, because it is only the trunk plant where the long amplifier cascades exist that limit system performance and artificially constrain our bandwidth. It seems clear that the limitations of the cable systems we operate today are based not on the capacity or capabilities of our fundamental transmission medium, coaxial cable, but rather on the architecture within which we have used that coaxial cable. Those limits include bandwidth (and channel capacity), reliability, signal quality and two-way communications capability. It is logical to suggest that we can overcome these architectural limitations by replacing the trunk portion of the plant with low-loss optical fiber, which has the ability to provide signal transport for up to 20 miles without repeaters or amplifiers. There is indeed a different approach to architecture that meets our needs very well and, better yet, it is an architecture into which we can evolve our systems gradually from the one used at present.

Figure 7: Queens, N.Y., 1 GHz/150-channel system

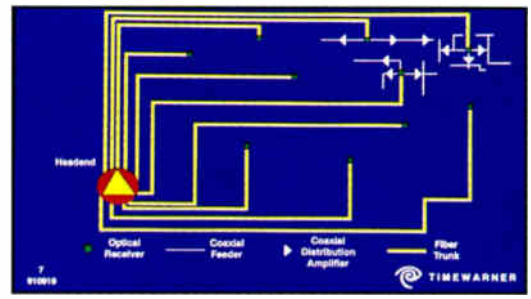


Figure 7 shows the kind of system architecture that is being constructed in Queens, N.Y. Note that there are a large number of individual fiber trunks leaving the headend and providing direct connection with each neighborhood where they feed the "last mile" of coaxial distribution plant. A large community may have several hundred separate fiber trunks leaving the headend in this way. This reduces the remaining broadband amplifiers in cascade in the remaining distribution plant to only three or four, allowing us to design plant that takes advantage of the full potential bandwidth of coaxial cable and yielding additional reliability and improving signal quality as well.

The Queens system will have a bandwidth of 1 GHz and a capacity of 150 channels, each occupying 6 MHz. There will be a bundle of four fibers in the trunk going to each neighborhood conversion point. Three fibers will carry portions of the outgoing RF spectrum and will be separately detected and then amplified and combined at the conversion point. The conversion electronics will be pole-mounted with an optical input and a broadband RF output on coaxial cable. The fourth fiber to each neighborhood will be used as a return path to transport data signals from each home back to the headend.

CT's PRODUCT SHOWCASE
PREVIEW 1992
A SUPPLEMENT TO COMMUNICATIONS TECHNOLOGY MAGAZINE

Welcome!

... to ***Communications Technology's*** first quarterly ***Product Showcase*** for the communications industry!

CT's Product Showcase provides more than 30,000 key decision makers in corporate management, management, technical engineering and marketing with a useful, reliable source of more detailed information about products, equipment and services from manufacturers, distributors and suppliers. Many are companies whose products you read about in ***Communications Technology*** throughout the year!

To get prompt access to more information on the items of interest to you, simply circle the number on the reader service card that corresponds to the one accompanying the product or service showcased.

CT's Product Showcase: the complete source of communications product information for applications, specifications and service.

THE FasTest™ FIBEROPTIC TESTER . . . EVER

A pair of revolutionary fiberoptic test systems (FOT-900) from EXFO can measure power, attenuation and back-reflection at two wave lengths at the touch of a single key. Since it performs these measurements automatically, the FOT-900 can significantly increase the characterization speed of multi-fiber cables; training time is minimal. Features: storage of 1024 readings; RS-232 interface and software; 3 power sources; back-lit alphanumeric display; auto data acquisition. Options: LED, Laser or TE Cooled sources, at 850, 1300 or 1550 nm; portable printer.

EXFO
Electro-Optical Engineering

EXFO
465, Godin
Vanier, QC, Canada
G1M 3G7
Tel: 418-683-0211
Fax: 418-683-2170

Reader Service Number 210

C-COR's 1GHz Amplifier

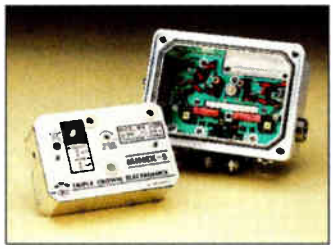
C-COR continues in its tradition of leading the marketplace in extended bandwidth products with the introduction of the first 1GHz amplifier. The new amplifier provides the bandwidth and the distortion performance necessary to build a fully loaded 1 GHz system with 155 channels. Other extended bandwidth products offered by C-COR include the 1 GHz Main Line Passives.

C-COR ELECTRONICS INC
C-COR Electronics, Inc.
60 Decibel Road
State College, PA 16801-7580 USA
(814) 238-2461 (800) 233-2267 FAX: (814) 238-4065

Reader Service Number 211

Reader Service Number 219

THE BIGGEST STEP FORWARD IN LINE EXTENDER DESIGN IN YEARS!



The MINEX series of ultra-small Line Extenders

The MINEX Series line extenders are designed for application as main distribution amplifiers, with the features and facilities you expect from a full sized line extender: only the size (and power consumption) are reduced.

MINEX offers Push-Pull and Power Doubled models in bandwidths to 862MHz, with passive Sub-Low reverse path built in. MINEX amplifiers require no optional plug-in equalizers or attenuators, reducing overall installation and operational complexity.

TRIPLE CROWN ELECTRONICS INC.

4560 Fieldgate Drive Mississauga, Ontario. L4W 3W6 Canada
Tel: (416) 629-1111 Fax: (416) 629-1115

Reader Service Number 220

SC16 "SAXXIT" Metal Cable Clip

The SC16 "SAXXIT" Metal Cable Clip is made of galvalume steel and is used for securing and maintaining a uniform installation of the coaxial cable to concrete, mortar, stucco, or wood.

The galvalume metal construction of the SC16 will endure all types of weather conditions, it ensures the ultimate cable attachment with a reduction of cable maintenance.

The SC16 Metal Cable Clip is supplied with a pre-inserted self taping screw or a drive pin. The "SAXXIT" cable clip can be installed directly onto most surfaces.

SACHS®
Sachs Communications Inc.
211 Stonewall Street
Cartersville, GA 30120 800-829-SACH

SNIFFER Lite

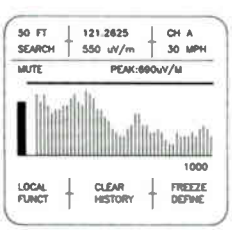
SIGNAL LEAKAGE MODULE

NEW

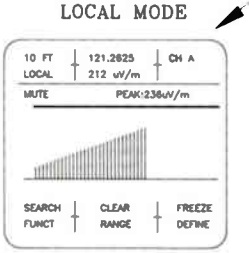
ComSonics Announces,the SnifferLite Module; Combining the Industry's most advanced SIGNAL LEAKAGE DETECTION TECHNOLOGY with the Industry's only,truly hand-held Signal Level Meter.

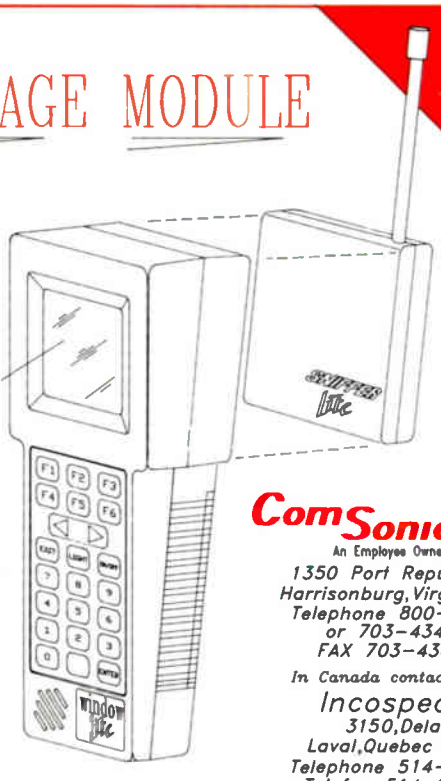
See the WindowLite/SnifferLite at
SCTE BOOTH NUMBER 574

SEARCH MODE



LOCAL MODE





ComSonics, Inc.
An Employee Owned Corporation
1350 Port Republic Road
Harrisonburg, Virginia 22801
Telephone 800-336-9681
or 703-434-5965
FAX 703-434-9847

In Canada contact
Incospec Inc.
3150, Delaunay
Laval, Quebec H7L 5E1
Telephone 514-686-0033
Telefax 514-688-7709

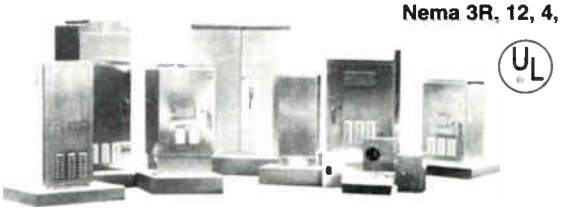
Reader Service Number 221

Defend Your Fiber

Expensive electronics placed outdoors requires superior protection.

Shield your fiber and CATV equipment from environment and vandals with a Hennessy Enclosure. . . **You be the Judge. . .**

Nema 3R, 12, 4, 4X

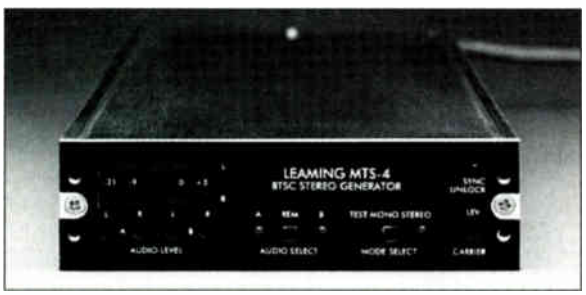


- Aluminum or Stainless Steal Construction
- Single Door - Double Door - Front & Rear Door Models
- Custom Designs Available
- Equipment Mounting Options
- 19" - 23" Rack - Shelf - Panel - Hanger Brackets
- Climate Control Options
- AirConditioning - Forced Air - Insulation - Sunshields

SCTE Booth# 267.

HENNESSY PRODUCTS

Hennessy Products
910 Progress Rd./P.O. Box 509
Chambersburg, PA 17201
Phone 717-264-7146 Fax 717-264-1634



See Leaming Industries improved MTS-4 BTSC Stereo Generator in Booth #402. Now you can encode up to three channels of the same high quality stereo TV audio Leaming is known for in only 1 3/4" of rack space.

The new MTS-4 has already proved to be very popular. Time Warner is using nearly 100 of them in their Queens NVOD project. Also, most of the top MSOs have approved and are buying the MTS-4.

LEAMING INDUSTRIES

15339 Barranca Parkway, Irvine, CA 92718
(714) 727-4144 • FAX (714)727-3650
(800) 4-LEAMING

SCTE Booth #402

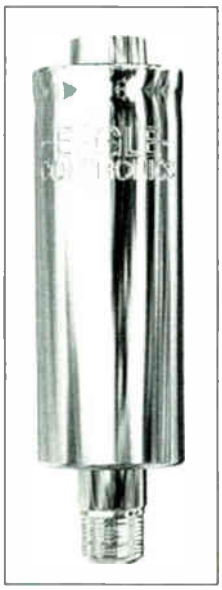
Viewsonics introduces a new concept in multi-output distribution taps. Using a modular concept, they developed a series of multitaps having various port values within the 16, 24, 32, and 48 port models. Home-run installs with extreme distance variations are easily served. In addition they provide for more selectivity in signal level. Tap values are from 14 to 35dB, from 5-600MHz.

Viewsonics inc.

6454 E Rogers Circle
Boca Raton, FL 33487
phone 800-645-7600 fax 407-998-3712

EAGLE
COMTRONICS INC.

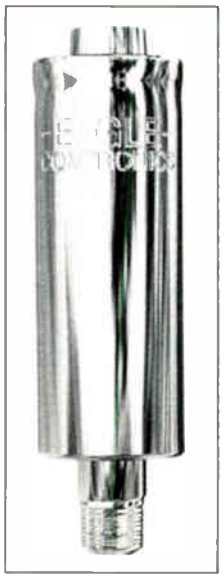
ULTRA NARROW NEGATIVE TRAP



Unique new trap circuitry provides notch widths 50% less than the past. Less effect on lower and upper adjacent channels results in higher channel usage while preserving the lower adjacent channel. Immediate improvements can be attained on marginally trapped channels.

Model ESN **Reader Service Number 230**

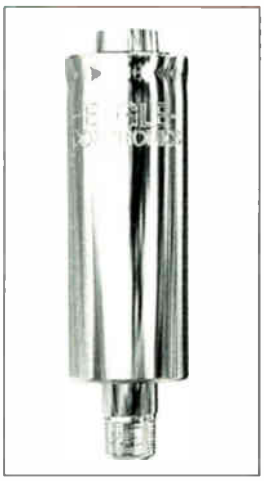
SIDEBAND INTERDICTION POSITIVE TRAPS



This non-jamming carrier positive trap system amplifies the video information to produce a scrambled picture. Near perfect reproduction of original video results where the new specially tuned decoding filter is utilized. Channel usage to 400 MHz and above is normal.

Model SID **Reader Service Number 231**

ULTRA NARROW POSITIVE TRAPS FOR JAMMING CARRIER SYSTEMS



Jamming carrier positive traps inherently lose some video. This new trap has a narrower notch resulting in less video loss and sharper pictures. Immediate improvement for current systems can be realized while dramatically increasing the number of positively trapped channels.

Model ESD **Reader Service Number 232**

EIGHT POLE MULTICHANNEL NEGATIVE TRAPS.

Eight pole negative traps are now standard with Eagle. Increasing the number of poles sharpens band edges, reduces bumper channels, thereby increasing the number of usable channels.

Model 8NF **Reader Service Number 233**

Phone: 315-622-3402 or 800-448-7474 SCTE Booth # 406

THE OPTICAL ADVANTAGE ANYONE CAN SEE.

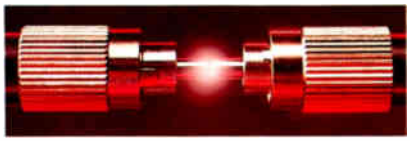
DEPTH OF R

Only Sumitomo designs, b everything you need

Sumitomo makes a full range of fiber optic cables. Choose from matched clad or depressed clad fiber in either loose tube or LitePipe™ cable construction.

As a result, you don't get a runaround: questions get answered, problems solved, deadlines met, network goals achieved. ■ We design, manufacture, install and support everything optical you need for video transmission. Including a full line of optical VSB-AM and digital video transmission equipment, matched clad VAD-type fiber pioneered by Sumitomo. Loose tube and economical LitePipe™ optical cables. Fully automated fusion splicers. Plus optical connectors and patch cords, all made by Sumitomo. ■ Hardware, though, is only half the story. Using our own in-house resources and expertise,

Our compact, lightweight T-35 fusion splicer is fully automated. You get advanced features because we pioneered fusion splicing.



We manufacture a full line of multi-mode and single mode cable assemblies in standard or custom lengths.

Sumitomo VSB-AM video transmitters and receivers–rack, strand and pole mount–give you unmatched network design flexibility. Every unit meets uniformly high performance specs.

ESOURCES.
uilds, installs and supports for video fiber optics.

we offer engineering services and turnkey construction:

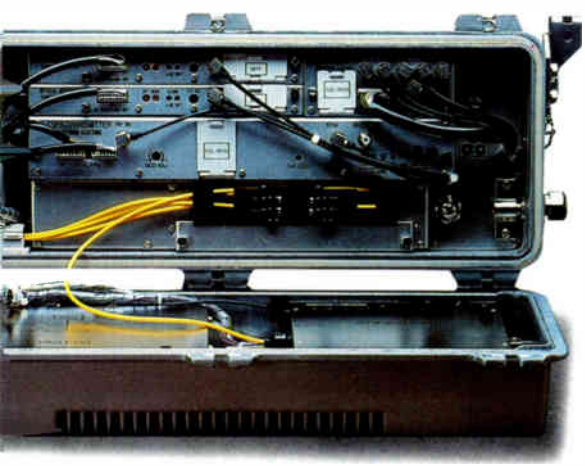
Sumitomo digital transmission equipment is cost competitive with FM. Get up to 24 video channels on a single fiber without compression or wave-division multiplexing.

single-source responsibility for your project, from initial design to turn-up. ■ Then there's training programs, ongoing support, maintenance/ repair with loaners–whatever you need. Whatever you want, all or any part. Including peace of mind–

We do it all, including engineering and construction–entire turnkey newbuilds and rebuilds, plus ongoing maintenance, repair and support.

one reason we've been a leader in fiber optics *and* cable television for nearly 20 years. ■ Call us at (800) 358-7378. Discover the optical advantage anyone can see, but only Sumitomo can deliver.

We think you have a big future with fiber optics, so we invested $100 million in our North Carolina research and manufacturing headquarters facility.



Our new, economical VSB-AM strand mount optical receiver frees you to create fiber-to-feeder and fiber-to-line-extender architectures.

Reader Service No. 1

Sumitomo Electric, your light-support system.

VIDEO TRANSMISSION EQUIPMENT

ANALOG

Choose from our full line of rack, strand and pole mount equipment. Optical transmitters and repeaters are available with 4 or 6 mw lasers at 1310 nm, rack or strand mount. The rack housing accommodates up to 2 transmitter or receiver units within 2 mounting spaces. One strand-mount trunk station provides 30 dBm V output and accommodates up to 4 receivers or 2 transmitters or 2 receivers and 1 transmitter with an A/B switch plus status monitoring. Our secondary-node receiver provides 48 dBm V for fiber to the feeder architectures.

DIGITAL

Simple to maintain, our equipment consumes far less space and power than FM — and requires fewer optical fibers. Sumitomo systems transmit, without compression, NTSC, PAL and BTSC baseband video/audio signals at 2.4 GBs, 24 channels on a single fiber; 1.2 GBs, 12 channels; or 400 Mbs, 4 channels. Up to 72 channels fit in a single 6-foot rack. Channel capacity can be doubled via Wave Division Multiplexing. Transmission distance: up to 80 km without a regenerator. Express and drop regenerators available. Systems meet RS250C medium haul specifications.

CONNECTION SYSTEMS

FUSION SPLICERS

Sumitomo pioneered fusion splicing, which produces economical, high-quality splices. Advanced features include high-speed imaging in two directions, self-diagnostic arc test and high-accuracy splice loss estimation, plus easy-to-use tools for fast stripping and cleaving. Sumitomo Type 35 is an industry standard, and our Type 51 splices up to 12 fibers at once. Our splice sleeves provide optimum protection.

CONNECTORS

We make a full line of optical multimode and single mode cable assemblies with connectors such as Biconic, ST, FC, D4, mini-BNC and SC. We provide custom lengths and can make Super PC Polish connectors, even FDDI.

DEPTH OF RESOURCES

We're part of $6-billion Sumitomo Electric Industries, Ltd. Group. Our $100-million, 350,000 sq. ft. manufacturing complex in Research Triangle Park, North Carolina employs more than 350 people dedicated to meeting all your optical network needs.

OUTSIDE PLANT

FIBER OPTICAL CABLES

We manufacture cable with your choice of matched clad or depressed clad fiber. We offer loose-tube cable in fiber counts of 4 to 216, plus our new, economical Lite-Pipe™ cable in counts of 2 to 24. Reel length: up to 12 km. Sumitomo pioneered vapor axial deposition (VAD), the matched clad fiber-making process that set the record for low loss. We offer optical cable sheath construction from all dielectric to double armoured suitable for all installations (lashed aerial, duct and direct buried) and environments.

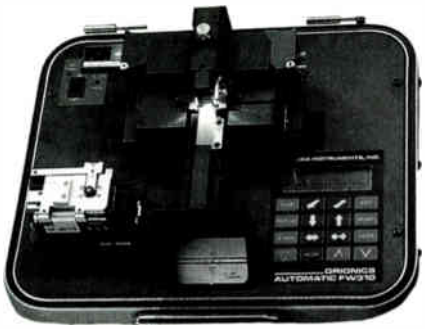
CONSTRUCTION & ENGINEERING

We provide any level of service including entire turnkey newbuild or rebuilds. Our in-house experts work closely with your people to evaluate design alternatives, select methods of construction, perform installation, and do turn-up, testing, fusion splicing, repair and maintenance. We offer single-source responsibility, assuring your project gets done right.

SUMITOMO ELECTRIC
Fiber Optics Corp.
YOUR LIGHT SUPPORT SYSTEM

78 Alexander Drive ■ Research Triangle Park, NC 27709 ■ (800) 358-7378 or (919) 541-8100 ■ Fax (919) 541-8265
Member of the Sumitomo Electric Industries, Ltd. Group

Reader Service Number 238



NICE SPLICE!

Aurora Instruments, Inc. of Blue Bell, PA is the manufacturer of Orionics fusion splicers, local alignment systems, hand held cleavers and splicing accessories. The Orionics Model FW-310, portable, fully automated fusion splicer with pigtailing capability provides the user with reliable, low loss single and multimode splices anywhere!

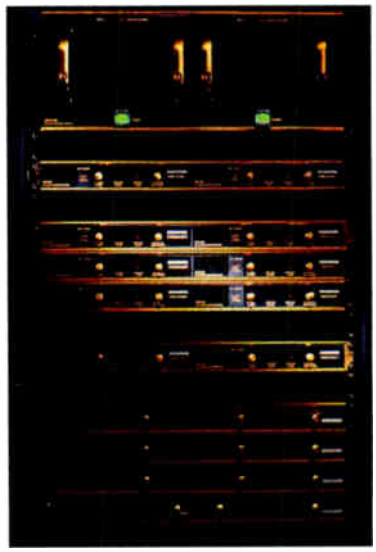
See us at SCTE at
ACT COMMUNICATION'S Booth #533!!

ORIONICS
AURORA INSTRUMENTS, INC.
Dublin Hall, Ste. 402 • 1777 Sentry Parkway West
Blue Bell, PA 19422
Phone: 215-646-4636 • Fax: 215-646-4781

Reader Service Number 239

The Intelligent Headend (TM)

Nexus delivers high performance intelligent headend solutions for your cable system.



Optimize system performance, headend space and customer satisfaction with the Nexus Series 2000 Headend System. The Series 2000 Intelligent Headend(TM) combines unsurpassed reliability with remote status monitoring and control.

Visit the Nexus exhibit (booth #546) at the SCTE and experience first hand an intelligent headend in action.

NEXUS
Advanced Cable Systems

Nexus Engineering Corp.
7725 Loughheed Hwy.
Burnaby, BC Canada V5A 4V8
(604) 420-5322 FAX: (604) 420-5941

US ELECTRONICS
COMPONENTS CORPORATION

INTRODUCES the latest line of ***multi-function*** remote controls . . .

'UTV' Series

UTVRC	UTV475	UTV170	UTVBR-82	UTVH9	RDTV03	UTV150
Jerrold Compatible	S A Compatible	Panasonic Compatible	Pioneer Compatible	Hamlin Compatible	Zenith Compatible	Panasonic Compatible

**All 'UTV' Series remotes operate OEM Converters (all types) & all remote televisions.

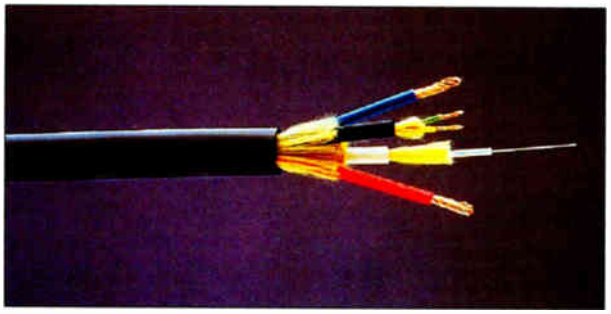
SEE US AT THE SCTE SHOW, BOOTH # 482

Toll Free: 1-800-283-1792 Direct: 1-716-839-3803 Fax: 1-716-839-3381

Reader Service Number 240

Reader Service Number 241

CATV COMPOSITE CABLE



Optical Cable Corporation can manufacture many types of composite cables to meet your CATV applications. Any number of optical fibers and twisted pair wires can be combined within the same cable to provide you with both voice and data communication capabilities. The outer cable jacket material can be provided to meet any plenum or riser ratings. Delivery is 3 to 4 weeks after receipt of the order. Call 1-800-622-7711 today for a price and delivery quotation.

OPTICAL CABLE CORPORATION

P.O. Box 11967 • Roanoke, VA 24022-1967
703-265-0690 Fax 703-265-0724

Reader Service Number 242

Model HMA-450 Frequency Agile Modulator

The HMA-450 is a low cost SAW filtered, frequency agile modulator specifically designed to meet the highest CATV performance standards. All channels from 2-YY are easily selected by front panel accessible dip switches. The HMA-450 features an extremely low out-of-band noise level allowing their use in large channel head-ends. The user friendly front panel controls and over modulation indicators make the HMA-450 the ideal choice for any system where performance, reliability, and low cost are required.

- **Selectable output channels 2-YY**
- **Low cost**
- **Low out-of-band noise**
- **SAW filtered**

HOLLAND ELECTRONICS CORP.

5308 Derry Avenue, Ste. W
Agoura Hills, CA 91301
800-628-6688 818-597-0015 Fax 818-597-0206

Traps and Filters

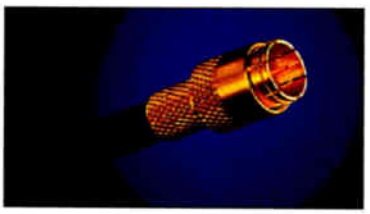
Arcom manufactures the Double Density series of traps and filters. Products include Mini Negative and Positive 4-Pole Traps, Tiering Filters, and the new patented Gaussian System which delivers a response with no loss of bandwidth. The Arcom Mini-Trap at 1 7/8" is the smallest Four-Pole Trap in the industry.

ARCOM® Double Density®

P.O Box 6729 • Syracuse, NY 13217
(315) 422-1230 • FAX: (315) 422-2963
See us at Cable-Tec Expo, Booth# 203/205.

Reader Service Number 243

PPC Re-Usable "Quik-Lok F" Connector



Production Products Co., has released its New Indoor, Subscriber Friendly, Re-Usable, Push-On "F" Connector.

The PPC Quik-Lok-F connector allows a full and complete seating of the connector to the port BEFORE lock-up occurs. Full lock-up is achieved through a simple 1/2 twist-turn of the locking sleeve.

The cable retention force to the connector is 25 to 35 lbs., with RFI protection at 85-90 dB, or equivalent to the drop cable. This connector series comes in two models, a Quik-Lok-F 59, in Gold and a Quik-Lok-F 6 in Silver.

Patents have been applied for on the PPC Quik-Lok-F Connector Series.

PPC **PRODUCTION PRODUCTS COMPANY**
Division of John Mezzalingua Associates Inc.
One Mezzy Lane
Manlius, NY 13104 **1-800-800-6652**

Reader Service Number 244

Reader Service Number 245

AD WATCH WORLD INCORPORATED

New!

Admiral Series-
Random Ad insertion with a powerful difference
"The Wild Card"
Built with digtial in mind

- Powerful PC Platform
- Full Flexibility
- Easy Editing

Call for details!
SCTE Booth # 708-710
801-263-1661

Reader Service Number 246

Connector Waterproofing Simplified

STUF: A Non Hardening, High Purity, Macroscopic Foam, Dielectric Paste Filler formulated specifically to simulate the dielectric properties of coaxial cable core. Connector waterproofing is done simply by filling the cap end of the connector assembly. Upon mating and tightening of the **STUF** filled connector, protective filler is hydraulically channeled into all voids and ports of moisture infiltration, preventing moisture infiltration by occupation. **STUF** will not interfere with connector signals or electrical throughput while providing connector protection throughout cable life. 100 f. connectors per tube.

CROSS DEVICES
P.O. Box 567 • Cutchogue, NY 11935
(516) 298-4517

AD WATCH WORLD INCORPORATED

Now!

Expanded Lieutenant Series includes new Ad Lieutenant 200, four channel, 2 VCR, ROS Ad Insertion.

- Performance
- Price
- Reliability

Call for details!
SCTE Booth # 708-710
801-263-1661

Reader Service Number 247

The AudioBOSS 1:

puts an end to audio loudness control problems. Gradually and smoothly, the AudioBOSS 1 corrects source signal imbalances resulting in a consistent audio level output.

The AudioBOSS 1 is mounted between the audio signal path and the channel modulator: Once the channel modulator is calibrated to the AudioBOSS 1, audio levels from any source will be automatically and continuously corrected. Consistent output audio levels are achieved despite varying input levels.

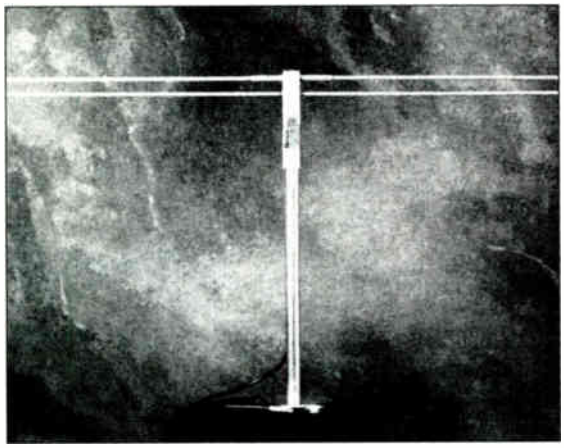
A pre-emphasis control features split band processing allowing equalization from locally inserted audio levels to provider's pre-processed audio level. When low input signals occur or during pauses, a noise reduction circuit reduces noise up to 15db while the "wait" feature holds the main gain to prevent hum. The AudioBOSS 1 compensates for audio peaks necessary for naturalness, and at the same time adjusts over-processed input levels.

The AudioBOSS 1 is easy to install and operate. The compact design of a complete three module system, including a low EMI/RFI power supply, requires 1 3/4" of vertical rack space.

ADCOM
Advanced Communications International, Inc.
6290 Lehman Drive, Suite 202 • Colorado Springs, CO 80918
800-223-7765

Reader Service Number 248

Reader Service Number 253



For dependable, accurate measurements use the SITCO DPX-1, a rugged leakage dipole that won't let you down!

- 2 year warranty
- Strong 5" mag. base
- Aircraft alloy aluminum construction
- Replaceable elements for easy field tuning
- Competitively priced.

SITCO Antennas
10330 N.E. Marx St., P.O. Box 20456, Portland, OR 97220 (503)253-2000

Reader Service Number 254

So far ...and yet so near

CALAN Comet Remote Monitoring brings your broadband network right into your office.

Until Comet, you had to dispatch fleets of technicians to take signal measurements out in the field. Too often, you were forced to react rather than prevent problems.

CALAN's Comet system enables you to take measurements of all carrier levels of all components in your broadband system.

That means you can monitor deviations and take corrective action before the system goes down. You'll know exactly what and where the problem is instantly!

Comet is a total system consisting of instrument-grade hardware and proven software that opens a whole new era in cable system performance monitoring.

CALAN
CABLE AND LOCAL AREA NETWORKS

SCTE Booth # 511-515

CALAN, Inc. Dingman's Ferry, PA 18328 1-800-544-3392 In PA 717-828-2356 Fax 717-828-2472

Reader Service Number 255

CABLE LINK, INC.
The Affordable Alternative

New and Remanufactured
• Converters •
• Linegear • Passives •
• Headend •
• CAD System Design •

AUTHORIZED JERROLD DISTRIBUTOR

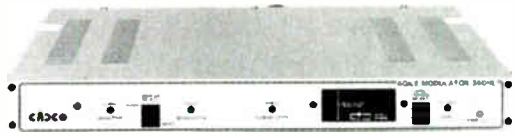
From the Headend to the Home
If we don't have it, we'll get it

CALL TODAY
(614) 221-3131 FAX (614) 222-0581

Reader Service Number 256

The World of Cadco Headend Products

NTSC - PAL - SECAM
International Television Systems B/G - D/K - I - M/N



Around the world, CADCO Frequency Agile and Fixed Channel headend equipment is there.

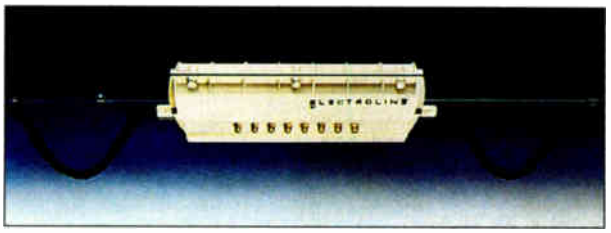
CADCO is simply the most user friendly, advanced-technology frequency agile equipment and fixed channel headend equipment anywhere at any price.

See us at the SCTE Show Booths: 202 - 204

CADCO
2405 S. Shiloh Rd. • Garland, Texas 75041
1-800-877-2288 • 214-271-3651 • Fax 214-271-3654

Reader Service Number 257

Electroline's new 1GHz Electronic Multi-tap



Electroline Equipment Inc., has introduced its new EAS Electronic Multi-tap in the international market. The EAS Electronic Multi-tap is the world's first 1 GHz broadband addressable system designed for off-premises television security and is a direct replacement for the standard multi-tap used in cable TV. It is designed for strand and pedestal installations and is compatible with PAL, SECAM and NTSC today, as well it is transparent to future HDTV formats. EAS Multi-tap offers operators a new choice for cost effective addressable control of signals delivered to individual family homes.

The EAS Multi-tap is based on the field-proven Electroline Addressable System, first put into operation in 1982 and which is currently in widespread use and serving more than 600,000 subscribers.

Cable-Tec Expo, Booth # 644-646.

ELECTROLINE

+1-374-9370
800-461-3344 U.S.

Reader Service Number 258

SCO2MFA Universal Messenger Drop Clamp

The SC02MFA is used for the suspension of integrated messenger drop cables at the tap, house and service pole and will fit all series of drop cables from type 59 to 11, including dual cable.

The unique design of the new universal messenger drop clamp preserves the cables coaxial configuration and its characteristic impedance. The cable being installed into the body of the clamp is protected in such a way that problems of sheath damage, reflections and signal leakage caused by wrapping it with the messenger wire are eliminated.

SACHS®
Sachs Communications Inc.
211 Stonewall Street
Cartersville, GA 30120 800-829-SACH

LOW PROFILE IRD

Blonder Tongue offers a full featured Integrated Satellite Receiver Descrambler in one rack space (1.75"). The unit features unique dual conversion input which provides foolproof full C and Ku Band 100 KHz increment PLL main channel tuning for drift free operation, unsurpassed image rejection and a 70 MHz third IF that automatically tracks the incoming signal to compensate for LNBC local oscillator drift. The video performance is unmatched in the industry.

In stock now nationwide
For further information call (908)679-4000

SEE US AT BOOTH #114

BLONDER TONGUE
LABORATORIES, INC.
One Jake Brown Road, P.O. Box 1000
Old Bridge, NJ 08857-1000 USA
Tel: (908)679-4000 • Fax: (908)679-4353

Reader Service Number 265

ANTENNA TECHNOLOGY

SIMULSAT 35+ C & Ku-Band Satellites Simultaneously!

- *Large Aperture Antennas - Both New & Used*
- *Parabolic Antennas from 1.8 to 32 Meters*
- *Headend Electronics*
- *Earth Station Heating Systems*
- *Parabolic Retrofit Systems*
- *Audio, Voice & Data Systems*
- *Inmarsat Systems*

VI 2.0
Portable Analyzer Receiver, Monitor In One

Simulsat

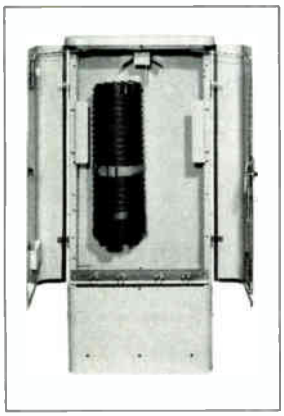
See us at the SCTE Cable-Tec Expo, Booth # 414

Call now for more information
1128 E. Greenway - Mesa, AZ 85203
Phone: 602-264-7275 Fax: 602-898-7667

Reader Service Number 259

Reader Service Number 260

Few Things are as Functional as Reliance Comm/Tec's OPFO-TV8



This upright cable television enclosure is used for housing fiber/coax conversion equipment.

On one side this versatile enclosure can house most fiber splices, an amplifier and up to 150-ft of optical cable.

On another side you can mount a tap, a splitter and a line inserter.

This kind of functionality means one OPFO-TV8 can obsolete multiple pedestals at a site.

Come see us at booth #403 SCTE Cable-Tec Expo

RELIANCE COMM/TEC

Reader Service Number 261

CALAN STAR 2010 SETS A NEW STANDARD IN CARRIER ANALYSIS

It's a data management system offering: Data Communication, Data Acquisition, Data Analysis

CALAN
CABLE AND LOCAL AREA NETWORKS

CALAN, Inc.
Dingman's Ferry, PA 18328
1-800-544-3392
In PA 717-828-2356
Fax: 717-828-2472

SCTE Booth # 511-515.

CALAN's Star 2010 SLMS (Signal Level Measurement System)

Opens a whole new era in carrier analysis for the cable industry.

First, it's simply the best level meter ever designed - covering the entire frequency range (5 MHz to 1GHz) with unmatched speed (36 channels in less than 2 sec.), accuracy, stability, and simplicity of use.

It's also a data management system - incorporating computer interface, built-in comparison and analysis capability, and communications with PC's and printers.

Audio Loudness Controllers

System Solutions Under $200/CH

Matrex XL Series modular audio controllers correct loudness variations of 30db to within 0.5db. Guaranteed ultra clean and artifact free with 95db dynamic range and less than 0.03% THD. User selectable release time, pre-emphasis and adjustable headroom (for matching to off airs). Features include: Balanced audio I/O, two stage processing, noise gate and built in calibrator. Modular unit instantly mounts anywhere, without the need of rack space. Available in AC and DC powered versions. Call Wayne Slater for a FREE evaluation.

MATREX INDUSTRIES
2860 E. Flamingo Rd., Suite A
Las Vegas, NV 89121
702-737-5420
702-735-8092(Fax)

Reader Service Number 262

LOW-COST PAGE TITLER PROVIDING A FULL SCREEN MESSAGE DISPLAY

The Model 810P is an economical, compact downstream keyer with 16K battery backed-up memory that provides a full screen display (8 text rows). It includes such features as Font and Border Selection, Real-time Clock and Calendar Line with battery back-up.

- Preview Editing
- Remote Control Via RS232 Serial Port
- Word Flash
- Variable Background Sizing
- Crawl Line
- Emergency Alert
- System Identification
- Promotions
- Includes Keyboard and 2 Fonts
- User Friendly

PRICE BREAK! $995.00 SAVE OVER $400

Optional features include:
- Custom Logos, Symbols and Icons
- 2 Additional Fonts

Also Available:
The System 830CB Color Billboard System **$1595.00**

VIDEO DATA SYSTEMS.
30 Oser Avenue, Hauppauge, New York 11788
Phone 516-231-4400 • Fax 516-435-4544

Reader Service Number 263

New Headend Products and More at Cable-Tec Expo

Headend Manager
• Restore failed channels remotely
• Automatically control all switching and channel selections
• Other new status monitoring and control features

Model 9660 Slimline IRD
• Only 1 3/4 inches of vertical rack space
• VideoCipher® II Plus descrambler module • C or Ku band compatible

Model 9656 Addressable IRD System
• Compatible with ESPN blackout switching
• Integral 6:1 LNB switch • 40 character LCD display

LE II line extender
• High efficiency power supply • Optional wideband AGC • 750 MHz ready

FSA Variable FITT
• Save coax and upgrade to 550 MHz • Retain existing bridge locations
• Space for future 750 MHz • Minimize downtime

Addressable Interdiction
• 450 MHz jamming • Reduces truck rolls
• Ideal for MDUs and other high churn, high theft areas

Model 8600 Advanced Set-top Terminal
• Now Zenith and Jerrold compatible • New RF-Bypass switch available
• Lowest parts count of any addressable set-top

See them at Booth # 558, or call us at 800-722-2009

Scientific Atlanta

Our customers are the winners.

Reader Service Number 264

Figure 8: 1 GHz system spectrum

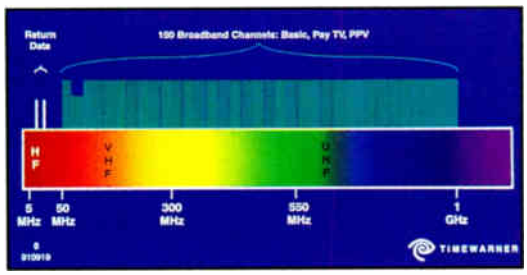
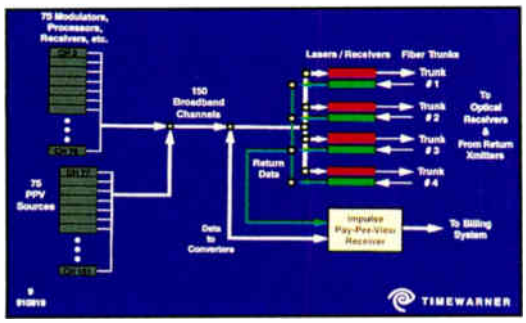


Figure 9: 1 GHz headend



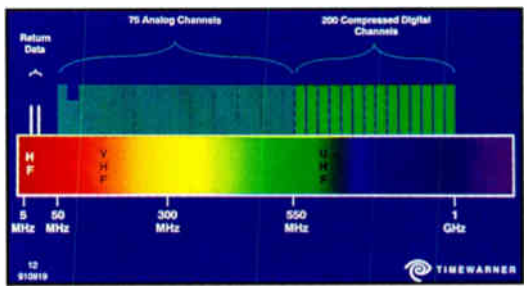
The spectrum carried on the coaxial cable used in "the last mile" of the Queens system is illustrated in Figure 8. One hundred and fifty separate broadband analog TV channels will be carried. In the reverse direction on the same coaxial cable will be low-speed data carriers transporting transactional service ordering information back from each home. Figure 9 illustrates the headend that will feed this system. In addition to 75 modulators providing the basic and pay TV services already offered in the Queens system, there will be an additional 75 modulators, generating channels primarily devoted to PPV movies and movie preview channels. The 150 outgoing channels will be used to modulate three lasers, feeding the three outgoing strands of optical fiber in each fiber trunk. Return signals will be detected from the fiber returning from each neighborhood and the return data will feed the impulse PPV (IPPV) control computer. This, in turn, will provide transactional information to the billing system and will also issue descrambling authorizations to individual set-top signal descramblers via the outgoing signal path.

In order to avoid overwhelming our customers with choices, the set-top terminal in each home will generate an on-screen TV guide, as well as menu-driven ordering screens to simplify ordering of IPPV movies directly from the hand-held remote control.

We believe this system will allow us to generate significant additional revenue and the customers will react positively to greatly increased choice and viewing convenience of movies. Today's consumer expenditures in renting videotapes demonstrate that they want significantly more choice and convenience than today's cable systems offer.

Initially those choices will be available on cable plant passing 10,000 residences. During the first half of next year, we expect to refine the way in which we offer movie product and to explore the economics of this new service. The system being built in Queens is not the ultimate video delivery system, however. We believe there are additional evolutionary steps that will take us to that goal. Figure 10 shows the spectrum that we believe we will eventually transport on systems using the hybrid fiber/coaxial cable architecture we are demonstrating in Queens. The 50 MHz to 1 GHz spectrum is still transported on the coaxial "last mile." It contains 75 analog channels, for basic and subscription services, and 200 or more compressed digital video channels carrying HDTV and a wide array of PPV and narrowcast services. This will further increase the number of choices we offer our customers and we believe that it also will allow us to generate additional revenue.

Figure 10: 1 GHz system with digital video spectrum



The technology required for digital video compression has advanced significantly over the last year or two. It now appears that it will be economically feasible in the next three to five years to deliver between four and six channels of compressed NTSC video within the bandwidth currently occupied by one 6 MHz analog TV chan-

Figure 11: 1 GHz system with digital video

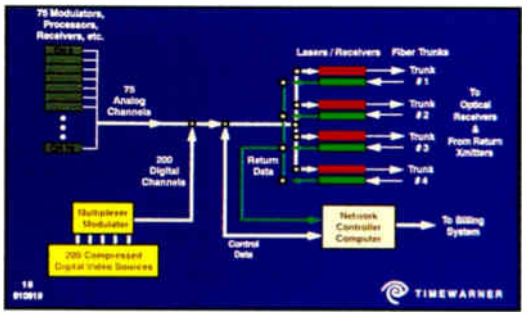
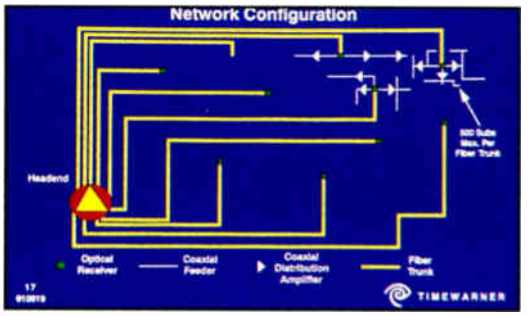


Figure 12: Switched digital video system

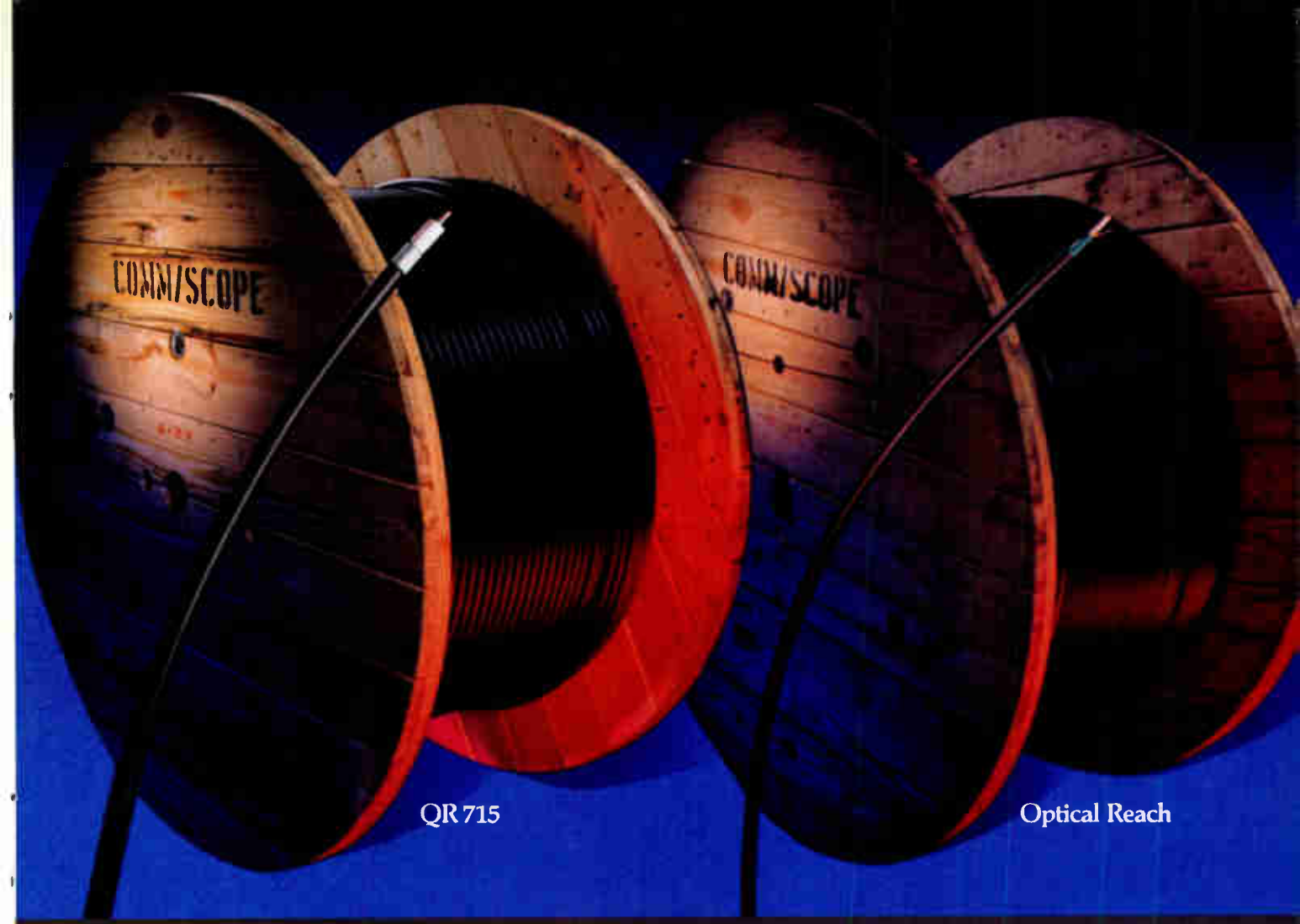


nel. Figure 11 shows that the headend for such a system will be very similar to that used in Queens, but replaces 75 of the analog video modulators with a source for 200 or more compressed digital video channels.

But that is not the end of the story. Figure 12 shows the same kind of hybrid fiber trunk/coaxial "last mile" architecture being deployed in Queens, but has had enough fiber trunks added so that no trunk ever serves more than 500 homes. Using, for example, 200 channels of compressed digital video, this architecture would allow us to offer fully switched video.

It should be noted from Figure 12 that we have come a long way from the broadcast tree-and-branch architecture of the today's conventional CATV system with a single coaxial trunk leaving the headend. Rather, we have constructed a "star" architecture from the headend into each 500-home neighborhood. This allows us to provide a different mixture of 200 digital channels to each group of 500 homes. This should be sufficient capacity when combined with 75 channels of basic "broadcast" services, to allow us to provide individually switched video to an individual home. The key element making this possible is the construction of a digital video library and banks of digital video routing switchers at the headend as shown in Figure 13 (on page 88).

If a movie were ordered by an individual subscriber, that request would be routed back to the headend through the coaxial and fiber return path to a control computer. This would access the movie being ordered from the digital video library and the switch bank serving that subscriber's neighborhood would select that data stream as one of its 200 digital video channels. The digital signal would then be transported to the neighborhood and only the decompression and decryp-



REEL TWINS

Introducing the latest arrivals to the Comm/Scope cable family, QR 715 and Optical Reach. Two cables that are so perfect for each other, we think of them as twins. QR 715 offers all the benefits of our Quantum Reach cable family, 1 Ghz at no premium price, superior handling and low loss...plus one other important factor. It answers the question of what coax to use in a fiber rich architecture.

Then there's our Optical Reach Fiber Optic cable, which you must also get to know. With multiple or central buffer tube configurations. Armored or non-armored. From two to 144 fibers. The perfect fiber component in a fiber trunk to feeder or hybrid system. Best when used with twin cable, QR 715.

You know the name. Comm/Scope. THE Cable In Cable TV. The only cable company that makes and delivers a complete line of coax and fiber optic cable products. With the most reliable and knowledgeable, as well as one of the oldest names in cable. Now you know something more. The name of our twins. QR 715 and Optical Reach.

If you'd like to get to know them better, call your nearest Comm/Scope representative or distributor or call us at (800) 982-1708. Remember. We deliver!

Comm/Scope, Inc.
THE Cable in Cable TV.

Comm/Scope, Inc., P.O. Box 1729
1375 Lenoir-Rhyne Blvd., Hickory, NC 28602
Phone: (800) 982-1708 or (704) 324-2200
Fax: (704) 328-2400.

Figure 13: 1 GHz system with switched video

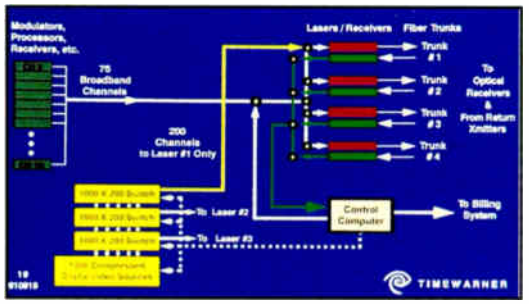
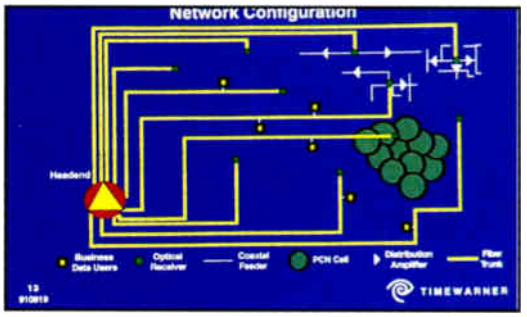


Figure 14: 1 GHz system with digital communications



tion electronics at the home of the customer ordering the movie would be authorized to restore it for viewing.

Thus, we see a logical migration path from today's all-coaxial systems with their limitations in reliability, signal quality and channel capacity to an entertainment delivery system capable of delivering any program to any home.

We do not believe that is the end of the story, however. In Figure 14 we see the same hybrid architecture that we are building in Queens, but now we have added digital communications services. We can see that the establishment of an extensive fiber infrastructure in the community now allows us to provide fiber drops to business users and to provide them with very high-speed computer communications (either between businesses within our own service area, or through long distance fiber carriers) to businesses in other areas. In addition, we believe that this kind of broadband network provides the ideal interconnection infrastructure for the personal communications network (PCN) business. This successor to cellular telephone will make very efficient use of the radio spectrum for wireless communications. However, in order to make that possible, each cell will cover an area only a few hundred yards in radius. In order to provide cost-effective interconnection of those "microcells," a broadband network of the kind that we are building to support our entertainment business appears to be ideal.

There are many unanswered questions with regard to business strategy and regulatory and public policy issues that must be answered in advance of the provision of telecommunications services on the cable TV system. Nevertheless, from a technical standpoint, we believe there is an evolutionary path open to us that leads to an almost ideal entertainment delivery system and leaves open many options with regard to other information and com-

Attenuation and ORL* testing:

The FasTest™ way is the simplest way!

THE FOT-900 IS FAST

The EXFO FOT-900 redefines the standards in attenuation and ORL testing with FasTest™ .FasTest automatically performs these measurements, at two wavelengths, up to 20 times faster, at the push of a single button. (Patent pending)*

THE FOT-900 IS SIMPLE

It selects the calibration wavelength to match that of the signal detected. It adjusts the "reference level" to display the true end-to-end attenuation without needing to "zero out" at a common site. It acquires and stores readings permanently (up to 1000).

IT PRINTS OUT MEASUREMENTS

*For on-the-spot cable documentation detailing each fiber's attenuation or return loss, you can use the optional portable 40 column printer to generate a complete report: location, date, operator, cable number etc. You can also transfer all stored readings to a PC** via the built-in RS-232 interface.*

UNCOMPROMISING FEATURES

The FOT-900 significantly cuts down on training costs, human errors and average measurement time, while retaining all the features. In addition to FasTest™, you obtain: 3 independent power supplies, multiple built-in source options (including TE-cooled laser for outstanding stability), large alphanumeric back-lit display, very rugged construction, soft protective holster, etc.

IT'S WHAT YOU HAVE BEEN WAITING FOR

The FOT-900 with FasTest™ meets your demands for intelligent instruments which permit fast, accurate and simple characterization of today's large fiber networks (FTTC, FTTH etc). A PC card version (FOT-900PC) that fits on laptop computers offers even more possibilities.

*ORL: Optical Return Loss
**PC: trade mark of International Business Machines

From now on, FasTest™ is the ONLY way.

EXFO
Electro-Optical Engineering

USA WEST:
Tel: (818) 500-0466
Fax:(818) 247-1744

USA CENTER:
Tel: (215) 672-4065
Fax: (215) 441-0346

USA EAST:
Tel: (603) 424-8211
Fax: (603) 424-8212

EUROPE:
Tel: 33-1-3953-9830
Fax:33-1-3953-9840

Main office
465 Godin Vanier, QC, CANADA, G1M 3G7
Tel: (418) 683-0211 Fax: (418) 683-2170

munication services. As the cable industry faces a much more competitive environment in the future, it is helpful to note that we have a course of action open to us allowing us to keep our cost structure low, and yet to greatly expand the convenience and variety of the services we offer the consumer.

All of this makes extensive use of technologies that have been developed only recently or are being developed today. That continues cable's tradition of the last 40 years of adaptation of new technologies to meet business needs. It will be fascinating to see precisely how the future does unfold. Regardless of the twists and turns it takes, however, I believe that we will find ourselves to be uniquely positioned to play a key role in entertainment delivery and, perhaps, telecommunications of various sorts. This all stems from the fact that we have spent the last four decades putting a broadband transmission medium into the local loop. That is an exceedingly difficult thing for potential competitors to replicate, and I believe that it will serve us very well indeed.

"We have only begun to realize the 'plumbing system' that we have put in place over the last 40 years can really do."

There are two ways for us to look at our current situation. The first is essentially all negative. That is, we will soon be beleaguered with rich and powerful competitors. We will be constrained and regulated by Congress, the Federal Communications Commission and the municipalities that oversee our franchises. As well, we will be saddled with obsolete plant. This seems to be today's conventional wisdom, and there are echoes of it heard in articles in the popular and technical press, in Washington and even on Wall Street.

As widespread as this negative view may be, however, I believe that it is absolutely incorrect. While the cable industry indeed may go through a period of limited re-regulation and will certainly face increased competition in the business of video delivery, our biggest single challenge arises from the enormous and almost unprecedented number of choices and opportunities that technology places at our disposal today.

Beginning with our installed base of broadband coaxial cable in the local loop, and aided by technologies from the fields of optical fiber, microcomputers, data transmission, mass data storage and digital switching, we have the tools at our disposal to construct a system that delivers almost any imaginable entertainment, education, information or communications service. We have only begun to realize what the "plumbing system" that we have put in place over the last 40 years can really do. I am confident that we will continue in our proud tradition of marrying new and existing technologies, and consumer needs and desires as we blaze the trail into a third, most exciting era in the development of the cable business. **CT**

THE SOUND INVESTMENT

))) IN STEREO (((

It's a tough market out there and the smart money goes with a sure thing whenever it's available. That's why more top MSO's put their money on Learning audio equipment. It has the proven assets to return a high yield of performance and reliability.

It's clear why the industry is bullish on Learning equipment. Products like the MTS-2B BTSC Stereo Generator offer more standard features than any comparable unit and at a very comparable price.

Sharp, clean audio with a frequency response flat out to 15 kHz, typical stereo separation >30 dB, true AGC, Bessel-null test-tone, dbx® noise processing, and stereo synthesis for ad insertion are basics that Learning buyers have come to expect.

This is the kind of dependable equipment that operators want to have on-line for the not-so-far-away day when every minute of broadcast time will be in stereo.

So, if you're in the market for success, take this insider tip and call or write today for more information on the full line of audio equipment. Make Learning your next sound investment.

LEAMING INDUSTRIES

15339 Barranca Parkway, Irvine, CA 92718
(714) 727-4144 • FAX (714) 727-3650
(800) 4-LEAMING

THE MTS-2B IS PREFERRED BY MORE TOP MSO'S THAN ANY OTHER ENCODER

See us at the SCTE Cable-Tec Expo, Booth 402, 404. Reader Service Number 83

Figure 1: Sample picture from an analog MVC-5000 Sony camera

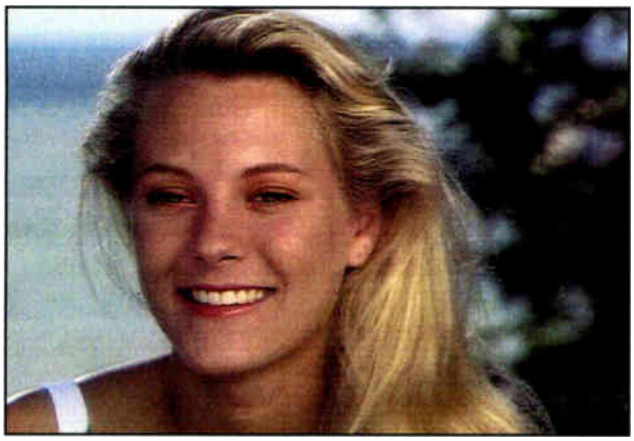


Figure 2: Sample picture from a Kodak DCS

Digital still photography

By Lawrence W. Lockwood
President, TeleResources
East Coast Correspondent

Analog electronic still video cameras have been around for some 10 years but recently electronic still camera developments have been progressing in the direction that the world is moving in — digital. Eastman Kodak has produced a digital still camera with outstanding performance (more about this system later) but first a review of the first analog electronic still video camera systems is in order.

Early analog electronic still video cameras

The Sony Mavica, introduced in 1981, was the first of a generation of analog still video cameras. Since then many other companies have entered the field but since they all perform in a similar manner and since the Sony is so well-known, its cameras will be examined. Sony currently has two analog still video cameras on the market with two levels of imaging capabilities — the MVC-2000 camera and the MVC-5000 camera — the MVC-5000 producing a higher resolution image than the MVC-2000.

The MVC-2000 uses an electronic CCD chip (380,000 pixels) to sense the image in place of film. The image is recorded in FM on a 2-inch floppy disk built into the camera. This disk can record up to 25 full-frame (50-field) color images. The MVC-2000 incorporates selectable hi-band or normal band recording modes — hi-band offering the maximum picture quality obtainable from the CCD sensor. It produces a picture with a horizontal resolution of 320 lines.

The MVC-5000 uses *two* CCD chips (380,000 chips each) as the image pickup device and the hi-band format to provide a horizontal resolution of 500 lines. The luminance and chrominance information is picked up separately on each chip. In the hi-band mode the FM carrier frequency and its deviation for luminance signals are increased (analogous to standard hi-band videotape recording.) This results in a luminance horizontal resolution of 500 lines. The MVC-5000 uses a compressed digital audio signal recorded on the disk by FM to provide a capability of logging short descriptions of each picture. Tables 1 and 2 (on page 94) show specifications of both cameras. A typical picture from an analog Sony camera is shown in Figure 1.

A serious limitation of these cameras results from the fact that they are essentially an analog recording of a still frame from an NTSC signal, and therefore subject to that signal's restrictions and more importantly limited to any upward improvements. These analog electronic still cameras were introduced accompanied by extravagant hype claiming that this was to be the new wave of still photography. However, the NTSC system limitations prevented professional use (e.g., news photography) and consumers felt that standard film from the drugstore pro-

"Kodak has created a tool for the professional market that offers unique advantages over film."

BROADCAST PREMIER.

Presenting the Drake ESR 1240 Integrated Receiver/Decoder.

Drake has been in business long enough to know what you demand in an IRD.

The Drake ESR 1240 IRD delivers high performance in an affordable, compact unit that combines a commercial grade satellite receiver with an integrated VideoCipher® II Plus Commercial Descrambler Module.

The ESR 1240 IRD uses a new low noise 70 MHz IF with threshold extension to provide the best possible picture and low data error rates under weak signal conditions.

Convenient front panel access.

The ESR 1240 IRD's front panel design allows easy access to the descrambler module without having to remove the unit from its rack mounted position.

Two front panel LEDs show sync and authorization status of the descrambler module. A two-digit LED display indicates C band channel selection. Channels 1-24 can be tuned in by the ESR 1240 IRD's front panel channel selection switch and fine tuning control.

VideoCipher® II Plus is a registered trademark of General Instrument Corporation. Ownership or possession of a ESR 1240 IRD with a VideoCipher® II Plus Commercial Decoder does not entitle owner or possessor to receive descrambled signals without authorization by the programmer.

VideoCipher® II Plus Decoder Module warranteed separately by General Instrument Corporation.

Complete video and audio reception control.

When a signal is received, video output is automatically switched between descrambled video and normal clamped video, providing crisp, clear video from either scrambled or unscrambled signals. Also, digital stereo audio is available with a choice of balanced or unbalanced outputs for left and right channels. The subcarrier audio demodulator is tunable from the front panel.

Famous Drake quality.

Backed by a one-year limited warranty, the Drake ESR 1240 IRD complies with and exceeds the latest industry standards. All in a highly reliable, efficient and affordable unit designed with you, the cable operator, in mind.

Because Drake has made its business on knowing your business.

Contact us for the name of your nearest Drake distributor.

DRAKE®

R. L. Drake Company
P.O. Box 3006, Miamisburg, Ohio 45343 U.S.A.
Sales: (513) 866-2421, Fax: (513) 866-0806
In Canada: (705) 742-3122
Service and Parts: (513) 746-6990

Made in America by Drake...a world leader in communication products since 1943.

Reader Service Number 84

Table 1: MVC-2000 specifications

Recording format	Still video floppy (2-inch)
Video	Luminance: FM recording Chrominance: R-Y, B-Y differential color line sequential FM recording
Recording mode	Hi-band/normal band selectable
Imager	2/3″ interline transfer CCD image sensor
Picture elements	380,000 pixels (768[H] x 493[V])
Video recording mode	Frame/field selectable
Sensitivity (NORM)	Frame recording: Equivalent to ISO 80 film Field recording: Equivalent to ISO 160 film
Recording capacity	Frame recording: 25 pictures Field recording: 50 pictures
Horizontal resolution	320 lines (hi-band/normal band)
Power requirement	"AA" battery (IEC designation R6) x 6 and backup lithium battery
Power consumption	3.7 W
Price	$3,095

Table 2: MVC-5000 specifications

Recording format	Still video floppy (2-inch)
Video	Luminance: FM recording Chrominance: R-Y, B-Y differential color line sequential FM recording
Audio	Time compressed FM recording (9.6 sec/track)
Recording mode	Hi-band/normal band selectable
Video signal system	EIA monochrome, NTSC color
Imager	Two 2/3″ interline transfer CCD image sensors
Picture elements	380,000 pixels (768[H] x 493[V])
Video recording mode	Frame/field selectable
Microphone	Input: -69 dB, electret condenser microphone
Recording capacity	Frame recording: 25 pictures Field recording: 50 pictures Frame picture with audio recording: 16 pictures Field picture with audio recording: 25 pictures (Audio only: 480 sec)
Horizontal resolution	500 TV lines (recorder, hi-band) 360 TV lines (recorder, normal band)
Audio recording capacity	9.6 sec/track compressed recording
Power requirements	NP-55 battery pack and memory backup lithium battery
Power consumption	7.4 W
Price	$7,150

duced not only better pictures, but was considerably easier on the wallet.

Kodak's Digital Camera System

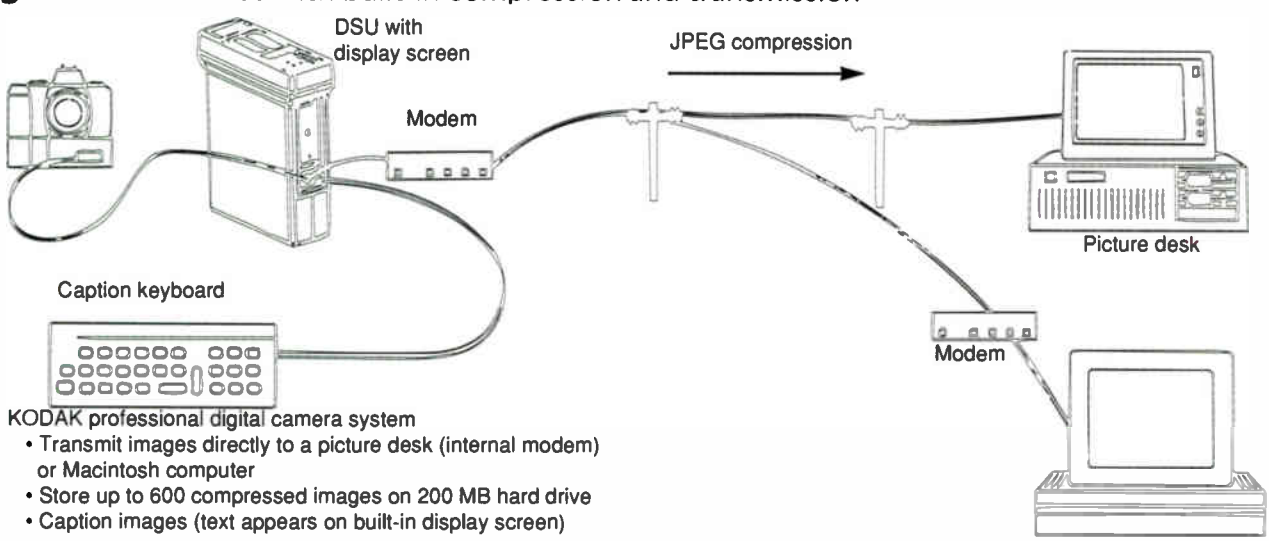
To overcome the limitations of NTSC and analog recording the developers of digital still cameras developed both new imaging formats and new digital video signal techniques — thus obtaining the flexibility that digital signal processing yields. The most outstanding example of these cameras is already in use in photo journalism. It was developed and is being manufactured by Kodak — the Digital Camera System (DCS). Newspapers such as *USA Today* have turned to electronic still photography for deadline sports coverage and major events such as the Academy Awards, Grammy Awards, etc. Its resolution at present is not that of film but for print use it is more than adequate. (See Figure 2 on page 92 — compare to Figure 1.)

The DCS uses a Nikon F3 35mm camera body with a digital imaging back and standard Nikon lenses to capture color or black-and-white images. The images can be computer enhanced and transmitted.

Three main components make up the DCS. First, either of two camera backs — one color, one monochrome — replace the camera's standard back. Second, a camera winder (allowing rapid advancement of the F3 shutter that can operate at a rate of up to 2.5 captures per second. Third, a Kodak digital storage unit (DSU) stores up to 138 uncompressed, or 400 to 600 compressed images. The digital storage unit incorporates a 200 megabyte Winchester disk and JPEG-compatible image compression capability.

With a modem, stored images can be transmitted over normal phone lines directly from the digital storage unit to any computer capable of receiving files in the transmission format. (See Figure 3.) →

Figure 3: Kodak DCS with built-in compression and transmission



Hand Held Precision That's Affordable!

The LP-5000 series are low cost, rugged, hand held meters and sources designed for field use. These NIST traceable units are ideal for: FDDI Testing, Cable Acceptance testing, End-to-End testing of installed links, Splicing and Connectorization.

- **LP-5000 POWER METER**
  - Simple 3 button operation
  - Tests both singlemode and multimode fibers at 780, 850, 1300 and 1550nm wavelengths
- **LP-5100 series LED LIGHT SOURCES**
  - Available in 850, 1300, 850/1300 & 1300/1550nm Dual wavelength models
  - Features both Continuous Wave (CW) and Modulated modes (270Hz, 2KHz).
- **LP-5200 series LASER LIGHT SOURCES**
  - Available in 1310, 1550, and 1310/1550nm Dual wavelength models
  - Features both Continuous Wave (CW) and Modulated modes (270Hz, 2KHz).

LP-5000 series Hand Held Fiber Optic Power Meters and Light Sources

laser precision ... *The Industry's Standard for Excellence*

109 North Genesee Street • Utica, NY 13502 • (315) 797-4449 • FAX (315) 798-4038

European Office: P.O. Box 81094 • 3009 G.B. Rotterdam, Holland • 31-10-451-1510 • FAX 31-10-451-8667

Brazilian Office: AGC Optosystems • Rua Panacu, 54-Ipiranga • São Paulo, SP-CEP.04264, Brazil • 55-11-273-8566 • FAX 55-11-274-3997

See us at the SCTE Cable-Tec Expo, Booth 650. Reader Service Number 85

Figure 4: DCS CCD imager chip pixel layout

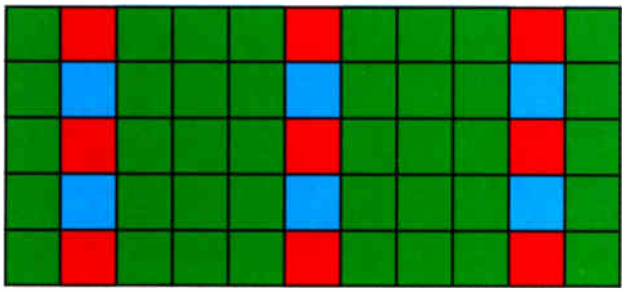


Figure 5a: Front view of the DCS and DSU

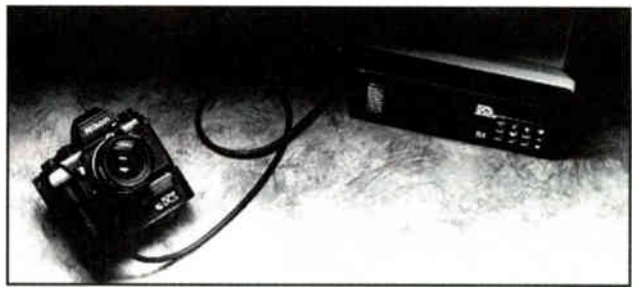
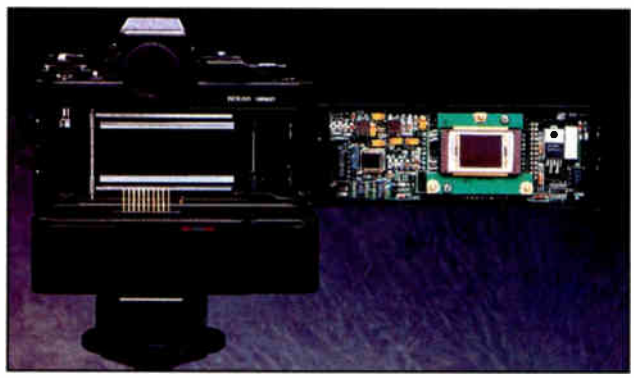


Figure 5b: Rear view of the DCS and CCD chip



The color and monochrome backs contain the DCS's "heart": a 1,280 x 1,024 pixel imager (1.3 million pixels). Measuring 21mm x 17mm, this imager is approximately half the length and width of a 35mm film frame. Its 16 micron pixels offer excellent light sensitivity.

Commonly available still video cameras contain sensors with 250,000 to 500,000 pixels (380,000 for the Sony Mavica). The DCS generates an image composed of *1.3 million pixels* — or approximately 3-1/2 the number of pixels of the Sony. With the color back of the Kodak professional DCS, the system produces images equivalent to exposure indexes (EI) of 200, 400 (system nominal speed), 800 and 1,600.

An integral color filter array (CFA) on the sensor serves to separate the red, green and blue scene information. The "three-green" CFA pattern is shown in Figure 4. This pattern allocates 75 percent of the photosites to detecting green scene detail, and the remaining 25 percent to detecting red and blue scene information. The CFA pattern was designed to sample images in a manner compatible with the human visual system in that the high sampling rate for green (luminance) scene information produces a high degree of scene detail and sharpness in captured images, while the sparse sampling for red and blue provides lower resolution chroma information. This process is analogous to the NTSC handling of luminance and chrominance (for the same reasons).

The digital storage unit is equipped with an 8 megabyte dynamic random-access memory (DRAM) buffer capable of storing up to a six-image burst. But since many photographers often fire many more images per burst, a 32 megabyte buffer capable of storing up to a 24-image burst is available as a system option.

Photographers in the field can view captured images immediately on a 4-inch monochrome LCD monitor built into the digital storage unit. The digital storage unit also features a 12-button keypad and two-line 16-character LCD alphanumeric display for image captioning and system control. Finally a full color print of 8.5x11-inch or 11x11-inch size can be rapidly produced by a Kodak digital continuous tone thermal printer.

The current price of the DCS is approximately $20,000. See Figure 5a for a front view of the camera and the DSU and Figure 5b for a rear view with the camera back swung open showing the CCD imaging chip and some of the electronics.

Conclusions

It is apparent that even at the present DCS resolution it is more than adequate for various professional applications; e.g., photo journalism, computer-searchable police electronic mug books and many others. More important, because of its digital structure, the ceiling for improvement presented by earlier analog systems is not there.

An obvious restriction for consumer use is price. However, past experience with digital technology indicates that this will come down. How long — if ever — it will take for the price to come into even the advanced amateur photographers' range remains to be seen. Regardless, Kodak has created a tool for the professional market that offers unique advantages over film.**CT**

COMTECH SUPPLY, INC.

WORLDWIDE DISTRIBUTOR

* STOCKING *

CATV * TELEPHONE * POWER

* DATA PRODUCTS *

Established 1975

Comtech Supply de Argentina, S.A.
Sanchez de Bustamante 880
(1173) Capital Federal
Argentina
Phone: (541) 885482, (541) 8628561
FAX: (541) 8624295

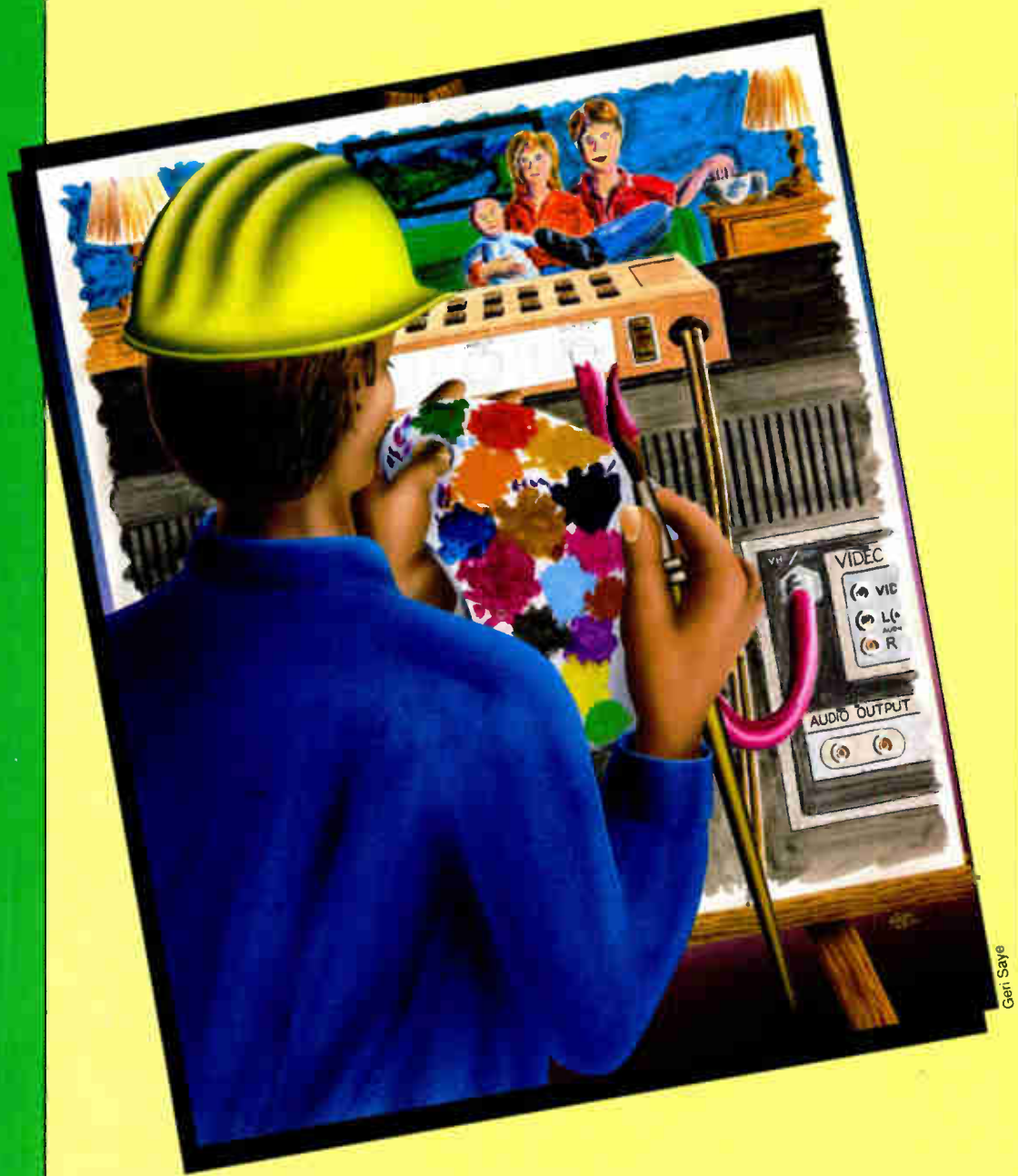
Comtech Supply Inc
1952 N.W. 93rd Ave.
Miami, FL 33172 USA
Phone: (305) 592-3948
FAX: (305) 592-9646

June 1992

Focus on installations

BACK TO BASICS

The training and educational supplement to Communications Technology magazine.



Geri Saye

Table of Contents

Figure 1: TV set and converter

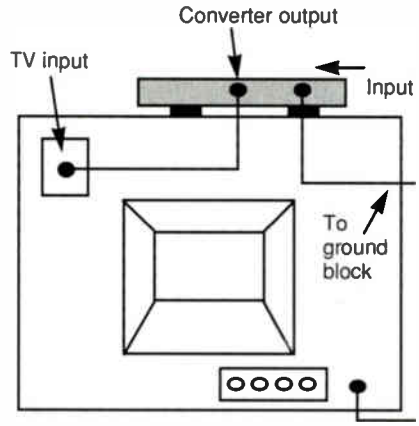
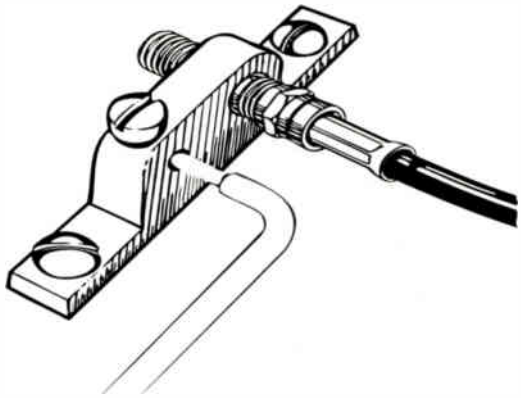


Figure 2: Ground block

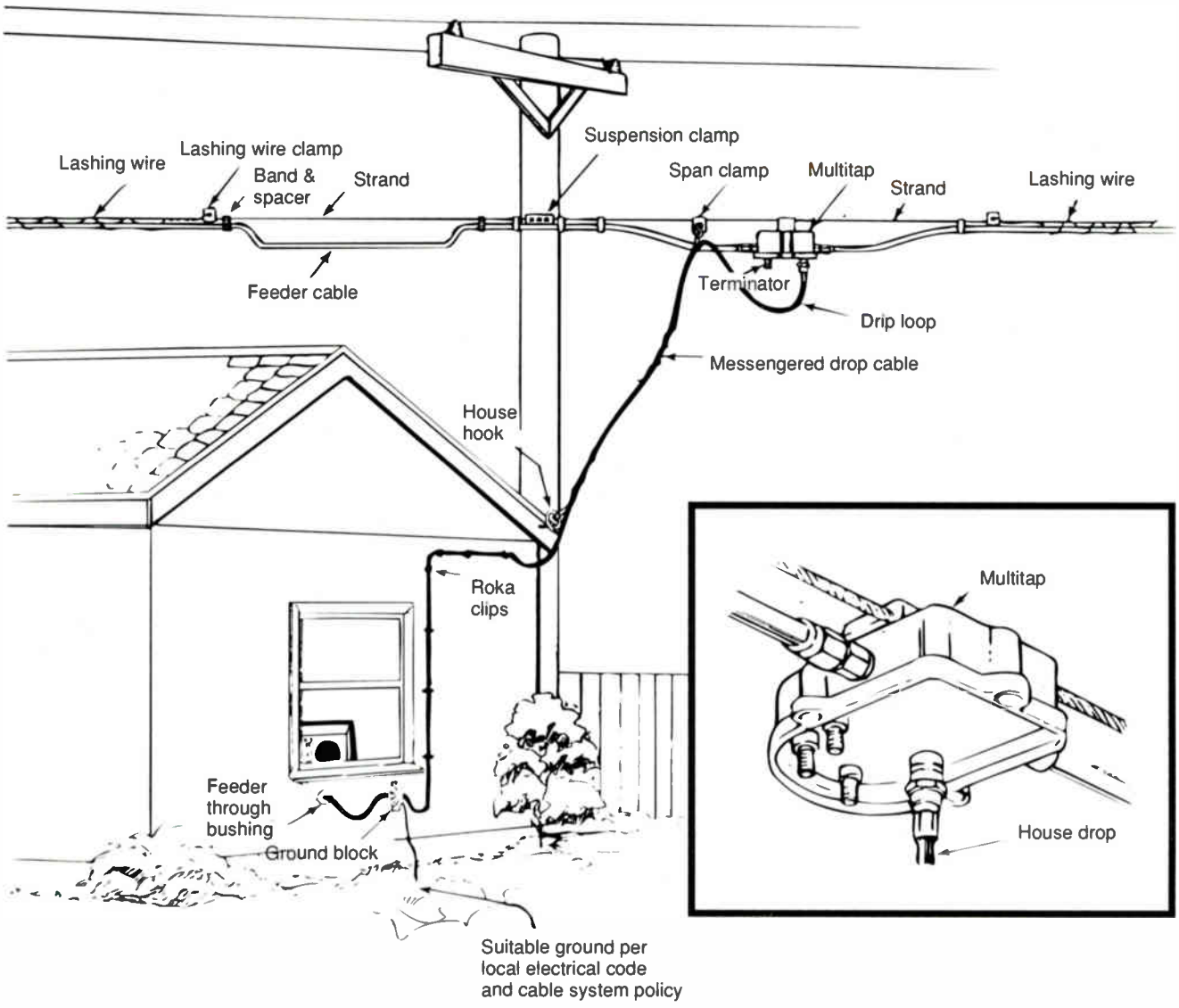


Troubleshooting the CATV installation

By Al Dawkins
Technical Instructor, ATC Training Center

Installation problems comprise the highest percentage of service calls

Figure 3: Drop Installation



A New Addition To The Blonder-Tongue AGILE Family

IRD-2001 Rack Miser Only 1.75" High.

- **Only 1.75" high to conserve rack space**
- **Rock solid 100 KHz PLL tuning accuracy**
- **Dual down-converter circuitry**
- **70 MHz IF loop for insertion of TI filters**
- **Textbook video quality**

Commercial grade, frequency agile, C/KU-Band satellite receiver and Commercial Videocipher® Descrambler now available from Blonder Tongue in a low profile, 1.75" high, rack mount unit. PLL tuning gives easy access to C/KU-Bands and all scrambled cable programming. Optional IF bandwidth and a second agile broadcast quality demodulator are available.

Available Now. Call 908-679-4000 for further information.

BLONDER TONGUE LABORATORIES

The Standard of Quality In TV Signal Distribution

One Jake Brown Road, Old Bridge, N.J. 08857
Phone: 908-679-4000. Fax: 908-679-4353

See us at the SCTE Cable-Tec Expo, Booth 114. Reader Service Number 88

and are manifested as outages, non-standard performance, intermittent performance and customer relation problems. With an outage, there is no signal at the TV set. In non-standard performance there are snowy pictures, distortions and/or hum interference. Intermittent problems usually are caused only under certain conditions (windy, cold, hot, rain, etc.) and you must catch the problems during these conditions, which can be difficult. Customer relation problems are generally a result of some misinformation or misunderstanding on the subscriber's part.

The installation process involves the subscriber's TV set, the cable converter, connectors, drop cable, splitters, ground block and tap. Troubleshooting an installation can be an easy task if you have the knowledge of its function, proper test equipment and some experience. As well, problems can occur before the tap, in a line extender or bridger along with associated connectors and feeder cable. Your company policy will dictate the extent of your troubleshooting.

Good test equipment and the knowledge of its operation are necessary to troubleshoot efficiently. A signal level meter (SLM), volt ohm meter (VOM) and the subscriber's TV set are the major pieces of test equipment used to troubleshoot.

The SLM is a tunable receiver that can select any RF carrier of any channel and read, at proper test points, that channel's signal level in dBmV. The VOM is used to test drop cable for open or short circuits and the continuity of a cable. The subscriber's TV set often will show the problem in question and with a trained eye a troubleshooter can determine some problems by observation.

There are proper procedures to follow before starting the troubleshooting process. First you must identify yourself to the subscriber and determine if you are at the correct address. Have the sub explain the problem and allow him or her to turn on the TV set. This procedure can eliminate problems with defective TV sets. You may be blamed for a pre-existing condition. This also shows whether the sub understands the procedure in obtaining a picture. Make sure the TV set's channel selector is on the converter output channel (Ch. 2, 3, 4 or system-specific).

Determining cause

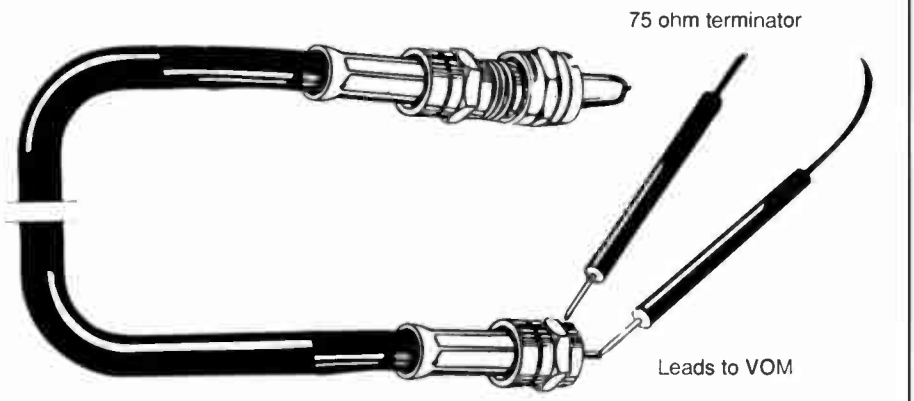
Look at the picture and you may see one or more of the following troubles:

• *A snowy picture usually means low signal to the TV set.* This is most common. Inspect the connections behind the converter and TV set. The cables can be reversed or connected incorrectly. A common subscriber error is incorrect placement of the 75/300 ohm switch or jumper as well as connecting the matching transformer incorrectly.

Figure 1 on page 100 shows the basic TV set, converter and cable connections. Using an SLM, check the levels on the output of the converter (Ch. 2, 3 or 4) by measuring the level at the TV set's end of the output jumper cable. This will test the cable as well as the converter. The reading should be between 0 and 10 dBmV.

• *If signal levels are good, there are two possible problems.* Replace the matching transformer. (If a transformer is not used, that leaves only the TV set.) Good levels at the back of the TV set leads us to believe that the TV set is not processing the input signal to produce a good picture.

Figure 4: Drop (VOM) test



Convincing subscribers that they have a TV set problem can be difficult. The best way to convince the subscriber is to have him or her supply a good spare portable TV to hook up on the same line as the bad TV set, using a splitter. Your TV test set is a last resort because subs may think it's a special set. Fixing the TV set is the sub's responsibility and you should not recommend a repair shop.

• *If no or low signal levels are measured, you must check the input of the converter.* Measure a high- and low-band channel. Good signal levels at the input indicate an inoperative converter box.

Low or no signal levels at the input of the converter will move the testing back toward the tap. The major rule in any type of troubleshooting is divide and conquer. What this means is you must divide the remaining installation in half and keep dividing until you find the problem. This rule applies to all signal flow problems. Since we are di-

viding the installation in half, this puts you at the ground block. (Figure 2 shows a ground block while Figure 3 (both on page 100) shows the entire drop installation.)

Before leaving the converter and TV set, tighten all connections with a 7/16-inch wrench. This will prevent unwanted signals (such as those from local TV stations) from entering the system and prevent the cable connections from leaking cable signals into the air. These signals could possibly cause interference with other services using the same frequencies.

Using an SLM, measure the signal level (both high- and low-band) on the TV set side of the ground block. Most systems are designed for tap levels of 7-10 dBmV in 36-channel systems or 9-12 dBmV in 60-channel systems or higher. RG-6 drop cable has a loss of about 4.5 dB at 450 MHz and 1.5 dB at Ch. 2 for 100 feet of cable (the average drop length).

At the high and the low channel you should measure above 0 dBmV (2.5-7.5 dBmV). If the signal levels are good, the problem is between the ground block and the TV set. If the levels are still low, you will test levels back at the tap.

To test this last section (drop from the tap to the ground block), it is necessary to climb a pole, use ladders or open the pedestal (if underground). If you climb a pole or use a ladder, please pay attention to all safety rules regarding ladder and climbing safety. The frequency of climbing accidents are second only to vehicle accidents. Be careful to follow all rules of your climbing and ladder training. (Climbing and ladder training is an Occupational Safety and Health Administration requirement.)

At the tap (Figure 3 on page 100), measure the affected subscriber's tap port with an SLM. If the tap port has a poor output it is not necessary to check the drop. If the tap output is good, check the drop cable.

An easy way to test drop cables is to terminate one end of the cable with a 75 ohm terminator. If the cable is good you will read close to 75 ohms using VOM measuring from the center conductor to the shield at the opposite end of the cable. (See Figure 4 on page 103.) You can check any section of drop cable to find the bad section.

You cannot test through a splitter using this method — only sections of cable. Some of the problems areas are poor connectors, corrosion, short center conductors and open or shorted cables. Before you descend the pole or leave the tap, perform a visual inspection looking for poor connections, missing terminators or missing traps (positive or negative, if used). Check for leakage if detecting equipment is provided; you may save a service call later. If a discrepancy is found, repair it or report the problem. Also, be sure to verify proper weatherproofing of all connections.

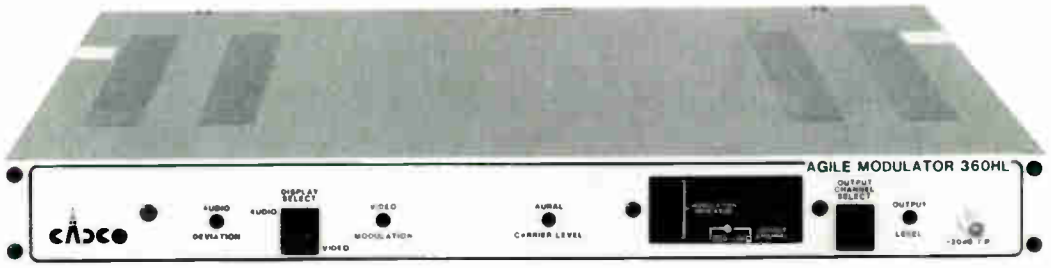
At the tap and beyond

You will find that a high percentage of the time you will have found the problem with one of the preceding tests. The problem is seldom before the tap. Some cable company's allow their installers to troubleshoot back beyond the tap in question, in which case the divide and conquer method would continue.

• *If there is no signal at the tap, the tap could be inoperative.* Another tap port must be tested along with a tap input test (SLM testing at the seizure screw) before you can deter-

AGILE PLUS

Proven reliability PLUS added Features



The time-proven CADCO Agile line of Modulators, Processors and Demodulators now offer PLUS FEATURES:

☞ RS-232 CONTROL OPTION at 4 SELECTABLE BAUD RATES

☞ FULL SUB-LOW T-Channel AGILITY T-7 thru T-14*

☞ EXTENDED OUTPUT TO 550 MHz OPTION

☞ RELIABLE SURFACE MOUNT TECHNOLOGY

☞ INTERNATIONAL DUAL CARRIER AUDIO

these features are PLUS to the regular popular CADCO features like:

☞ NTSC • PAL • SECAM

☞ INTERNATIONAL TELEVISION SYSTEMS B/G - D/K - I - M/N

☞ AUTOMATIC INPUT CORRECTION

☞ AUTOMATIC FCC OFFSET OUTPUT (defeatable)

☞ MICROPROCESSOR CONTROL

☞ PHASE-LOCKED SYNTHESIZED OSCILLATORS

☞ AMERICAN MANUFACTURED & 2-YEAR WARRANTY

CADCO is simply the most user friendly, advanced-technology frequency agile equipment anywhere at any price.

* Demodulator Option

BROADBAND COMMUNICATIONS

Made in U.S.A.

2405 S. Shiloh **Garland, Texas 75041**

1-800-877-2288 **FAX 214-271-3654** **214-271-3651**

Reader Service Number 93

mine whether the problem is at or before the tap.

• *If the problem is distortion, alternative troubleshooting methods are used.* In the case of poor pictures, problems do not relate in all instances directly to low signal conditions. You may have visible distortions caused by intermodulation or cross-modulation, or hum modulation could impair the picture. You may not be responsible for repairing feeder problems, but the TV picture can provide information concerning the problem. Any useful information can help service technicians repair the problem.

Intermod appears as diagonal lines across the picture, which may vary by distance of separation and angle. This is determined by the frequency of the interfering beat carrier. Crossmod appears as two pictures on one channel or vertical or horizontal sync bars. This is caused by video from another channel.

With these two distortions, your SLM test at the TV set will give good or higher-than-normal levels, which means the problem could be at an active device — line extender, bridger or trunk amplifier — that is being overdriven (high input). The line extender is the most common problem in this case. The more subscribers that are affected, the more likely that a problem is located farther back toward the headend. To troubleshoot this problem, use an SLM to test inputs to active devices. Divide and conquer. Usually, troubleshooting this problem is done by a service technician or maintenance technician.

"Installers should make it a practice of doing all they can to repair their own drop installations when they are found to not function properly."

With hum mod (horizontal bars rolling through the picture on all channels) your SLM will show normal levels, or if the SLM has a hum test feature, a 1 percent or higher measured hum will be shown. (This measurement may have to performed on an unmodulated carrier, depending on the specific test equipment being used.) The problem is the active device power supply filtering (AC ripple on the DC supply). The TV set can cause the hum as well, but no hum will be measured on the cable drop. To troubleshoot this problem, test (with a VOM) for AC at the DC test point of the amplifier power supply. Test with another TV set if the set is suspected of causing the problem. This usually is the responsibility of a service tech or a maintenance tech.

Do all that you can

Installers should make it a practice of doing all they can to repair their own drop installations when they are found to not function properly. Learning to perform your job more efficiently can lead to fewer problems. Realizing mistakes helps you learn not to repeat the same thing on the next install. Remember, a very high percentage of call-backs and service calls stem from poor installations. Weak signal, ingress and egress can be a direct results of poor installation practices. Make the installation look good, function well and take pride in your work. **BTB**

REPLACEMENT EQUALIZERS FOR QUALITY RF SERVICES, JERROLD, TEXSCAN / SYLVANIA PATHMAKER AND RCA

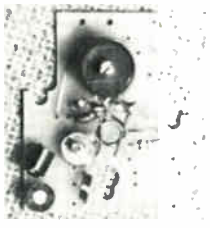
✦ ✦ ✦ NEW ✦ ✦ ✦ QLX ✦ ✦ ✦ NEW ✦ ✦ ✦

(450 AND 550 MHz)

Available in 2 dB Cable Equivalent Increments
0 to 24 dB Fixed Values

6.75

600 MHz COMING SOON FROM QRF PRODUCTION DEPARTMENT



QEP Trunk Equalizers (Replaces SEP by Jerrold)
(ST 20 and SJ Chassis Compatible - Available in one-way or two way . . . 4's and 5's)

TL - 5 thru 11 dB
L -10 thru 16 dB
H -16 thru 22 dB
ST -18 thru 25 dB

(300 through 450 MHz Bandwidths)

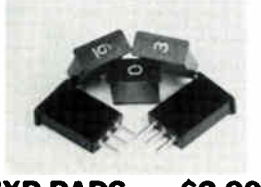
$15.00 ea. all values.

QEE Line Extender Equalizers (Replaces SEE by Jerrold)

Bandwidths		Values:
220 MHz	330 MHz	6 dB, 12 dB, 18 dB, 24 dB
270 MHz	400 MHz	
300 MHz	450 MHz	

$5.00 ea. all values.

SXP PADS $1.75
(0 to 20 dB in 1 dB steps)



JXP PADS $2.90
(0 to 20 dB in 1 dB steps)

FOR SCIENTIFIC ATLANTA EQUIPMENT

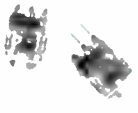
SXP-T TOPS $1.75
(WITH HANDLE)

PATHMAKER EQUALIZERS
$10.00 EA.
AVAILABLE IN THE FOLLOWING BANDWIDTHS:
300MHz, 330MHz, 400MHz, 450MHz

NOMINAL VALUES:
4dB, 7dB, 10dB, 13dB, 16dB, 19dB

◆ RCA EQUALIZERS ◆
Available in 300MHz, 330MHz and ◆ NEW ◆ 360MHz
$6.50

✦ ✦ ✦ NEW ✦ ✦ ✦



PATHMAKER PADS
$4.50 EA.
0 to 6dB
9, 12 AND 15dB

RCA PADS
(Single value 0 to 20dB in 1 dB steps)
$4.00

Quality RF Services is not a Sales agent for Jerrold Electronics

QUALITY RF SERVICES, INC.

850 PARK WAY
JUPITER, FL 33477

(800) 327-9767

(407) 747-4998
FAX (407) 744-4618

See us at the SCTE Cable-Tec Expo, Booth 306. Reader Service Number 95

dimensions vary. A measuring gauge is often provided to aid in meeting connector manufacturer specifications.

Both tools require the same performance evaluation — clean often, lubricate and keep aligned. When working with flooded cable, it will be necessary to clean the bit and guide sleeve more often because the flooding compound impairs the performance of the tool. Mineral spirits work well to remove the compound.

Another type of stripping coring tool is designed for Comm/Scope's Quantum Reach cable. Because this is a soft-walled cable, it is necessary to prepare it for connectorization in a different manner. These tools are two-piece and the bodies (which thread together to protect the core bit during storage) are made of aluminum. The main body works the same as a standard tool — it removes the dielectric and, for this cable, cuts the jacketed aluminum. After you finish coring the cable and exposing the center conductor, you use the second part of the tool, which has a steel cutting blade to remove the jacket. It also has a center mandrel pin to support the inner cable wall while removing the jacket. It's a good idea to keep oil on the threads when you put the pieces back together for storage.

Drop cable stripping tools

Tools used for preparing drop cable have a replaceable cartridge containing two blades. The cartridges have no moving or adjustable parts and are pre-set to produce either 1/4-inch braid and dielectric with a 1/4-inch exposed center conductor prep, or a 1/8-inch braid/dielectric and 1/4-inch exposed center conductor prep on 6 or 59 series cables. Some tools are available that produce a 3/8-inch braid, 1/8-inch dielectric and 1/4-inch center conductor.

One type of tool body is a spring-loaded, clothespin-type with a large finger hole on the end. To use the tool you compress the lever and install the cable in the direction of the arrow on the lever. The 1/4-1/4 prep tool has no cable stop. The cable should be inserted flush with the edge of the cartridge. The 1/8-1/4 prep tool has a stop built into the cartridge.

With the cable centered in the "V" groove of the lever, spin the tool three or four complete rotations in one direction. Then stop and reverse direction two or three turns. Now hold the cable in your hand and grip the head of the prep tool in your other hand. Gently rock the tool back and forth and pull away from the cable. The cable is ready for connectorization. (See the diagram on page 108 for step-by-step directions for prepping the cable and installing an F-connector.)

Different types of jacket material as well as percentage of braid have an effect on how well the tool works. If the jacket tends to be somewhat soft and thick, you must rotate the tool slowly. If the jacket is thin and hard, then a faster rotation works better. The amount of braid may affect how much the jacket moves on the cable while you are preparing it. Be aware that hot and cold conditions also affect how the jacket cuts.

Whenever you start a new reel of cable or use a different type, you should make a few practice cuts to get a feel for how the stripping tool works on the particular cable. Once you do that you should have a trouble-free run prepping drop cable. These tools should not be lubricated. The only maintenance is to remove the cartridge and clean the small pieces of debris near the blades and, of course, replace the cartridge when the blades are dull.

Hand tools are supposed to make the your job easier, but they are only as good as the person using them. The more you know about how they work and how to take care of them, the better they will perform for you. **BTB**

WASHINGTON CABLE SUPPLY, INC.

We now stock **Regal!!!**
Splitters and Taps

We also carry a full line of equipment and accessories at competitive prices.
The products we stock include:

Gilbert • Jerrold
Comm/Scope • Belden
Tyton • Pico Macom • LRC
Klein • Bashlin • Aervoe

4600-D Boston Way
Lanham, MD 20706
FAX: (301) 577-5551

Call the company that makes a difference

1-800-888-0738

Reader Service Number 99

Installers: Contract vs. in-house

By Wayne Davis
Fund Engineering Director, Jones Intercable

If you're a cable operator, you've probably used installers on a contract basis at least once. Our industry has become increasingly dependent on contract installers to the extent that, in some systems, there are no in-house installers employed at all.

Several years ago, when major new-builds were happening, using temporary contract installers made good sense because the work loads would fluctuate dramatically from day to day and week to week. It didn't make sense to hire an in-house installer, keep him working all month and standing around the next. Nor did it make sense to lay off the employee after every new install push.

When the push was over and the system had grown, the policy of using contract installers stuck because it was difficult to justify the expense and capital needed to hire, train, supervise and equip in-house installers. Therefore, the need for contract installers was easily justified and necessary.

But is it worth it?

Is this scenario the same today? While there are some very good and reputable contract installation companies out there, we have all lived through the bad ones. You'll recall some of the nightmares: 15-year-old trucks with rusted out fenders, no safety equipment (strobe lights, hard hats, traffic cones, etc.), no uniforms, no radio communication and very little training or experience. Then they're always in a hurry to get to the next job, leaving barely acceptable work in their wake. Remember the contract installer who showed up at the first job of the day at 11 a.m. with alcohol on his breath and the wrong converter box? He promised the customer he would return later in the day, but was never to be found. Remember the out-of-state contract installers you brought in and later found selling your PROM converters and positive traps at the local bar?

We all have our horror stories, but contract installers have sometimes been considered the "necessary evil." That's not to say that all contractors are bad because there are some very good contract installation companies out there that are worth every dime they charge. And fortunately the bad ones don't usually last long (at least as long as it takes them to pack up and head to another cable operator). Pity the other operator!

In this age of increased customer service awareness, can we afford to give our customers substandard or even minimum service, quality and performance? The cable industry is being scrutinized for its reputation as a poor service provider. Installers oftentimes take the brunt of the heat and many times rightly so.

You've seen the skits on late night TV and sitcoms where the installer shows up six hours late, pulls up to the house in a smoking, backfiring, beat-up pickup truck, wearing clothes right out of the hamper, and offers to hook up the second TV set illegally or hook up HBO for a "one time charge." These skits are funny, but painfully true in many cases. However, we can no longer tolerate such things or dismiss them casually. →

In-house installation model

	Jan. '92	Feb. '92	March '92	April '92	May '92	June '92	July '92	Aug. '92	Sept. '92	Oct. '92	Nov. '92	Dec. '92	
Total connects	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	***12,000***
In-house (I-H) connects	8	250	350	500	700	750	750	775	775	750	650	650	***6,908***
Contractor connects	992	750	650	500	300	250	250	225	225	250	350	350	***5,092***
Total in-house installers	3	5	7	7	7	8	8	8	8	8	8	8	***7.08***
Average wages per hour	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	$8	***$8***
Total wages per month *	$4,032	$6,720	$9,408	$9,408	$9,408	$10,752	$10,752	$10,752	$10,752	$10,752	$10,752	$10,752	***$9,520***
Overhead **	$4,133	$6,888	$9,643	$9,643	$9,643	$11,021	$11,021	$11,021	$11,021	$11,021	$11,021	$11,021	***$9,758***
Total monthly expenses (I-H)	$8,165	$13,608	$19,051	$19,051	$19,051	$21,773	$21,773	$21,773	$21,773	$21,773	$21,773	$21,773	***$231,334***
Average cost I-H connect	$1,021	$54	$54	$38	$27	$29	$29	$28	$28	$29	$33	$33	***$117.09***
Average cost contract connect	$55	$55	$55	$55	$55	$55	$55	$55	$55	$55	$55	$55	***$55***
Cost if contracted	$440	$13,750	$19,250	$27,500	$38,500	$41,250	$41,250	$42,625	$42,625	$41,250	$35,750	$35,750	***$379,940***
(Total net savings/month)	**$7,725**	**($142)**	**($199)**	**($8,449)**	**($19,449)**	**($19,477)**	**($19,477)**	**($20,852)**	**($20,852)**	**($19,477)**	**($13,977)**	**($13,977)**	***($148,606)***

Capital cost/associate †	**$22,000**
Number associates/year	**8**
Total capital cost	**$176,000**
Payback in years	**1.18 years**

* Includes 5 percent overtime wages
** Includes gas, oil, vehicle maintenance, uniforms, benefits, tires
† Includes vehicle, test equipment, safety equipment, tools, radio, etc.

ACT Communications— Lighting the Way . . .

for the enlightened choice in fiber optic equipment.

If you want the best in fiber optic equipment, service and support, make the enlightened choice and call ACT Communications. ACT has everything that the big conglomerates have, only more. In our "lighthouse" you'll find over 25 lines of fiber optic and telecommunications equipment that we manufacture and represent. Not only do we have superior products, but we also provide superb nationwide support to our customers with expert advice and service for all our products.

ACT Communications has been breeding innovation since 1983 . . . Texas style. Our experts are waiting to shed some light on your fiber optic needs.

ACT COMMUNICATIONS INC.

TEXAS BRED TECHNOLOGY

Corporate Headquarters: 903/961-2300 • Fax: 903/961-2222
109 North Main Street, P.O. Box 375 • Ector, Texas 75439

See us at the SCTE Cable-Tec Expo, Booth 535. Reader Service Number 100

Fiber Equipment
- Connectors
- Pigtails
- Jumpers
- Closures
- Splices
- Splice Trays
- Cleavers
- Organizers
- Patch Panels
- Distribution Panels
- Kits
- Tools
- Cleaning Solvents
- Encapsulant
- Restoration Kits
- Ground Isolators
- Cable
- Innerduct

Fiber Test
- Fusion Splicers
- LIDs
- Power Meters
- Test Kits
- Light Sources
- Attenuators
- Talksets
- Cable Fault Locators
- OTDRs
- Plotters
- Data Loggers

Fiber LAN
- Multiplexers
- Modems
- Links
- Ethernet
- Token Ring
- Tempest Products (military)
- Interfaces to Wide Area Networks

in the amount of work that an in-house installer can do in a day as compared against the contractor. The in-house installer soon becomes as proficient and efficient in performing installs as the contractor. After all, that's what he does all day. He becomes the expert, doing the job as well as or better than the contract installer.

Where are your contract installers? Are you having a tough time getting them to call in during the day? Do you want to have them go back to the last job? Radio contact with our in-house technical staff is almost a given. How can we accept not being able to contact our scheduled work staff in the field, especially since the heat is on our industry to meet two-hour appointment windows? In-house installers have radios.

One of the side benefits that we've seen is the ability to "grow our own" technicians. It is getting more and more difficult to find trained service and maintenance technicians. Because in-house installers are required to troubleshoot their own work and are trained in the use of FSMs, VOMs, locators, time domain reflectometers, etc., they eventually "grow" into entry level service technicians out of necessity. Where do you fill your next service technician opening from? Promote from within and move one of the in-house installers up.

Do those contract installs leak? How do you know? Traditionally, contract installers are not equipped to monitor their work for signal leakage, let alone the system they drive by during the course of a day. Have you ever asked a contractor to monitor signal leakage on your cable system? It will cost you. Using in-house installers for signal leakage is an effective way to monitor a lot of cable plant and ensure the work they do is leak-free for only the cost of the equipment.

In these days of increased customer service demands and tight money, the following list of benefits for having in-house installers is hard to ignore:

- Reduced costs
- Controlled, predictable costs
- Uniformed, trained installers
- Reduced staff turnover
- Pride in craftsmanship
- Late model vehicles with cable company logos
- Better customer service image
- Better knowledge of product and ability to sell it
- Radio contact with office
- Higher level of commitment
- Equipped with test equipment and able to troubleshoot problems on the spot
- Trained, competent staff to fill technician openings
- Equipped to monitor signal leakage

If your work load is on a roller coaster or if you have one of the hard-to-find quality contractors, you may be happy where you are and it would be tough to justify in-house installers. However, if you look closely at the feasibility of doing your own installs you may be surprised. Think about it. If the contractor can hire people, train them, pay for insurance, pay for gas, oil, repairs, etc., and still make good money, why can't the cable operator do the same thing and keep his money in his own pocket? After all, we are the experts at cable TV! You may find you can have your cake and eat it too! **BTB**

DISTORTION MEASUREMENTS?

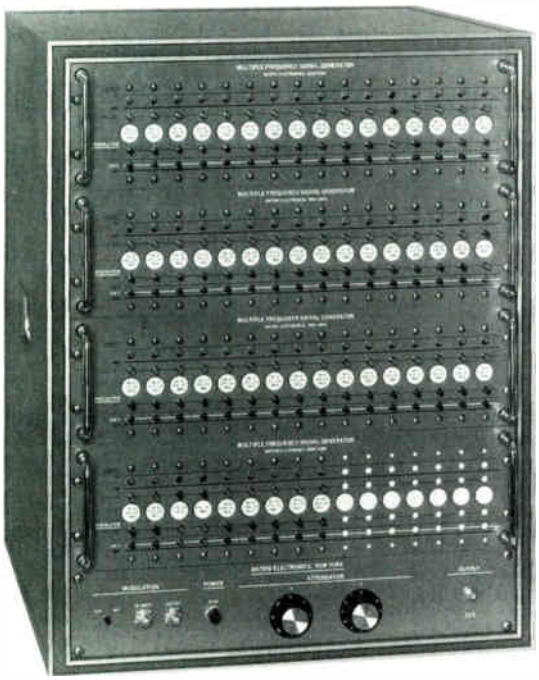
If you are testing CATV, LAN, Cellular telephone amplifiers, Broadband RF systems, or Power amplifiers

MATRIX GIVES ANSWERS!

MATRIX MULTIPLE FREQUENCY SIGNAL GENERATORS in conjunction with our SIGNAL STRENGTH AND DISTORTION ANALYZERS directly display Carrier to noise ratio, Cross modulation, Intermodulation, Composite third order, and Composite second order distortions

MODEL R-75
SIGNAL STRENGTH
AND DISTORTION ANALYZER

- Cross-modulation, Discrete second order, and Discrete third order down to -95dB.
- Composite Triple Beat and Composite Second Order down to better than -77 dB.
- IEEE 488 or RS-232 remote control options.



MODEL SX-16
MULTIPLE FREQUENCY
SIGNAL GENERATOR

- Any frequency from 5 MHz to 1000 MHz. Specials above 1000 MHz.
- +57 dBmV per channel with 32 channels. +51 dBmV per channel with 128 channels.
- All harmonics and residual modulations better then 100 dB down.
- Carrier and modulation levels adjustable individually for each channel.
- Models available with IEEE 488 or RS-232 remote control options.

Many options and custom configurations available.

For custom made special products and full technical support contact

MATRIX TEST EQUIPMENT INCORPORATED
200 WOOD AVENUE
MIDDLESEX, NEW JERSEY 08846
(908) 469-9510
FAX (908) 469-0418

Benefits of a "wish list" F-connector

By Viacom Operations Group

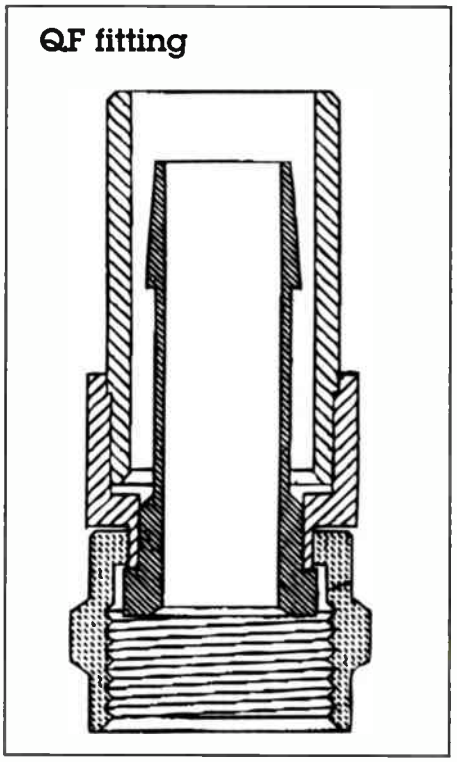
In late 1986, Viacom found through computer tracking of service calls that it was spending $8 million to $9 million for F-fitting related calls. With that level of service calls being unacceptable, a decision was made to do two things:

1) Start a long-term controlled test using standard hex crimp F-connectors to identify their failure modes.

2) Explore and field test the new F-fitting technologies.

Aged connector problems

In Viacom's San Francisco system, history has taught us that standard hex crimp connectors were acceptable upon installation but deteriorated rapidly. Service calls for direct pickup within six months of initial installation were common. Chs. 2, 4, 5, 7 and 9 were being transmitted in the center of the city. The San Francisco peninsula is only 15 miles across and with the city being in a small, compact geographical area such as this, the ambient signal level in any part of the city is extremely high. Service calls generated from direct pickup happen long before the bad connectors could be detected with a standard signal leakage device.



The industry standard testing methods using a radiometer or an RF chamber were adequate to measure egress upon initial installation. However, it did not lend itself well to test connectors that were aged. This was due to the fact that the installation of the F-connectors in the chamber would result in physical movement of the samples, which would renew the electrical contact between the F-connector post and braid. This would result in erroneous test data.

It was decided to use San Francisco as a test bed due to the extreme ambient field available. Samples of connectors were installed on 12-inch pieces of cable and joined together with F-81 connectors. Eight such samples were mounted on a piece of wood for stability. With one end terminated, the other end was connected to a battery-powered post-amplifier and the level of ingress was measured. With this method, consistent relative measure-

TECH TIPS

Putting out fires with a 41 dB tap

By Arthur "Skip" Kraus
Owner, Seneca-Manhattan-Elmwood-Gardner Cable TV

This article is not for the big MSO, although a few of the old techs there may enjoy hearing about small operators' logic and how we live out here in the boonies.

By small operator, I mean one where there is no budget and only money to put out fires. With that mentality, I discovered the Jerrold FFT-2-41 tap. Your first line of thought might be: "Who would want a tap with a value of 41 dB?" That was my first thought, too. Well, while on the phone to my supplier to order taps and while negotiating with him, he mentioned he had a close-out of FFT-2-41. I took 10 at $1 each.

What can you do with 41 dB?

Why did I order them? Well, first of all for parts. I'm sure we all have taps in our inventory with broken ports. Did you ever try to order a new face plate for an FFT? How about the connecting terminal inside the tap? When you change a face plate and snap off the post, what do you do with the tap? They cost upwards of $10 each!

Once I got these taps in stock, my mind went wild with other uses. We were in the middle of some extensions around our town. Here and there we have splice pedestals. Personally, I don't like the splices that are available. The screws sheer the center pin, it's not made to bond, it's a poor test point, etc. Well, the FFT-2-41 is a perfect splice-bonding point, test point, etc.

What about cable theft? Did you ever have a pedestal that whatever you did (locks, padlocks, a security connection, and even the law) residents still ended up connected? Put an FFT-2-41 in that pedestal and let them enjoy snow.

Let's touch on test points. With our leakage problems, why not a 41 dB test point?

It shouldn't take long before our manufacturers will build us a new "tap," "test point" and "bond point." But a warning to my fellow "moms and pops," I don't think you'll find any more FFT-2-41 out there at $1 each. I just bought out the last 71 they had in stock. I've got enough spare parts for a while. You have to admit, it has its uses. **BTB**

Congratulations

• Jim Chiddix •
• James Ludington • Roosevelt Mikhail •
• David Pangrac • Jay Vaughn •

Recipients of the 1992 Service in Technology Award

We congratulate you on the design and implementation of the first 1GHz upgrade cable system.

The Times Warner Queens System
"The only Gig in town"

The Pioneers of 1GHz Coax Cable

ments were possible. By measuring the ambient field with a calibrated Singer dipole and adding the post-amplifier's gain, a shielding number was obtainable.

Within 30 days, a dramatic change in shielding of the hex crimp connectors was noted. Some of these samples were taken to the laboratory and dissected. It was discovered that the jacket material of the drop cable would cold flow away from the high pressure points to the low pressure points of the hex crimp thus loosening pressure on the post-to-braid interface, causing both signal ingress and overall degradation of the electrical and mechanical performances.

In view of this discovery field tests of the new F-connector technologies (i.e., 360° compression-type fittings) took on greater importance. At first glance, the F-connector using 360° symmetrical pressure for mechanical and electrical integrity appeared superior. The one obvious exception was that they were craft-sensitive.

They also eliminated the ability to visually inspect the post sliding over the inner foil during installation causing a situation we term as blind entry. It was apparent both in our controlled tests and our nine months of field tests, that when installed properly, these new fittings showed significant improvements. However, the blind entry, with the lack of visual inspection, proved to be a big problem. We literally had cables falling off at the fitting. While we realized this was an installation training problem, it was difficult (if not impossible) to look at the installed fitting and know it was done correctly.

F-connector wish list

In an effort to solve this problem, with the cooperation of Yumen International, Viacom developed a new "wish list" for an F-fitting in early 1989. The list included:

1) 360° compression, 360° pressure applied to post-to-braid interface.

2) Increase post length for greater post-to-braid contact.

3) Two-piece design for visual assurance of proper installation while maintaining the positive elements of the one-piece design.

4) 100 percent metal construction for electrical continuity and long-term reliability. →

WE SELL, REPAIR & PURCHASE ALL EQUIPMENT LISTED

REFURBISHED MODULATOR'S

Scientific Atlanta
Blonder Tongue
Cadco
Catels
DX
Triple Crown
Drake

REFURBISHED RECEIVER'S

Scientific Atlanta
DX
Standards
Microdyne

REFURBISHED PROCESSOR'S

Cadco
Scientific Atlanta
Triple Crown
Phase Com
Precise
Pico

REFURBISHED LINE GEAR

Scientific Atlanta
Sylvania/Texscan
Tap's Pads
EQ's DC's

REFURBISHED LNC'S

270-770 mz
360-1 360-2 362 9360
Cal-Amp

900-1400 mz
Down Convertors
LNB's

760-1260 mz
Standard

950-1450 mz
LNB's

4-gz
LNA's

SPECIAL

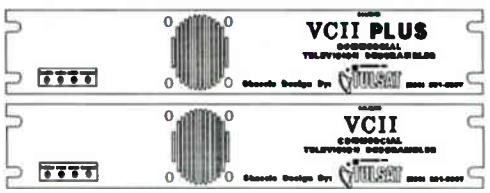
50° Cal-Amp Commercial LNB's $89.00

50° Cal-Amp LNA's $119.00

We FIX ®VIDEOCIPHERS

$139.00 HALFSIZE VCII CHASSIS

THERMOSTAT CONTROLLED FAN
SAVES RACK SPACE



DRK ENTERPRISES, INC.
DBA

TULSAT

800-331-5997

FACT

1991

* Average Repair Charge

LESS THAN **$100.00**

Including Parts

* Dosen't Include Line Equipment or Shipping Charges

MOST REPAIRS IN ONE WEEK

MOST REPAIRS $93.00

VCII PLUS

*UPGRADES & EXCHANGES

+ IRD CARD
OR
STANDARD +

$269.00

*Must Be Working White Label or IRD

1575 N. 105th E. Ave
Tulsa, Oklahoma 74116
(918) 836-8348

®VideoCipher is a registered trademark of General Instrument

5) Improved plating — bright tin on all surfaces except the center post, which should be silver-plated for enhanced electrical performance.

Plating became an important issue because the results in Viacom's controlled test showed that a silver center post improved performance over time by as much as 10-15 dB.

In January 1990, Viacom started using the connectors developed with Yumen International, called the QF fitting.

Cost savings

Since Viacom introduced the product to its systems (with instructions to change all F-fittings during a service call), F-fitting related service calls have been reduced by 5,000 — that is, 265 percent. To date, Viacom estimates that 20-25 percent of all F-fittings have been replaced. The reduction in F-fitting related service calls is estimated to be a savings of approximately $200,000. While it is true that Viacom is spending two to three times more for this connector, it is believed that when the change is complete, F-connector service calls should be reduced by at least 75 percent. This should produce an annual savings of $500,000-$600,000 in service calls. When considering the higher cost of the product, Viacom still expects a net annual saving of over $250,000. In addition, it believes there is the positive benefit of customer satisfaction and improved cumulative leakage index (CLI) compliance. For both of these, an associated dollar value is unknown.

Even though the F-connector is a small and mundane part in a cable system, it is used extensively and can create major problems within a cable operation. For example, in one day a group of 10 installers installing one bad F-connector per install will keep a technician busy for approximately two weeks.

Based on the monetary/labor impact that this new connector has on the cable operation, the time and effort put forth has proven to be a sound investment, which will pay dividends for years to come. This being the case, Viacom decided the product should be shared with the entire cable TV industry. Not wanting to be a supplier, Viacom has made this product available though Signal Vision Inc. and John Weeks Enterprises Inc. **BTB**

" THE SPUN ANTENNA PEOPLE "

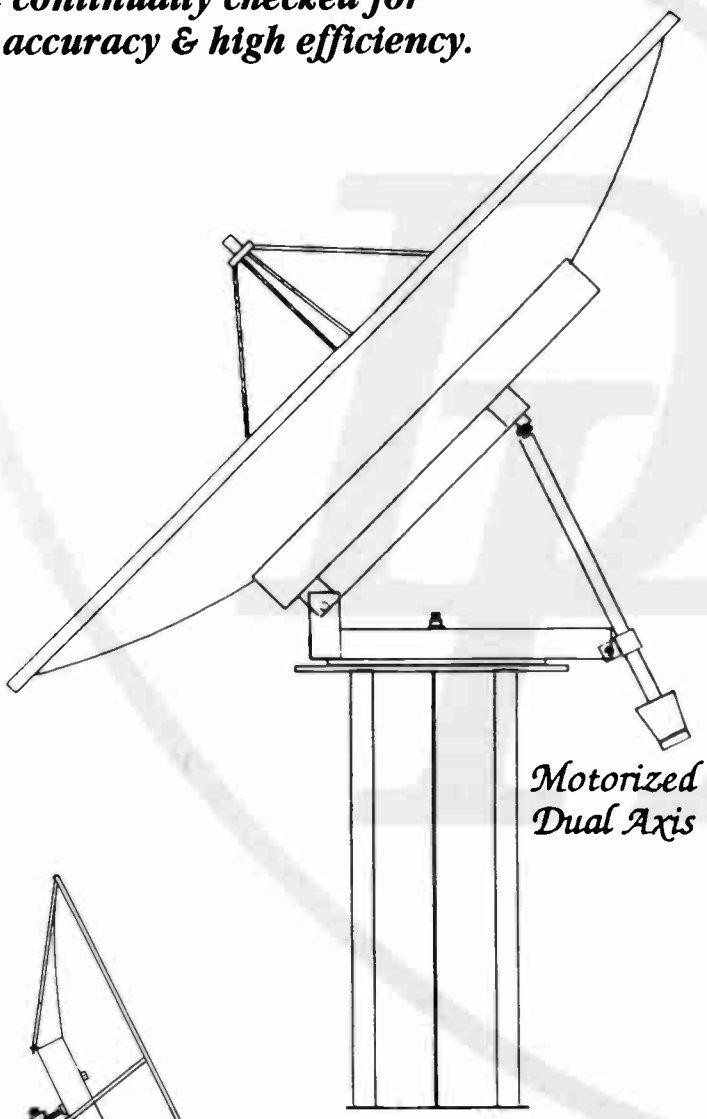
- WORLDWIDE SHIPPING -
- ANTENNAS 60 CM THRU 5 M -

All DH Antennas are spun aluminum and continually checked for repeat accuracy & high efficiency.

Our reputation was built by excellent reception in Ku fringe areas.

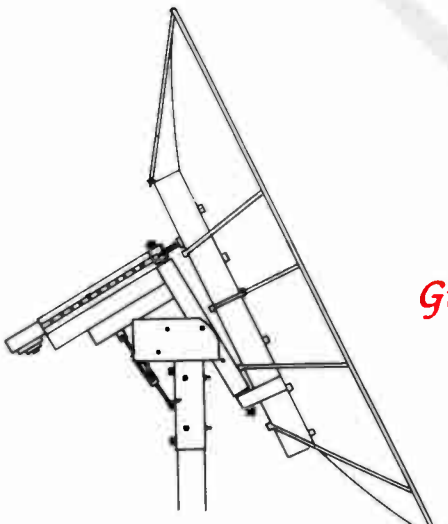
Over 10 different mounts for over 17 different size antennas are available.

DH offers different focal lengths, and different edge designs to customize your antennas for private label.

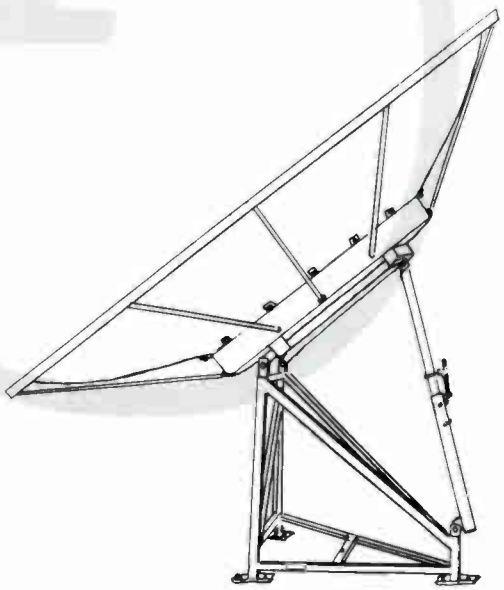


Motorized Dual Axis

Gibralter Mount



Horizon Polar



3 pt. SSE AZ/EL Mount

DH SATELLITE INC.

P.O. Box 239
Prairie du Chien, WI 53821 U.S.A.

Phone (608) 326-8406
Fascimile (608) 326-4233

CALL, WRITE OR FAX FOR INFORMATION

See us at the SCTE Cable-Tec Expo, Booth 117. Reader Service Number 111

These boots are made for working!

By Ralph Haimowitz
Training Director, Society of Cable Television Engineers

There has been a lot of controversy about appropriate footwear for cable TV personnel. In an effort to clarify this matter, the Society of Cable Television Engineers went to the Occupational Safety and Health Administration for a ruling on what OSHA required. The answers that we received were not as specific as we had hoped for, but did provide enough information to make some specific conclusions.

Warehouse workers

First we asked about footwear requirements for warehouse personnel. Linda Anku, regional administrator of the Philadelphia regional OSHA office, responded, "Employees who lift and move heavy items should wear safety toe footwear. Employers of such employees are obligated by OSHA Standard 29 CFR 1910.132 (a) to ensure that they wear such footwear."

Since our warehouse personnel are lifting, moving and carrying heavy objects such as reels of cable, amplifiers, etc., OSHA Standard 29 CFR 1910.132 (a) definitely applies and the employer must be certain that the safety toe footwear meets American National Standards Institute (ANSI) specifications Z41 as required by OSHA Standard 29 CFR 1910.136.

Installer/techs

The second specific question we asked addressed the needs of those employees who are required to climb poles and ladders in the performance of their work. The reply from Anku was: "Employees who climb poles and ladders should wear footwear that is appropriate for such activities. Under Section 5(a)(1) of the OSHA Act, employers may not permit employees to work in a manner that could cause them to be exposed to a recognized hazard."

We examined what we thought were the areas of consideration for pole and ladder climber footwear. This included depth of heel to ensure slipping would not occur from ladder steps, pole steps, tower ladders, steps or frames and proper seating and security of the climbers that are required to work on wooden poles. We also looked at the height of the sides of the boot (to provide protection against irritations that could result from the upper part of the leg iron rubbing against the trousers and legs), as well as the need for a heavy-duty steel shank to keep the climber's legs from tiring while working.

After very careful consideration and numerous discussions with several top cable TV engineers and safety coordinators/trainers, the only possible conclusion that we could determine was that all cable TV personnel who climb poles and ladders in the performance of their assigned work must wear appropriate climbing footwear and since they also lift, move and carry the same heavy objects as warehouse personnel, the footwear also must have safety toes that meet ANSI Standard Z41.

ANSI Standard Z41 classifications are based upon safe resistance to impact when an object hits the shoe toe and compression that occurs when a static load is placed upon the safety toe. Impact is rated based upon 50 pounds dropped from a height of 18 inches and is measured in foot pounds.

The minimum requirements specified in Z41 are as follows:

Impact	Compression
I-75 = 75 ft lbs (101.7J)	C-75 = 2,500 lbs (11 121N)
I-50 = 50 ft lbs (67.8J)	C-50 = 1,750 lbs (7 784N)
I-30 = 30 ft lbs (40.7J)	C-30 = 1,000 lbs (4 448N)

For improved safety we recommend the I-75, C-75 ratings.

Employers' responsibilities

The specific responsibilities of employers are to see to it that their employees whose job functions requires them to wear safety toe footwear and/or safety toe climber's boots do so in the performance of their work. This is accomplished easily by making it a condition of employment. For those companies that do not have such an existing requirement, it should be put into company policy immediately. Those personnel who are already employees of such a company should be given a reasonable period of time to comply with the new policy. Remember that this is a safety issue and compliance times should be kept to a minimum.

Courtesy Iron Age Protective Co.

Lineman's safety boot.

When the new rules are introduced to personnel, you may be asked if the company is going to furnish the footwear the same as it does climbers and safety belts since it is a condition of employment. This is a decision that can be made by each individual company or corporation and would be a highly appreciated benefit if the organization chose to do so. However, since footwear is a personal item and health requirements prevent issuing them to anyone other than the initial wearer without proper sanitation, employers may require their personnel to provide their own.

We would strongly recommend that employers order the footwear to ensure the proper kind is obtained to meet OSHA requirements and to obtain the best possible price for the footwear (because there may be price reductions for multiple footwear orders). If necessary, set up a payroll deduction plan for employees over three or more pay periods to help them obtain the appropriate footwear without having to experience financial difficulties.

Who makes them?

We contacted the 10 footwear companies that exhibited their products at the National Safety Council Congress in

Courtesy Red Wing Shoe Co.

Athletic style safety shoe.

TURN IT ON

OR

TURN IT OFF

WITH THE NEW UTVRC

The new **UTVRC REMOTE CONTROL** from **U.S. ELECTRONICS** is the latest technology in subscriber friendly remote products. At last your subscribers can control their cable-box converter and TV set with one "easy to use" remote control

- Dual function remote control.
- Now offer volume control services to your regardless of the type of converter you have.
- Increase subscriber satisfaction.
- Generate additional revenues and add a new and exciting punch to your marketing efforts.
- Remote control shown is Jerrold® compatible.
- Available models include: Scientific Atlanta, Zenith, Pioneer, Panasonic, Hamlin, and others.

US ELECTRONICS
COMPONENTS CORPORATION

(800) 283-1792

UTVRC

INCLUDES 2 ALKALINE "AAA" BATTERIES
AND A TWO-YEAR WARRANTY.

Jerrold is a registered trade mark of General Instruments

See us at the SCTE Cable-Tec Expo, Booth 482. Reader Service Number 112

New Orleans last October to determine what they made and/or sold that meet the requirements as set forth by OSHA and our interpretation of the OSHA Standards and Act. Two companies that responded manufacture waterproof footwear made of rubber, neoprene or vinyl and do not match the requirements we were looking for. Five other companies replied and provided information about their products for this article, and one other company happened to mail us a flyer that we followed up on as an additional source for warehouse shoes.

The following information is listed by company in alphabetical order:

• CLAS Inc. manufactures safety toe shoes in a sneaker/tennis shoe style that is appropriate for warehouse personnel. AIM Inc. — phone, (800) 220-0068 — is a distributor for CLAS. These athletic shoes come with a steel toe that locks over the insole to resist shifting, tilting and cutting under impact. Independent laboratory testing showed that these toes far exceeded ANSI Class 75 standards for impact and compression. The boots are equipped with long-lasting outsoles; contoured cushion heel and arch pads; an extended heel counter to hold the foot in place for greater stability; a soft inside lining; and soft leather on upper shoe parts. AIM Inc. has Model STL 8922 in stock in sizes 7-13 EE at about $65 a pair. Logos can be added for the cost of setup and labor.

• Iron Age Protective Co. — phone, (615) 378-5580 — makes a Style 771 safety toe 10-inch lineman's boot that features premium oil-tanned work leather with double leather reinforced vamp and inside quarter; leather insole, mid-sole and storm welt; a heavy-duty steel shank; Austempered steel toe; and high-abrasion, oil-resistant Nitrile rubber outsole and matching heel. The boots meet or exceed ANSI Class 75 standards and come in D width, half sizes 8-12, 13 and 14, and EEE width, sizes 8-12. Approximate cost is $90 per pair. Iron Age also makes safety toe footwear for other uses and athletic-type shoes for warehouse employees are available in the $70 range.

• Lehigh Safety Shoes — phone, (800) 847-9371 — has a black oiled full grain leather 10-inch climber's boot with a Chemigum sole and heel, Lockrim steel toe cap, free-breathing Cambrelle vamp lining, full climbers patch comfort cushion insole, combination steel shank, and Goodyear welt construction in sizes D 7-11, 12, 13, E 7-11, 12 and EEE 6-11, 12, 13 for $78.95. Athletic STX style safety toe footwear is in the $60 range and all safety toe footwear meets or exceeds ANSI Class 75.

• Red Wing Shoe Co. in Minnesota — phone, (800) 359-2668 — does not currently have a safety toe lineman's boot since there has not been a high demand for this item recently, but it does have several non-safety toe climber's boots. If demand for a safety toe lineman's boot increases for any reason, the company will most likely manufacture these again. In athletic style safety toe shoes, Redwing has a number of styles that have a recommended retail price from $96-$127 (Styles 6607, 6630, 6653, and 6656).

• The Shoe Shack in Martin, Tenn. — phone, (800) 634-1468 — has Carolina pole climber's boots Style 101, which is an 11-inch steel toe safety boot in full grain black oil-tanned leather with a full stock overlay for pole, ladder or tree climbing. The boots have leather vamp lining, extra heavy midsole, right and left triple rib steel shank, and leather welt. They are long-wearing and oil-resistant. As well, they have a Chevron sole and logger heel with a Goodyear welt. Sizes are available in D 6-13 and E 5 to 14. Cost for these boots is $67 per pair plus $4 shipping and handling. Several other safety toe style are available including Style 151, which is a Carolina all-purpose safety toe oxford in black, smooth finished leather with an arch support and oil resistant crepe sole. This shoe meets ANSI Class 50 and costs $49.25.

• The last company to supply information was Tidewater Safety Shoe Service Inc. — phone, (804) 244-0121 — which is a division of Safety Supply America. It makes and sells Tru-Guard safety footwear. A variety of athletic style shoes are available in black or white. All models have the following: premium leather upper, cushioned tongue, Cambrelle cushioned forepart linings, outside lateral heel stabilizers, contour cushioned heel and arch cups, slip-resistance, and oil-resistant high-performance rubber stitched to the upper. All meet ANSI Class 75. Models TG400, TG402, and TG405 are low-tops and sell for $52 per pair. Models TG450, TG455 and TG456 are high-top sneakers and sell for $55 per pair. All models come in medium width, 6-11, 12 and 13, or wide 6-11, 12, and 13. Models TG456 and TG402 also come in size 14 (medium or wide). In addition, Tidewater also sells the Carolina lineman's boot Model 101 (as described previously under the Shoe Shack entry) for $94. **BTB**

Ideal Conditions for Lectro's UPS & Line Conditioners

Lectro's UPS and line conditioners are built to give you dependable power protection — even in harsh environments. Temperature ranges from minus 30° up to 130° Fahrenheit are no problem. And, with cabinets made of rugged aircraft grade aluminum, these units are some of the toughest in the industry. They can stand up to factory floor conditions, tolerate high levels of dust and humidity, and the outdoor models provide reliable power protection even when mounted on a telephone pole. Lectro offers a complete family of FerroMax™ products that use ferroresonant technology to ensure clean, consistent power protection that you can depend on.

- **Temperature Range - Minus 30° to 130° F**
- **2000 to 1 Spike Suppression**
- **30 Minute Standard Battery Run Time**
- **NEMA Cabinet Ratings - 4/4X/12**
- **Available from 300VA to 5KVA**
- **Two Year Warranty**

If you're looking for power protection that won't let you down...you need FerroMax™ from Lectro.

Introductory Offer - *Call today to take advantage of our special 10% discount offer. Limited time only.*

FerroMax™

Lectro

Power Protection for the Real World

Lectro Products, Inc.
420 Athena Drive • Athens, GA 30601
1-800-237-4877

See us at the SCTE Cable-Tec Expo, Booth 510, 512.

Reader Service Number 113

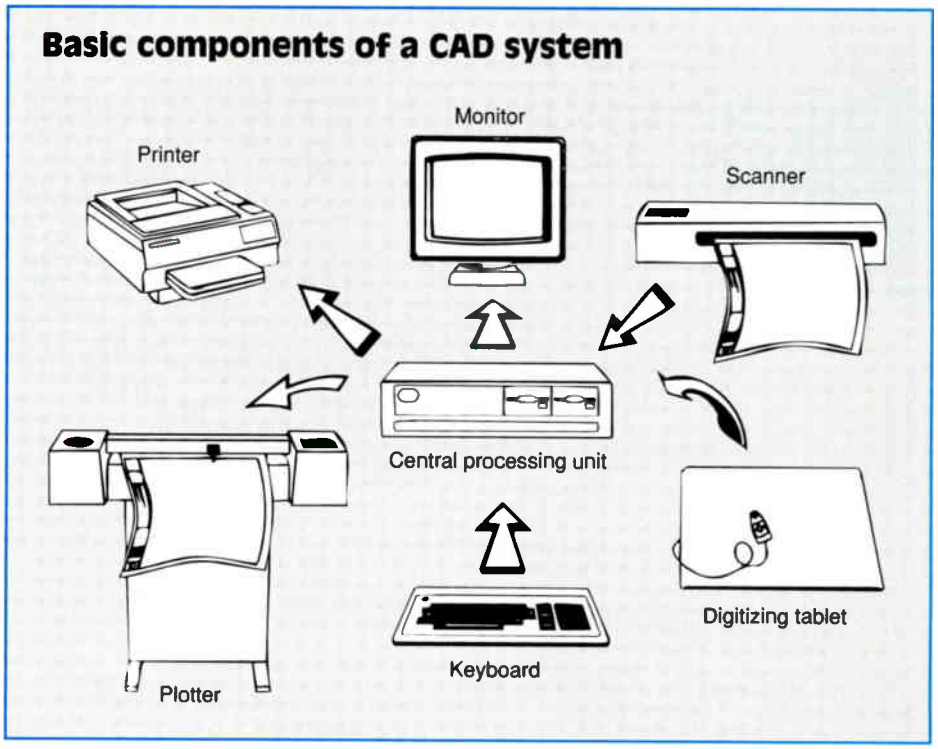
A CAD primer — Computer-aided drafting and cable TV

The following is the premiere column of a new "CT" department.

By Gary Block
President, Block & White

Computer-aided drafting and design (CAD) was first used on large mainframe computers around 1964. It didn't become widely popular, however, until about 10 years ago when CAD systems such as AutoCAD became available for personal computers.

Since then, it has been primarily used in architecture and civil engineering. Just recently has CAD become the popular choice for the cable TV industry. Let's look at what CAD is and what it can do for CATV specifically.



Drafting table vs. computer

If you've ever spent time leaning over a drafting table (drawing with leaky technical pens, erasing and replacing lines, and lettering tiny footages) the first thing you'll appreciate about CAD is that it is clean and comfortable. Positioned in front of your computer you can make changes quickly without leaving a trace of an erased line.

Editing, duplication and revising features can speed up tasks that were previously tedious. For example, a person using a traditional drafting method would have to draw each telephone pole symbol over and over. With CAD, you create the symbol once and insert it whenever and wherever you like from that point on.

Revisions such as changing all of the .412 feeder on a CAD drawing to .500 feeder is performed almost instantaneously with a few simple commands. Redefining a symbol, such as replacing all the symbols for push-pull amplifiers with feedforward symbols, can be done globally instead of having to change each one individually. If you have underground routing that is the same around several cul-de-sacs, you can just draw it once and copy it multiple times (saving considerable time). The examples are endless.

One-inch accuracy

In the past, if you wanted to draw a pole-line you had to scale out the distances and rely on your sight to determine accuracy. With CAD you can input distances from the keyboard greatly reducing error-prone tasks like this. And, once drawn, lines and other objects can be stretched or rotated as needed.

The "trim" command lets you clean up the lines of a street intersection perfectly and quickly. A four-way tap symbol can be inserted into a cable line and rotated to the exact same angle. Footages can be placed in the center of an aerial span, offset precisely the same distance each time, resulting in an incredibly clean, easy to read, professional looking drawing.

Zooming and panning features allow you to magnify a small area of a drawing and work on it more accurately. Zooming with CAD is similar to zooming with a camera. You pick an area and it is expanded to fill the screen. Once you are zoomed in, you can pan from side to side or top to bottom. A cable map representing more than a square mile can be worked upon with 1-inch accuracy.

Intelligent drawings

Probably the biggest feature that separates CAD from traditional hand drafting is the ability to attach information to an object in the form of text. Such a piece of information is called an attribute, and the ability to attach attributes to a drawing is often referred to as "intelligence."

Attributes can be visible or invisible. A visible attribute could be a footage between two telephone poles

EASY AS PIE

Get a positive RF seal with just one push.

What could be simpler than a push-on connector that secures your RF signal? No wrenches. No under or over tightening. Just prep the cable, slip the connector onto the cable, and push the sleeve over the port.

Then, our unique locking mechanism ensures long life and reliability — something no other push-on can offer.

Plus, it's designed to fit any F port, use a standard 1/4 inch to 1/4 inch prep, and be compatible with 59 and 6 series cables.

Augat's Push-N-Lock connector: you won't find an easier recipe for reliability anywhere.

Augat Communications Division, integrating products for CATV, Fiberoptics, LAN, and Telephony.
1-800-332-8428

AUGAT

We thrive on challenge.

LDC Electronics Inc., 631 Old Corning Road, PO Box 111, Horseheads, New York 14845

Reader Service Number 121

or the value of a two-way tap. Invisible attributes might be manufacturer's part numbers or serial numbers.

These attributes can be extracted from the drawing and transferred to programs like Lotus 1,2,3, D Base, or Word Perfect. For example, you could extract all the footages and house counts and add them up in Lotus 1,2,3. Or, information from amplifier data symbols can be extracted and sent to a word processing program to produce a report.

Customization is the key

CAD programs, just like other types of powerful computer software programs, are designed to be used by people in many different industries working toward many different results. What we need to do when we first obtain our CAD system is to customize it to our specific tasks.

Drawing machine screw threads or architectural floor plans won't do us much good in our industry. We need to customize our CAD system so that repetitive tasks like inserting telephone pole symbols or drawing different cable types are more automatic. The more extensive your customization, the more productive you'll be.

You can either customize your CAD system yourself (which can entail writing macros, developing menus and even programming), or you can purchase one of several customized packages that are available specifically for CATV mapping.

Hardware components

There are seven major hardware components to a CAD system as shown in the figure on page 128. The computer, also known as a central processing unit (CPU), is the most vital piece. Programs that deal with graphic images, such as CAD, are the most complex and demanding programs most people will ever run on their computers. A drawing you create with CAD is nothing more than a mathematical data base. Every time you manipulate an entity in the drawing the data base needs to be recalculated. The larger the drawing, the more calculation takes place. Therefore, the faster your computer can handle these calculations, the faster commands will be executed.

The keyboard is the most important input device you have. It is used to start programs, initiate commands, provide responses to commands and produce text when needed. However, it is not only an input device.

A digitizing tablet is an almost indispensable part of a productive CAD workstation. At first a digitizer may look similar to a computer mouse. You move the mouse around and the cursor moves correspondingly on the screen. However, on a digitizing

What will it cost?

Computers	
386-33 PC compatible	$2,500
486-33 PC compatible	$3,000
Monitors	
14-inch SVGA	$450
19-inch SVGA	$1,900
Printers	
24-pin dot matrix	$250
300-DPI laser	$850
Digitizers	
12x12-inch	$260
36x48-inch	$2,400
Plotters	
8-pen 24x36-inch	$4,200
24x36-inch electrostatic	$32,000

tablet a point on the tablet will always match the same point on the computer screen. For example, a point on the lower left-hand corner of the tablet will always equal a specific point on the lower left-hand corner of the screen. Therefore, you can tape maps down on a digitizing tablet and trace or "digitize" them. You can also attach a tablet menu to the digitizer and pick commands and symbols from it.

A scanner also is an input device. You can scan existing drawings and bring the image into your CAD system. It's not as straightforward as it first appears, however. Several factors can influence how a scanned image will appear on your screen or if it will appear at all. The quality of the original drawing, the software the scanner utilizes to create the image, the format the scanned image will be saved in and the scanner itself are some of those factors.

A popular option to purchasing your own scanner is to contract a service bureau to do it for you. However, get a sample scanned first to make sure the format and quality are acceptable. Regardless of whether you scan a drawing yourself or you have it contracted out, be prepared to do some cleanup when you finally get it in your CAD system.

Your monitor or computer screen is probably the single most important output device of your CAD system (considering you'll be looking at it for hours a day). High-resolution monitors such as VGA and SVGA are almost standard equipment on all computers now. Having a high-resolution monitor to a CAD operator means that circles and curves will look smooth and not like a bunch of angled line segments.

"Revisions such as changing all of the .412 feeder on a CAD drawing to .500 feeder is performed almost instantaneously with a few simple commands."

Also standard are 14-inch monitors. They will do the job just fine, however, a 19-inch monitor will allow you to view more of the drawing at a time and cut down on having to pan and zoom as frequently.

A printer isn't an essential item but it sure comes in very handy. It is useful for outputting any non-graphic information, such as the attribute information discussed earlier. Also, if you are doing any customization you can get a hard copy of menu or programming codes rather than just looking at them on the screen. You can even use your laser or dot matrix printer to print out a piece of your drawing for checking purposes.

The plotter is a mechanical drafting device that gives us our final drawing output on paper, vellum or mylar. A pen plotter actually moves a pen (similar to a technical pen and just as finicky) to actually draw the image just as it appears on the computer screen on a piece of paper, or whatever media you choose. An electrostatic plotter uses positive and negative charges to adhere toner — just like photocopier toner — to a piece of paper or mylar.

A very dense CATV map that might take an hour to plot on a pen plotter would take only a couple of minutes on an electrostatic plotter. Once again, because plotters can be very expensive, contracting out plotting needs is an option. Many blueprint companies offer plotting services.

To get a general idea on what all this hardware would cost you refer to the accompanying table, which is a price sampling of various CAD components. Cost can range from $7,660 for a basic CAD workstation to over $40,000 for a state-of-the-art system.

New technology

I'll never forget when I was in high school and the faculty decided to let us use calculators in science classes instead of the slide rule. They figured that calculators were here to stay and slide rules would soon go the way of the dinosaur. Although it may not reach to the same extent, CAD has already begun to replace much of the work that used to be done by traditional hand drafting methods. **CT**

Augat's 1 GHz house drop amplifier

By Ron Hranac
Senior Technical Editor

During the last two years our industry has seen some pretty impressive strides in technology, particularly in the area of expanded bandwidth. Manufacturers have developed a variety of products to support operation up to 1 GHz (1,000 MHz), including coaxial cable, connectors, passives and even some active components.

The most visible application of this technology has been American Television & Communication's flagship Queens, N.Y., system, which is the first 1 GHz cable system in the world. What does 1 GHz mean? From the viewpoint of plain old channel capacity, how does 150+ adjacent NTSC TV channels simultaneously on one cable sound? Who needs that many channels, you might ask? Well, I remember when we asked the same question about 35 channels and 300 MHz operation.

These days, however, expanded bandwidth is laying the groundwork for hybrid systems of the future. Consider that 950 MHz of usable downstream spectrum (50 MHz to 1 GHz) means that the system of tomorrow will easily be able to carry some combination of conventional analog channels — perhaps 60 or so up to about 450 MHz — and compressed digital signals that could represent several hundred more channels. These additional digital services will bring the video rental store directly into the customer's home via the cable system, in the form of near-video-on-demand, and someday true video-on-demand. And these services won't be your run-of-the-mill "VCR-quality" either. Expect broadcast-quality NTSC equivalents, in addition to high definition TV. The digital pathway in our future networks also will have the ability to support such technologies as personal communication services.

But even if you don't see advances like this in your future (I'd be willing to wager otherwise), the development of 1 GHz technology is providing another benefit: better overall performance of the components for today's systems. The reason for this is that in order to make CATV equipment work at these higher frequencies, equipment designs and manufacturing processes have had to be improved. This means that components designed for 1 GHz operation often will perform better at lower frequencies than previous generations of equipment that were actually designed for those lower frequencies.

This month we decided to look at one of the recent entries in the world of 1 GHz active equipment: Augat's Model SS10/15D-1-2W house drop amplifier. It's one of

Figure 1: Frequency response (54-1,000 MHz)

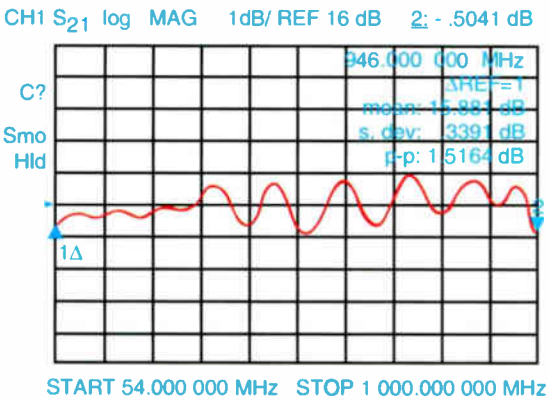
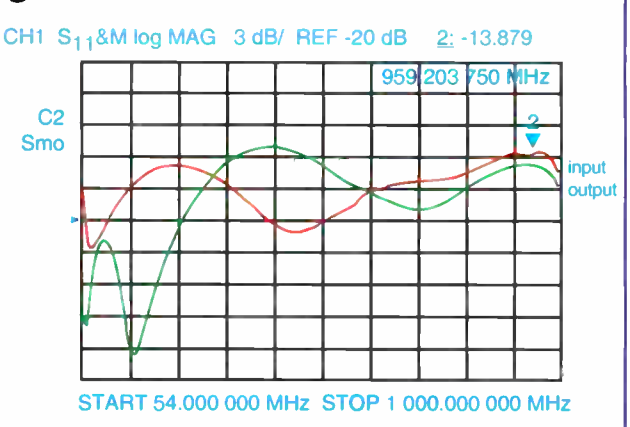


Figure 2: Port return loss



Congratulations!

to

ATC

Recipients of The Service in Technology Award

James A. Chiddix
David M. Pangrac
James P. Ludington
Jay A. Vaughan
Roosevelt Mikhail

Regal Technologies is proud to support your 1 GHz Queens project.

ANTEC℠

REGAL // TECHNOLOGIES Ltd

ONI OPTICAL NETWORKS INTERNATIONAL

ANIXTER CABLE TV

Figure 3: Frequency response (5-30 MHz)

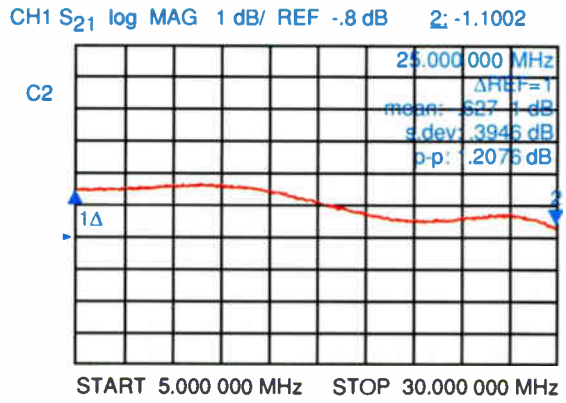
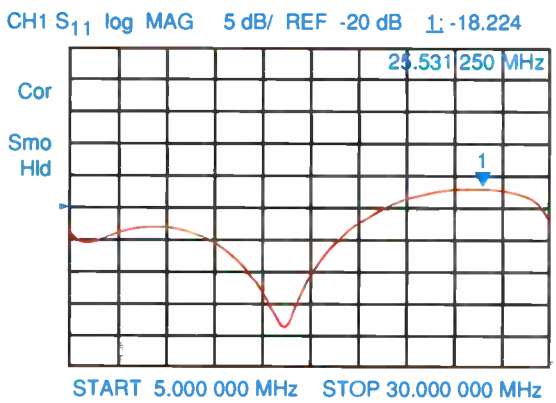


Figure 4: Input return loss (5-30 MHz)



several 1 GHz components that is being used by ATC in Queens.

The product

Augat's 1 GHz house drop amplifier is a descendant of the popular Signal Stretcher product line from Broadband Engineering. (Broadband Engineering is now known as the Broadband Division of Augat.) The model we tested is a push-pull design that uses a single Motorola hybrid for downstream signal amplification. Capable of supporting two-way operation, the SS10/15D-1-2W is active only in the 54-1,000 MHz range, but provides a passive return path for the 5-30 MHz spectrum.

Two versions are available — one with a single output and the other with four outputs. Nominal gain with the single-output model is 15 dB, and the four-output amplifier is rated at 9 dB gain (our test unit was the single-output version). The finned housing is diecast aluminum and features a removable back cover. Since this amplifier is intended to be used in residential or multiple dwelling unit installations, the housing also includes an integral grounding connection, similar to that available on many drop splitters.

The overall dimensions of the housing are 4-11/16 x 4-29/32 x 1-1/2 inches, which takes into account the mounting flange. Standard powering is with the supplied 120 VAC to 30 VDC wall transformer, although drop cable powering is possible through the number one output port by using Augat's optional power inserter. A small red LED pilot light has been provided on the front of the unit to indicate that the internal 24 volt power supply circuit is operational.

The user can install plug-in attenuators at the input and output of the hybrid to facilitate gain control, as well as a plug-in equalizer at the hybrid's input for slope control. (All these are accessible by removing the back cover plate.) The SS10/15D-1-2W is shipped with wire jumpers installed in the attenuator and equalizer sockets; the attenuators and equalizers are optional items available from Augat.

The input and output F-connectors are from LRC (also a division of Augat) and feature round center conductor seizure mechanisms instead of the more common square butterfly style. (Augat calls them "special 1 GHz F-type connectors.") The round design maintains a more constant impedance across a wider bandwidth and is usually found only on LNB outputs or other devices that operate at fairly high frequencies and require a female F-connector interface.

Printed circuit board construction is used and the hybrid's heat sink is mounted directly to the inside of the finned housing top for optimum heat dissipation. The amplifier is intended to be installed indoors or at least in a protected outdoor enclosure, since it does not incorporate any special weather gasketing or other weatherproofing. An optional RFI gasket is available to fit in the precast groove under the back cover.

At the time of our evaluation, the list price of the single-output model was $145.98.

Lab test

One of the interesting things that must be faced when testing 1 GHz components is the availability of suitable test equipment. No longer does the trusty 450 MHz bench sweep fit the bill. This is the world of network analyzers and similar equipment. A network analyzer, for example, can provide the ability to compensate for measurement errors introduced by the test jumpers and connectors, which can be significant at 1 GHz. The network analyzer we use is a Hewlett-Packard HP 8753B with a companion 75 ohm S parameter test set. This configuration can, during the calibration process, remove the effects of the test leads and other components.

Noise figure isn't a problem, since the noise figure meter we use is good to beyond 1.5 GHz.

Perhaps the toughest part of this evaluation was realizing that the Matrix signal generator (Dix Hill) we have access to for amplifier distortion measurements is only a 750 MHz (110-channel) unit. The SS10/15D-1-2W is a 1 GHz (150-channel) amplifier. More on this later.

The table on page 140 summarizes the manufacturer's published specifications for the model tested. Where applicable, this information is based on CW carrier measurements (National Cable Television Association method), with 0 dB jumpers installed in the attenuator and equalizer sockets.

The SS10/15D-1-2W easily met Augat's noise figure specification of 8 dB. The average noise figure across the 54-1,000 MHz spectrum as indicated on a Hewlett-Packard HP 8970B noise figure meter was around 7.5 dB and was as low as 7 dB in several places. Gain was typically in the 16 dB range. →

1992

SERVICE IN TECHNOLOGY AWARD

ALL THE BEST

to our friends at

TIME · WARNER

BROOKLYN · QUEENS CABLE PROJECT

for your achievement

in winning the

SERVICE IN TECHNOLOGY AWARD

NEXUS

GROUP OF COMPANIES

Figure 5: Output return loss (5-30 MHz)

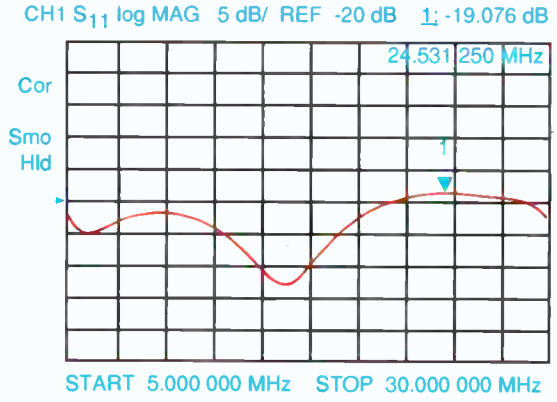


Figure 1 on page 132 shows the amplifier's downstream bandwidth and frequency response (as well as gain). Our test unit exhibited an unusual ripple in the response that started at about 280 MHz and continued right up to the upper bandwidth limit. This ripple resulted in a frequency response of ±0.76 dB (half of the network analyzer's indicated 1.5164 dB p-p), which is slightly out of Augat's spec of ±0.5 dB. Figure 2 on page 132 is a dual plot of the input and output return loss, both of which are within spec.

I spoke with the manufacturer about the ripple, and was told that it is not normal. Because return loss was OK — and I could find no loose components or other obvious signs of a problem — neither of us had an explanation for what we saw. Augat faxed me a network analyzer plot of a similar unit, and it did not exhibit the response we found with our test unit. I also talked to Dave Franklin at ATC, who tested this product line prior to its use in Queens. Franklin said he didn't see this frequency response ripple during his evaluations either. This indicates that our particular evaluation sample had an isolated, though not severe problem.

Since the upstream signal path is passive (the manufacturer's spec is 0.75 dB *loss*), we didn't attempt to measure noise figure in the 5-30 MHz spectrum. Figure 3 on page 134 is the amplifier's upstream bandwidth, frequency response and insertion loss. Frequency response is ±0.6 dB, well within the ±1 dB spec. Insertion loss ranged from just under 0.2 dB at 5 MHz to 1.1 dB at 30 MHz. The latter figure was somewhat more than the 0.75 dB spec. (By the way, this measurement agreed with the plots faxed to me by Augat. The company's published upstream insertion loss spec may be a little too tight.) Measured input and output return loss in the 5-30 MHz region are shown in Figures 4 (page 134) and 5.

Because the Matrix used for distortion testing is only a 750 MHz (110-channel) version, distortion measurements weren't able to be performed at 1 GHz channel loading. However, measurements were made with 450 MHz (60-channel) loading, then at 750 MHz. Extrapolations from these two results indicate acceptable performance at full channel operation.

The Matrix was adjusted for an input level of +19 dBmV on all channels, resulting in a nominal amplifier

The Society of Cable Television Engineers presents a

Video BREAKOUT!

Due to popular demand, the SCTE is now making videotapes of workshops and panel discussions presented at its groundbreaking "Cable-Tec Expo '91" technical conference available as individual items. Previously available only in the "Cable-Tec Expo '91 Video Package," these classic tapes include:

T-1098—*OSHA Regulations: Safety in the Workplace*—An in-depth look at safety requirements and records.
T-1099—*Satellite Proof-of-Performance Measurements*—How to install, test and maintain satellite antenna feeds.
T-1100—*Painless Technical Speaking*—Learn the "dos and dont's" of giving technical presentations.
T-1101—*Practical Technical Calculations Made Easy*—Excellent reference, offers basic definitions/calculations.
T-1102—*Tap to TV: Strengthening the Weakest Link*—Addresses the installer's function and career.
T-1103—*Fiber Optic Trunk Restoration*—Explore typical fiber faults and learn temporary and permanent repairs
T-1104—*Signal Leakage Issues One Year After Form 320*—A valuable update on CLI and the new role of EBS.
T-1105—*A Look Back - The Birth of Broadband Communications*—How our industry started and developed.
T-1106—*Exploring Fiber Optic Architectures*—Uses, performance and future applications of fiber are discussed.
T-1107—*Interdiction and Other Signal Security Techniques*—The latest methods of battling theft of service.
T-1108—*A Look Ahead - The Future of Broadband Communications*—The evolution of CATV; new services.

TO ORDER: All orders must be prepaid. Shipping and handling costs are included in the continental U.S. All prices are in U.S. dollars. All SCTE videotapes are in color and are available in the 1/2" VHS format only. Videotapes are available in stock and will be delivered approximately three weeks after receipt of order with full payment. Videotapes are shipped UPS. SCTE accepts MasterCard and VISA. NO CASH REFUNDS.

Mail to: SCTE
669 Exton Commons
Exton, PA 19341
(215) 363-6888

or FAX with credit card information to: (215) 363-5898

Ship To: (Name)_____

Address:_____

_____

_____

_____

Phone #: (_____)_____ Date: _____

Please send me the following tapes at $45 each: ❑ T-1098
❑ T-1099 ❑ T-1100 ❑ T-1101 ❑ T-1102 ❑ T-1103
❑ T-1104 ❑ T-1105 ❑ T-1106 ❑ T-1107 ❑ T-1108

SAVE $$$! CABLE-TEC EXPO '91 PACKAGE
(includes T-1098 to T-1108 plus proceedings manual, pen and pin)
#_____ sets at $350.00 each = $_____ (member price)

A check or money order for the appropriate amount shown above and made payable to the Society of Cable Television Engineers is attached.
I wish to pay by credit card. ❑ Master Card ❑ VISA
(Please check one)

Account Number:_____ Card Expires:____/____

Signature:_____

CONGRATULATIONS

TO THE 1992
COMMUNICATIONS TECHNOLOGY'S
SERVICE IN TECHNOLOGY AWARD RECIPIENTS
ATC's

JIM CHIDDIX • JIM LUDINGTON
ROOSEVELT MIKHAIL • DAVE PANGRAC • JAY VAUGHN

C-COR® ELECTRONICS INC

AUGAT

SACHS

NEXUS
Advanced Cable Systems

ANTENNA TECHNOLOGY

PPC

METRONET INC.

LEAMING INDUSTRIES

ARCOM®
Double Density ®

TFC

National Cable Television Institute
P.O. Box 27277
Denver, CO 80227
(303) 761-8554 • Fax (303) 761-8556

CCI CABLE CONSTRUCTORS, INC.
COMPLETE TURNKEY CONSTRUCTION 1-800-338-9299

Manufacturer's specifications — SS10/15D-1-2W

Technology	Push-pull
Bandwidth	
Upstream	5-30 MHz
Downstream	54-1,000 MHz
Outputs	1
Frequency response	
5-30 MHz	±1.0 dB
54-1,000 MHz	±0.5 dB
Minimum full gain	
5-30 MHz	-0.75 dB
54-1,000 MHz	15 dB
Slope	
5-30 MHz	±1.0 dB
54-1000 MHz	±1.0 dB
Return loss (input and output)	
5-30 MHz	15 dB
54-750 MHz	15 dB
750-1,000 MHz	13 dB
Distortions	
Channel loading	151
Rated output level	+35 dBmV flat
Composite triple beat	-60 dB
Cross-modulation	-57 dB
Composite second order	-60 dB
Noise figure	8 dB
Power consumption @ 110 VAC	12 watts

output of +35 dBmV per channel. At 60-channel loading, composite triple beat (CTB) was -70.1 dB, composite second order (CSO) was -76.1 dB and cross-modulation (XMOD) was -66.8 dB. Increasing to 110 channels resulted in a CTB indication of -63.8 dB. CSO was -69.8 dB and XMOD dropped to -61.6 dB.

The classic channel loading correction formula indicates that CTB and XMOD should degrade 5.3 dB when going from 60 to 110 channels. The actual difference was 6.3 dB for CTB and 5.2 dB for XMOD, which is reasonably close to the expected values. (Note: Some research suggests that at channel loadings as high as these, as well as at the higher operating levels encountered in today's systems, the distortion degradation departs from the 20log convention.) CSO also degraded 6.3 dB, although CSO performance usually follows a different curve.

Assuming the validity of the 20log degradation, extrapolated performance at 1 GHz is an additional 2.8 dB change from the 750 MHz figures. This would put CTB at -60 dB, XMOD at -58.8 and CSO at -67, all at or better than spec. Although we could not verify it due to test equipment limitations, the manufacturer claims to have measured -55 dB CTB with 151 channels at +40 dBmV output (instead of the rated +35 dBmV output level).

The direct mounting of the hybrid's heat sink to the housing is effective at getting rid of heat. The amplifier housing runs fairly warm to the touch during operation, although not uncomfortably so.

Comments

Getting acceptable 1 GHz performance from a hybrid-based amplifier is a tough feat, but Augat has done an admirable job. The "tweaked" Motorola 901E hybrid is performing well in this application, despite its known return loss shortcomings at higher frequencies. Augat has had to design appropriate matching circuitry around the chip to overcome this, and as the amplifier input and output return loss figure shows, the circuitry works as intended.

The manufacturer's distortion performance specifications are based on a rated output of +35 dBmV. With the exception of MDU applications, it's unlikely that the amplifier would ever see levels this high in most residential drop installations. The SS10/15D-1-2W's moderate gain would require drop levels *at the house* in the vicinity of +20 dBmV to achieve such an output. Imagine the tap output necessary to provide levels that high! With that in mind, this house drop amplifier should easily satisfy most requirements for 1 GHz operation.

Overall performance was good, except for the frequency response ripple (which was out of spec by only 0.5 dB), but this was apparently due to a problem unique to our test unit. The insertion loss at 30 MHz exceeded spec by 0.35 dB on our test unit and 0.27 dB in the plots of another amplifier's response faxed to us by Augat. This suggests that Augat's reverse insertion loss spec needs to be loosened up a bit, from 0.75 dB to perhaps 1.2 dB or so.

The ability to install internal pads and an equalizer provides a lot of flexibility, and the amplifier's moderately low noise figure will help to maintain good carrier-to-noise performance under most circumstances. The instructions that accompanied the amplifier are well-written and complete. Both installation and maintenance information are included, and the manufacturer also has provided a list of available optional accessories for the amplifier. The SS10/15D-1-2W has a one-year warranty.

For more information, contact Augat Communications Group at 2414 S.W. Andover St., Seattle, Wash. 98106; phone (800) 327-6690 or (206) 932-8428. **CT**

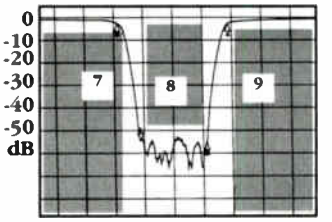
"Brickwall" TV Channel Deletion Filters
- For New Data/Program Insertion

Single or Multiple Channels 5-450 MHZ

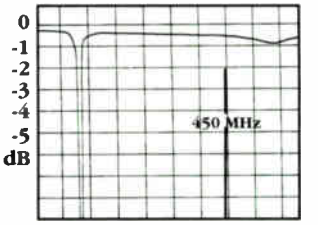
- CATV Head End Substitution
- Mass Descrambling at Institutions
- SMATV Systems
- MDU Interface Channel Pruning
- CATV or Broadband LAN Testing
- Creating Closed Circuit Channel for
  - Training, Entertainment, Security

Our exclusive line of *BRICKWALL* filters lets you delete and reuse single or multiple channels or to arbitrarily divide the broadband spectrum into *PASS* and *STOP* regions without sacrificing channels as guardbands. Our modular approach lets us deliver your deletion filter network *FAST* - usually in less than *ONE WEEK*!

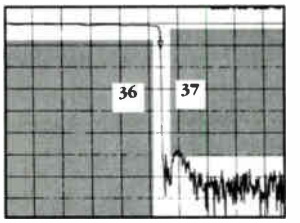
"We Make Filters In A Hurry - For Customers In Trouble!"



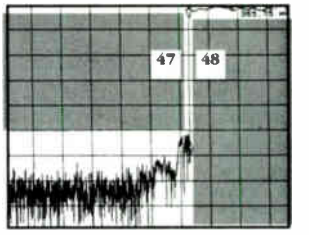
Single Channel 50 dB Notch, Leaves Adjacents In Service 3271ABH-8



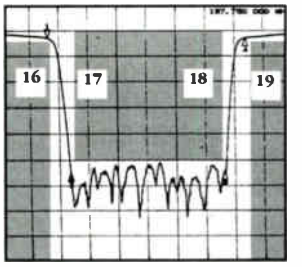
Low Off Notch Attenuation To At Least 450 MHz Type3271ABH-8



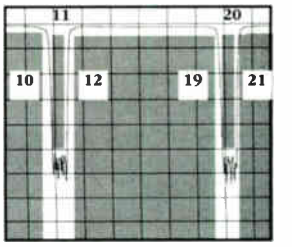
Brickwall LPF 6211LP-36/37 Passes Channel 36 Down, 50 dB Channel 37 Up



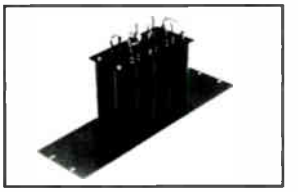
Brickwall HPF 6211HP-47/48 Passes Channel 48 Up, 50 dB Channel 47 Down



Contiguous Multichannel Type 7964-17/18



Scattered, Multichannel Type 6971-(2)(11,20)(450)

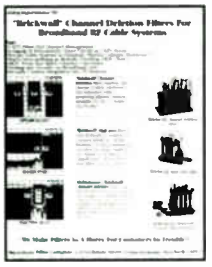


Single Channel Hyperband 3271ABY-FF

Short Term Rental Available On Standard Models:

- *Special Events*
- *Blocking During Trapping*
- *System Test*
- *Etc.*

Get our *Free* Notcher Application Catalog/Handbook *SuperNotcher/91*



Catalog /Handbook SuperNotcher/91

Contents of SuperNotcher/91:

"BRICKWALL" Deletion For:
- *Single Channels 2-61*
- *Multiple Channels*
- *Spectrum Split*

Reprocessing Networks:
- *Closed Circuit Insertion*
- *Batch Descrambling*
- *Batch Conversion*
- *Channel Detour*

Accessories/Options:
- *Weatherized Cases*
- *AC/DC Bypass*
- *In/Out Switching*

Data:
- *World Channel Frequencies*
- *Individual Filter Sweeps*

Filters for All Electronic Needs: *CATV, SMATV, IN-HOUSE TV/LAN, SATELLITE, LPTV, FM/TV BROADCAST, MOBILE RADIO, MICROWAVE TV (ITFS MMDS), RF/IW COMMUNICATIONS, RADAR, NAVIGATION, ELECTRONIC WARFARE, MEDICAL/PHYSICS RESEARCH*

Microwave Filter Company, Inc. • 6743 Kinne Street • East Syracuse, New York 13057

Toll Free (USA/CAN): 1-800-448-1666 • Collect (NY/HI/AK): 315-437-3953 • FAX: 315-463-1467 • Telex: 249-613

Design parameters for an affordable next-generation TV system

The following was adapted from the author's comments filed with the Federal Communications Commission in December 1991.

By Isaac S. Blonder
President, Blonder Broadcasting Corp.

The march of time and technology has made it quite apparent that our old faithful workhorse, NTSC broadcast, will be rendered redundant by new methods of delivering higher quality pictures to the home. An international maelstrom of engineers and entrepreneurs is spewing out daily improvements in the science of television. But, is anyone watching the cash register? Current price projections for the proposed high-definition TV receivers (try and find one under $3000) may unleash an unfortunate stratification of the audience, based upon family income, that could deny important educational and current event programs to a majority of our population.

DBS, MMDS, cable and telco qualify as common carriers and are usually exempt from conforming to the standards set for broadcast TV. Thus, these alternative entertainment delivery systems may adopt any standards for television they find effective in persuading the home viewer to abandon watching the free broadcast stations. Not only can they initiate superior quality TV systems, but they could also engage in a sales mode, not yet in vogue, where the TV receiver (monitor) would be leased on a monthly basis.

The potent combination of leased HDTV receivers, and the flood of entertainment channels available on the alternate delivery systems, will reduce the number of broadcast viewers, resulting in a reduction in advertising income, and inevitably, bankruptcy for the free broadcasting world.

Preserving an industry

Now, in order to preserve the current, cost-effective, terrestrial broadcasting system, the FCC, in my opinion, should proceed according to the following guidelines.

1) The winner should deliver the most picture for the lowest cost (I would pick a little less resolution if it came for a lot less money). Conversion of digital HDTV-to-NTSC at a nominal price is likely to be the most important feature of the winning technology. The next most important feature of the digital compression system is its ability to survive terrestrial artifacts, and provide at least the same coverage at NTSC. It is unfortunate that Advanced Television Test Center will not measure the terrestrial qualities of each proponent, since no other property is as vital to the financial health of the broadcasters.

2) The aspect ratio should remain at 4:3, solely because of the excessive price to be paid in the display for an imaginary (lots of studies now say so) improvement in viewing pleasure.

3) The additional charge for decoding HDTV into NTSC should not only be small, but all new TV receivers should possess this capability in the same way the UHF tuner is mandated. It is of extreme importance to the survival of broadcast TV that the multiple NTSC channels made available by compression (four or more) result in a lower per channel cost to the broadcaster and the viewer.

4) The shift to digital sound, which is projected to cost no more than analog stereo, should not be burdened with any added features such as surround sound. It is my personal opinion that only a minuscule number of homes now use detached speakers to enhance the stereo effect. The importance of stereo sound has been fantasized beyond reality.

5) The digital compression format is ideal for scrambling. There is no reason why the free broadcast station should not sell one of his channels on a pay-per-view basis, while still providing free programming on the other three, thus improving his ability to withstand the competition from the common carrier competitors.

6) It is a psycho-physical fact that the home viewer, seated at a normal distance from the typical 20-inch TV set, cannot appreciate the increased resolution afforded by HDTV. Perhaps, in the dim future (10 years), when HDTV receivers approach NTSC prices, the free station could resort occasionally to the HDTV format, if advertisers can afford the tab.

7) The digital HDTV systems being tested by the ATTC are each generally believed to be capable of carrying four simultaneous NTSC signals on a single 6 MHz channel. It is my belief that the current TV broadcast spectrum should be gradually converted to an all-digital scheme in which every station is able to transmit four programs. Owing to the lower power needed for the same market coverage, the taboos may also be lowered, and it appears that the existing UHF spectrum can be invaded to double the number of broadcast stations in every major market. The new stations would be digital-only and financially feasible as soon as adequate num-

"The legal battle over patents and royalties may be a greater barrier to the new HDTV service than the technology battle."

CONGRATULATIONS

TO

AMERICAN TELEVISION AND COMMUNICATIONS CORPORATION (ATC)

Recipient of
Communications Technology's
Service in Technology Award

— 1992 —

For your contributions and commitment to the growth and development of the Cable Television industry's technical community through the Queens 1-GHz 150-Channel Cable System upgrade.

AUGAT COMMUNICATIONS GROUP INC.

LRC Electronics, Inc., 901 South Avenue, Post Office Box 111, Horseheads, New York 14845, 607-739-3603

bers of low-cost digital-to-NTSC converters become available. Thus, when the current analog broadcast stations eventually go digital, 48 over-the-air programs could be available in the major markets throughout the nation. It may be useful to parallel the conversion of NTSC-to-digital, with the prior experience in color and UHF. The time span measured about 10 years for the price and performance of those two new services to be acceptable to the general public. The standard NTSC TV receiver can survive indefinitely with an external converter that turns the digital signal into four NTSC programs. Rest assured that the price of a new TV set, loaded with all the tricks of the new TV system, will become affordable within 10 years.

Rewarding the inventors

The legal battle over patents and royalties may be a greater barrier to the new HDTV service than the technology battle. I hope to suggest here, a new approach to the use by the FCC (and perhaps other government agencies) of privately funded inventions. Instead of relying upon the private sector to form study groups and committees, the FCC's own staff should make the selection of the winning technology, after giving the proponents a decent time to make their case. The Constitution gives the Patent Office the power to award exclusive rights to the inventor for a period of time and the ability to charge whatever the market will bear. In the case of a public use, such as television, I believe the FCC can take on some of the mantle of the Patent Office and not only declare who is the inventor but, because of the monopoly nature of the award, set the royalties.

I suggest that 1 percent of the gross income of the stations and 3 percent of the sales price of the transmitting equipment and receivers go into a patent pool. The FCC will award shares of the pool according to the importance of the inventor's contribution to the HDTV system. The license period will be 20 years instead of 17 because of the slow introduction of a new TV system. There are bound to be legal challenges to the validity of the inventions, but at least the new TV world will have been launched without delay. (A close cousin to the patent pool suggested is the cable compulsory copyright license instituted by Congress in the Copyright Act of 1976.)

Made in America

Finally, we have to face the fact that the US is no longer the sole and dominant source of high-tech products. In my 40 years as an electronics manufacturer, I witnessed the rise and fall of my industry. Now serving as the USNC Technical Advisor to the IEC 12g (cable) and 12c (broadcasting) subcommittees, I observed how each country protects its technology and industry. In our country's self-interest, I propose that the FCC take the following steps: Declare that a new TV product is rated "American manufactured" only if the U.S. content is over 75 percent, and items with less U.S. parts or imported, incur a tariff of 10 percent. This proposal will, of course, raise the price of the new TV system to the public, but it will provide the necessary capital to fund research laboratories — and I have faith that we will have a better and more affordable TV industry in the future. **CT**

National Show Wrap-Up

CT DAILY

New Products from the National Show — Dallas, May 3-6,1992

The following is a wrap-up of new products covered in the "CT Daily" at the 1992 National Cable Television Association Show in Dallas.

New Analyzer/Receiver/Monitor Featured by Antenna Technology
The new VI 2.0 analyzer/receiver/monitor was premiered by Antenna Technology. It is portable at 9 pounds and has an interchangeable power pack and a compact design (3-inch screen). Among its many functions, it can operate as a field strength meter, audio/video monitor, calibrated noise generator, spectrum analyzer, sweeper, reflectometer and more. **Reader service #141**

Avid Announces Digital Non-Linear Editing System
A new digital non-linear editing system, the Airplay, was introduced by Avid Technologies. It is said to feature the company's highest image quality to date, using standard JPEG compression technology. It provides professional audio editing and mixing with 44.1 or 48 kHz digital sound. The unit includes various flexible features including real time digitizing, time line editing, and the ability to let editors combine on-camera and voice-over narration, interviews, backgrounds, music and effects. **Reader service #140**

Blonder-Tongue Introduces Stereo Generator, Distribution Amplifier, Modulator
Blonder-Tongue unveiled its SG-1000 BTSC stereo generator, which uses the U.S. broadcast-standard BTSC format. The generator uses dbx companding and generates a BTSC stereo composite multiplex signal from left and right baseband audio inputs. The product features a Bessel-Null calibration test tone, SAP input connector for second language programming, internal AC power supply and flat frequency response. The company also is showing its new RMDA series of 19-inch rack-mount amplifiers designed specifically for signal distribution systems requiring the low distortion characteristics only available using hybrid CATV integrated circuits. Blonder-Tongue also premiered its FAVM-860 frequency agile heterodyne audio and video modulator. It accepts video and audio baseband inputs from any source (such as a satellite receiver or demodulator) and provides a modulated visual and aural RF carrier output on any channel in the frequency range 470 to 860 MHz. Any standard output channel can be selected by the setting of a 10-position DIP switch located behind an access door on the rear panel of the unit. **Reader service #154, stereo generator; #153, amplifier; #152, modulator**

CableData Introduces New Tandem Products
CableData showed new products that include the following RISC-based Tandem computers: Cyclone/R (RISC-based entry level Cyclone computer system), CLX 2000 (option to upgrade existing CLX processors to RISC-based technology) and high performance data storage subsystems (4500 disk and 5175 tape subsystems). The Cyclone/R and CLX 2000 allow cable operators to simultaneously run operations such as on-line transaction processing, batch and query applications while maintaining exceptional performance standards, according to the company. **Reader service #164, Cyclone/R; #163, CLX 2000; #162, subsystems**

CLT Introduces Digital RF Tracking/Mapping System
Cable Leakage Technologies unveiled a digital RF tracking/mapping system, the Wavetracker. It utilizes the Global Positioning System (GPS) for accurate longitude/latitude data and Wavetek's CLM 1000 for RF signal leakage data collection. The system also includes advanced digital mapping software. **Reader service #172**

Cable Security Systems Announces New Beast Apartment Boxes
Cable Security Systems announced it added the following to its line of apartment boxes: the Son of a Beast (SOB), the Swinging Beast (which has a non-detachable full box lid hinged to swing out of the way for servicing) and the Beast II. All have box-in-a-box design with fully welded seams, optional rack system, open or solid backs, custom knockouts and dimensions, and non-reproducible keyways. **Reader service #161, SOB; #160, Swinging Beast; #159, Beast II**

Channelmatic Unveils Digital Local Ad Insertion, Adcart Features, S-VHS Line
The first operational and deliverable digital local ad insertion/playback system, the Adcart/D from Channelmatic, made its first public appearance at the show. The system is designed to replace tape-based VCRs in local ad insertion and program playback operations by storing the digitized audio/video data for analog playback. The product performs local, regional, national and/or satellite-delivered ad insertion and can operate as a stand-alone unit or in conjunction with a traffic and billing system. It can be installed in existing ad insertion operations as a retrofit or to initiate new ad insertion situations. Channelmatic also featured its Adcart random access ad insertion system, which has three new features. The ROS event mode allows ad sales managers to continue to sell Run-of Schedule (ROS) advertising as usual by enabling the Adcart to perform sequential ad insertion without requiring a detailed break-by-break schedule. The electronic directory editor feature eliminates the need for a separate tape encoding unit so operators can use pre-encoded spot tapes. This information is simply downloaded to the Adcart and edited. Storing this data electronically is said to greatly improve spot tape reliability. Adcart's new VCR Sharing capability allows the system to share up to four VCRs between two channels in any combination. Finally, Channelmatic premiered Sony's S-VHS player and recorder products that are designed for ad insertion applications. Two of Channelmatic's products, the CompEdit and Adcart systems, featured the new Sony SVO-9600 recorder. **Reader service # 177, digital ad insertion system; #176, Adcart features; #175, S-VHS line**

Computer Utilities Unveils Remote Order Processor
Computer Utilities introduced its remote order processor (ROP). The OS/2 version 2.0 IBM PS/2- or PC/AT-based ROP is available in the following versions: four-, eight- or 12-phone line. It is used to facilitate pay-per-view processing in apartment complexes, hospitals, universities, hotels or other remote headend environments. **Reader service #157**

Corning Sets Standard for Fiber Geometry
Corning introduced a fiber with a 50 percent improvement in cladding diameter. The company's Opto-Electronics Group had previously announced it is the first fiber manufacturer to offer optical fiber with an outer cladding diameter of 125 ±1 micron as a standard for several of its single-mode products. The move of the specification from 125 ±2 microns to 125 ±1 micron is said to be a significant step toward improving splicing efficiency because the smaller tolerances on the cladding diameter can reduce splice loss and improve fiber joining fields. **Reader service #203**

Eagle Premieres Interdiction Positive Trap
New from Eagle Comtronics was a non-jamming carrier positive trap, the Model SID. This sideband interdiction positive trap amplifies the channel's video information to produce a scrambled picture. Near-perfect reproduction of the original video is said to result when the new specially tuned decoding filter is used. **Reader service #199**

Electroline Introduces New Security System, New IPPV System
Electroline Equipment featured its new 862 MHz multitier security (MTS) broadband addressable system designed for multiple dwelling units and resort housing applications. MTS can secure one or two tiers of basic service (up to 73 channels) on an on/off basis and up to 12 premium services on as many as six additional tiers using electronic signal jamming. Electroline also displayed a new impulse pay-per-view system designed specifically for hotel, resort, campus and hospital applications. Using the new system, customers can order movies or other programs by touching keys on their in-room telephone. An automated voice response unit

guides the caller through a simple order process. The system automatically generates billing statements for the property management as well. **Reader service #208, security system; #207, IPPV system**

Harmonic Lightwaves Introduces Expanded Fiber Networking Flexibility
Harmonic Lightwaves, which makes the YAGLink fiber video distribution system, announced the new HLR3100 rack-mounted version of the company's strand-mounted receiver. Designed to occupy just one rack unit (1.75 inches high), the HLR3100 is reported to offer exceptional sensitivity, flatness and stability over its entire 550 MHz, 0°-50° C operating range. **Reader service #200**

Hewlett-Packard Unveils Portable Spectrum Analyzer
Hewlett-Packard announced its new HP 8590 E-series of spectrum analyzers. The series is said to support the long-term quality requirements of RF, microwave, digital and RMC engineers and RF and microwave technicians. Measurement personalities are available for many applications including CATV. **Reader service #179**

New from Jerrold: HDTV demo, IRD, Cable Consumer Convenience Center, Lasers, Remote, Addressable Controller, Post-Amp, Timepiece Controller
The first demo of digital HDTV via two-way cable plant was presented at the show by Jerrold and TCI's Dallas system. Jerrold's commercial IRD with retune capabilities, the DigiSat Model DSR-1000, was introduced as well. The new receiver can interface with AM modulators at the system and offer a "seamless" digital interface for Jerrold's DigiCable transmission system. The company also premiered its "future friendly" Cable Consumer Convenience Center. Certain elements of the center include the new PC-based ACC-4000 addressable controller, CFT-2000 on-screen display addressable converter, the Cable Home Theater with digital audio and video, convenient remote controls and impulse order technology. Jerrold also announced three new lasers with system-specific functions that are said to offer better linearity and expanded channel capacity. They were the 80-channel Starfire 550, the digital-ready Starfire 750 and the Super-Starfire for niche "broadcasting" applications. As well, the company introduced an upgraded model of its Buddy simple remote. The new model, In-View, gives the Buddy the ability to operate Jerrold's CFT-2000 on-screen display addressable converter. To perform these functions, the remote has four keys — Select, Enter, Menu and Display — added to a limited keypad that contains only on/off/channel/up/down/mute and volume on/off. The In-View model will continue with the Buddy's popular bright yellow coloring. Jerrold also unveiled the Song-ID remote that lets subscribers gather information about the last songs played on the Digital Cable Radio Service. The company also rolled out its new ACC-4000 addressable controller, which is built on the foundation of Jerrold's line of AH-4 addressable controllers and, according to the company, supports every addressable converter and every remote control ever manufactured by Jerrold. It is a fully stand-alone unit that can operate on the same wirelink as Jerrold's line of AH-4/4E and ACC-2000 addressable control models, thus eliminating any change to the billing system link. The ACC-4000 includes industry standard application packages for PC-compatible platforms, which is said to allow for lower support costs and a lower actual price tag while offering more capability. The unit includes a graphical user interface that provides multitasking screens, as well as character-based interface. The system, which includes a 486/33 processor, all operational software, a printer, graphics color monitor and a diagnostics modem, will allow Jerrold to upgrade the product in the future to meet new technological requirements. Also, Jerrold unveiled a new headend post-amplifier designed for use in systems with Cableoptics architectures. The Commander 6 feedforward post-amplifier (Model C6PA) is a high gain, low distortion 550 MHz product that supports Cableoptics architectures by providing low distortion amplification for headend combining networks. Finally, the company premiered another addition to its Cable Consumer Center, the Cable Clock, which will let subscribers keep all digital clocks in a household on-line. **Reader service #198, digital HDTV; #197, IRD; #196, Cable Consumer Convenience Center; #195, Starfire 550 laser; #194, Starfire 750 laser; #193, Super-Starfire laser; #192, addressable controller; #191, post-amp; #190, timepiece controller**

Ferro Option, UPSs, Line Conditioner Introduced by Lectro
Lectro unveiled a dual ferro option for its Sentry II standby power supply line of products. This innovation ensures protection from spikes and surges in both ferro and standby mode. The modular unit also can be

retrofitted into existing Sentry II products. Also new from Lectro was the Ferromax family of uninterruptible power supplies and line conditioners. The products are available in a variety of sizes and configurations from 500 VA up to 5 KVA. Each unit is available in both indoor and outdoor cabinets built from aircraft-grade aluminum. **Reader service #169, ferro option; #168 UPSs; #167, line conditioners**

New Passives Introduced by Lindsay
Lindsay exhibited "The Last Passive" series of directional couplers, line splitters and power inserters. The products feature corrosion-resistant zinc chromate housings, hinged lids, large heat-shrink areas and captive stainless steal lid screws. They also have separate moisture seals and housing/lid interaction that provides "well" effect. The series allows replacement of the motherboard without disturbing connectors and universal entry to accept any style of connector. **Reader service #166**

Northern Telecom Announces Fiber Multiplex Terminal
Northern Telecom showed its new 6 Mbps fiber multiplex terminal, the FMT-6 Plus. It is a low-capacity fiber multiplexer with an operating range of 0° to 65° C and is suitable for cabinets with elevated ambient temperatures. It is available in shelf assembly and wall-mount configurations. The product multiplexes up to four DS1s into an electrical DS2 stream. The DS2 stream is then converted into an optical signal for transmission over a single-mode or multimode fiber, making it compatible with any environment, according to the company. **Reader service #170**

Oak and ITM Announce Hotel PPV System
Oak Communications and ITM introduced Select-A-View 9500, a stand-alone impulse pay-per-view system. It provides cable system operators with a complete turnkey system to market to small and medium size hotels. The system is compatible with any cable system environment, includes a window-driven PC-based control computer and can be expanded to meet hotel growth. **Reader service #171**

ONI Announces New Fiber Splicer
Optical Networks International's Test, Measures and Restoration (TM&R) Group introduced Sumitomo's new Type-35SE fusion splicer. It reduces sleeve shrinking time by 50 percent and features an enhanced user interface as well as automatic atmospheric arc compensation, electrode monitoring and self-diagnostics. **Reader service #204**

Ortel Introduces DFB Transmitter Board, Photodiode
Ortel announced its Model 3610C, an 860 MHz DFB Transmitter Board for CATV applications. It uses an Ortel patented pre-distorter compensation circuit that extends the performance of standard 550 MHz production lasers to meet more demanding 860 MHz performance. Also, the company introduced the 2609B, broadband photodiode receiver for European CATV applications. It uses a broadband RF impedance matching circuit to maximize delivered power and achieve 5 dB higher RF gain than an unmatched photodiode. **Reader service #156**

Pioneer Unveils CD Changer
Pioneer Communications of America introduced the CAC-V3000 300-compact-disc autochanger. The system features a double CD player design for seamless switching between discs. Up to 32 CAC-V3000 CD autochangers can be daisy-chained together, so as many as 9,600 compact discs can be on-line at one time. The unit can be computer-controlled through the RS-232C or RS-422A port. The system has both digital and analog audio output. The digital output has two RCA connectors and the analog audio has three RCA connectors, including a mixed output. **Reader service #151**

Power Guard Unveils Custom Powering
Power Guard introduced its custom power worksheet. A free Lotus 1-2-3 worksheet will show how much you are actually paying to run 15 amp power supplies and what a system may save by using 3, 6, 9, 12 or 15 amp high-efficiency power supplies. **Reader service #142**

Pyramid Unveils New Connectors
Pyramid/Cabelcon introduced its new series of fiber-optic housing/entry connectors. **Reader service #158**

Regal Introduces Second-Generation Upgradable Taps
Regal Technologies exhibited its new second-generation 1 GHz taps designed to allow operators to migrate easily from 600 MHz to 1 GHz cable plant. The new taps (available in two-, four- and eight-way configurations) are faceplate-compatible with Regal's existing 600 MHz tap line. Thus, an operator that is currently using any Regal tap can upgrade to 1 GHz bandwidth by merely changing the faceplate. The new taps, designated Regal's RMT series, can be purchased as: 600 MHz taps, RMT 6 Series; 1 GHz taps, RMT 10 Series; or simply by ordering 1 GHz faceplates. Regal achieved a 9.4 dB better insertion loss for the new 1 GHz taps compared to its own first-generation versions. To remain compatible with the 600 MHz housing, both two- and four-way designs are incorporated into a narrow-body design, with the eight-way deployed in a wide-body design. Both configurations are available for strand- and pedestal-mounting and are fully compatible with Regal's 600 MHz passive line. **Reader service #178**

Scientific-Atlanta Unveils Zenith-, Jerrold-Compatible 8600s
Scientific-Atlanta Inc. introduced its new Zenith- and Jerrold-compatible 8600 set-tops. For more details, see Communications Technology, May 1992, page 106.

New Fiber Center, Fiber Cleaver Announced by Siecor
Access to fiber splices or termination is simplified with the new Siecor 48-fiber connector center, which was introduced at the show. The rack-mounted unit stores and protects up to 48 fiber splices or connectors while maintaining bend radius parameters in fiber routing rings and providing adequate cable strain relief. Panels on or near the housing can be removed to easily access multifiber cables entering the rear of the unit. A swing-open connector panel latches open during installation to make work in the rear easier. The center is designed for interconnecting outside plant and equipment cables in many single-mode and multimode fiber applications. Siecor also showed its new FBC-006 precision fiber cleaver. The FBC-006 unit (with standard fiber guides) can cleave 250 and 900 micrometer coated fibers to lengths required for fusion or mechanical splicing. No special training is said to be required to operate the cleaver. Once the fiber casing is removed, the user places the fiber in the cleaver's fiber guides at the desired length and presses down on top of the unit. Compact in design, the FBC-006 includes a diamond cutting blade for durability. **Reader service #174, connector center; #173, cleaver**

Superior Premieres Portable Distortion Package, Line Monitor
Superior Electronics Group showed its new Cheetah CDP-6 portable distortion package. The package, developed to give large and small system operators the capabilities of the company's Cheetah system, consists of six remote line monitors, one headend monitor and a notebook computer with Cell Link. The CDP-6 allows the operator to test, record and document accurate level, temperature and distortion characteristics at six different locations simultaneously. After retrieving the data via computer or the Cheetah Cell Link, the units may be packed in their reusable shipping containers and transported to another system. Superior also unveiled the newest member of its Cheetah family. The PC4650M line monitor (a reduced cost version of the company's PC4650 line monitor) provides the ability to remotely test and document video and aural carriers and temperatures, all with full automatic call back alarm functions. According to the company, the product is inexpensive, function-specific, and maintains full compatibility with existing Cheetah hardware and software. **Reader service #206; distortion package; #205, line monitor**

Synchronous Introduces 1,550 nm External Mod System, Narrowband FM Video System
The EMS-1500 external modulation system from Synchronous Communications was unveiled. It is offered with either a 20 or 40 mW output power and is designed to accommodate up to 80 channels. It utilizes a chirpless 1,550 nm light source and an optically linearized Mach Zehnder with a modulation bandwidth of up to 1 GHz. The Mach Zehnder modulator feeds either a single or double-pumped erbium-doped fiber amp. The EMS-1500 has been designed to be used in a CATV system where the link loss budgets do not exceed 10 dB optical. As well, Synchronous introduced its new narrowband FM video system (consisting of the VFMT-5000 and VFMR-5000)

designed to provide a quality video link from a CATV subscriber via coax in the 5-30 MHz frequency band to an optical node and then to the headend via the optical return path. Depending on the required quality, up to two channels of narrowband FM can be transmitted in the 5-30 MHz band. The system is offered in 12, 14 or 16 MHz occupied bandwidths. All units are frequency agile in 1 MHz steps. **Reader service #150, external mod system; #149, narrowband FM video system**

Tektronix Introduces New Spectrum Analyzer
The new 2714 cable TV spectrum analyzer introduced by Tektronix is said to simplify and make more repeatable RF spectral measurements for cable TV and broadband LAN engineers and technicians. All commonly needed measurements, such as C/N and hum/low-frequency disturbance, are automatically made by selecting the measurement from the on-screen cable TV menu. An accompanying PC-based software package extends this capability to an even higher level with complete measurement configuration, data collections and report generation features. This new level of automation allows new users to collect extensive system performance in the field. **Reader service #180**

Texscan Premieres Amp, Line Extender
Texscan's Subscriber Service Amplifier (SSA), which has been designed for "subscriber node" architectures such as those being constructed in Europe, was introduced. It is said to add increased efficiency in the design of 1 GHz architecture. The SSA allows entry and exit from the bottom of the housing and is coupled to the feeder line by a simple internal "plug-in" directional coupler, thus allowing the use of smaller pedestals or enclosures and eliminating any 90° connections and external passives. It employs Texscan's standard PAL Series RF modules that are available in fixed, variable and ASG versions with gains of up to 40 dB and 550 or 600 MHz bandwidths. The 1 GHz platform also will accept higher bandwidth modules when needed. The other new product premiered was the Model S-PAL line extender that also allows entry and exit from the bottom of the housing. Like the SSA, this feature eliminates 90° connectors and reportedly allows for lower cost and lower profile enclosures. **Reader service #202, amplifier; #201, line extender**

Texscan MSI Introduces Video Promotion System, Video Controller
Texscan MSI unveiled its Marquee video promotion system, which uses laser disc players, Texscan's new Z 4000 character generators and two custom controllers for pay-per-view promotion. System software consists of several programs designed for rapid learning and long-term ease of use, according to the company. The Marquee prioritizes promotional segments and mixes generic and system-specific text. It also features a built-in character generator and is updatable via modem. As well, the company premiered its new field-expandable M series video controller for multiple channel commercial insertion and other video control applications. The M Series maximizes equipment usage by sharing one or more video sources (VCRs, laser players, digital video device, etc.) across several channels. **Reader service #148, promotion system; #147, video controller**

Times Fiber Expands Semiflex Cable Product Line
Times Fiber Communications announced a new cable to expand its low-loss TX Semiflex cable product line. The new TX 10-700 Series coaxial cable offers both low-loss performance and 1 GHz bandwidth. According to the company, the product is optimized to provide a cost-effective solution for feeder applications employing fiber-optic architectures. The TX 10-700 Series cables are available in standard aerial, buried and armored configurations with optional color-coding. **Reader service #143**

US Electronics Unveils Universal Remotes
The UTV Series of dual-function universal remotes from US Electronics was introduced. Units are available for Scientific-Atlanta, Jerrold, Pioneer, Panasonic, Zenith, Hamlin and others. **Reader service #165**

Wegener Announces New Demodulator, Receiver Module, Audio Storage Unit
Wegener introduced its Model 1620 Agile Panda I dual-channel subcarrier demodulator, which is designed to provide two full dynamic range high S/N audio channel outputs. Based on the firm's "spectrum efficient" narrowband subcarrier transmission standard, the demodulator provides audio outputs from a subcarrier-above-video or FM2 signal. By applying the proper tuning code to the demodulator's DIP switches, channels from 0.15 MHz to 8.2 MHz may be selected in increments of 2.5 kHz. Also premiered was the Series 1825 video receiver module, designed to be inserted into one of the auxiliary slots of the Series 1800 or 1900 audio receivers. The module is a complete receiver that accepts an L-band input and provides clamped and de-emphasized video. Also included is a wideband audio demodulator that can be set to subcarrier frequencies of 6.2 or 6.8 MHz. The module receives its power and control from the network controller module of its host receiver. In the event the host receiver is not addressable, the module can be equipped with DIP switches for manual tuning of the transponder and audio channel frequencies. The module also can be utilized in a stand-alone version by installing it in a separate cabinet with power supply. Also new was the Series 1980 digital audio storage unit that provides storage and playback of high-quality audio in a compressed digital form in business broadcast systems. The basic unit is an AT-style PC in which the Wegener digital signal processing (DSP) board has been integrated. The DSP unit contains the microprocessor and the DSP circuits to digitize and compress an audio signal prior to storage on a hard disk drive. The algorithm used by the audio storage unit is in accordance with CCITT G.722. **Reader service #146, demodulator; #145 receiver module; #144, audio storage unit**

SANKO
FASTENING SYSTEMS

Your Best Connections in the Business. SANKO People. SANKO Products.

Each morning, Leticia Ramirez has her work cut out for her. Taking orders, checking order status, mailing out product literature and referring customer questions to the right people. There's no customer call Leticia isn't willing to handle. And SANKO customers know she'll do everything she can to deliver the products they need on time. With a smile.

Leticia's attitude solidly reflects the SANKO philosophy. Simply, we are here to provide the best quality product on the market with unsurpassed quality control and exceptional customer service.

See that guy over there installing an anchor into a slab of concrete? That's Jim Karoly, our engineer and walking encyclopedia on anchors. Whenever you have a question about shear, pull-out, ICBO approvals, or anything else about concrete anchors, you'll never go wrong if you ask Jim. He knows all about SANKO products as well as other anchors on the market. He's been involved in the industry for over 10 years.

As one of the top five anchor manufacturers in the world, we're proud to have people like Jim ready to assist you in any way he can so our products continually perform to your highest standards.

Maybe some V.P.'s of sales and marketing sit behind a desk all day. Not Doug Rogge. Doug's sales philosophy emphasizes a team commitment to customer satisfaction no matter what it takes. That's why he's always out in the field talking to customers, getting feedback and coming up with ideas to make our sales and marketing team even more effective.

Ever since the extensive use of oru ALL-ANCHOR in the construction for the 1964 Tokyo Olympic Games, our uniquely designed anchors have become know for their time-saving, cost-effective installation.

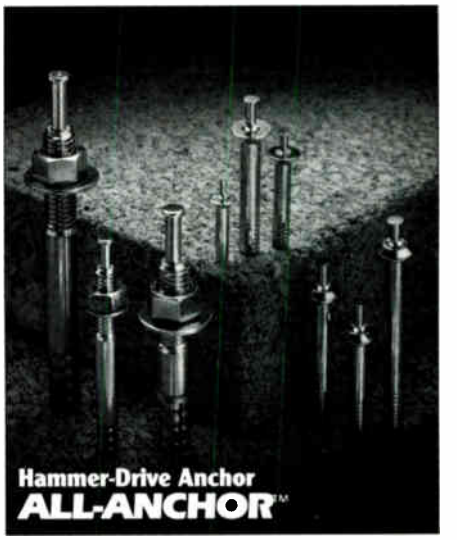
If you'd like more information on our full line of fastening systems, call our toll-free number. And connect with the best in the business.

Hex Washer Head & Phillips Flat Head
Sizes: #8 & #12 / Hardened Steel

Fast, reliable, universally accepted fastening system for light to medium-duty applications • Case hardened, fully threaded concrete / masonry screw • Two available styles: hex washer head and phillips head in true #8 and #12 sizes • Ideal for cable and electrical installations and do-it-yourself projects
• High concrete / block pull-out values
• Installation into 4000 psi concrete will not strip threads as with traditional screw systems
• All-in-one tool: setting tool houses recessed drill bit which retracts when bit is removed from drilled hole.

Metric Expansion Anchor • Yellow Dichromate Finish

Fast, reliable, universally accepted fastening Provides high strength, vibration resistance, immediate loading capability • Two available styles: finished hex head (SB) and adjustable threaded rod (SL) • Sizes M10 (3/8")-M20(3/4") • Metric Bit included • Carries high tension / shear load and resists dynamic load conditions • Follow-up expansion ensures safety.



Yellow Zinc Carbon Steel • Available In Stainless Steel

Easy, fool-proof installation • Installed 5 times as fast as traditional anchors • Hammer center pin flush with anchor body to set • Visual inspection capability minimizes field inspection time • Shows minimal displacement under load • Displaced from hole only when anchor fails • Always provides a consistent design load.

SANKO FASTEM USA, Inc.
National Headquarters
8230 Industry Ave • Pico Rivera • CA 90660

Information
1-800-44-SANKO
Order Desk
1-800-43-SANKO
Fax
1-800-772-FAXX

Reader Service Number 135

AD INDEX

It's so simple! To obtain additional information from any of the display advertisers appearing in this issue of ***Communications Technology***, please use one of the **Reader Service Cards** on the facing page (pass the others along). The ad index below has been expanded to include not only the page number of each advertiser, but also each corresponding reader service number to be circled on the Reader Service Card.

	Reader Service #	Page #
AB Chance	76	84
ADCOM	114	130
Ad Systems	8	8
Adrian Steel	15	14
Alpha Technologies	2	2
AML Marketing	115	130
Anixter	132	168
Antec Corporation		133
Antenna Technology	75	83
Applied Instruments	47	56
Arnco	17,133	16
ATC National Training Center	60	68
Augat Communications	121	129,143
Aurora Instruments	35	46
Automated Light Technologies	61	68
Avcom of Virginia	18	59
Barco	21	19
Belden Wire & Cable	34	45
Ben Hughes/Cable Prep	58	66
Budco	70	78
Cable Constructors	41,125	131,144
Cable Innovations	63	70
Cable Leakage Technologies	27	25
Cable-Lock Connectors Ltd	26	24
Cable Security	6	6
Cable Services Company	37	47
Cable Spinning Equipment	30	33
CableTek Center	56,57	64,65
Cable TV Services/Sawtre	51	60
CaLan	39	49
Channel Master	68	76
Channelmatic	67	17
Channell Commercial	11	10
Clic Instruments	80	88
Comm/Scope	79	87
Comnet Engineering	53	62
ComSonics	65	72
Comtech Supply	86	97
Contec International	29	31
Corning Inc	31	36,37
The Crown Divisions	44	53
CTA		163
Diversified Test Technologies	122	140
Dovetail	43	52
DX Communications	9	9
Dynatech Cable Products	23	21
Electroline		165
EXFO	81	89
Flight Trac	69	77
Gould Fiber Optics	74	82
Hennessy Products	78	86
Hewlet-Packard	62,64	69,71
Industrial Technology	66	73
Ipitek	71	79
Isowave	42	51
Jerrold Communications	16	15,139
Jones Intercable	126	144
KES	77	85
Knaack Manufacturing Co	54	62
Laser Precision	85	95
Leaming	83	91
Lindsay Specialty Products	82	90
M/A-COM LCS	19	59
Magnavox/Philips Broadband	12	11
Masterack	123	55
Metronet Inc	72	80
Microwave Filter	46	141
Multilink	24	22
NCTI	127	162
Newhall Pacific	40	50
Nexus Engineering		135
NSC	116	131
ONI	5	5
Optical Cable	14	13
PFM Electronics	10	10
Pioneer Communications	28	26,27,164
Power & Telephone Supply Co	32	39
Power Guard	7	7
Power Technologies	36	46
Pyramid/Cabelcon Connectors	13	12
Regal Technologies	55	63
Riser Bond Instruments	45	54
RL Drake	84	93
RMS International	22	20
Sachs Communications	33	41
Sanko Fastem USA	135	151
SCTE	1	137
Superior Electronics	131	167,136
Tamaqua	47	98
Telecommunications Techniques Corp	25	23
Telecrafter Products	4	4
Texscan Communications	48	57
Times Fiber Communications	59	67
Trilithic	50	75
Trilogy Communications	3	3
Triple Crown Electronics	38	48
Tulsat	49	58
TVC Supply	20	18
Unique Systems	117	50
Viewsonics	73	81
Wavetek	52,134	61
Back to Basics		
ACS Communications	89	102
ACT Communications	100	113
Avantron Communications Corp	106	120
Blonder-Tongue	88	101
Cadco	93	105
C-COR Electronics		115
Contec International	91	103
DH Satellite	111	123
Eagle Comtronics	96	109
Lectro Products	113	127
Matrix Test Equipment	104	117
M&B Manufacturing	97	110
Milbank	101	114
Multilink	107	120
NaCom	94	106
Power Technology Inc	90	102
Quality RF Services	95	107
Rahmer Technical Services	109	122
Ripley Company	110	122
Sadelco	103	116
System Performance Engineering	92	104
Times Fiber Communications		119
Tulsat	108	121
US Electronics	112	125
Washington Cable Supply	99	111
Xon Digital	98	110

COMMUNICATIONS TECHNOLOGY

Name _____

Title(Please specify) _____

Company Name _____

Address _____

City _____ State _____ ZIP _____

Phone _____ Date _____

FREE INFORMATION

Reader Service Card

June 1992 (Valid until August 1992)

CT 6/92 - 1

Simply circle the number(s) belowcorresponding to products of interest!

1	26	51	76	101	126	151	176	201	226	251	276
2	27	52	77	102	127	152	177	202	227	252	277
3	28	53	78	103	128	153	178	203	228	253	278
4	29	54	79	104	129	154	179	204	229	254	279
5	30	55	80	105	130	155	180	205	230	255	280
6	31	56	81	106	131	156	181	206	231	256	281
7	32	57	82	107	132	157	182	207	232	257	282
8	33	58	83	108	133	158	183	208	233	258	283
9	34	59	84	109	134	159	184	209	234	259	284
10	35	60	85	110	135	160	185	210	235	260	285
11	36	61	86	111	136	161	186	211	236	261	286
12	37	62	87	112	137	162	187	212	237	262	287
13	38	63	88	113	138	163	188	213	238	263	288
14	39	64	89	114	139	164	189	214	239	264	289
15	40	65	90	115	140	165	190	215	240	265	290
16	41	66	91	116	141	166	191	216	241	266	291
17	42	67	92	117	142	167	192	217	242	267	292
18	43	68	93	118	143	168	193	218	243	268	293
19	44	69	94	119	144	169	194	219	244	269	294
20	45	70	95	120	145	170	195	220	245	270	295
21	46	71	96	121	146	171	196	221	246	271	296
22	47	72	97	122	147	172	197	222	247	272	297
23	48	73	98	123	148	173	198	223	248	273	298
24	49	74	99	124	149	174	199	224	249	274	299
25	50	75	100	125	150	175	200	225	250	275	300

COMMUNICATIONS TECHNOLOGY

Name _____

Title(Please specify) _____

Company Name _____

Address _____

City _____ State _____ ZIP _____

Phone _____ Date _____

FREE INFORMATION

Reader Service Card

June 1992 (Valid until August 1992)

CT 6/92 - 2

Simply circle the number(s) belowcorresponding to products of interest!

1	26	51	76	101	126	151	176	201	226	251	276
2	27	52	77	102	127	152	177	202	227	252	277
3	28	53	78	103	128	153	178	203	228	253	278
4	29	54	79	104	129	154	179	204	229	254	279
5	30	55	80	105	130	155	180	205	230	255	280
6	31	56	81	106	131	156	181	206	231	256	281
7	32	57	82	107	132	157	182	207	232	257	282
8	33	58	83	108	133	158	183	208	233	258	283
9	34	59	84	109	134	159	184	209	234	259	284
10	35	60	85	110	135	160	185	210	235	260	285
11	36	61	86	111	136	161	186	211	236	261	286
12	37	62	87	112	137	162	187	212	237	262	287
13	38	63	88	113	138	163	188	213	238	263	288
14	39	64	89	114	139	164	189	214	239	264	289
15	40	65	90	115	140	165	190	215	240	265	290
16	41	66	91	116	141	166	191	216	241	266	291
17	42	67	92	117	142	167	192	217	242	267	292
18	43	68	93	118	143	168	193	218	243	268	293
19	44	69	94	119	144	169	194	219	244	269	294
20	45	70	95	120	145	170	195	220	245	270	295
21	46	71	96	121	146	171	196	221	246	271	296
22	47	72	97	122	147	172	197	222	247	272	297
23	48	73	98	123	148	173	198	223	248	273	298
24	49	74	99	124	149	174	199	224	249	274	299
25	50	75	100	125	150	175	200	225	250	275	300

COMMUNICATIONS TECHNOLOGY

Communications Technology is distributed ***FREE*** of charge to qualified cable TV personnel. Incomplete forms will not be processed.
I wish to receive/continue to receive ***Communications Technology.***
Yes ☐ No ☐

(please print or type)

Name _____

Title *(please print or type)* _____

Company Name _____

Address _____

City _____ State ___ ZIP _____

Signature _____ Date _____

(Signature and date required)

1. Are you a member of the SCTE (Society of Cable Television Engineers)?
Yes ☐ No ☐

2. In the performance of my job, I authorize, specify or recommend products and/or services for purchase.
Yes ☐ No ☐

CT 6/92

3. Please check the category that best describes your firm's primary business (please check one only).

1. Cable TV Systems Operations
   - ☐ a. Independent Cable TV Systems
   - ☐ b. MSO (two or more Cable TV Systems)
- ☐ 2. Cable Tv Contractor
- ☐ 3. Cable TV Program Network
- ☐ 4. SMATV or DBS Operator
- ☐ 5. MDS, STV or LPTV Operator
- ☐ 6. Microwave or Telephone Company
- ☐ 7. Commercial Television Broadcaster
- ☐ 8. Cable TV Component Manufacturer
- ☐ 9. Cable TV Investor
- ☐ 10. Financial Institution, Broker, Consultant
- ☐ 11. Law Firm or Government Agency
- ☐ 12. Program Producer or Distributor
- ☐ 13. Advertising Agency
- ☐ 14. Educational TV Station, School or Library
- ☐ 15. Other _____

(please specify)

4. Please check the category that best describes your job title/function.

- ☐ A. Corporate Management
- ☐ B. Management
- ☐ C. Programming
- ☐ Technical/Engineering
  - 1 ☐ Vice President
  - 2 ☐ Director
  - 3 ☐ Manager
  - 4 ☐ Engineer
  - 5 ☐ Technician
  - 6 ☐ Installer
- ☐ E. Sales
- ☐ F. Marketing
- ☐ X. Other (please specify) _____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 535 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

COMMUNICATIONS TECHNOLOGY

A Transmedia Publication
P.O. Box 1843
Riverton NJ 08077-9443

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 535 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

COMMUNICATIONS TECHNOLOGY

A Transmedia Publication
P.O. Box 1843
Riverton NJ 08077-9443

Place
Stamp
Here

COMMUNICATIONS TECHNOLOGY

Transmedia Partners
P.O. Box 9106
Plainview, NY 11803-9106

BUSINESS DIRECTORY/CLASSIFIEDS

Career Opportunities

Corporate Designer/Drafter

Our state-of-the-art CATV Engineering Department seeks a Designer-Drafter in our Corporate Headquarters. The successful candidate will have experience in CATV broadband design and strand/design drafting in excess of 3 years and must be able to demonstrate work quality and past success. Job responsibilities include design/drafting of aerial and underground CATV plant; electronics design; bill of materials develoepement; quality assurance on field designs; maintenance of corporate-wide system maps; and miscellaneous drafting projects.

Located in northcentral, rural Pennsylvania we offer life in a small, stable community and will reward your talents with an attractive salary/benefits package. For prompt consideration, direct your resume to:

Adelphia Cable Communications
5 West Third Street
Coudersport, PA 16915
Attn: Dan Ritter
Director - Employee Relations
Equal Opportunity Employer
Encouraging Workforce Diversity

Line Maintenance Technician

Palmer CableVision, a fast growing Palm Springs area cable company, is looking for a Line Maintenance Technician to work in this 74,000 subs, 1,200 mile system.

APPLICANTS must have a minimum of 2 years maintenance technical experience. Good driving record and valid driver's license required.fiber, CLI and Sweep experience a must. Great benefits and advancements.

Palmer CableVision
Human Resources Department
41-725 Cook Street - Box 368
Palm Desert, CA 92261

Equal Opportunity Employer

Leader in the placement of Cable Television Professionals
Call Toll Free 800-433-2160: In Texas call 817-599-7623: FAX 817-599-4483

Since 1977 Jim Young & Associates has been serving the Recruiting needs of the Cable Television industry.
Our bottom line has and will continue to be your success.
On our 15th anniversary, we would like to take this opportunity to say thank you for our success.

JIM YOUNG & ASSOCIATES
One Young Plaza 1235 Ranger Highway Weatherford, TX 76086
Call for information about these and many other opportunities nationwide

Position Wanted

SCTE Member/ Qualified Technician
- 15 years well rounded experience,
- NCTI certified — seeks position with MSO.

Will relocate -
for resume & references.
Rod Howard
501-535-9850

SYSTEM ENGINEER/ TECH MANAGER
SCTE member with expertise in Headend and Addressable Equipment seeks position with cable operator or equipment manufacturer.
For resume call David Deyo at
(315)451-1490

CANITEC

Cámara Nacional de la Industria de Televisión por Cable

The Mexican Chamber for Cable Television will be holding its annual convention at the Hotel Stouffers El Presidente.
Mexico City,
August 3, 4, 5, 1992.

For more information please contact:
Sergio Morales or Eduardo Iglesias

CANITEC
Mexico City, Mexico
Tel: (525) 682-0173, 682-0298 Fax: (525) 682-0881

Equipment

Southeast Region

The Converter Shoppe

The Growing Alternative
Repair • Reconditioned Sales • Supplies

- True flat rate pricing: includes all parts & labor
- Pick-up and delivery in many areas
- One year warranty on Reconditioned Converters

Call for rate list and references

800-765-5474

Also serving:
ATC - CableVision Ind. - Century - Comcast
Cooke - Enstar - Falcon - Intermedia -
James Cable Partners - McDonald - MultiVision
Northland - PCI Sun - Ritkin - Summit -
Telemedia - Warner

ACTV
Annes's Cable TV, Inc.
- Quality Converter Repairs
- Flat-Rate Billing
- Free Pick-Up & Delivery
- Buy & Sell Converters
- **Free Offer For New Customer**

(Please Call for Details)
917 Hillcrest Avenue • Stuart, FL 34994
(407) 220-6841 • Fax: (407) 220-6840

CALL US FIRST!

dB-tronics®
For Your Equipment Needs

- **AFFORDABLE, QUALITY REPAIRS:**
  We Are THE SA Addressable Converter Repair Experts!
  8500's, 8550's, 8580's
- **WE BUY & SELL EQUIPMENT:**
  SA PP 450MHz LE's $109.00
  SA FF 450MHz TA's $299.00
  SA PP 400MHz BRDGR $90.00
  8556-005 Scramblers ..... Call

Hurry, Limited Quantity Available

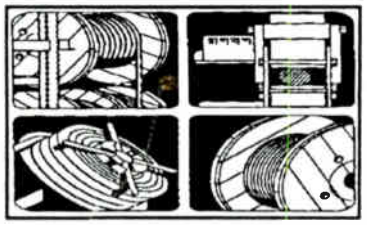
FREE REPAIRS?
Repair Credits Given For Your Excess Equipment!

FOR OTHER SPECIALS CALL:

SALES
404-992-6730 • 614-885-1520

CUSTOMER SERVICE
Phone: 1-800-356-2730 • FAX: 1-803-439-7518

get converted!



Wire Handling, Storage Systems and Equipment for the Electrical Industry

Wemco
"The Wire Handling People"

800-798-2130 (U.S.)
Call for complete catalog
800-221-3595 (Canada) FAX: (313) 777-7390

FREE SHIPPING
CASH PAID

We Need: Magnovox, Jerrold, Scientific-Atlanta (X-cess, Used, In Field)
We Pay: Top Prices!!
We : Buy-Repair-Sell
ACHIEVE PEAK PERFORMANCE

RMT ENGINEERING, INC.

1-800-228-0633 FAX: (408) 773-0937

S.C.I. Communications Inc.
Barry Cohen
National Sales Rep.

CATV, SMATV Equipment MDS, STV Suppliers, Installers

We are a national cable system supplier. We carry cable boxes & remotes in these brands Jerrold, Panasonic, Pioneer, Scientific Atlanta, Eastern, Zenith, Regency, Oak, Hamlin, Eagle, Regal & Viewstar.

We deal with cable systems, brokers, & contract installers.

Our prices are very reasonable & negotiable.

So check us out! Now 8 years in business.

Hours: 11am to 7pm EST
182-39 Jamaica Avenue • Jamaica, NY 11423
(718) 262-0900 FAX: (718) 657-4015

WHY PLOW?

"More Saving$ For You "

- **It's Faster!**
- **Lower Machine Costs**
- **Less Down Time**
- **Nationwide Reliability**
- **Cuts Restoration**

"Call Now For Free Brochure"
1-800-383-7569
ANTHONY'S Manufacturing Service

SubTRACKER
CATV BILLING SYSTEM

Statements, Database, Reports, IBM Compatible, Low Cost, Fast. Ideal for small to medium systems.

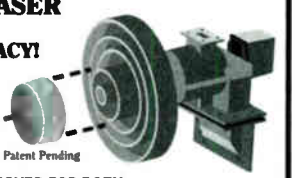
LAN and Multi Town Capability.

Canergy Cable Software
403-354-2510 or Fax 403-354-8780

LASER FOCUS FINDERS
STATE OF THE ART LASER
3 Piece Set
TRY THE EYE OF ACCURACY!

NEW!

ALSO AVAILABLE
MANUAL FOCUS FINDER
WITH ADJUSTABLE
60 INCH EXTENDED ROD



Patent Pending

DON'T GUESS ANY MORE!!!

THIS PRODUCT WAS DESIGNED FOR BOTH
COMMERCIAL and HOME OWNERS
USE OF SATELLITE INSTALLATIONS

Now Available for C & KU Band:

•Chapperal	•Fujitsu	•Channel Master	•Astro
•Cal-Amp	•Most Others	•ADL	•All duplicates

Powered by two "AAAA" cells battery bright red dot projected by the unit is clearly visible in excess of fifty metres in daylight or darkness. Measuring 150mm in lg. 10mm in diameter, weight 60 grams.

Satellite Home Owners For Best Picture Performance Feed Must Be Centered. Save On Service Calls With The Focus Finder

SETS UP EVERY DISH RIGHT!

PRICE
LASER PEN ONLY
LASER PEN WITH CAPS

MAXROD DISH INTERNATIONAL
P.O. Box 14115 • St. Paul, MN 55114
PHONE (612) 646-4700 • FAX (612) 641-1898

CATV DATA LINK
$$ Inventory Liquidators $$
!! WANTS !!
Your excess and obsolete equipment
Amplifiers, Converters, Passives or ???

IN STOCK REFURBISHED GUARANTEED SPECIALS:

JERROLD JLE-300-2W WITH NEW HOUSINGS	$90.00
JERROLD JLE-400-2W WITH NEW HOUSINGS	$100.00
JERROLD TRUNK/BRIDGER STATIONS 300MHZ	$250.00
MAGNAVOX TRUNK STATIONS 5T300/330	$350.00
MAGNAVOX LINE EXTENDERS 5LE300/330	$100.00
S/A 400MHZ TRUNK STATION WITH BRIDGER	$400.00
S/A 330MHZ LINE EXTENDERS	$120.00
S/A 8510 CONVERTER W/REMOTE	$38.00

☎(619)757-3008,FAX (619)757-4048

Equipment

Professional Services

Midwest Region

Ki-Tech CATV Installation Co.
15 years experience
Audits, Trap Changes, Drop Rebuilds, MDU's
Call for Company Profile and References
314-686-6229

Health, Safety and Hazardous Materials

- *Health, Safety and Hazardous Materials Manual*
- *MSDS Handbooks - Standard and Enhanced*
- *Personnel and Safety Mgmt. Computer Program*
- *Consutling, On-site Training & Risk Assessment*
- *Custom Employee Handbooks*
- *Custom Designed Training Programs*

Taylor Morris and Associates, Inc.
1281 West Long Avenue
Littleton, CO 80120

Phone 303-794-3092
FAX 303-794-3372

USGS-CAD Mapping
• Computer Aided System Design Drafting
• Strand Mapping • AS-Builts
• Field Surveying

Call for demo diskette
800-448-5087 717-323-9028

A.C.D. INC.
CATV DESIGN & MAPPING

318 Government Place
Williamsport, PA 17701

Installation company wants to expand operations thru acquisition of other install contractors with long term contracts. 40M plus subscribers preferred with solid MSO relationship.
1-800-486-4165

Design & Drafting

AJM Design Associates
Contact Tony Messina
(over 10 years of Experience)
for further information call;
Ph: 215-676-9161 Fax: 215-677-9026

Training

On-Site Fiber Optic and CATV Training

Nationally recognized for CATV training, Wadena Technical College will train your technical staff in fiber optic splicing and testing with a customized program.

We will bring the training to you!

Fiber optics courses available in the following areas:

•Fiber Optic Theory •Fusion Splicing
•Mechanical Splicing •OTDR Operation

CATV Technology Courses Also Available

WTC offers quality training at competitive prices. Call Doug Stromberg, Technical Coordinator, for a free quote & information packet.

WADENA TECHNICAL COLLEGE

405 S.W. Colfax • P.O. Box 566
Wadena, MN 56482
(218) 631-3530, ext. 259

In California and Arizona

CCC

COCHRAN COMMUNICATIONS CONSTRUCTION
36630 Cathedral Canyon Drive
Cathedral City, California
Ca Lic #478543/Az Lic #079518
SCTE Sustaining Member
SCTE Certified Staff
For information call
Ofc: 619-328-6778
Fax: 619-328-4139

For Busineess Card or Classified Advertising Inquiries, Call Mike Elmer at 1-800-325-0156.

Autocad CAD Drafting Service
System Design/Map Maintenance
Aerial & Underground Construction
Splicing & Activation

Call now for more information

VOGTMAN ENGINEERING, INC.
Richard S. Vogtman
Chief Engineer
125 W. Center St.
Linwood, MI 48634
FAX: (517) 697-3081 Phone: (517) 697-3807

SAVE YOUR MONEY.

Lower your costs for programming, equipment, and service through group purchasing. Join today.

NATIONAL CABLE TELEVISION COOPERATIVE, INC.

14809 West 95th St. Lenexa, KS 66215 913-599-5900

BOOKSHELF

The following is a listing of videotapes currently available by mail order through the Society of Cable Television Engineers. The prices listed are for SCTE members only. Non-members must add 20 percent when ordering.

- *Extension Ladders* — A course designed to provide thorough and comprehensive instruction on the safe use of extension ladders. Includes segments on ladder positioning, transporting and carrying, securing, climbing and safety. Produced by the Atlee Cullison Training School. (35 min.) Order #T-1043, $145. **I/T**
- *Digital TDRs, an Investment You Can Find Fault With* — Riser-Bond presents a discussion and instruction on the proper use of its line of digital time domain reflectometers. From SCTE's Product-Specific Tele-Seminar Program. (Approx. 20 min.) Order #T-1044, $30.

- *Balance and Alignment Techniques for Scientific-Atlanta Series 6500 and 6800 Distribution Equipment* — Scientific-Atlanta engineers discuss components and proper alignment techniques for this particular series of distribution equipment in this video produced exclusively for SCTE's Product-Specific Tele-Seminar Program. (30 min.) Order #T-1045, $30.
- *Implementing Stereo Headend Equipment* — Audio engineers Tom Williams and Steve Fox discuss BTSC stereo technology and its proper testing through specific headend equipment in this workshop from Expo '87. (1 hr.) Order #T-1046, $35.

Note: The appearance of the symbol **I/T** indicates a videotape relating to the Installer Certification Program. These tapes have been discounted to aid candidates in their studies. All videotapes are in color and are available in the 1/2-inch VHS format only. Videotapes are available in stock and will be delivered approximately three weeks after receipt of order with full payment.

Shipping: Videotapes are shipped UPS. No P.O. boxes, please. SCTE pays surface shipping charges within the continental U.S. only. Orders to Canada or Mexico: Please add $5 (U.S.) for each videotape. Orders to Europe, Africa, Asia or South America: SCTE will invoice the recipient for additional air or surface shipping charges (please specify). "Rush" orders: a $15 surcharge will be collected on all such orders. The surcharge and air shipping cost can be charged to a Visa or MasterCard.

To order: All orders must be prepaid. Shipping and handling costs are included in the continental U.S. All prices are in U.S. dollars. SCTE accepts MasterCard and Visa. To qualify for SCTE member prices, a valid SCTE identification number is required, or a complete membership application with dues payment must accompany your order. Orders without full and proper payment will be returned. Send orders to: SCTE, 669 Exton Commons, Exton, Pa. 19341 or fax with credit card information to (215) 363-5898.

A complete listing of SCTE publications and videotapes appears in the March 1992 edition of the SCTE newsletter, "Interval."

ECC '92
"OPEN FOR BUSINESS"

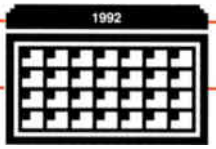
OLYMPIA, LONDON
19th, 20th, 21st October

European Cable Communications '92

For further information on stand availability please contact
Sharon Chapman
The Cable Television Association
Telephone (44) 71 222 2900
Fax (44) 71 799 1471

CABLE'S ONLY EUROPEAN CONVENTION

CALENDAR



June

8: SCTE Central New York Meeting Group seminar, grounding and bonding, and technical evaluation, Ramada Inn, Syracuse, N.Y. Contact Vincent Cupples, (315) 437-3953.

8: Hewlett-Packard communications test symposium, Detroit. Contact (800) 765-9200.

8-11: Siecor seminar, fiber installation, splicing, maintenance and restoration, Hickory, N.C. Contact (800) SIECOR 1, ext. 5539.

9: SCTE Desert Chapter seminar, CLI. Contact Chris Middleton, (619) 340-1312, ext. 258.

8: Hewlett-Packard communications test symposium, Detroit. Contact (800) 765-9200.

10: SCTE Delaware Valley Chapter seminar, fiber optics, Williamson Restaurant, Willow Grove, Pa. Contact Louis Aurely, (215) 675-2053.

11: SCTE Chesapeake Chapter seminar, cable technology for non-technical personnel, Holiday Inn, Columbia, Md. Contact Jennifer Wardrop, (410) 461-7017.

11: SCTE Satellite Tele-Seminar Program, *Video and Audio Measurements (Part 1)*. To air from 2-3 p.m. ET on Transponder 6 of Galaxy I. Contact (215) 363-6888.

11: SCTE Music City Meeting Group seminar, "think hot," Ponderosa Steak House, Nashville, Tenn. Contact Dale Goodman, (615) 244-7462.

12: SCTE Miss/Lou Chapter seminar, Biloxi, Miss. Contact Dave Matthews, (504) 923-0256, ext. 309.

12: SCTE Wheat State Chapter, BCT/E exams to be administered in all categories, Multimedia Cablevision offices, Wichita, Kan. Contact Mark Wilson, (316) 262-4270.

12: Hewlett-Packard communications test symposium, St. Louis. Contact (800) 765-9200.

13: SCTE Wyoming Chapter seminar, Sheridan, Wyo. Contact Stan Olson Sr., (307) 347-3244.

14-17: SCTE Cable-Tec Expo '92, Convention Center, San Antonio, Texas. Contact (215) 363-6888.

15-17: Space-2000 personal communications services and networks technology, applications and regulatory trends seminar, Washington, D.C. Contact (800) 933-4540.

15-19: ONI Fiberworks '92 seminar, ONI Training and Product Development Center, Englewood, Colo. Contact Rand Reynard, (800) FIBER ME.

17: SCTE Michiana Chapter seminar. Contact Russ Stickney, (219) 259-8015.

17: SCTE Snake River Chapter seminar, installation procedures and troubleshooting and Installer Certification exams to be administered. Contact Ron Kline, (208) 376-0230.

20: SCTE Central California Chapter seminar, Installer Certification Program. Contact Sarah Hanks, (209) 722-8542.

22-25: Siecor seminar, fiber installation, splicing, mainte-

nance and restoration, Keller, Texas. Contact (800) SIECOR 1, ext. 5539.

24: Greater Chicago Chapter, BCT/E exams to be administered, Palatine, Ill. Contact Bill Whicher, (708) 362-6110.

24: SCTE San Diego Chapter seminar. Contact Kathleen Horst, (310) 831-4157.

25: SCTE New Jersey Chapter seminar, fiber construction and restoration. Contact Jim Miller, (201) 446-3612.

27: SCTE Central California Chapter, Installer and BCT/E exams to be administered. Contact Sarah Hanks, (209) 722-8542.

27: SCTE Sierra Chapter, BCT/E exams to be administered in all categories, City Hall, Roseville, Calif. Contact Rocco, (916) 354-3500.

July

5-8: Colorado, New Mexico and Wyoming Cable TV Associations' Rocky Mountain Cable Television Expo, Beaver Run Resort, Breckenridge, Colo. Contact (303) 863-0084.

7: SCTE Rocky Mountain Chapter seminar, troubleshooting. Contact Patrick Kelley, (303) 267-4739.

8: SCTE Oklahoma Chapter seminar. Contact Arturo Amaton, (405) 353-2250.

8: SCTE Magnolia Meeting Group seminar, Ramada Inn Coliseum, Jackson, Miss. Contact Steven Christopher, (601) 992-4461.

8: SCTE Oahu Meeting Group seminar, basic video measurement and spectrum analysis and function, relation with CATV interference and resolution questions. Contact Michael Goodish, (800) 836-2888.

9: SCTE Mid-South Chapter seminar, Howard Johnson's, Senatobia, Miss. Contact Scott Young, (901) 365-1770, ext. 4150.

9: SCTE Penn-Ohio Chapter seminar, fiber restoration and emergency troubleshooting, Sheraton Hotel, Warrendale, Pa. Contact Bernie Czarnecki, (814) 838-1466.

9: SCTE Satellite Tele-Seminar Program, *Video and Audio Measurements (Part 2)*. To air from 2-3 p.m. ET on Transponder 6 of Galaxy I. Contact (215) 363-6888.

10: SCTE and Woman in Cable Greater Chicago Chapters and **NAMIC** "A Day at the Races" event. Contact Bill Whicher (708) 362-6110.

11: SCTE Big Sky Chapter seminar, fiber, new technologies, fiber plant tour and hands-on fiber splicing, Missoula, Mont. Contact Marla DeShaw, (406) 632-4300.

13:-17: ONI Fiberworks '92 seminar, ONI Training and Product Development Center, Englewood, Colo. Contact Ray Reynard, (800) FIBER ME.

14: SCTE Chattahoochee Chapter seminar, compliance with new FCC technical standards, Macon, Ga. Contact Hugh McCarley, (404) 843-5517.

14: SCTE Desert Chapter, Installer and BCT/E exams to be administered, Southland Cablevision, Redlands, Calif. Contact Chris Middleton, (619) 340-1312, ext. 258.

Planning ahead

Sept. 8-10: Eastern Cable Show, Atlanta. Contact (404) 252-2454.

Sept. 15-17: Great Lakes Cable Expo, Cleveland. Contact (517) 482-9350.

Oct. 6-8: Mid-America Cable Show, Kansas City, Mo. Contact (913) 841-9241.

Oct. 13-14: Atlantic Cable Show, Atlantic City, N.J. Contact (609) 848-1000.

Dec. 2-4: Western Cable Show, Anaheim, Calif. Contact (415) 428-2225.

PRESIDENT'S MESSAGE

SCTE develops new mission statement

By Wendell Woody
President, Society of Cable Television Engineers

The Society of Cable Television Engineers Planning and Finance Committees, chaired respectively by Directors Wendell Bailey and Leslie Reed, recently held a 1-1/2-day meeting for all their committee members and the national board of directors. The meeting was held in Exton, Pa., prior to our spring board of directors meeting.

The meeting's functions included listing all the major strengths and weaknesses of the SCTE. Then, opportunities were listed that might affect the Society within our specified planning period, along with what threats or potential problems might exist.

From here assumptions about the future were derived. Assumptions are temporary estimates regarding important probable developments. They are not considered forecasts or predictions, but they do reflect the current thinking of the Society. This planning session concluded with a scientifically developed list of well-defined short- and long-term goals for the Society as well as a formalized business plan.

SCTE mission

The first element in a business plan is the development of the mission statement. In simple terms, it's "a fundamental statement of the business that our Society is in." Its purpose is to serve as a guide for future activities and should address, in general terms, what sets the Society apart.

Our newly developed mission statement is, "SCTE: Training, Certification, Standards." It is a broad statement without much detail and should require only infrequent changes if any at all. It reflects the philosophy, values and principles of our organization, the volunteer leadership, key staff and of course, the members. It also must reflect the image the leadership has of the Society and how it wants the organization to be thought of by members, staff, industry leaders and the community.

A "technical" vacation

Again this year, many are planning their summer vacation (holidays) around the SCTE Cable-Tec Expo being held at the San Antonio Convention Center in Texas. What an excellent choice! San Antonio is a fun and friendly city with a great spirit of hospitality. The metro area offers a large variety of activities and events for families and children of all ages.

Cuisine

Mexican cuisine and Texas barbecue restaurants are in abundance for your choosing when you're at the expo. However, Chinese, Japanese, Continental, American and steak/seafood dining is readily available as well.

For Italian food served in a unique atmosphere, take a short drive out Interstate 10 to the Leon Springs area to the Macaroni Grill & Deli — phone (512) 698-0003. This unique restaurant gives one the illusion of eating in an Italian kitchen. In fact, you'll walk through the kitchen when you enter. Wine is served on your table in gallon jugs and Manager Vic Pisano won't allow any SCTE member to leave hungry.

New subcommittee

Tom Elliot, chairman of SCTE engineering, has established another standards subcommittee for "CATV Systems and Design and Construction." Keith Burkley, American Television & Communications corporate director of construction, was appointed chairman. The inaugural meeting will be at the expo in the River Room B at the convention center on Wednesday, June 17, 11:30 a.m.-12:30 p.m. We need subcommittee members and you are welcome. The subcommittee will officially meet four times a year.

Meeting the members

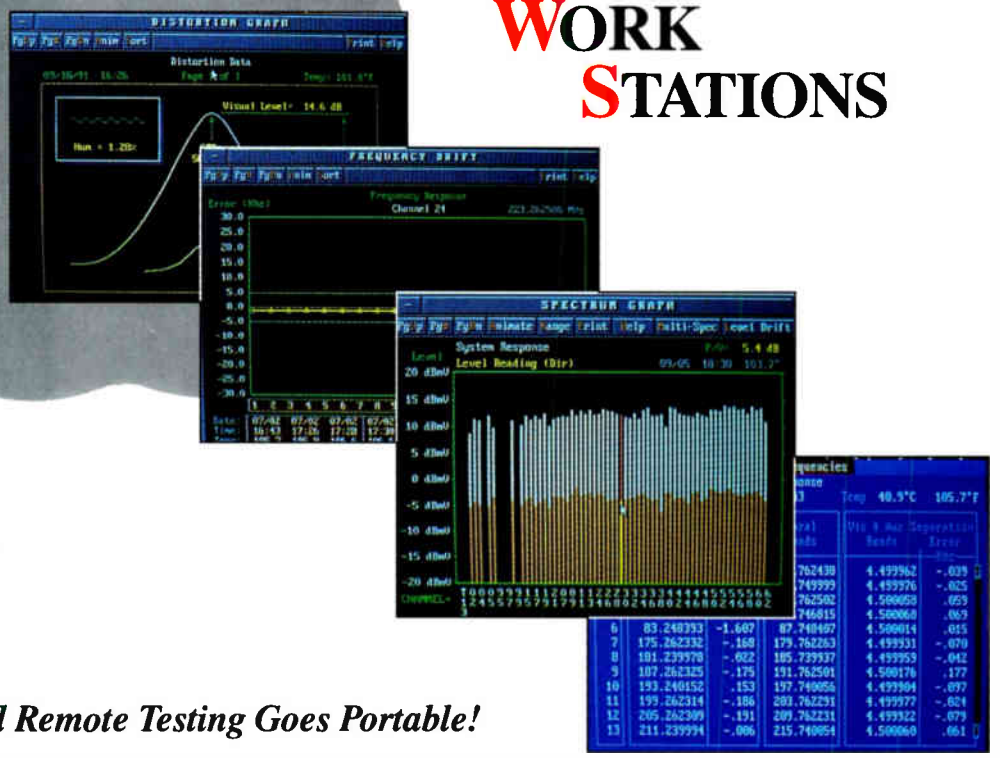
The Old Dominion SCTE Chapter had an excellent turnout for its BCT/E and Installer testing at the Virginia Cable TV Show in Richmond. The chapter demonstrated strong and dedicated leadership from its officers: Wes Burton, Margaret Davison, Matt Lambert and Richard White. Thanks to SCTE member Andrea Cousins for her great assistance in working the SCTE exhibit display at this show. We certainly appreciate the great relationship between the Old Dominion Chapter and the Virginia Cable TV Association. We acknowledge Richard Carlton, state executive director, for scheduling us to address the management sessions on the merits of supporting our Society.

"Our newly developed mission statement is, 'SCTE: Training, Certification, Standards."

Kenneth Wright, SCTE chairman of the Emergency Broadcast System Subcommittee, and I recently attended the National Broadcast System Advisory Committee (EBSAC) meeting in Washington, D.C. Wendell Bailey of the National Cable Television Association and an SCTE at-large director, also is a member of this committee. Each of us was assigned to national EBS working groups. Featured speakers were: FCC Chairman Alfred Sikes, FCC Commissioner Andrew Barrett, FCC Field Operations Chief Richard Smith, EBS Chief Helena Mitchell, and FCC Engineer Frank Lucia. **CT**

Have PAWS™ will Travel!

PORTABLE ACCESS WORK STATIONS



PAWS™

Precision Automated Remote Testing Goes Portable!

Cheetah™ Systems, the creators of the Best Automated Remote Testing equipment in the industry, is proud to introduce its new ***Portable Access Work Stations, PAWS.™***

PAWS™ has all of the precise frequency, level measuring, data storing and documentation qualities of the renowned Cheetah™ HE-4650 — now in a **portable package**. ***PAWS™*** may be operated virtually anywhere for monitoring and documenting the condition of your plant, and for trouble-shooting CATV systems.

PAWS™ is engineered to provide every cable operator an economical and convenient method to measure and document, around-the-clock, information that's necessary for complying with the new technical standards.

Another work of ART™ from the Cheetah™ people

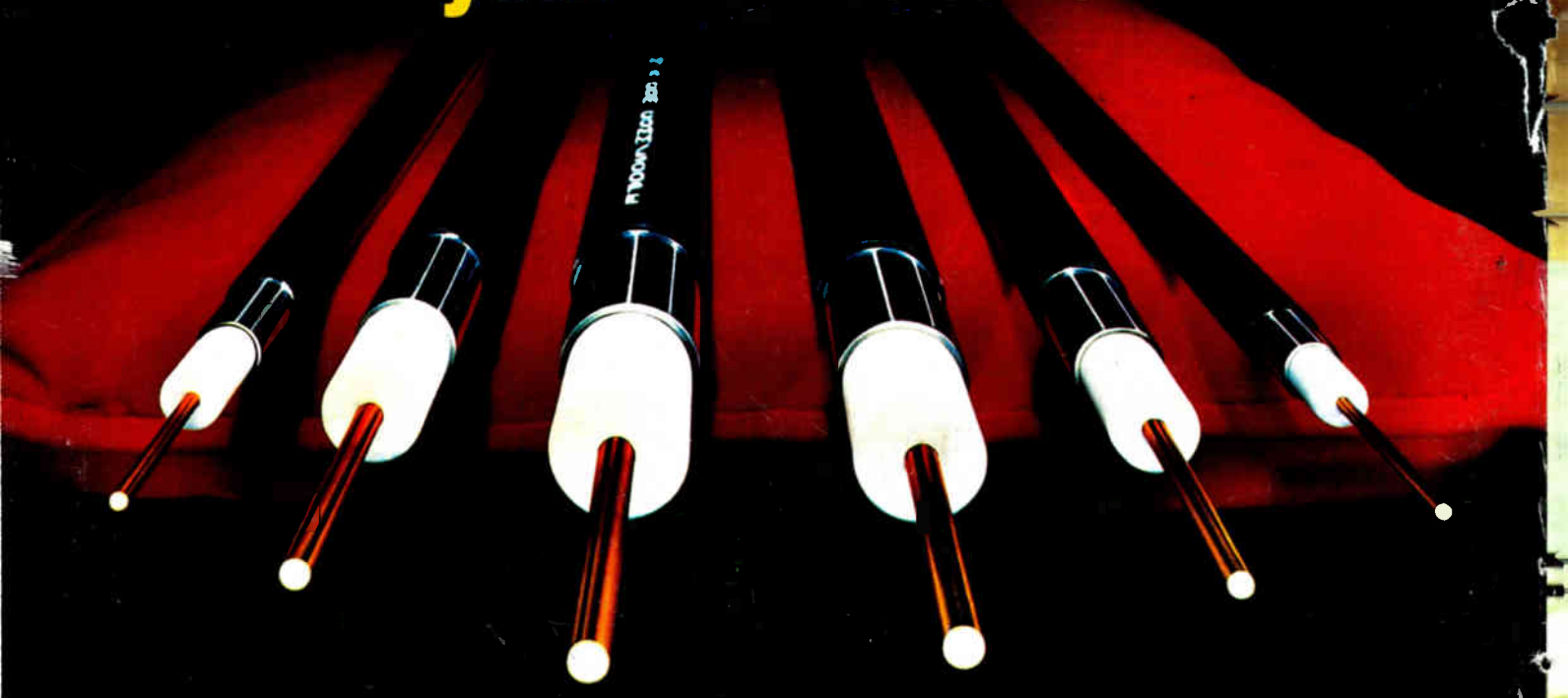
Automated Remote Testing™

WE MEASURE THE BEST!™

cheetah™

SUPERIOR ELECTRONICS GROUP, INC.
2237 Industrial Boulevard, Sarasota, Florida 34234
Telephone (813) 351-6700 • Fax (813) 351-9193

Now Anixter puts Comm/Scope Coaxial Cable even closer to your next rebuild!



...That's because we've added additional stock to all of our on-line computer linked distribution centers located throughout North America.

Anixter has a "just-in-time" delivery service that puts your rebuild trunk, distribution and drop cable at the job site where and when you need it. So don't buy more cable for rebuilds than you need.

Remember, at Anixter, Service is our Technology.

ANIXTER
CABLE TV

Atlanta, Georgia
(404) 840-7901 • (800) 242-1181
Anaheim, California
(714) 779-0500 • (800) 854-0443
Chicago, Illinois
(708) 350-7788 • (800) 544-5368
Cleveland, Ohio
(216) 526-0919 • (800) 321-8068
Dallas, Texas
(214) 446-CATV • (800) 231-5006
Denver, Colorado
(303) 740-8949 • (800) 841-1531
Iron Mountain, Michigan
(906) 774-4111 • (800) 624-8358
Montreal, Quebec
(541) 636-1421 • (800) 561-9710
Seattle, Washington
(206) 838-9552 • (800) 438-9290
Toronto, Ontario
(416) 507-6226 • (800) 665-1482
Vancouver, British Columbia
(604) 276-0366 • (800) 663-7995
Wharton, New Jersey
(201) 328-0980 • (800) 631-9603

See us at the SCTE Cable-Tec Expo, Booth 258. Reader Service Number 132