

COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers

000363317 9006 03 SCTE 580
FRED MCCORMICK CMT00532
DESIGN ENGR
HASTEAD ENGINEERING CO
BOX 9077
FAKGD ND 58106

HDTV

**Commercial
insertion**

**Lab test:
Power Cast
power supply**



SCTE Cable-Tec Expo

August 1990

Virtually eliminate customer calls during service interruptions.



Now you can virtually eliminate angry customer calls during service interruptions.

The **Nexus Customer Service Headend** allows you to keep your customers informed when their service is interrupted.

This headend and graphics generator injects 33 channels at any point in your distribution



The Nexus Customer Service Headend

- weighs less than 50 pounds
- rechargeable internal battery

system to advise affected customers downstream.

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

Best of all, your customized message reaches your customers before they reach for the phone.

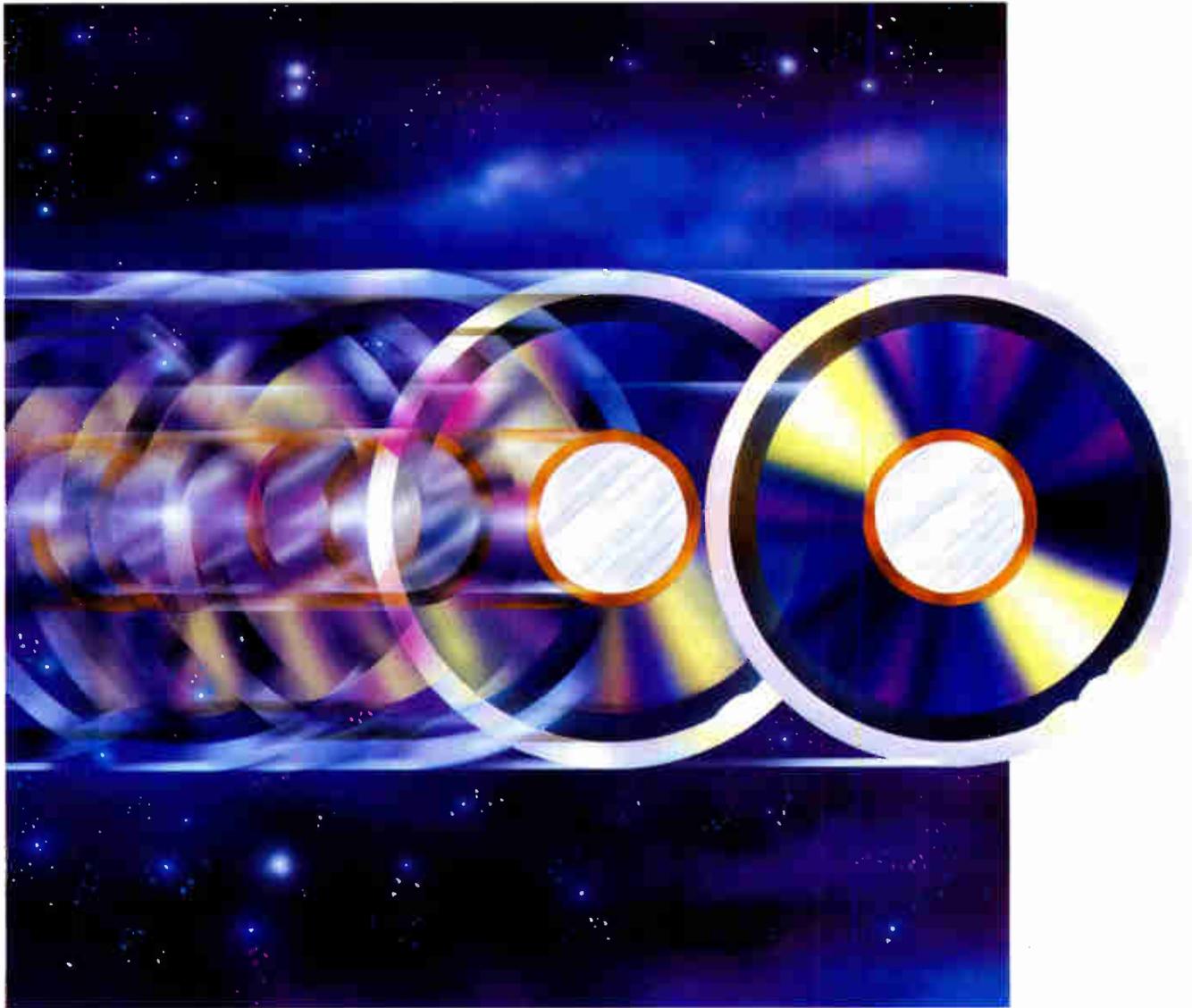
Call us today for more information.

Reader Service Number 2.

Nexus – Definitely Ahead of our Time

NEXUS
ENGINEERING CORP.
PERFORMANCE
YOU CAN SEE.

TRILOGY MAKES THE RIGHT MOVES



MC² FASTER DELIVERY. FANTASTIC SERVICE.

In addition to the many product benefits you get with MC², you also get the *plus* of faster delivery and incredible service. No costly waits. No bothersome delays. You want MC², you got it! Quick as a wink!

And, of course, you get the special advantages of MC². Air-the perfect dielec-

tric. MC² provides such important benefits over foam as: unequalled 93% velocity of propagation, superior attenuation, hermetically-sealed inner structure, stronger bonding, sheathed endurance, better suck-out relief, and purity of signal.

Get to know, what makes MC² go!

PERFECTION IS IN THE AIR!



Reader Service Number 3.

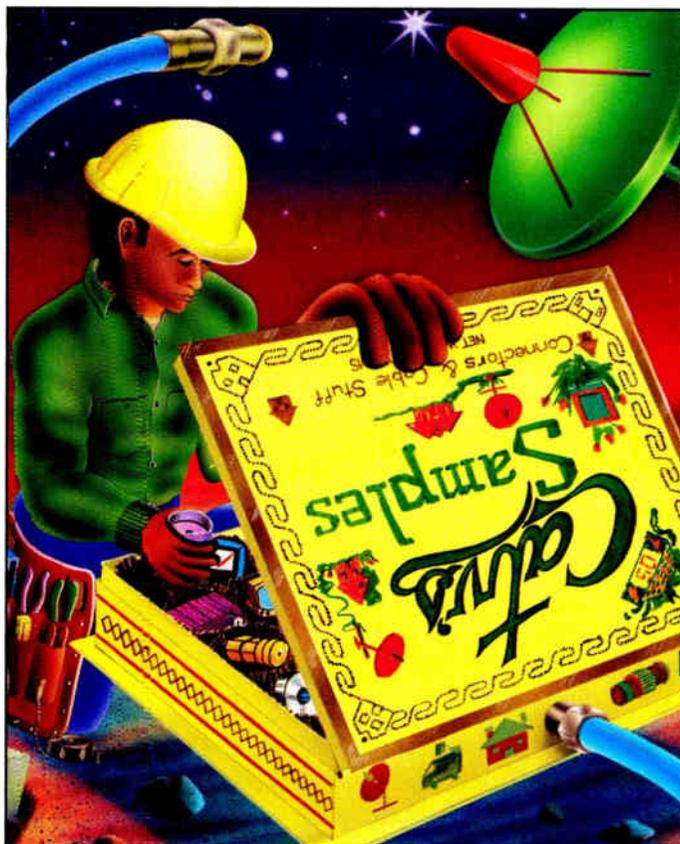
Trilogy 

COMMUNICATIONS INC.

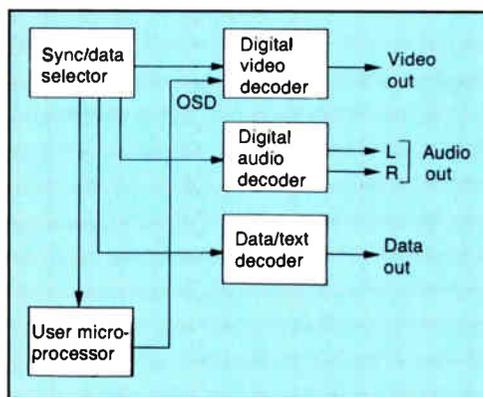
Call or write for your free sample and brochure: TRILOGY COMMUNICATIONS INC. 2910 Highway 80 East, Pearl, Mississippi 39208
800-874-5649 • 601-932-4461 • 201-462-8700

Departments

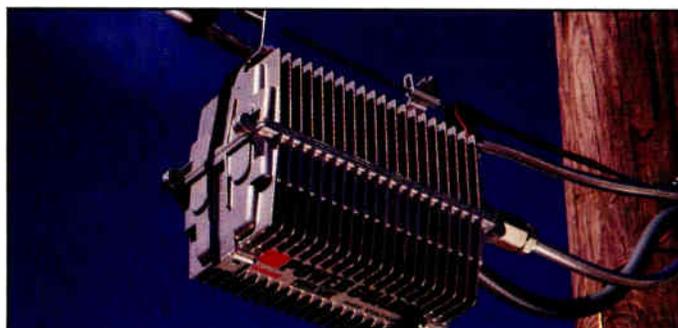
Editor's Letter	6
News	12
Back to Basics	97
Treat yourself to a sampling of basic CATV technology.	
Lines of Communication	109
How to write when you're pinched for time.	
Correspondent's Report	112
East Coast Correspondent Lawrence Lockwood discusses GI's HDTV proposal.	
CT's Lab Report	122
Power Guard's Power Cast 60 VAC power supply gets put through the paces.	
Business/Classifieds	126
Product News	133
Ad Index	137
President's Message	138
Wendell Woody takes the SCTE helm.	
SCTE Interval	63
The Society's newsletter reviews Expo '90.	
Cover	
Computer generated image © Stock Imagery. Nashville Convention Center and SCTE President Wendell Woody photos by Bob Sullivan.	



Back to Basics 97



Correspondent's Report 112



CT's Lab Report 122

Features

ATV status	16
CableLabs' Craig Tanner covers the progress being made with advanced TV proposals.	
Our HDTV future	20
ATC's Walt Ciciora says CATV's in good shape.	
HDTV MUSE	22
A MUSE transmission experiment comes off a success.	
ATV antennas	26
Receive antenna requirements for satellite reception of ATV signals.	
Ad insertion	28
Mega Hertz's Steve Fox considers insertion interface in the headend.	
Expo wrap	30
The sights and sounds of the SCTE's Cable-Tec Expo '90 in Nashville, Tenn., are captured.	

WITH OUR COMPATIBLE ADDRESSABLE CABLE SYSTEMS, EVERYONE WINS.



Update your current addressable system at your own pace. With the latest in addressable technology that's always one step ahead of the times.

Our systems are compatible with virtually any other addressable equipment—Jerrold IMPULSE 7000 systems with Oak, Hamlin and most Scientific Atlanta, TOCOM systems with Zenith Z-TAC installations. So we save you from large up-front costs and the disruption of service by letting you phase in new equipment gradually.

But no matter what, making the move to one of our addressable systems now lets you keep pace with the future of addressable cable TV.

Our extensive Impulse Pay-Per-View experience is unmatched. And no one can keep up with our advancements in on-premises technology, fiber optics, in-home integration, HDTV and digital audio.

When it comes to consumer-oriented features, our systems continually give subscribers the advancements they ask for most, like remote with volume control, LED display with time, electronic parental control, stereo, favorite-channel memory and channel scanning.

Find out more about our addressable systems. And see why going with us is the best path to the future.



TOCOM 5507



Jerrold IMPULSE 7000

**GENERAL
INSTRUMENT**

**JERROLD
COMMUNICATIONS**

For more information contact: Jerrold Communications, General Instrument Corporation, 2200 Byberry Road, Hatboro, PA, 19040, 215-674-4800

Reader Service Number 4.

THE BEAST™ STOPS THIEVES.



Stop The Thieves And You'll Stop Signal Leakage In MDU's.

Theft means signal leaks. It's as simple as that. And wherever you've got MDU's, you've got a high probability of theft.

But if you install The Beast™ high security apartment box with our exclusive SuperLock, you turn thieves and vandals into revenue generating subscribers. You also cut down on your CLI compliance problems. And you save on future maintenance and truck rolls.

No wonder you'll find The Beast working for almost every major MSO and in almost every major city.

To find out how to put The Beast to work for your system, call Cable Security today. We're the industry's number one source for high security installations.



Dress up The Beast™
with our new lines
of molding and
accessories.



Cable Security

801 Fox Trail
P.O. Box 2796
Opelika, AL 36801
800-288-1506

EDITOR'S LETTER ||||||||||||||||||

Professionalism

Over the years the U.S. cable industry has had a sometimes less than desirable reputation, both from a customer service perspective and even from a professional standpoint. In many ways, ours has been somewhat of a renegade business, and at one time was even considered sort of an ugly stepchild of broadcasting. But during the 40-odd years of its existence, it has been learning, growing and maturing, and is indeed becoming a truly professional industry.

Witness the contributions of organizations such as CableLabs, NCTA, CATA, CTAM and SCTE. At the core of the efforts of each of these is professionalism. Industry standards and guidelines in technology, service and programming have been the fruits of their labors. Many MSOs have created their own training and service programs that have set them apart in the communities they serve.

If we look at the perception of service and professionalism in the telephone companies, one attribute shines through: consistency. And the sheer longevity of the telcos is another advantage. As time passes, CATV will likely enjoy a similar reputation industrywide. But we are far from where we need to be.

Our most valuable resources

In spite of the progress we have made, one of our weaknesses is the way we sometimes treat our most valuable resources: our people. I had a stark reminder of this when a fellow engineer and friend called me at home a couple weeks ago to inform me that he was the "victim of acquisition." He worked for a 5,000-subscriber SMATV operation in the Atlanta area and gave them five years of his 15 years in the business. That company was recently acquired by Wometco.

One Monday morning he came to work only to be told that his position had been eliminated along with that of the sales manager. No advance warning, no thank you other than two weeks severance pay.

Unfortunately in this day and age of mergers and acquisitions, events like that are all too common. Often the merger results in duplicated positions that are difficult to justify economically, and otherwise good people find themselves "displaced" from their career. I don't question that this happens; it's a necessary evil in

the business world. The issue of inconsistency in our professionalism is apparent here, though. Sometimes the severance includes outplacement assistance, consideration for years of service and other arrangements to make the departure as pleasant as possible. But sometimes the departure is what I would describe as less than professional, and the affected individual is essentially nothing more than a line that has been deleted from some business plan.

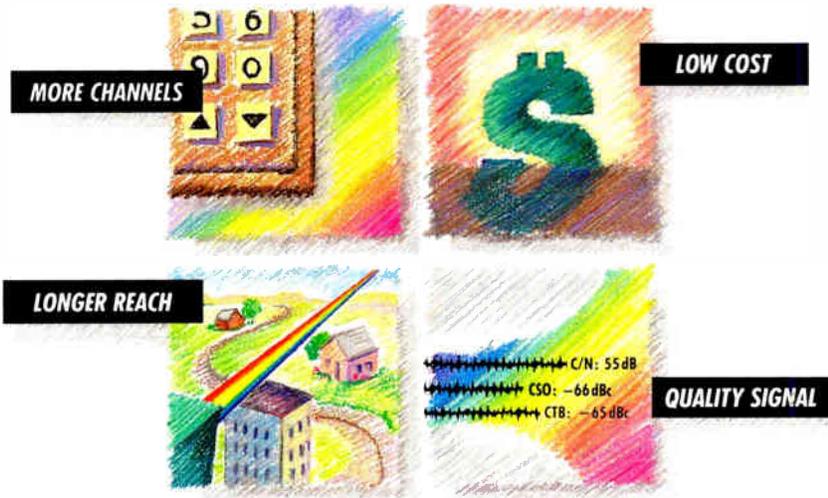
Recently I've seen examples of questionable professionalism elsewhere, too. Our industry is served by several excellent publications, each with important messages in their respective areas of marketing, operations and technology. It's come to my attention that one of our competing publications has apparently been telling some advertisers that "only installers" read *Communications Technology*, and it's "obvious by the editorial content." I have to chuckle at statements like that but unknowing advertising agencies may actually believe it!

Sadly, as we try to progress forward in our industry's level of professionalism, events like the ones I've described here and in past editorials are stumbling blocks to that progress. Until the CATV industry becomes more consistent in its daily operations—customer service, safety practices, training, standards and reliability—we will continue to be the "whipping boy" of our detractors.

When I went through SCTE's BCT/E certification program, both the technician and engineer levels of that program required me to take examinations on "Professionalism and management." Category VII used to be called "Professionalism and ethics." I wonder if the original name shouldn't have been retained to be a reminder of the importance that the subject plays in the maturity of the CATV industry.

4

REASONS WHY CATEL IS THE CLEAR CHOICE FOR IMPROVING YOUR SYSTEM.



You're expanding. Or upgrading. Tackling issues like initial cost, future costs. Channel capacity and signal quality. Over today's distances—and tomorrow's. Before you make a move, you'd best talk to Catel, the fiber optics specialists. And look at the numbers—numbers that prove our TransHub III AM fiber technology is your best solution, by any criteria.

Begin with more channels—at lower initial cost.

A TransHub III system can give you 80 channels—now—at costs much less than those associated with "hero" laser systems that have yet to consistently match that capacity even in laboratory environments.

Add multiple nodes more cost-effectively.

With TransHub III you can add multiple nodes—at minimal incremental cost. Cost-effectively split signals to serve indoor or outdoor hubs. Without compromising carrier-to-noise or composite triple beat.

Maintain the highest signal quality—to the farthest reaches of your system.

Signal quality shouldn't disappear after a mere 9 or 10 miles. At 15 miles our system's C/N is 52 dB; CTB is 65. At 22 miles

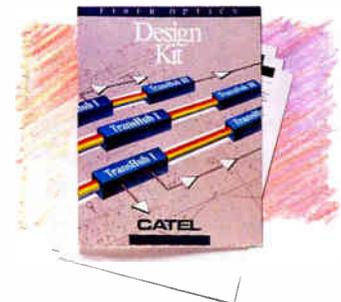
C/N drops one decibel; CTB remains 65. Think about it—and compare.

Add channels—without trading off signal quality.

Multiple channels shouldn't be paid for in signal quality. In a TransHub III system, channel count doesn't impact quality. At 40, 60 or 80 channels over a ten-mile link, you'll have a C/N of 55 dB, CSO of -66 dBc and CTB of -65 dBc.

Another important number?—800-827-2722.

Call it or use the FAX number below. Ask for Catel's free Fiber Optics Design Kit and Applications Notes 3, 4 and 5. Then you'll have all the numbers. So you can make the clear choice.

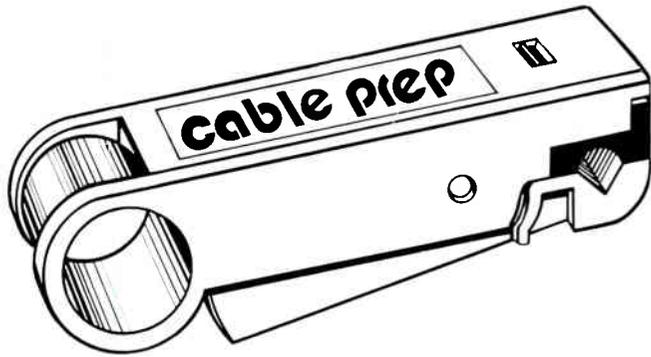


Reader Service Number 6.



4050 Technology Place, Fremont, CA 94537-5122.
Telephone: (415) 659-8988.
800-827-2722. Fax: (415) 651-8437.

Presenting . . . The New



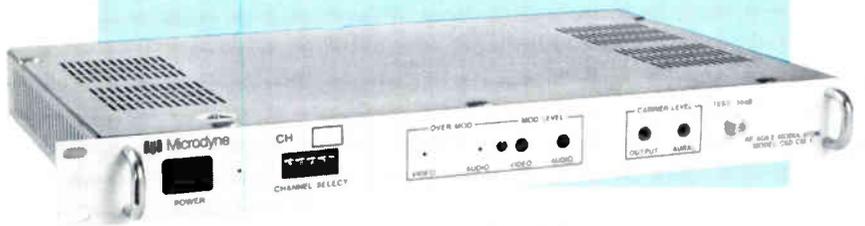
CABLE PREP STRIPPER

- Non-adjustable blades – stripping dimensions set to industry standards for RG-59 and RG-6.
- Replaceable blade cartridges snap in – no extra tools, no adjustments, no screws or spring-loaded traps.
- Indestructible space-age plastic tool – safety yellow color is highly visible.
- Clean-out feature removes debris with each use.
- Made in the U.S.A. Patent pending.
- Part Number 6590



207 Middlesex Avenue, P. O. Box 373
Chester, CT 06412-0373
(203) 526-4337 • Fax: (203) 526-2291

Tunable Headend Modulators, With Microdyne Quality, Have Never Been So Affordable



High performance, 36 channel capacity (2 through W). Dual reference oscillators provide drift-free operation. Tracking saw filters virtually eliminate signal degradation.

For additional details, just give us a call at (904) 687-4633.

Simplified operation with front panel controls and indicators. Select the channel and adjust the carrier and modulation levels. Over modulation indicators are provided for both audio and video.



491 Oak Road • Ocala, Florida 32672 • Phone (904) 687-4633 • Fax (904) 687-4780

COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers

A Transmedia Publication

Editor in Chief, Paul S. Maxwell
Senior Vice President-Editorial, Ronald J. Hranac
Vice President-Editorial, Toni I. Barnett
Executive Editor, Wayne H. Lasley
Contributing Editors, Deborah Arney
Shelley L. Bolin
Bob Diddlebock
Ed English
Karen Fisher
J.L. Freeman
Patrick J. Gushiran
Laura Hamilton
Janet C. Powell
Tom Rees

East Coast Correspondent, Lawrence W. Lockwood

President/Group Publisher, Paul R. Levine
Vice President-Sales, Charles M. Castellani
Regional Vice President-Sales, Pippa Johnston
Account Executives, Neil Anderson
Barbara Allen Bellomo
Patty Linster
Diane Means
Linda S. Sommer
Circulation Manager, Mary L. Sharkey
Circulation Assistants, Kathleen Jackson
Carol Pennebaker
Production/Traffic Coordinators, Mary Felker
James Watts
Art Director, Sharon F. Lasley
Artlata, Brad Hamilton
Christine Henry
Mike Mathis

Transmedia Partners-I, L.P.

Chairman, Terrence Elkes
President, Paul S. Maxwell
Vice President/Chief Operating Officer, Harry C. Gerhart
Executive Vice President, Paul R. Levine
Senior Vice President, Patrick J. Gushiran
Vice President-Editorial, Bob Diddlebock
Controller, Kenneth W. Edwards Jr.
Assistant to Controller, Nancy Parkin
Art Director, Christine Henry
Advertising Coordinator, Maria Sullivan
Marketing Manager, Marie T. Beert
Marketing Assistant, Dotte Dunevitz
Executive Secretary, Barbara Moir
Receptionist, Jane Duesing

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

Washington Bureau

1926 N St. N.W., Second Floor, Washington, D.C. 20036
(202) 223-0970

New York Bureau

420 Lexington Ave., Suite 300, New York, N.Y. 10170
(212) 297-6153

Advisory Board

Paul Barth, United Artists
Austin Coryell, Mile Hi Cablevision
Richard Covell, General Instrument/Jarrold Division
Len Ecker, Consultant to CATV Industry
James Farmer, Scientific-Atlanta Inc.
Robert Luff, Jones Intercable
Clifford H. Paul, Consulting Engineer to RTK Corp.
Dan Pike, Prime Cable
William Riker, Society of Cable Television Engineers
Clifford Schrock, CableBus Systems Corp.
A. H. Sonnenschein, Hughes Microwave
Raleigh B. Stelle III, American Television and Communications
David L. Willis, Tele-Communications Inc.

SCTE Board of Directors

At-Large Directors

Richard Covell, Jerrold Communications
Tom Elliot, CableLabs
Robert Luff, Jones Intercable

Regional Directors

Pete Petrovich (Region 1), Petrovich & Associates
Ron Hranac (Region 2), CT Publications
Ted Chesley (Region 3), CDA Cablevision
Leslie Read (Region 4), Sammons Communications
Wendell Woody (Region 5), Anixter Cable TV
Bill Kohrt (Region 6), Kohrt Communications
Victor Gates (Region 7), Metrovision
Jack Trower (Region 8), WEHCO Video Inc.
James Farmer (Region 9), Scientific-Atlanta
Michael Smith (Region 10), Adelpha Cable
Pete Luscombe (Region 11), TKR Cable
Wall Ciciora (Region 12), ATC



When it comes time to increase channel capacity, available head-end space may be the first problem.

Enter the agile 40C/K or 32C/K IRD.

Additional free space can be created by using Standard Communications new Agile IRD VideoCipher® mainframe and one Agile 40C/K or 32C/K satellite receiver. Our packaging saves you 7 inches of rack space compared to older receiver descrambler designs. In a typical 24 satellite channel headend the total rack space savings is 14 feet. That's 2.3 empty 6 foot racks compared to older receiver descrambler designs. Now that's space available for additional channel capacity.

With more equipment going into the headend, system reliability and maintenance will be the

next problem.

Enter the agile 40C/K or 32C/K IRD.

Standard has designed a commercial alternative to other integrated receiver descrambler offerings. Our concept is to utilize an unmodified, industry proven Agile 40C/K or 32C/K satellite receiver design and a separate Agile IRD mainframe.

By separating the VideoCipher® from the receiver we could concentrate on making the best modular descrambler possible. Complete RF shielding, individual power supplies, full function indicators and maximum heat reduction are best served with independent housings. Instead of designing a compromising home-type IRD satellite receiver, Standard built individual components that would integrate and survive in 24 hour a day CATV head-end environments. Setup, main-

tenance and trouble shooting are simplified when equipment can be isolated and individually tested.

With all this additional space and reliability the Agile 40C/K and 32C/K IRD will stay up and running night after night, so you won't have to.



**Standard
Communications**

SATCOM Division

Telephone: (800) 243-1357
In California: (800) 824-7766
(213) 532-5300 FAX: (213) 769-0620
Represented in Canada by:
DGH Communications Systems Ltd.
Scarborough, Ontario (416) 499-4746

The descrambler module mainframe can only be used by specifically approved SCC receivers.
VideoCipher is a registered trademark of General Video Instruments.

Reader Service Number 9.

**Space
available.**

SUPERIOR
BILLBOARD CO.

INTEGRAL

GREAT PROTECTION IN A CRUNCH!

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

Backed by over 10 years of CATV experience, Integral's Cablecon "Cable-in-Conduit" products have made them the leading supplier of underground CATV conduit. While you can buy cheaper duct, none comes close to meeting Cablecon's technical specifications and manufacturing consistencies.

There's no confusion when you buy Cablecon. Duct classifications are not necessary because Cablecon comes one way. Our premium duct systems have comparable crush ratings to Class 200 PVC pipe. Their installed costs are less than Class 160 duct and outperform the so-called "good deal" CATV-160 and DB conduit lines...hands down!

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

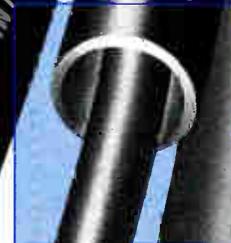
To avoid the "20 year crunch" and protect your underground assets, specify only Cablecon—the "user friendly" conduit systems.



*Cablecon
Fiber-in-Duct
(FID™) 1/4" duct
with fiber*



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



*Cablecon
Drop-in-Duct®
(DID®) 1/3mm
duct with RG-6
service wire*



*Cablecon
String-in-Duct
(SID™) 3/4" empty
duct with pull-string*



MARKETED EXCLUSIVELY BY
Channell Commercial Corporation • 800/423-1863 • 800/345-3624 in CA

Reader Service Number 10.

• Integral has a pass-thru warranty program with Times Cable and Comm Scope. Contact Integral for full Cablecon Series "No Crunch" warranty program.

COOL IT WITH CHANNELL HDC™ COVERS!



HDPE COVER

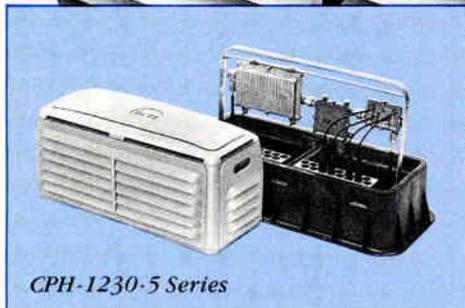
THERMAL INSULATION

5 SERIES HDPE ENCLOSURE

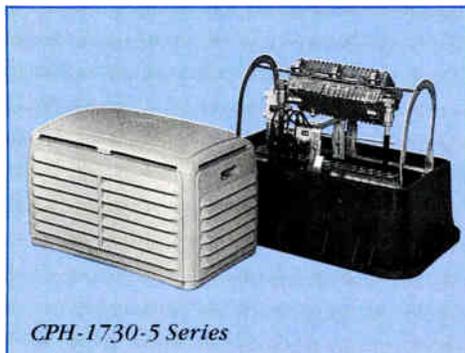
What do San Diego, CA, Fairfax County, VA, Jacksonville, FL and Sacramento, CA have in common? They've all switched to Channell's 5 Series Heat Dissipation Covers (HDC)! In fact, in just 12 months, 38% of our active equipment enclosure customers have switched to HDC. Why? Because these unique pedestal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

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

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



CPH-1230-5 Series



CPH-1730-5 Series



CPH-2436-5 Series

Channell
COMMERCIAL CORPORATION

800/423-1863
800/345-3624 in CA

Reader Service Number 75.

Woody discusses SCTE goals for year

NASHVILLE, Tenn.—An exclusive interview was conducted by CT at Cable-Tec Expo '90 with newly elected Society of Cable Television Engineers President Wendell Woody (director of fiber optics for Optical Networks International, an Anixter Cable TV subsidiary). In the interview, Woody discussed his goals for the upcoming year. These include:

- 1) to carry out and follow through on the Society's current programs,
- 2) to increase SCTE membership growth for both national and local groups,
- 3) to support improvements in the BCT/E program along with greater participation by more members,
- 4) to increase national's interaction with chapters and meeting groups as to their needs and desired support,
- 5) to accelerate implementation of the new Installer Certification Program and
- 6) to initiate new projects for the Interface Practices Committee.

Woody explained that the BCT/E program needed to be "beefed up and revised." He also expressed the need to be more visible to more of the local groups, spending more time in the field talking to chapter and meeting group members. He acknowledged that his expertise in fiber would only assist in the industry's push for using this technology. Woody main-

tained that "the strength of the Society is in its membership participating in the programs of the Society." He claimed that the industry is on the verge of calling the 1990s the "years of education and training."

Midwest moves, reorganizes structure

ENGLEWOOD, Colo.—As of Aug. 1, Midwest CATV's national headquarters moved all of its central and computerized operations to this Denver suburb. The new address is Fairway Two at Inverness Business Park, 94 Inverness Terrace East, Suite 310, Englewood, Colo. 80112. The new phone number was not available at press time. The move comes after the company has spent almost four decades in Charleston, W.Va. According to the company's president, Chris Sophinos, the firm is moving because it is outgrowing its current facilities and in order to remain a growing force in the industry, it must position itself at the industry's focal point, Denver.

Midwest also announced the opening of its LAN market national sales office in Encino, Calif. That address is 16200 Ventura Blvd., Suite 419, Encino, Calif. 91436. The phone is (818) 382-3660.

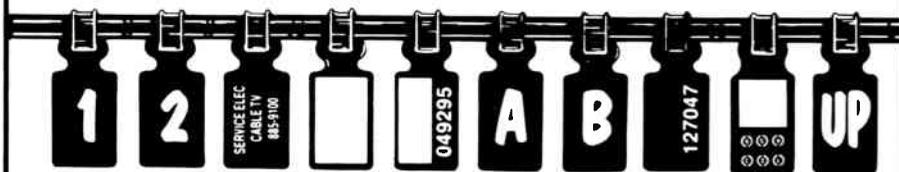
In other news, the company is readying a master warehouse to supply the company's other distribution centers. The 300,000 square foot complex is located on



John Egan (right), president and CEO of Anixter Cable TV, received the 1990 Vanguard Award for Associates at the National Cable Television Association Show in Atlanta. Awards Committee Chairman Timothy Neher (left), president of Continental Cablevision, presented Egan with the award for his leadership in advancing the application of fiber-optic technology for cable TV.

the outskirts of Paris, Ill. According to the company, the facility will be stocked and ready to ship product by the early fall of 1990. Also, Midwest's "warehouses on wheels" will be extended into two new major points of service. The SYNC trucks will be rolling in both the East Coast and Dallas areas. The SYNC system is a materials management arrangement for the systematic control of inventory needed to support cable systems.

THE BEST LINE OF TAGS IN THE INDUSTRY.



Tamper-proof, time-proven, choice of ten colors, pre-stamped for all numerals and letters, serialized, customized, in strips of ten for field convenience. For additional information on the most cost-efficient cable markers available anywhere or any of our other products call **800-548-7243**.

Telecrafter Products

Products creatively designed for the cable industry

Reader Service Number 11.

GI's DigiCipher HDTV precertified

NEW YORK—General Instrument Corp.'s VideoCipher division announced its new proprietary digital video compression technology, DigiCipher, was precertified for testing for a national high definition TV (HDTV) standard for terrestrial broadcasting. The precertification came in a unanimous vote from Working Party 1 of the Systems Subcommittee of the Federal Communications Commission's Advisory Committee on Advanced Television Services, following the committee's review of the DigiCipher technology in Washington, D.C.

The technology is now the only all-digital system among the seven systems under review in the FCC HDTV standards setting program. It uses proprietary techniques, for which patents have been applied, to digitize and compress TV signals. For broadcast HDTV, DigiCipher is a simulcast system transmitting the HDTV

Adapt a spectrum analyzer.



© 1990 Hewlett-Packard Co. TMSA1DWRBS/CT

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

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

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

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

There is a better way.



signal completely within a 6 MHz channel, consistent with current terrestrial and cable TV channel technology. (For more details on the DigiCipher technology, see "Correspondent's Report," page 112.)

NCTA committee meets on tech issues

NASHVILLE, Tenn.—The National Cable Television Association Engineering Committee, which holds a meeting every other month, met here the day prior to the SCTE's Annual Engineering Conference at the Cable-Tec Expo '90. The full com-

mittee was chaired by Walt Ciciora; Tom Jokerst was made the acting chairman when Ciciora, who is Region 12 Director for the SCTE, left to attend a Society meeting.

Wendell Bailey provided a Washington update on several regulatory issues: rates for basic services, cable cross-ownership and whether or not telcos should operate unfettered. On June 7, the Senate cable bill was marked up and the issue of cable exclusivity (which previously was agreed to by the NCTA) did not fare too well.

The subcommittees then informed the board on its recent activities. Ciciora

reported that work is continuing on EIA MultiPort issues. "We've had excellent discussions on direct pick-up and tuner design," he said, and added that "there is an interesting challenge coming down the road. Signal leakage is the primary issue. I'm disappointed in the process concerning converters."

Norm Weinhouse gave input on satellite practices, Bert Heinsheid and Richard Shimp reported on test procedures on return loss and John Wong addressed the signal leakage issue. In a nutshell, Wong said, "Fix your leaks and send in the appropriate paperwork. We just want to see leaks fixed, not their locations."

Ned Mountain, head of the Sound Quality subcommittee, couldn't attend but sent memos that called for volunteers, stated signal-to-noise ratio and audio performance are not what they should be and recommended using a specialist from Dolby Labs. In-Home Wiring Subcommittee members Larry Nelson and Dana Eggert said interest in the subject has escalated over the past six months; it is working on consumer education. Joe Van Loan, heading the ad-hoc MultiPort issue, stated the National Telecaptioning decoders are a factor and if they rally their support for multichannel decoders it would help. Bob Dickinson of the ARRL Subcommittee said there was little activity at present to report.

RMT, Jerrold sign \$1 million contract

NASHVILLE, Tenn.—RMT Engineering, a service company for the past 18 years, announced it signed a \$1 million contract with Jerrold Communications to become one of the largest distributors on the West Coast.

RMT intends to augment its technical expertise along with sales to provide customers the added service their systems need and give the West Coast's largest repair facility added exposure in the cable TV market.

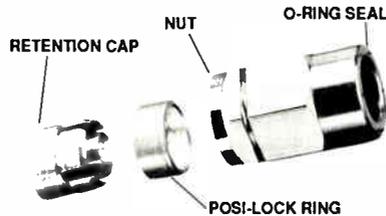
- Magnavox CATV entered into a distributor agreement with Jerry Conn Associates. Jerry Conn will distribute Magnavox broadband electronics equipment throughout the United States and the Caribbean.

Corrections/clearifications

In the article "Fiber-optic splicing simplified" (May 1990, CT), the caption for Photo 8 stated that the automatic process produces fusion splices with "average splice losses less than 0.5 dB." The figure should have been 0.05 dB.

LOCK IN YOUR SIGNAL WITH A SIMPLE TWIST

Using the New T-Lock Premium F Connector



Lower your installation and maintenance costs

Provides consistent reliability over a wide range of installation conditions due to a simple twist and lock design.*

Installs with an inexpensive 7/16" wrench.

Low installation force: requires only 18 in-lb torque to lock the unique cable retention mechanism.

Reduces RF leakage using a posi-lock shielding ring.*

One connector fits all cable sizes (one model RG-6, one RG-59).

Fastest installation: prep cable, insert in connector, screw on to tap, wrench tighten.

Disposable cassette packaging insures a safe, easy installation with minimum connector loss.

"O" ring environmental rear seal.

*PATENT PENDING

Distributed by: Drop Shop, Western CATV, and VueScan.

For more information, call:

HOLLAND
ELECTRONICS CORP

5308 Derry Ave., Suite W • Agoura Hills CA 91301 USA
(800) 628-6688 • (818) 597-0015 • FAX (818) 597-0206

Reader Service Number 13.



ELECTROLINE

Number One in Off Premises Addressability



Équipement ELECTROLINE Equipment Inc.

8750, 8^e Avenue, Montréal, Québec, Canada H1Z 2W4 Fax: (514) 374-9370 Tél.: (514) 374-6335

Tél. (U.S.A.): 1-800-461-3344

Advanced TV status report

By Craig K. Tanner

Vice President, Advanced TV Projects, Cable Television Laboratories

Cable Television Laboratories is an industry research and development consortium supported by U.S. and Canadian cable operators. Our U.S. member companies represent about 85 percent of American cable subscribers. Located in Boulder, Colo., CableLabs conducts research projects in new network architectures for optimized operation of cable systems, the consumer's interface to cable, video compression, new business opportunities from technology, general technology assessment and, of course, high definition TV (HDTV).

There are two main areas of advanced TV (ATV) activity currently under way. First is the activity targeted at developing a worldwide HDTV standard (or family of related standards) for the *production* of HDTV. Then there are the efforts to develop *transmission systems* to get those advanced pictures to the home. Obviously, cable operators are most interested in this area.

When it comes to transmission via cable and over-the-air broadcast, seven organizations are currently proposing systems, all of which are still in a design stage. They are as follows:

Simulcast systems: NHK's Narrow MUSE; Advanced Television Research Consortium's (ATRC) HDS/NA. 6. (The ATRC is a consortium of North American Philips, The David Sarnoff Research Center, Thomson Consumer Electronics and NBC.); Massachusetts Institute of Technology's Channel Compatible system; Zenith's Spectrum Compatible system; and General Instrument's DigiCipher.

Enhanced definition TV systems: ATRC's Advanced Compatible Television (ACTV).

Improved NTSC systems: Faroudja Research Enterprises' SuperNTSC.

The cable industry has an opportunity to influence these system designs through contact with the proponents and participation in the proceedings of the Federal Communications Commission's Advisory Committee on Advanced TV Service. There are ATV approaches that may have particular value for cable transmission; we need to encourage their development and adoption in the standard that will be recommended by the committee.

Presently, the best estimates are that ATV will happen slowly, with start-up during this decade but relatively low consumer receiver penetration. Beyond the year 2000, most expect major penetration of ATV, with a total replacement of NTSC perhaps 25 or 30 years from now.

For now, cable must make efforts to promote the interests of our industry and our subscribers. We are the delivery mechanism for well over half the households in the United States. We need to influence the design of the future ATV system so that it will work well over cable. The ATV system needs to take into account cable's particular set of transmission impairments, which are quite different from those of broadcast.

Finally, we must prepare our cable systems with respect to the quality of our channels as well as our channel capacity, in order to be ready for the era of ATV. If we're successful, we'll be able to carry high quality ATV services with a minimum of disruption and difficulty—and at minimum cost. On the more positive side, a redesign of the basic TV signal carried on our systems may well improve the way cable operates and will likely allow some new revenue opportunities.

Understanding the terminology of ATV

"ATV," of course, is a general term applied to almost any form of consumer TV that is a step beyond NTSC (or European standards PAL or SECAM, for that matter). There are a range of ATV technologies, with IDTV, EDTV and HDTV the primary terms used. These definitions are in line with those formally agreed upon by the Advanced TV Systems Committee and are therefore becoming standardized.

IDTV (improved definition TV) refers to improvements to NTSC that remain within the general parameters of NTSC emission standards and, as such, would require little or no FCC action to implement. Improvements may be made at the source and/or receiver. IDTV may include improvements in encoding, filtering, ghost cancellation and other parameters as long as what is transmitted and received qualifies technically as standard NTSC in a 4:3 aspect ratio.

At the moment, IDTV has not been implemented by changes in processing on the transmit end. Practically then, IDTV today means a receiver that is specially equipped to process a normal TV signal. These receivers generally reduce NTSC color artifacts via three-dimensional comb filtering for separation of luminance and chrominance; they generally provide some video noise reduction and, most obviously, they all double the number of scan lines appearing on the display tube.

Line doubling generally involves displaying 525 lines, progressively scanned; that is, 525 lines every 1/60th of a second, as opposed to NTSC's 262.5 lines per 1/60th of a second. This eliminates the visibility of the line structure of the NTSC signal and improves apparent vertical resolution, although there is actually no additional picture information being presented.

Some estimates are that in 1990 only about 5,000 IDTV receivers will be sold in the United States. They tend to have list prices in the \$1,800 to \$3,000 range for direct-view CRT models and actually come with their own peculiar set of picture artifacts along with improvements. They are available from Philips, Sony, NEC, Panasonic, Hitachi and a few other major manufacturers.

EDTV (extended definition TV) refers to a number of different improvements that modify NTSC emissions but keep the signal compatible with the NTSC receiver. In other words, additional picture information, inserted into the 6 MHz channel, will not disturb an existing NTSC receiver but can be decoded by an EDTV receiver and used to display an improved picture. These changes may include a wide screen image and some modest extension of resolution to a level somewhat less than twice the horizontal and vertical resolution of standard NTSC. Proponents of EDTV systems are generally designing digital sound transmission as part of their systems.

Finally, **HDTV** refers to systems with approximately twice the horizontal and vertical emitted resolution of standard NTSC plus improved color rendition. HDTV has a wide aspect ratio and attempts to approximate the picture quality of 35mm motion picture film. It is designed to be watched on a large screen (where the NTSC has historically failed to please). Digital sound is being planned by all proponents of HDTV.

By FCC ruling, an HDTV system must not make existing NTSC receivers obsolete. It can avoid doing so in one of two ways: It can be truly receiver-compatible, although this appears to be

(Continued on page 58)

THINK CLI

Conquer RF leakage with Snap-N-Seal™ and Push-N-Lock™ Connectors

Augat's high performance RF connectors can help you meet the FCC's cumulative leakage index (CLI) requirements, while reducing your long term service wire maintenance costs.

Whether the application is in the air, underground or in the home, Augat's Snap-N-Seal or Push-N-Lock connectors are a snappy solution to eliminate RF leakage. They offer an abundance of craft friendly features from **triple seal** protection... to a "one step" **push-on** indoor installation.

Marketed by Channell's direct sales organization, Snap-N-Seal and Push-N-Lock are the CLI connections for the 90's. If you are thinking CLI, why not call the Augat Channell connection today!

AUGAT & Channell

THE CONNECTION FOR THE 90'S

Reader Service Number 15.

Marketed by:
**CHANNELL COMMERCIAL
CORPORATION**
U.S.: (800) 423-1863
(800) 345-3624 in California
Canada: (800) 387-8332
(416) 567-6751 in Toronto

Cable's excellent position in HDTV

When we review the mechanisms that cause picture impairments, we realize that there is a limit to what can be accomplished in the receiver. The only alternative is to improve the cable plant. There are a number of cost-effective methods that can be phased into practice in an evolutionary manner. When we examine the technical demands for HDTV (high definition TV) carrier, we realize that they are essentially the same as for quality NTSC delivery. Since quality HDTV delivery is mandatory for competitive reasons in the short run, it becomes clear that cable will be ready for HDTV long before consumers are ready.

By Walter S. Ciclora, Ph.D.

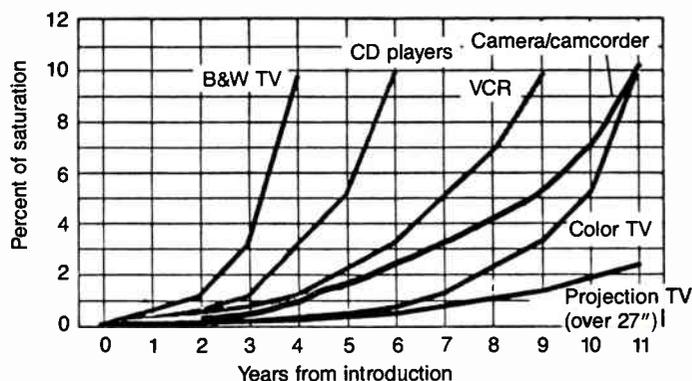
Vice President of Technology
American Television & Communications Corp.

There are three reasons why HDTV is important to the cable industry. First, our "friends" in the telephone industry continue to say that they are the only ones who will be able to deliver true HDTV to the consumer. They say this must be done digitally and over fiber to the home.

This is simply not true. Cable must make it clear that HDTV works well on the kind of coaxial cable systems currently in operation. Fiber backbone strategies and similar approaches make the job easier and the picture even better. But they are technical options; they are not required for

"The technical standard for HDTV must do nothing to impair NTSC receivers."

Figure 1: Home saturation growth of consumer electronic products



cable delivery of HDTV.

The second reason for cable involvement is that HDTV will be with us for at least 50 years. That alone makes it important. We must be involved in shaping something that will have such a great impact on our future.

The third reason is that we need to know how to plan rebuilds and upgrades. Waste can occur in two ways. First, we can spend too much too soon. Second, if what we build becomes obsolete too soon, it too will have been wasted.

Rational expectations

There was a lot of hype over HDTV and over how quickly it was to sweep across the country. Fortunately, most of that has died down.

Testing of HDTV proponents was originally scheduled to begin in December 1989. Then it was postponed until June 4, 1990. It is currently hoped that this testing will begin sometime in the fall of 1990. Nine testing slots were created from the original batch of proponents who qualified. Other proponents have come forth wishing to have slots. It is only human nature to expect that some of those who were tested early in the schedule will have made further inventions and progress and wish to be retested.

After all of the testing is complete, the Federal Communications Commission's Advisory Committee may need up to a year to digest the data and prepare its conclusions. Then, the FCC will need an additional year to 18 months to decide.

This all boils down to the conclusion that a terrestrial standard may be available in early 1994. The first HDTV receivers may go on sale in late 1994 or in 1995.

Possible short circuits to this lengthy

process would occur if the proponents themselves decide to merge into one system. The David Sarnoff Research Center and Philips Laboratories have agreed to do just that. While this action was necessary, it is by no means sufficient. Nearly all of the proponents need to merge for this short circuit to be successful.

That is unlikely for several reasons. Many of the proponents are fundamentally different from each other and cannot merge (for technical reasons). There are some very large egos involved that provide political impediments to merger. The "little guys" would cry foul if the big guys joined forces. Finally, there are too many involved in the FCC Advisory Committee to let too much happen without extensive testing.

HBO and the Massachusetts Institute of Technology both did consumer research that shows a viewer cannot tell the difference between NTSC and studio quality HDTV when seated more than five times the picture height from the screen. The HDTV signal used was not compressed by any of the proponents' systems. It was artifact free. There would be even less difference between NTSC and most proponent systems.

Home viewing distance is primarily determined by room size and furniture placement. To satisfy these two constraints, the HDTV receiver must be a large screen device 3 to 4 feet high. HDTV is a large screen phenomenon. Large screens of any type, NTSC or HDTV, are expensive. In addition, there are only a limited number of homes that can accommodate a large screen.

History has some useful lessons that can help us project how the HDTV market will be penetrated (Figure 1). It took color

Figure 2: Typical cable system

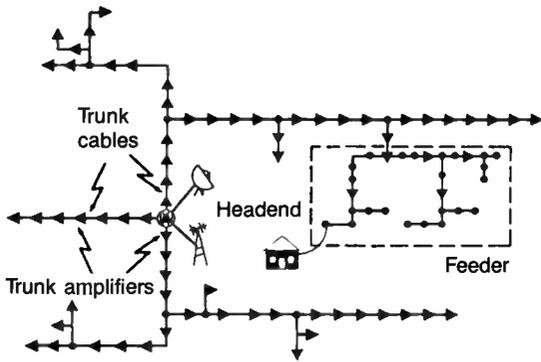
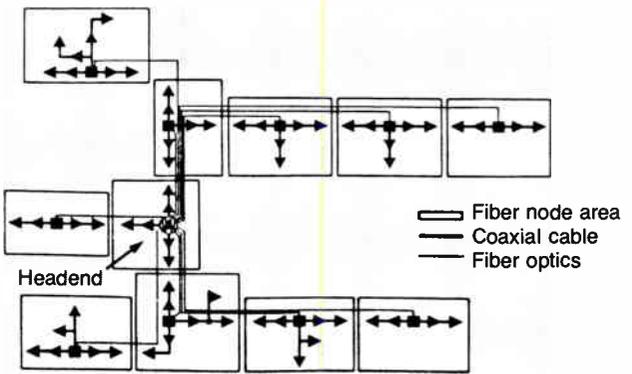


Figure 3: Cable system with fiber-optic backbone trunk



TV seven years after introduction to reach 1 percent penetration. It took color TV 11 years to achieve 10 percent penetration. The first black and white TV sets cost as much as a compact car of the time. The first color TV receivers likewise cost about the same as a compact car. It is reasonable to expect that the first HDTV receivers will cost about as much as a Hyundai!

I believe it is reasonable to predict that HDTV will be at 1 percent penetration in seven to 10 years after introduction. Ten percent penetration will take 13 to 15 years after introduction. Thus if introduction takes place in 1994, expect 1 percent penetration in 2004 and 10 percent after 2007. Any more aggressive projections than this demand an explanation. The challenge is this: Why would HDTV be more of an improvement over color than color was over black and white? Will this degree of improvement justify the price of a large screen TV?

Just as with color, programming will initially be scarce. The broadcast industry is mature and not likely to grow because of HDTV. Its motivation to quickly add programming in an era of less than a few percent receiver penetration will be very low. Certainly, advertisers will not pay more for

programming in HDTV if the population of receivers is small.

Another reason for slow penetration of broadcast programming is the very practical problem of new tower construction. It is nearly universally agreed that a new 6 MHz channel will be required for HDTV. This means another transmitter and antenna. But current antenna towers are fully loaded. Few can accommodate another antenna. Since many of these towers are shared, they would have to accommodate several more antennas.

The problem of tower construction involves not only cost but getting construction permits. These are difficult to obtain since land is scarce, environmental impact statements need to be filed and environmental activists' objections overcome. Add to this the growing fear of the potential for electromagnetic radiation to cause cancer, and it is easy to appreciate that spectrum availability is not the only constraint on broadcasters.

But this issue must not be slighted. Not only do broadcasters have a spectrum scarcity, more importantly they have a scarcity of *quality* spectrum. HDTV spectrum must be free of ghosts, co-channel interference and noise. Otherwise, the

HDTV picture will be unacceptable. For these reasons, even if broadcasters could justify the cost, the rush to HDTV transmission simply won't materialize.

Goals and objectives

Cable should have four principal objectives for HDTV: 1) preserve cable's ability to compete, 2) deliver broadcasters' HDTV signals, 3) serve the NTSC population and 4) accommodate cable's unique needs. In all of this cable must find cost-effective solutions

Clearly, the environment for cable is becoming more competitive. Pre-recorded media, DBS (direct broadcast satellite), MMDS and even digital delivery of video via fiber to the home by the telcos are strong potentials. The most immediate and possibly highest quality delivery may come via baseband pre-recorded media with bandwidths of 15 to 20 MHz. We must not be embarrassed when our subscribers turn off their VCRs and turn to a cable channel.

Cable must be able to deliver the HDTV signal broadcasters choose. Broadcast signals are likely to remain very important

(Continued on page 82)

Figure 4: Distribution plant

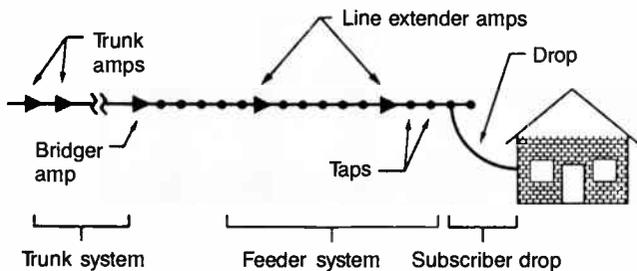
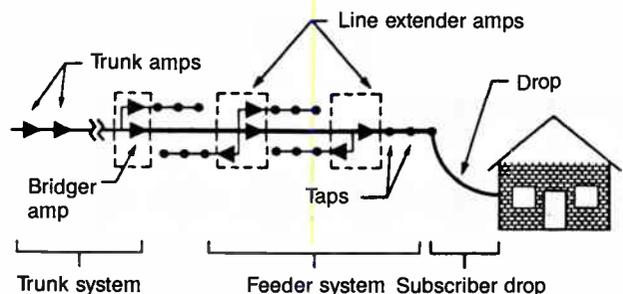


Figure 5: "Super" distribution plant



HDTV MUSE signals on cable and optical fibers

By **Yojo Utsumi, Hiroo Arata and Mikio Maeda**
 Science and Technical Research Labs of Japan Broadcasting Corp. (NHK)

The 1,125 scan line/60 Hz field rate HDTV (high definition TV) system has demonstrated its capability of producing high quality pictures and sound. In fact, TV programs have already been produced in many countries utilizing 1,125/60 cameras and equipment. NHK has been broadcasting HDTV experimental programs for an hour per day via broadcasting satellite BS-2 since June 1989 and planned to start full-fledged HDTV satellite broadcasting via BS-3 in 1990 by using the MUSE (multiple sub-Nyquist sampling encoding) system.

In addition, the MUSE system has been successfully tested over communications satellites under the auspices of Intelsat and other organizations for cable TV and optical fiber transmission. In Japan, a space-cable-net project demonstrated MUSE-FM and MUSE-VSB/AM (vestigial sideband amplitude modulated) transmission on cable facilities via communications satellite in October 1989. These experiments have proved the system's feasibility and versatility for a variety of distribution modes. Thus, HDTV has extensive applications to video media.

Presently, there are growing expectations in the United States as to the potential of HDTV services via cable networks and cable TV systems. In May 1988, NHK performed an initial demonstration of HDTV over a cable system in Los Angeles during the NCTA convention. Additional testing was performed in January 1989 over two Washington, D.C., area cable systems: a 120-channel

system owned by Media General, and a smaller system owned by Jones Intercable. These tests demonstrated that an HDTV picture can be provided today through a typical coaxial cable system without significant impairment due to cable propagation characteristics.

In order to further evaluate the feasibility of HDTV services on cable, the MUSE-VSB/AM transmission (including the satellite link in the cable distribution network) was tested in April 1989.¹ The first half of this paper describes the outline and experimental results of this transmission test. In addition, remarkable progress has been achieved in FM/FDM (frequency modulation/frequency division multiplexing) transmission of video signals for optical fiber CATV systems^{2,3}.

We recently developed an HDTV optical fiber CATV system employing a demand access technique. It can be used by low cost systems, because it does not need expensive wideband optical receivers at the subscribers. Any four MUSE-FM signals can be selected among 34 MUSE-FM signals transmitted on trunk lines at the hubs without demodulating. A compact and inexpensive hub system can be realized by using a heterodyne technique. We adopted commercial low cost laser discs (LDs) developed for compact disc players. Moreover, we utilized conventional BS receivers for Japanese satellite broadcasting at the receiving ends. The second half of this paper describes the outline and experimental results of this demand access optical fiber CATV system for HDTV.

Figure 1: MUSE-VSB/AM transmission spectrum

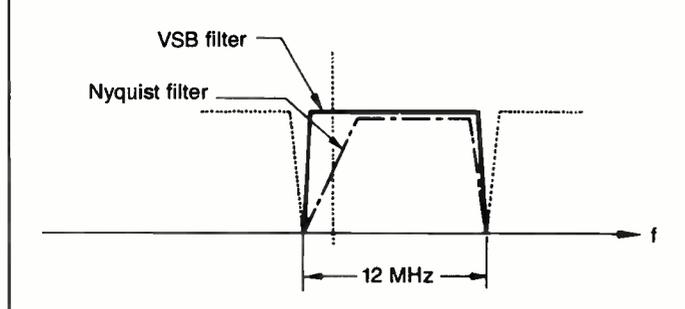
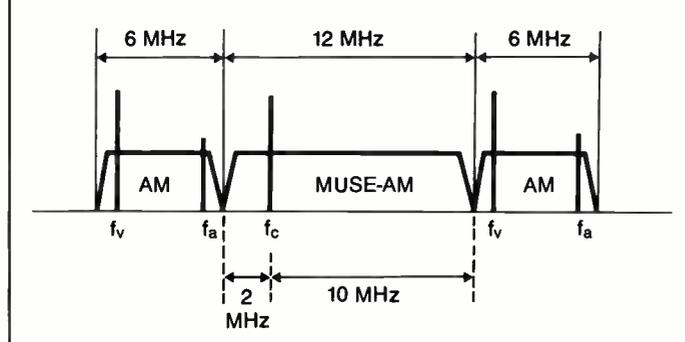


Figure 2: Example of MUSE-VSB/AM adjacent transmission



Cable transmission experiment via satellite

A MUSE transmission system compresses the bandwidth of HDTV signals (which have five times as much information as current TV signals) to just double, without deteriorating picture

Figure 3: C/N and CTB ratios in a cascade (MUSE-VSB/AM)

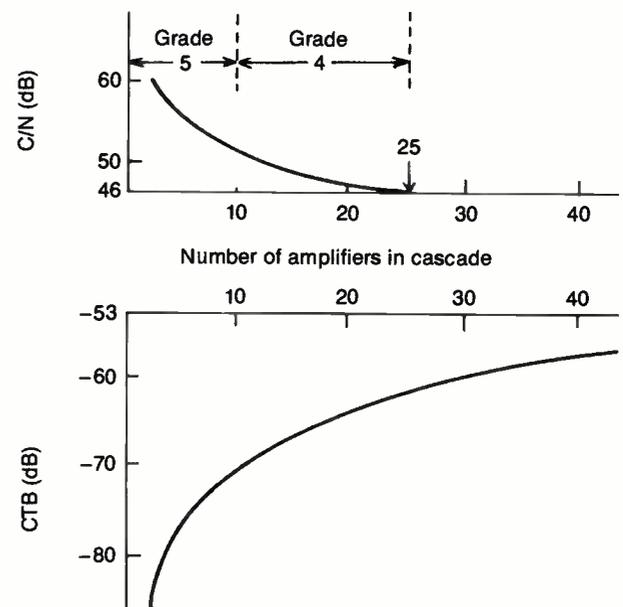


Figure 4: C/N and CTB ratios in a cascade (NTSC-VSB/AM)

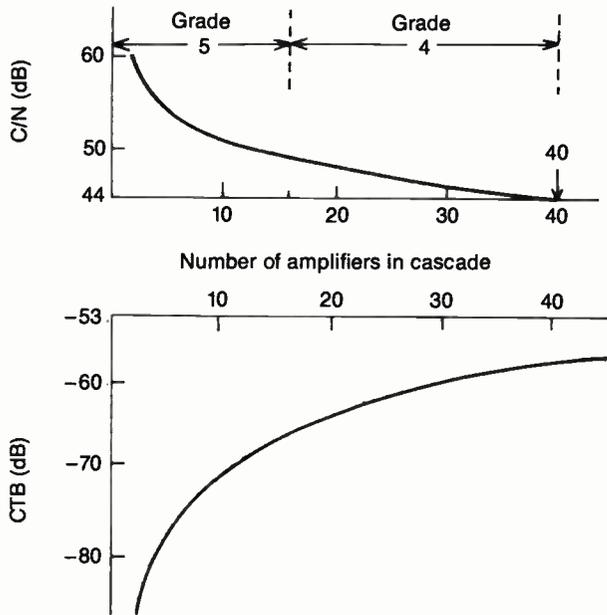
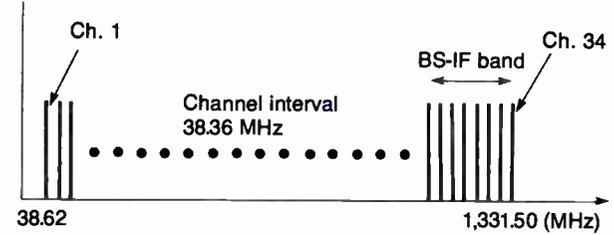


Figure 6: Frequency allocation of MUSE-FM on trunk line



a Nyquist filter on the receiving side. It has a 12 MHz bandwidth and can be transmitted in a channel adjacent to current TV channels, as shown in Figure 2.

The required C/N (carrier-to-noise) and CTB (composite triple beat) ratios are the main factors in limiting the number of cascaded amplifiers for coaxial cable systems. The relationship between the number of amps and the required C/N (4 MHz bandwidth) and CTB ratios for VSB/AM transmission of MUSE and NTSC signals are shown in Figures 3 and 4.

Also shown in the figures are the regions where the C/N ratio gives a picture quality of Grades 4 and 5 using a five-point comment scale. For the calculation, the performance of trunk amplifiers is assumed as follows: C/N ratio = 60 dB, CTB ratio = -90 dB. It can be seen from the figures that a picture quality of Grade 4 requires a C/N ratio of about 46 dB for MUSE and about 44 dB for NTSC; thus, HDTV transmission requires a higher C/N ratio.

The setup of this transmission experiment is illustrated in

quality. This means an HDTV picture can be transmitted through a narrow bandwidth and, therefore, MUSE can be effectively applied to CATV systems.

The transmission spectrum for MUSE-VSB/AM is shown in Figure 1, and a VSB filter is used on the transmitting side and

Figure 5: Experimental setup of HDTV cable transmission via satellite

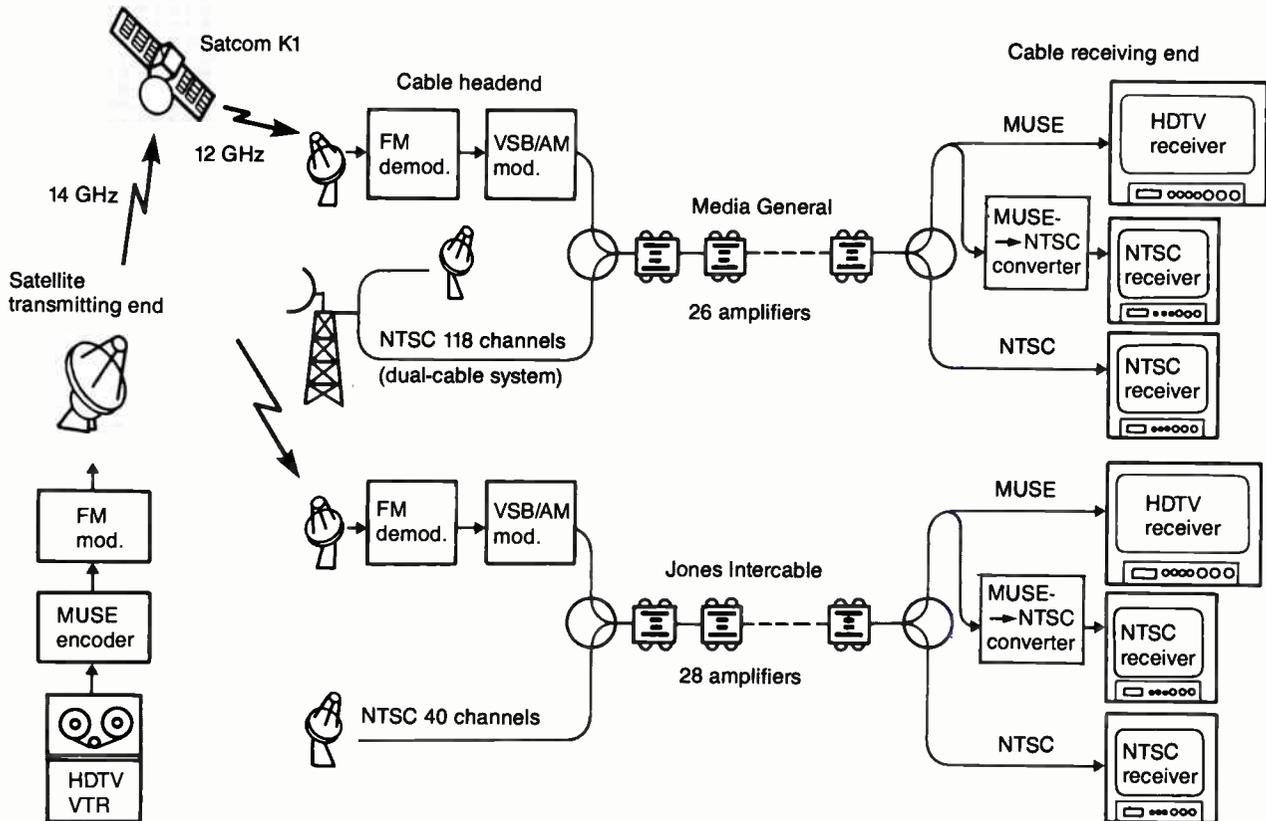


Table 1: Transmission parameters of satellite link

Items	Data	Comments
Downlink EIRP	50.0 dBW	
Receiving antenna gain	49.5 dB	Antenna diameter 3.1 m
Uplink C/N ratio	30.0 dB	
Total C/N ratio	23.7 dB	
Transmission bandwidth	36 MHz	
Frequency deviation	17 MHz	Without energy dispersion
FM improvement	17.7 dB	
Emphasis improvement	9.5 dB	
Received unweighted S/N ratio	50.9 dB	

Figure 5. In this experiment, a MUSE signal is transmitted through two transmission systems in cascade, comprising a communications satellite and cable facilities. At the satellite transmitting end of the HBO Communications Center on Long Island, N.Y., an HDTV studio signal is encoded into the MUSE signal, which is transmitted by frequency modulation to the communications satellite Satcom K1.

At the cable headends, the MUSE-FM signal received from the satellite is transformed into the MUSE-VSB/AM signal. This signal is multiplexed with many channels of conventional broadcast signals transmitted via the other satellites and ground micro-waves. These multiplexed signals are transmitted to the cable receiving ends through multistage amplifiers and coaxial cables. The cable systems involved in this transmission experiment were Media General (which owns the system in Fairfax, Va.) and Jones Intercable (which owns the system in Anne Arundel, Md.)

At the cable receiving ends, the received MUSE signal is decoded and displayed on an HDTV monitor. The MUSE signal also is received by a conventional TV set, with a simple and low-cost MUSE-NTSC converter.

The typical transmission parameters of Satcom K1 are shown in Table 1. The outline and the typical transmission parameters of cable facilities are shown in Table 2.

The experimental results of this MUSE cable transmission via satellite are shown in Table 3. The received C/N ratios of the satellite link at both cable headends are greater than 23 dB, and the received C/N ratios at both cable receiving ends are greater

(Continued on page 86)

Table 2: Outline and transmission parameters of cable facilities

	Media General system	Jones Intercable system
Number of NTSC channels	118 (dual cables)	40
NTSC transmission method	HRC	Standard
Number of subscribers	167,000	32,000
Modulation method	VSB/AM	VSB/AM
Transmission bandwidth	12 MHz	12 MHz
Video carrier frequency	330.30 MHz	331.25 MHz
Channels for HDTV	42, 43	42, 43
Adjacent channels	41, 44	41
Number of amplifiers	26	28
Cable length	13 km	20 km



Choosing the right cable and a white decision. Call MIDWEST

Need it now? Then call Midwest CATV. Full line inventory backed by great service.

Strand (foreign and domestic), trunk, feeder and drop. From a variety of manufacturers, in a variety of sizes.

Corporate Office
Denver, CO
303 799-4343
800 232-9378

Central Region
Lafayette, IN 800 382-7526
Outside IN 800 428-7596

East Region
Clarksburg, WV
Outside WV



hardware values



Brand supplier isn't always a black and
T CATV first and see why.

Ready to ship from any of our nationwide warehouses.

Call the Midwest CATV office nearest you. Just tell 'em a little bird told you where to
find the best service.

ern Region
04 624-5459
00 532-2288

Northeastern Region
Pottstown, PA 215 970-0200
Outside PA 800 458-4524

Southern Region
Ocala, FL 800 433-4720
Outside FL 800 433-3765

Southwestern Region
Dallas, TX 214 340-1515
Outside TX 800 421-4334

Western Region
Denver, CO 800 232-9378
Los Angeles 818 993-1502
Phoenix, AZ 800 782-4566

MIDWEST
CATV

A division of Midwest Corporation

More than supplies. Solutions.

Reader Service Number 16.

1 800 MID-CATV

TVRO requirements for ATV signal reception—Part 1

In recent years there has been increasing interest in the development of a TV system that will provide a picture of higher definition and quality than is currently available in conventional NTSC transmissions. A number of high definition TV (HDTV) systems have been proposed and are under development. The specific parameters proposed vary from system to system. Among the suggested new characteristics are: increase in the number of lines per frame from the present 525 up to 1,125, increase in aspect ratio from the current 4:3 up to 16:9 and use of a progressive scan format instead of the existing 2:1 interlace.

This article provides a brief description and overview of the diverse HDTV systems as well as extended definition TV (EDTV) systems that provide higher definition than NTSC (but not as high as HDTV) while having the advantage of being backward compatible with NTSC. The salient characteristics of the various systems are compared. The primary emphasis in this paper is the computation of TV receive only earth station (TVRO) antenna sizes appropriate for several of these advanced TV (ATV) systems.

By Marvin Freeling

Manager Advanced Studies, GE American Communications Inc.

And Krish Jonnalagadda

Group Head—Transmission Systems Research, David Sarnoff Research Center

In the determination of the antenna diameters required for the reception of the various ATV transmissions, the following link equations are employed:

$$\text{CNR} = \text{EIRP} - L - K + (G/T) - 10\log B \quad (1)$$

where:

CNR = carrier-to-noise ratio

EIRP = satellite EIRP

L = link or path loss

K = Boltzmann's Constant = $\frac{-228.6 \text{ dBW}}{(\text{Hz})(^\circ\text{K})}$

G = gain of the receive antenna

T = receive system noise temperature

B = RF bandwidth

For a circular dish of diameter d, the gain G is given by:

$$G = 18.18 + 20 \log (fd), \text{ dBi} \quad (2)$$

where:

f = downlink frequency in GHz

An efficiency of 60 percent has been assumed in Equation 2.

The signal-to-noise ratio (SNR) of the received channel is given by:

$$\text{SNR} = 6 (\text{CNR}) (D/f_m)^2 (B/f_m) P_w \quad (3)$$

where:

D = peak deviation

f_m = maximum baseband frequency

P_w = noise advantage due to pre-emphasis and de-emphasis and weighting

D = the peak deviation [Carson's Rule for D is: $D = (B/2) - f_m$]

For satellite transmissions in C-band, the following parametric values are appropriate for use in the link equation previously defined:

B = RF bandwidth = 36 MHz

L = link or path loss = 197 dB

T = receive system noise temperature = 100°K

f = 4 GHz

In conventional NTSC transmissions the FM deviation, D, is typically 10.75 MHz. This value of D has been adopted as the de facto standard for C-band cable TV transmissions. A typical standard of quality for TV reception at cable headend earth stations is a minimum value of weighted SNR of 50 dB. The corresponding value of carrier-to-noise ratio (CNR) is 11.9 dB. Substitution in Equation 1 and calculation of the effects of interference yields the following antenna diameters for satellite EIRPs of 35, 36, 37, 38, 39 and 40 dBW. The interferences that have been included in the analysis are those due to adjacent satellites, cross-polarized transponders on the same satellite and terrestrial microwave systems sharing the C-band with the satellite transmissions.

The antenna diameters required for reception of NTSC television for the six EIRP values can be shown to be:

EIRP (in dBW)	Diameter in meters
35	3.8
36	3.6
37	3.4
38	3.0
39	2.8
40	2.6

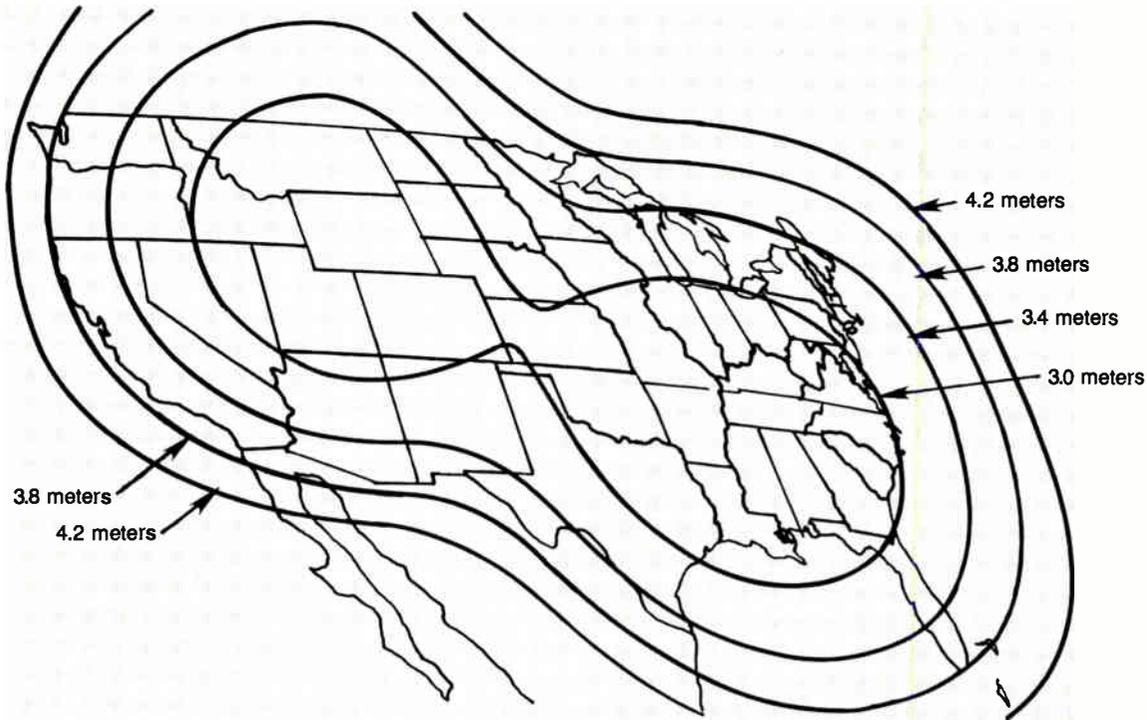
ATV systems and receive antenna requirements

The ACTV advanced television system is being developed by the David Sarnoff Research Center for RCA/Thomson and NBC. It will be seen in this section that the dish sizes required for reception of the broadcast standard form of ACTV will be the same as found for NTSC.

The broadcast standard form of the ACTV system is being developed for terrestrial transmissions. The signal transmitted in this system includes the standard NTSC signal with a maximum baseband bandwidth of 4.2 MHz and with two subcarriers: one being the NTSC color and the second (referred to as the "Fukinuki" subcarrier) containing most of the sidepanel signals. Two additional signals also are transmitted. One is QPSK modulated digital audio with a bandwidth of 0.2 to 0.3 MHz. The second signal, which is called "Component 3," contains the high frequency luminance signals beyond 4.2 MHz. It has a radio frequency bandwidth of 1.5 MHz. Component 3 is a double sideband amplitude modulated (DSB-AM) signal with a baseband bandwidth of 0.75 MHz and is transmitted as a quadrature amplitude modulated signal in terrestrial transmissions.

For ACTV transmissions via satellite, the means of incor-

Figure 1: Isodiametric contours for the reception of ATV in C-band; format transmitted is HDS-NA with 25 percent overdeviation



porating the digital audio and Component 3 signals has not yet been decided. It will be assumed in this analysis that the digital audio signal will be transmitted either in the horizontal blanking interval or as an additional subcarrier in the 6 to 7 MHz region (similar to NTSC FM audio). As indicated previously, the peak deviation of video transmissions in C-band is typically 10.75 MHz. By Carson's Rule (with a peak deviation of 10.75 MHz), the maximum baseband frequency could be as great as 7.25 MHz and the signal would still be accommodated within the 36 MHz-wide confines of a C-band satellite transponder. Since the subcarrier would be digital, its deviation requirement would be small. There also would be no noticeable increase in FM threshold.

The method of transmitting Component 3 (which consists of high frequency luminance signals and, hence, is of low power) on a satellite link is to be decided. If it is transmitted as a single sideband amplitude modulated (SSB-AM) signal just above 4.2 MHz, with a bandwidth of 0.75 MHz, the baseband frequency would increase to 5 MHz (or perhaps, with a small guardband, to 5.25 MHz). This would not result in overdeviation since, as previously stated, the highest permissible baseband frequency is 7.25 MHz. Also, since Component 3 is a low power signal, increasing the baseband frequency to 5 MHz is not likely to increase FM threshold or cause excessive luminance overshoots.

This discussion has been concerned with the broadcast standard form of ACTV. There also exists a production standard form of ACTV. In this format the baseband consists of the NTSC signal (color subcarrier at 3.58 MHz) but the luminance baseband extends to 6.9 MHz: The aspect ratio is 16:9. Since the highest baseband frequency is 6.9 MHz, it is not compatible with standard NTSC parameters in cable TV channels. Hence, reception of this form of ACTV by standard cable systems is not considered here.

HDS-NA: The Philips "High Definition Standard-North America" (HDS-NA) is a multiplexed analog component (MAC) system with a maximum baseband frequency of 9.5 MHz. A Car-

son's Rule bandwidth determination of peak FM deviation, D , yields a value of 8.5 MHz for a maximum bandwidth of 36 MHz. However, it is common to employ overdeviation in MAC systems due to absence of any subcarrier. Let $D = (1 + a) 8.5$ MHz, with "a" being a constant in the range of 0.25 to 0.50, which defines the amount of overdeviation beyond the Carson's Rule value. The noise advantage due to pre-emphasis and de-emphasis and weighting (P_w) may be determined as follows. For MAC systems, weighted signal-to-noise ratio is related to carrier-to-noise ratio as shown in Equation 4:

$$\text{SNR/CNR} = 12 (D/f_m)^2 (B/f_m) P_w \quad (4)$$

Reference 1 shows that $\text{SNR/CNR} = 30.46$ dB for $D = 6$ MHz and $B = 27$ MHz. This yields

$$P_w = 19.16 \text{ dB}$$

If it is assumed that the quality standard for HDS-NA is a weighted SNR of 50 dB (just as it was for NTSC), then:

$$\text{Weighted SNR} \geq 50 \text{ dB, which is equivalent to } \text{EIRP} + 20 \log d \geq 48.97 - 20 \log (1 + a) \text{ (dB)} \quad (5)$$

In Reference 1, the assumption of a 6 MHz peak deviation in an FM channel of 27 MHz bandwidth is equivalent to an overdeviation of 50 percent, since the Carson Rule deviation would be 4 MHz $[(27/2) - 9.5]$. For 50 percent overdeviation, the constraint of Equation 5 reduces to

$$\text{EIRP} + 20 \log d \geq 45.45 \text{ dB}$$

The 50 percent overdeviation described in Reference 1 was

(Continued on page 90)

Commercial insertion interface in the headend

By Steve Fox

Eastern Regional Manager, Mega Hertz

As local commercial insertion becomes an increasingly important revenue source for the cable industry, a larger percentage of systems are taking advantage of this opportunity. However, there are a number of factors to consider before you begin. From a marketing perspective, you must find advertisers whose commercials will run on your system. On the technical side, you need to shoot the ads, then prepare and edit the videotapes in a studio. At the headend, you must integrate the insertion hardware with your existing equipment and run the ads when you receive cues from the networks.

Networks control local insertion by sending cues to signal the beginning and end of each commercial break. These cues in turn trigger the equipment used in the headend to deliver local ads to the subscriber. This equipment includes a commercial inserter, VCR and cue demodulator. In addition, if you are using a BTSC stereo encoder on a channel onto which you are insert-

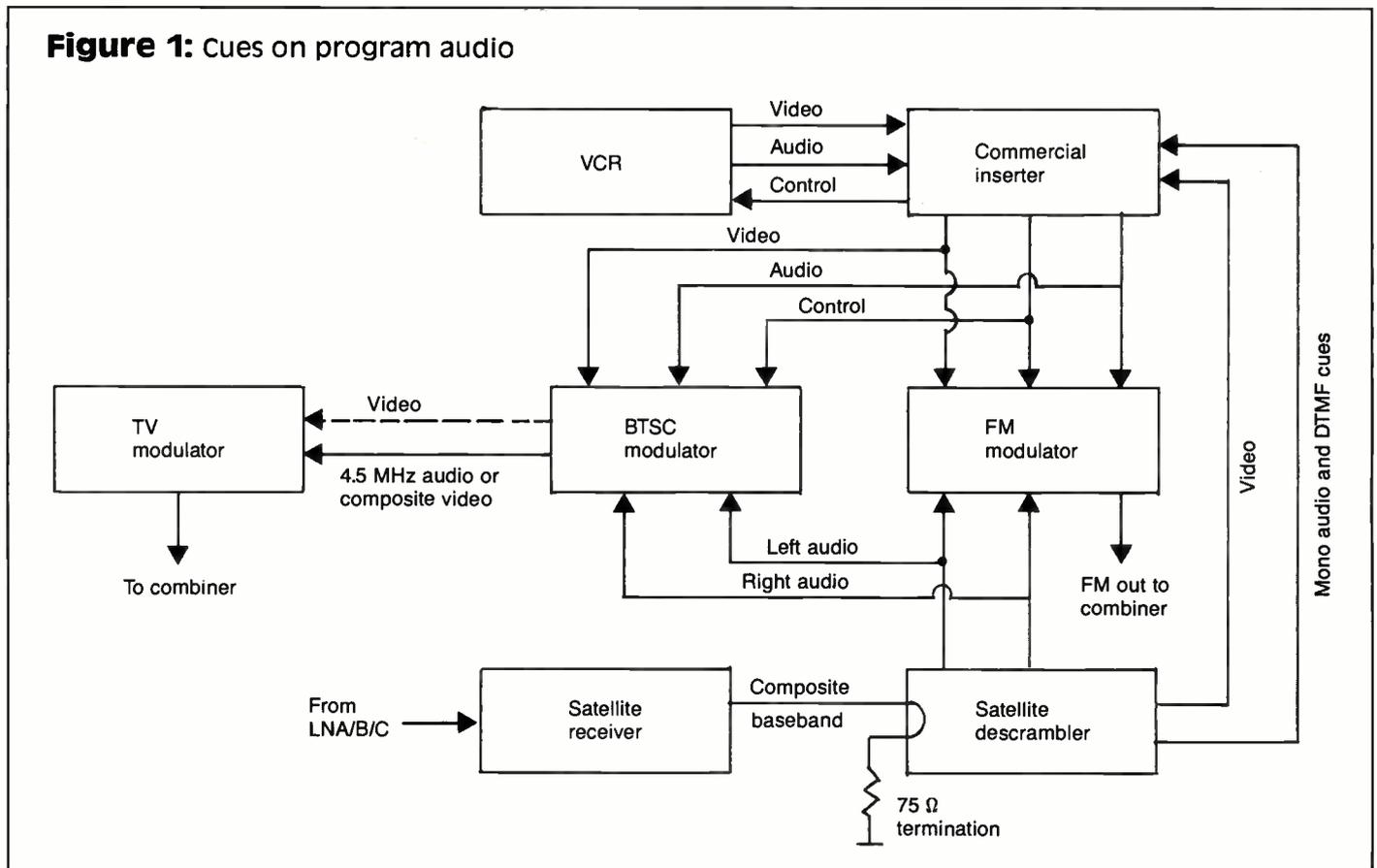
ing ads or if you are simulcasting the audio over an FM channel, you also must integrate these components into your system.

Understanding equipment and terminology

First, let's cover some definitions that apply. The commercial inserter is a device that receives network cues and provides switching between the network audio/video feed and a VCR loaded with a tape of the ads. A cue demodulator outputs the cue signals to the inserter and is required if the network is transmitting inaudible cues. If audible cues are used by the network, the cue demodulator is not required. Some period of time is needed for the VCR to come up to speed before the video can be switched in. This time period is called "preroll." For example, if the network is providing a two-minute commercial break and preroll time is defined as seven seconds, the start cue will actually be sent seven seconds before the break is to begin. The inserter will switch from network programming to the ad at the

(Continued on page 92)

Figure 1: Cues on program audio



Sometimes the Show Must Go Off.

Announcing the lowest cost complete solution to syndex and non-duplication requirements.

Now you can comply with exclusivity rules easily and economically... with your own PC and ComSonics' new Orchestrator™ I Remote Switcher.

Orchestrator I remembers syndex and non-duplication conflicts, switches off protected programs, airs your selected alternatives — such as CG messages or substitutions — and generates confirming reports. Automatically.

Simply enter your schedule and Orchestrator I does the rest. For even easier program control, you can download data from services such as TV Data or TV Host.

But the best news is cost: only \$2,995 for the basic Orchestrator I system including processor with battery backed-up memory, operating software and switch. It is expandable to 16 switches, each of which can handle RF, IF or baseband and associated stereo audio signals.

No other system gives you this much capability for so little.

Whether the show should go on or off, take control of syndex scheduling. For more information on Orchestrator I, call ComSonics at 800-336-9681. In Virginia, call 703-434-5965.



With Orchestrator I, ComSonics is your one source for complete system support.



COMSONICS, INC.

An Employee Owned Corporation



Orchestrator is a trademark of ComSonics, Inc.

Reader Service Number 17.



Cable-Tec Music

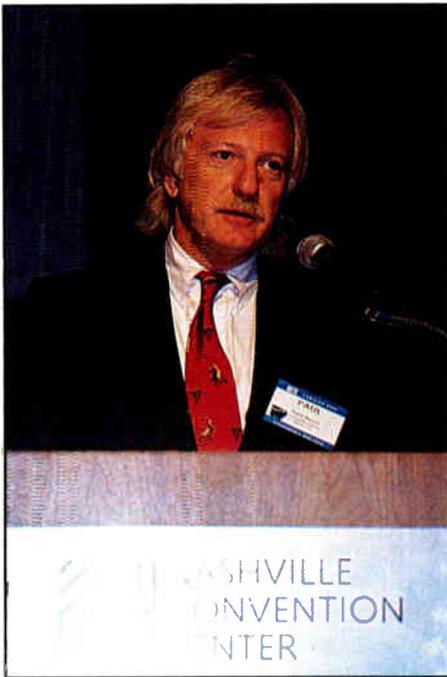
Photos by Bob Sullivan



Clockwise from left: Dr. Richard Green of CableLabs delivered a keynote address at the awards luncheon; SCTE's Bill Riker welcomed attendees and shared Nashville highlights during opening remarks; 1989 Member of the Year Paul Beeman of TVN Entertainment Corp. presented a plaque to Jerrold's Richard Covell, winner of this year's award; immediate past President Jack Trower gave the President's Award to Jerrold, accepted by Hal Krisbergh; Comm/Scope's Larry Nelson discussed the work of NCTA's In-Home Wiring Subcommittee during the first panel of the Engineering Conference.

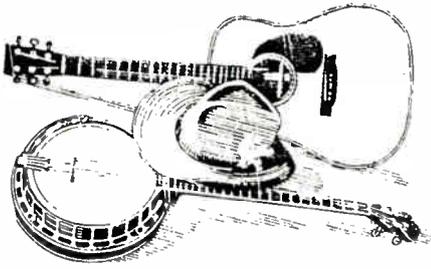
Expo '90: to the ears

Reckon you know the story, but here goes: From June 21-24, country & western music lovers (plus a lot of the industry's technical community) hitched their horses (or rental cars) somewhere in downtown Music City (aka Nashville, Tenn.). Guess you could say that Cable-Tec Expo '90 struck the right chord with everyone boarding that knowledge-bound train of



Clockwise from top left: Paul Maxwell of Transmedia Partners moderated the panel "Cable in the 1990s: Boom or Bust?" and presented a media overview of the '80s; exhibitors cleared the aisles and captivated expo attendees with hands-on demos; the Anixter/Sumitomo fiber-optic splicing workshop proved a big hit with expo-goers on its first tryout; outgoing directors Wendell Bailey, Dave Willis and Bob Price each received a plaque in recognition for their service to the Society; Jack Trower relinquished the ceremonial gavel to the new national president, Wendell Woody.





technical training. Well, the Society of Cable Television Engineers recorded some smash hits of its own:

- This year's show ranked #1 in attendance over previous expos; 1,600 registrants and 1,400 exhibitor personnel entered the doors of the Nashville Convention Center (connected to the Stouffer Nashville Hotel).

- Latecomers had a hard time finding a seat during Thursday's Annual Engineering Conference in the crowded Mezzanine Ballroom.

- Hungry for hands-on training, hundreds packed six sessions of 10 technical workshops Friday and Saturday mornings. SRO became common.

- During Expo Evening on Friday, more than 1,500 expoguers stamped the Grand Ole Opry to catch a glimpse of C&W legends.

- On Saturday, over 100 CATV "amateurs" exchanged call letters at the second annual Ham Radio Operators' Reception.

- Finally, while 100 capped off their



Clockwise from left: The SCTE Band returned with a gig at the Opryland Hotel during Expo Evening; Anixter, AT&T, Raychem and the Tennessee Chapter lassoed hundreds at Thursday's Welcome Reception; Wavetek rolled out the carpet for Engineering Conference attendees Wednesday evening; expo-goers jammed the Jerrold booth to obtain a green bandana and tickets to Expo Evening; CableLabs' Tom Elliot (center) accepted the "CT" 1990 Service in Technology award from CT Publications' Ron Hranac and Paul Levine.

expo experience with a tour of The Nashville Network's facilities Sunday morning, 150 others sat down for BCT/E and Installer Certification exams.

Starting Expo '90 a day earlier, the NCTA Engineering Committee convened for its bimonthly meeting (see "News"). In addition, the national SCTE board of directors met to elect new officers. The 1990-91 slate runs as follows: President Wendell Woody, Anixter Cable TV/Optical Networks International; Eastern Vice President Victor Gates, MetroVision;

Western Vice President Richard Covell, Jerrold; Secretary Jim Farmer, Scientific Atlanta; and Treasurer Les Read, Sammons Communications.

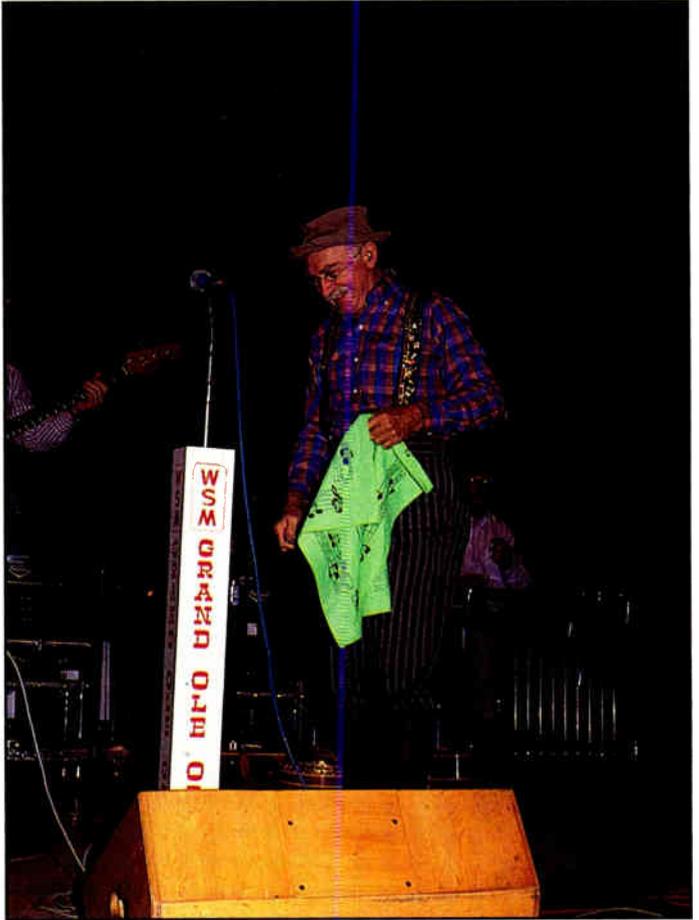
Later on, Wavetek greeted conference attendees in the Stouffer East Ballroom at the arrival night reception; it was the place to be for tantalizing music from a live band and appetizing eats from the buffet.

Highlighting Nashville's best

While waiting for the Annual Engineering Conference to begin, attendees toe-

tapped to recorded country music and watched a display of laser graphics on the main viewing screen—complete with a computer-generated, gyrating SCTE logo. Then Society Executive Vice President and Expo '90 Co-Chairman Bill Riker launched into his opening remarks. Speaking to a near capacity crowd, he described hotels and tourist attractions of Nashville—Church Street Center, Ryman Auditorium, Printers Alley, Music Row and Opryland USA.

Expo Co-Chairman Jim Chiddix, ATC's



Clockwise from top left: Charles Preston (N4SXM) presents Charles Rice (KD4SS) with an HR-2600 at the Ham Radio Operators' Reception as Ron Hranac (N0IVN) looked on; Grand Ole Opry favorite Grandpa Jones joked with the audience and autographed green bandanas at Expo Evening; a live band belted out familiar tunes at S-A's Closing Night Reception Saturday night; 1,500 expo attendees packed Opry seats to hear country music legends play the classics.



Once again, the expo exhibit floor proved to be always busy, ever educational and never boring.

senior vice president of engineering and technology, called the Engineering Conference to order, kicking off the day's sessions: "Donald Frost, master motivator," "Cable's weak link—Tap to TV," "Getting it right the first time: Field supervision techniques" and "Cable in the 1990s: Boom or bust?" (For an account of each of these sessions, see accompanying sidebar.)

Immediately after the second session, attendees moved to the Stouffer Grand Ballroom for lunch and the awards ceremony. But between these two events, Dr. Richard Green—president and CEO of CableLabs—presented his keynote address. Green praised the Society's role "in increasing the professionalism and level of training of cable technical personnel." He also clamored for cooperation among the CATV engineering organizations—the SCTE, NCTA Engineering Committee and CableLabs.

Describing the importance of each group, Green said, "I like to think of these organizations as the legs of a three-legged stool—each one an essential element properly positioned in a structure that supports and assists the industry's engineering community...to accomplish a mission that is complementary to the others."

Green invited both the SCTE and the NCTA committee to appoint representatives to meet with CableLabs to "outline a plan for future cooperative ventures and to address the issue of how we might better serve the needs of engineers in the operating companies."

Bill Riker then introduced the Society's directors and new officers. Three outgoing

directors—Wendell Bailey, NCTA (Region 10), Bob Price, BradPTS (Region 12) and Dave Willis, TCI (at-large)—received plaques in appreciation of their service.

Riker presented awards to coordinators of seminars at state/regional shows: Dan Pike and Les Read (Texas Show), Gary Selwitz (Atlantic Show), Ralph Haimowitz and Randy Pattison (Great Lakes Expo), and Dave Large and Pete Petrovich (Western Show). The 1990 Fiber-Optics Conference Program Committee posed for plaques and plaudits: Jim Chiddix, Tom Elliot, Ron Hranac, Mike Kaus, Large, Petrovich (chairman) and Riker. Also, the Expo '90 Program Committee accepted awards: Chiddix, Tom Jokerst, Larry Lehman, Paul Levine, Riker, Don Shackelford and B.J. Toner.

Haimowitz asked for members from each of seven meeting groups recently elevated to chapter status to stand front and center with their region director. The honored groups were Big Sky, Dairyland, Dakota Territories, Great Plains, Palmetto, Sierra and Wheat State chapters.

Texscan Corp.'s Bert Henscheid presented a check for \$2,500 to the SCTE Scholarship Committee. The check was accepted by Committee Chair Toni Barnett of CT Publications. Barnett urged increased participation by local groups to support and name candidates for the Tuition Assistance Program.

A Special Recognition Award went to MetroVision of Livonia, Mich., for a "technical marketing" training videotape produced for the SCTE's Satellite Tele-Seminar Program last year. Vic Gates accepted the award.

Jack Trower, last year's president, gave

his farewell address. He said, "Many people promised me that if I needed them, to just ask. And no one turned me down.... We all need to be involved in the Society. We ask the same people to do even more, but we need new blood, new ideas."

Trower bestowed the President's Award to Jerrold for its work in the technical community and for providing speakers for SCTE group seminars. Also noted was Jerrold's support of the New Building Fund, with donations of \$30,000. Jerrold President Hal Krisbergh said, "I've watched the SCTE and the industry come a long way. The industry is still in a growth phase, but without the SCTE, the growth would be retarded."

And then, the president's gavel passed from Trower into the hands of the new president: Region 5 Director Wendell Woody, currently director of fiber optics for Optical Networks International (a unit of Anixter Cable TV). Woody said, "I applaud the job that Jack Trower's done, to take that road to progress and make a rut in it. And I intend to stay in that rut on track to further success. The Society's success comes from its membership. If we look in terms of a new year ahead of us, education is the greatest achievement for this industry. Training is so important for us."

Finally, the Member of the Year Award went to an inveterate instructor: Jerrold Applications Engineer Richard Covell. Before Paul Beeman of TVN Entertainment Corp. (last year's winner) presented the award, a video cited Covell's work in the BCT/E and Installer Certification Programs, especially in preparing the installer manual. Covell thanked Jerrold for letting him give so many seminars at

TODAY, TOMORROW, TAMAQUA



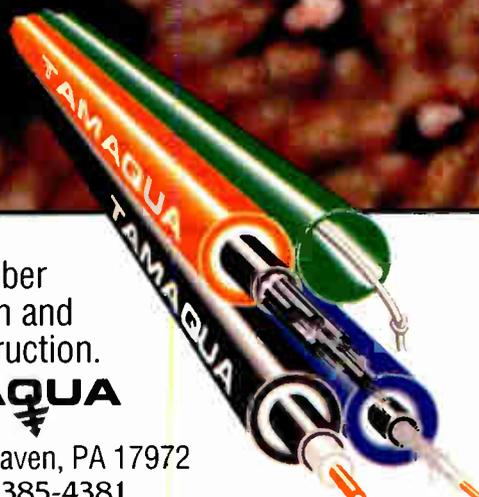
MARKETED
BY

A
L
L
C
A
B
L
E



Today's ducted systems for pre-installed coaxial cable or fiber optic ***cable in conduit***. Tomorrow's long-term protection and savings for your investment in underground construction.

TODAY, TOMORROW, TAMAQUA



MANUFACTURED BY Tamaqua Cable Products Corporation, Schuylkill Haven, PA 17972
CALL: 800-232-0883 FAX: 203-235-2454 PA: 717-385-4381

Reader Service Number 18.

Engineering Conference: Keep customer satisfied

By Rikki T. Lee

Special Correspondent

Glancing at the lineup of this year's Annual Engineering Conference, one might ask, "Where have all the big topics gone—high definition TV, re-regulation, fiber, telco entry?" True, panelists analyzed some of these technologies and threats in the fourth session. But in the other three, speakers put the emphasis of the discussion on the human factor—subscriber, installer, supervisor and so on. The conference aimed its sights in a different direction: engineering as an important tool for the growth of the *business* (not just technology) of cable.

Expo '90 Co-Chairman Jim Chiddix set the tone for the day with some well-worn complaints of customers, asking, "Why are we hearing the same story after 20 years?" Despite a lot of work to do in customer service, the industry is strong. On the down side, cable has attracted a variety of competitors. "And if we don't pay attention we're going to lose out," Chiddix said. "We've got to pay attention to service. We've got to give good, quality signals and reliable service. We've got to provide good customer contact. We've got to make our product less confusing for customers. We've got to compete on costs; and that means wise capital investments and to make our business less labor-intensive."

The right frame of mind

Bob Price of BradPTS welcomed motivational speaker Donald Frost of M-4 Productions. Price said, "The idea is to get you in the right frame of mind, not only to learn all that you can learn but also to enjoy yourself while you're here."

Frost introduced us to his hometown of Possum Trot, Tenn., whose less-than-favorite son Toody McClane got fired for calling in dead. After a half-dozen more anecdotes—the one about the golfer and the enchanted frog plus the one about the professor and the chauffeur—Frost got serious as he discussed self-image, self-confidence and self-improvement. Inadequate self-image leads to acceptance of low income, stated Frost (a Cadillac man).



Expo '90 Co-Chairman Jim Chiddix's insights made the Annual Engineering Conference an even more valuable experience.

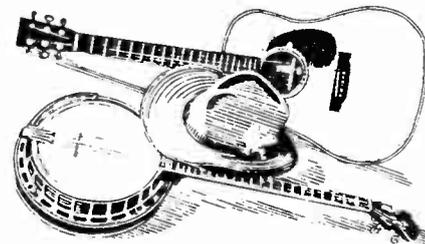
"The self-image we can alter. The mind is the only thing we have total control over." To gain self-confidence, it is important to have knowledge. Self-improvement means changing one's self-image to create a more positive, successful person. "You have the power to think whatever you want any time you want to... Visualize yourself as the person you'd like to become; think in the present tense."

Cable's weak link—Tap to TV

Dr. Walt Ciciora (vice president of technology, ATC) moderated the second morning session. He compared how the power and phone companies deal with customer in-home wiring; only cable does its own. "Nobody calls the power company to install another outlet, replace a fuse or do a repair. Power subscribers call contractors or do it themselves," Ciciora said. With power and phone, there are installation rules, licensing of contractors, inspections and permits, approved hardware, and many different ways of educating do-it-yourselfers.

Cable is different. "When people do their own wiring," he said, "there's an increase in leakage problems. This will increase background noise levels, reducing the tolerance for other leaks in the system." Ciciora suggested that allowing customer wiring can be "an important strategic advantage over competitive delivery means, particularly DBS and telco delivery of digital signals." But we must set some equipment standards, train qualified contractors and provide customer education.

Richard Amell (staff engineer, Metro-



SCTE groups.

Later, after the final Engineering Conference session, many attendees stayed for an open forum Annual Membership Meeting. Directors took their seats onstage to answer questions and accept complaints.

Technical sessions

On Friday morning, Cable-Tec Expo shifted into gear—more accurately, into overdrive. Expo-only registrants hurriedly got in line to pick up and stick on their red-trimmed name badge (or yellow, for a one-day pass). They also received a copy of the proceedings manual. This book of technical papers from Engineering Conference sessions and expo workshops was the first of its kind for the expo. While registering, one could not resist purchasing an SCTE lapel pin or a souvenir T-shirt. And everybody perked up thanks to NCTI's coffee before that first workshop.

Ten workshops were presented three times each on Friday and Saturday. Attendees could sit in six different sessions, see the same one six times or take in two or more in one period—a training smorgasbord.

"Advances in corrosion protection" featured Dr. Chak Gupta (consultant, Comm/Scope) and Barry Smith (connector specialist, Times Fiber Communications). Gupta gave a historical overview of corrosion and the role of inhibitors, humidity and absorbed anions on corrosion. Smith steered toward specifics on F connector susceptibility to corrosion. He quoted one industry leader that the drop was "the Rodney Dangerfield of the cable system. It doesn't get any respect."

Ted Hartson (vice president and chief engineer, Post-Newsweek Cable) began "Advances in signal security techniques" with a review of past methods, including traps and sync suppression. He discussed techniques used today, including MAC systems, interdiction and addressable switching. Jim Farmer (technical manager, S-A) stressed that security and sub-

Expo '90 Committee members Bill Riker, Jim Chiddix, Tom Jokerst, Larry Lehman, B.J. Toner, Don Shackelford and Paul Levine earned their awards many times over.



scriber friendliness go hand in hand. He compared set-top converter advances, addressable traps and interdiction.

Ninjas are usually bad guys. If you haven't turned in your Form 320, you'll find out how nasty "CLI ninjas" can be. John Wong (assistant chief, FCC Cable Television Branch), along with Brian James (director of advanced TV testing, Cable-Labs), discussed how to fill out the form. Wong asked how many attendees had not filed; no one volunteered. He asked, "If so many of you have reduced leakage, why are you here?" James echoed, "The FCC won't be tolerant of people who want extensions."

"Case studies in fiber optics" detailed the implementation of specific fiber projects. Larry Lehman (vice president of technology and planning, Cencom Cable

Associates) presented Cencom's St. Louis County project. He outlined the factors considered, such as the need for quality interconnect. Ron Wolfe (manager, ATC National Training Center) discussed how his MSO's Lake City Cablevision considered future requirements and alternatives before finally proceeding with fiber.

"Fiber-optic splicing" gave students information on and comparisons between rotary mechanical and fusion splicing. Jim Aberson (supervisor of lightguide joining, AT&T Bell Labs) illustrated the high performance and low loss of rotary mechanical splicing with case studies plus field and lab tests for environmental stability. John Midkiff (product development manager, Siecor) cited advantages of fusion splicing and requirements of a good splice, including precision alignment.

Fiber test equipment and its use during installation and maintenance were covered in "Fiber-optic testing." Mark Connor (product specialist, Siecor) described types of equipment needed to keep the fiber plant up to speed. Then Louis Williamson (technical staff member, ATC) analyzed factors that affect fiber measurements. He said, "My biggest problem was with connection effects," which include loss uncertainty, reflections and backscatter.

Three instructors proved "OSHA's gonna get you if you don't watch out." Roger Keith (director of training and safety, Adelphia Cable) outlined OSHA's authority and inspection process; he also discussed the six steps to compliance. Alan Babcock (technical training manager, Warner Cable) explained the

**AGILITY
ON COMMAND**



Vision) cited problems caused by subscriber wiring. He noted that "the installation of in-home wiring for cable TV involves more than the cable drop and its associated splitting hardware." More and more it includes addressable descramblers. Implementing HDTV, fiber and digital will bring additional interfaces.

Amell listed differences between the power/phone companies and cable. Power and phones are necessities. Power companies have no ownership of terminal devices beyond the circuit breaker panel and can leak 60 Hz energy. Phone wiring consists of two wires for every phone and frequencies do not exceed 10 kHz. For both power and phone, troubleshooting is easy. But cable is a luxury and has a complex spectrum; leakage is hazardous to shared users and troubleshooting requires sophisticated gear. Amell proposed a basic customer handbook detailing leakage rules, hookup procedures, a troubleshooting guide, etc.

Dana Eggert (president, Performance Plus) maintained that there's not purely a business or technical solution to the problem. Then she analyzed the costs of service calls vs. revenues from added outlets. She used a U.S. cable penetration of 45 million and a 3 percent service call rate per month—80 percent of all calls are drop related, 60 percent of those drop-related calls stem from problems in the home and 15 percent of those problems in the home are related to customer equipment. Eggert calculated that the industry annually spends \$34 million for service calls. With 40 percent of subs going for added outlets at a \$3-\$4 monthly fee per sub per outlet, annual revenues come to \$6.5 billion.

Eggert also weighed the economic options and regulatory issues, then suggested an interim solution: customer education for certain procedures (such as FM and VCR hookups). "Many subscribers would be willing to do a connection correctly if they had the information."

Tom Elliot, CableLabs' vice president of science and technology, traced the history of CATV technology and bandwidth increase. Despite our improved equipment, many products supplied by the electronics industry aren't up to par. Elliot quoted vastly different costs for service calls, about \$175 million to \$200 million annually, or \$3 per sub per year. To counter leak-

age and other problems caused by subscriber in-home wiring, he recommended a policy of free additional outlets. "When you don't charge, it's easier to get into the home," he said.

Elliot also advised better cable (including one specially designed for the home) and better F fittings, suggesting three types (outside, inside and consumer-accessible). "A cable's not a cable," Elliot said. He cited the need for standards, as well as contract training and documentation plus architectural documentation.

The final speaker was Larry Nelson (executive vice president, Comm/Scope), chairman of the NCTA Engineering Committee's In-Home Wiring Subcommittee. In a brief presentation, Nelson outlined the work of his new subcommittee as well as some of the restrictions placed upon it. "We must walk a narrow path," he said. The NCTA represents a diverse industry and cannot set industrywide or company policies or standards.

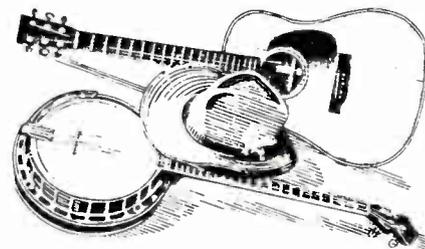
Nelson called for cooperation with standards and regulatory agencies as well as the SCTE and CableLabs in order to pull together for a common standard. He also suggested the need for architectural standards and labeling retail hardware as CATV-acceptable. Finally, Nelson discussed the importance of training: "Education is the fundamental issue that the subcommittee can deal with," he said.

Getting it right the first time

As moderator of the first afternoon session, Wendell Bailey (vice president of science and technology, NCTA) set the stage: "Getting it right the first time isn't a bad credo....The fact is that competition is after our business on all sides, simply because we've found a good business." Yet even as rates have gone up, so have penetration and the number of viewing hours. Bailey asked, "Can we continue to grow this business to the point where we are attack-proof from our competitors?"

Dana Eggert returned with a surprise spelling bee to illustrate bad practices in training and supervising field personnel. "We send a lot of people out in the field totally unprepared.... Often we try to incent but get it all mixed up; it turns out to be a negative incentive," she said. Eggert explained four interrelated elements of proper supervision:

1) **Standards:** Supervisors should



Hazards Communications Standard. Then, Ralph Haimowitz (director of chapter development and training, SCTE) revealed that OSHA will increase its fines and frequency of visits.

In "Painless technical writing," ex-cabbie Bill Cologie (director of communications, Pennsylvania Cable TV Association) gave both writing and driving tips. He provided some helpful advice: "Write like you talk," "Know your shortcomings" and "Visualize the person you're writing to." Also, Rikki Lee (editorial consultant) emphasized a few how to's: making an outline, getting rid of writer's block, writing clear and concise, using illustrations and submitting articles to trade journals.

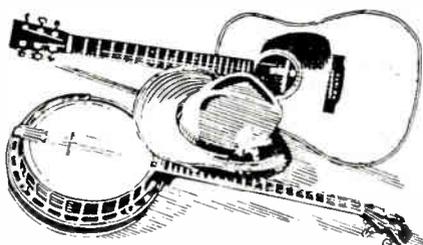
In "Signal leakage equipment calibration," Don Runzo (technical sales training engineer, ComSonics) said he'd met people who asked him, "What do we do about this CLU?" Runzo stressed the importance of calibration and discussed inconsistencies. Then Steve Windle (product marketing engineer, Wavetek RF Products) spoke on how instruments are calibrated in the factory, how accuracy can be verified in the field and how to set up a calibrated leak.

Finally, Ron Hranac (senior vice president of editorial, CT Publications) and Steve Johnson (senior CATV project engineer, ATC) teamed up for a demonstration of "Video and audio measurements." Topics under discussion included how to set video levels with an oscilloscope, how to set video depth of modulation and how to adjust audio carrier deviation. After the lecture, Hranac and Johnson gave their students an opportunity to practice measurements using actual test equipment.

On the exhibit floor

Once again, the expo exhibit hall expanded from the previous year, with occupied floor space increasing nearly 25 percent. More than 170 companies displayed time-tested wares as well as the latest in high technology: from amplifiers and distribution hardware to leakage and design software, from headend boxes to security boxes to converter boxes. A nearby annex allowed over a dozen more ex-

SCTE national directors gathered for audience questions and complaints during the first-ever open forum Annual Membership Meeting.



hibitors with room for table-top displays. And to bring in a healthy dose of local cable signals into the exhibit area, Channel Master and Viacom Cablevision installed a microwave link in the Convention Center.

This year, more than a few vendors raised our sights toward the magic of 1 GHz. And it seemed almost every company had embraced fiber optics in one

form or another: cable, OTDRs, spectrum analyzers, splicers, enclosures, and so on *ad infinitum*. Another special attraction at this expo was a fiber splicing workshop sponsored by Anixter and Sumitomo. Also, long-forgotten CATV equipment of yesteryear found a home at the National Cable Television Center and Museum booth.

Just down the hall from the exhibit floor, attendees entered the exciting world of interactive training. Performance Plus, ATC, Gilbert Engineering, Jones Inter-cable's Business Learning Group and many others shared lessons and glimpses of video production. Interactive modules featured training in installation practices, subscriber relations, safety and various other topics. A few doors away, visitors checked out test equipment with the help of a live amplifier cascade.

A few vendors also held tutorials on new products in the Exhibitor Training Center. Several demonstrations were held:

- 1) Times Fiber's Tim Dugan discussed the basics of TFC's 1 GHz cable.
- 2) Scott Henry of Midwest CATV unveiled the Fiberlign Micro Splicer.
- 3) Tektronix's Bill LeDoux presented his company's new system sweep.
- 4) Polychem's Charles Wines and Terry Condon provided the ChemShrink F connector boot.
- 5) Multilink's Steve Kaplan showed a new line of CLI maintenance tools.
- 6) Bill Margiotta of AML Specialties illustrated a microwave amplifier retrofit kit.
- 7) Dick Kirn of Times Fiber displayed the T-10 and triple-sealed connectors and Life-Time cable.
- 8) Hewlett-Packard's John Cecil exhibited a portable spectrum analyzer.

**CONTROL
ON COMMAND**



make a list of how procedures should be performed, make it company policy and communicate it to employees.

2) *Training*: Whatever has been set as a standard should become part of the training program. Train employees to the point of understanding.

3) *Evaluation and feedback*: Performance can be measured by regular testing. Communicate evaluation results to the employee immediately.

4) *Incentive*: People respond differently to different types of motivation—money, more training, etc. Be creative in your incentive choice.

Alan Babcock (technical training manager, Warner Cable) analyzed two attributes of good service: ability and responsibility. Ability means having skills, possessing knowledge, expressing the proper attitude and having the right tools. He defined responsibility via his "One call does it all" program, "Having one customer contact person responsible for handling the customer situation keeps the resolution simpler for the customer," he said. At Warner, installers can make billing or service adjustments and promote higher tiers or pay services.

Babcock then gave a thorough run-down of the Warner Installer Certification Program. Supervisors are trained and tested in the program, based on performance criteria; after qualifying, supervisors use the program to annually certify system installers. If necessary, employees can receive on-the-job, self-study or classroom instruction.

The last panelist, Kathy Keating (president, ATC's Appleton/Green Bay Division), outlined techniques to improve the effectiveness of field workers. During the screening phase, supervisors should study the work philosophies of applicants. "It's critical that you describe the job to be done and the skills you're looking for," she said. Also make sure to check out driver's licenses and school references.

Supervisors should communicate ideas in writing, not by word of mouth. In motivating, use recognition (alone or in front of peers) and motivation (anything employees will respond to positively). She also emphasized the need for goals, not standards: setting, communicating and tracking minimum service goals as well as personal, company and community goals. Finally, Keating said, "If you tell your em-

ployees what you want them to do, it'll be better than assuming they know it."

Bailey closed the session by reminding the crowd, "If we have the right attitude in the field, folks, some day when our competitors knock on a customer's door, they'll be greeted by someone who's happy with the service we're providing. In which case, all the lobbying in Washington, all the training—everything we've done—will have paid off."

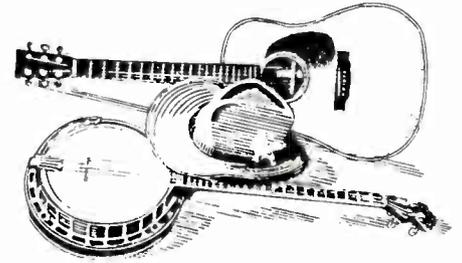
Cable in the 1990s: Boom or bust?

In the final session, moderator Paul Maxwell (president, Transmedia Partners) began with a media view of the past decade, citing people and events that changed the way people consume and use video information. "A bunch of things happened... Ronald Reagan, Ted Turner, Michael Milken and a deregulatory environment at the same time video technology became democratized—that is, anybody could get some; it's called a VCR."

Maxwell mused that there is no finite limit to how much media a population can consume. With the future of Sky Cable (dubbed "Death Star") providing 108 channels using video compression, Maxwell suggested that cable will find ways to meet the competition. "DBS used to stand for 'don't be silly.' Now, it means 'don't be surprised,'" he said. Finally, he named four media megatrends of the '80s: technology (VCRs, pay-per-view), segmentation, crossover impact and trans-media companies.

Then Gary Kim (senior editor, *Multi-channel News*) envisioned the future. "Over a period of time," he said, "telcos may get authority to do things they do not presently do today. Cable operators may gain new freedom to do things we don't do today." Kim asked the industry to consider data and voice services via fiber-optic architectures. As a signpost, he cited the recent growth in alternative access providers.

Such companies bypass the local phone plant to supply a redundant data path and long distance voice services to businesses. The topology of these providers is a ring structure; not surprisingly, new fiber plant construction by ATC and Rogers Cablesystems already resembles a ring. Finally, Kim advised, "Invest today for entertainment video but simultaneously lay in a future migration path for other things."



9) Triple Crown Electronics' Karl Poirier demonstrated the La Series distribution amps.

That's entertainment

Without a doubt, the expo had its share of fun things to do. As a reward for hard work, there was always something special on the evening agenda to splice nerve endings back together. For example, after the Engineering Conference on Thursday, Anixter Cable TV, AT&T, Raychem and the SCTE Tennessee Chapter sponsored a memorable social event, with the best music and the finest cuisine you could find for miles around.

On Friday night, over 1,500 donned green bandanas provided by Jerrold and *CT* for Expo Evening (also sponsored by Jerrold). The countrified soiree started with cocktails and victuals ("vittles" to you greenhorns) at the Opryland Hotel. After a two-year hiatus, the SCTE Band (Howard Whitman, bass and vocals; Bill Riker, drums; and Cosmo Bertino, guitar) rocked the crowd. Jerrold's Skip Litz welcomed the audience and *CT* Publications' Paul Levine and Ron Hranac presented Tom Elliot with *CT*'s 1990 Service in Technology Award.

Later, after a short shuttle ride, hundreds of pairs of boots disembarked in front of the "one place you must see in Nashville even if you don't like country music": the Grand Ole Opry. Once there, legends the likes of Roy Acuff, Grandpa Jones, Porter Waggoner (alas, without Dolly), Hank Snow and others took to the stage. The starstruck crowd hooted and hollered as bandanas were passed on stage for autographing. The biggest cheer came when "The Society of Cable Television Engineers Cable-Tec Expo '90" was announced over the Opry radio waves. A playlist was not available, yet rumor has it that the repertoire included *Stand by Your SCTE*, *The Yellow Spool of Coax* and *Fiber-Eyed Jim*.

Sponsored by S-A's Amateur Radio Club, the Ham Radio Operator's Reception on the following afternoon drew 100—double the attendance from last year. Tektronix made frequency and deviation

measurements of portable two-way radios used by many hams at the party. A door prize drawing was held near the end of the reception. SCTE's Anna Riker drew the names of winners, and one person in three left the reception with a prize (donated by S-A, ATC, Cadco, Jerrold, and other vendors and MSOs). Tek's Jerry Harris (K7JPF) won the grand prize, a Kenwood TS 680 S.

To round out Saturday evening, the S-A party was the place to be for great food, fabulous live music and lots of good company—all in elegant surroundings. Leave it to S-A to provide the perfect way for attendees to unwind and make new friends after an event-filled expo.

On Sunday morning, 100 attendees embarked on a tour of TNN's production facilities (and do a little country music stargazing on the side). The tour included visits to edit bays, earth station, master control and videotape rooms. Among those on the tour were SCTE President Wendell Woody, Region 4 Director Les Read and former Region 11 Director Gary Selwitz. TNN engineers fielded questions as groups saw studios where *Nashville Now* and *Hee Haw* are produced. The highlight came during a backstage visit to The Grand Ole Opry House, where some had a chance meeting with "King of Country Music" Roy Acuff.

Thus wraps up yet another successful Cable-Tec Expo. Next year's expo will be held next June in Reno, Nev. Hope to see you there. But for now, enjoy the following pages of photos from Expo '90. ■

This wrap-up was written by Special Correspondent Rikki Lee with assistance from Toni Barnett, Shelley Bolin, Ron Hranac and Laura Hamilton. Much obliged.

You don't know what the future will hold, and you have to be ready."

Jim Chiddix took the podium and gazed through his crystal ball. "It's very important," he said, "that the decisions we make each month and each year are all aimed toward something that's much longer term." Analyzing the per-sub investment of each element in the cable plant, Chiddix warned the industry to be careful where and how it spends money.

Yes, fiber will play a role in the future but should appear mainly in the trunk, in order to eliminate trunk amplifier cascades. "Forget about coax in the trunk," Chiddix said. Illustrating ATC's fiber trunk and feeder design, he extolled the advantages of coax for the last mile. Years from now, with a 1 GHz hybrid fiber/coax, hybrid broadband/digital plant, operators can have a 150-channel plant: 70 channels plus a special channel—any one of 80 PPV or special interest channels to be chosen by the subscriber, or maybe 80 different channels for each fiber node.

In a Tom Gillett speech presented by Tom Elliot, CableLabs extended an olive branch to the telcos. To begin, Elliot said, "One network—specifically the all-digital broadband ISDN, fiber-to-the-home network suggested by the telcos—cannot best serve America." CATV's AM fiber/coax hybrid can provide video better than the telcos' plan.

Elliot showed how the cable industry is enhancing its plant by using fiber. Also, fiber can be installed in a ring architecture for additional reliability.

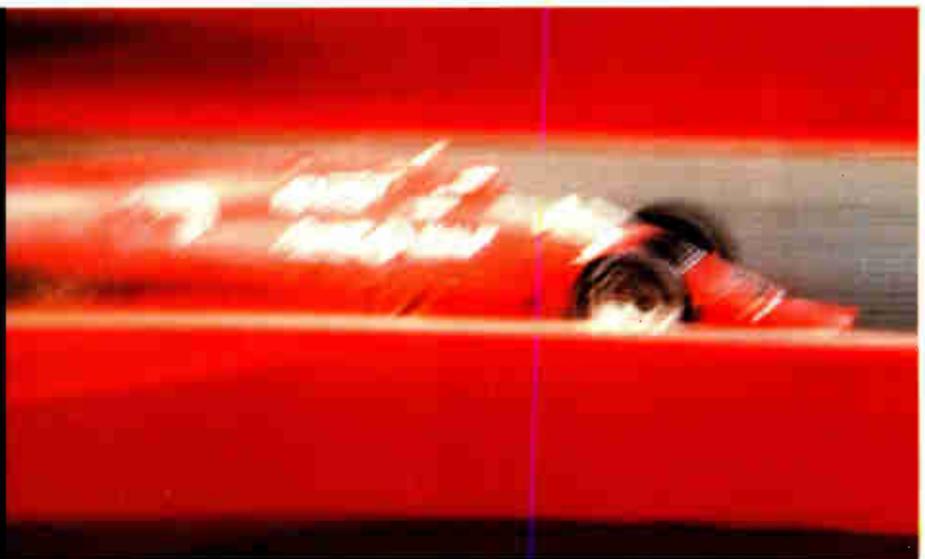
Further enhancements include downloading video, increasing channel capacity and providing a user-friendly program guide. He described his plan for a new ISDN (integrated services via dual or more networks) that would coordinate cable, telco and DBS into one information age infrastructure. Elliot concluded, "Let's have telco, satellite and cable working together to optimally serve America now."

Craig Tanner (vice president of advanced TV projects, CableLabs) brought home the reality of HDTV. "HDTV no longer means 'highly dubious TV,'" he said. "There are some powerful commercial interests that have bet hundreds of millions of dollars on it. And it's going to happen." With seven proponents of advanced TV (ATV) all looking out for #1, it's important for cable to influence these ATV system designs so they meet CATV's best interests. He then described the three types of ATV technology—improved, enhanced and high definition.

Tanner explained the FCC's requirements, describing how cable might find spectrum to simulcast HDTV signals. "We may need to double our capacity for broadcast channels or perhaps all channels." He revealed that CableLabs will conduct tests on each proponent's system for carrier-to-noise requirements, intermod, microreflections, etc.

Transmedia's Maxwell had the last word. "Cable in the 1990s, is it boom or bust? It's all up to us," he said. ■

**POWER
ON COMMAND**

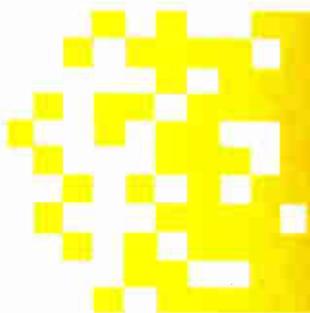




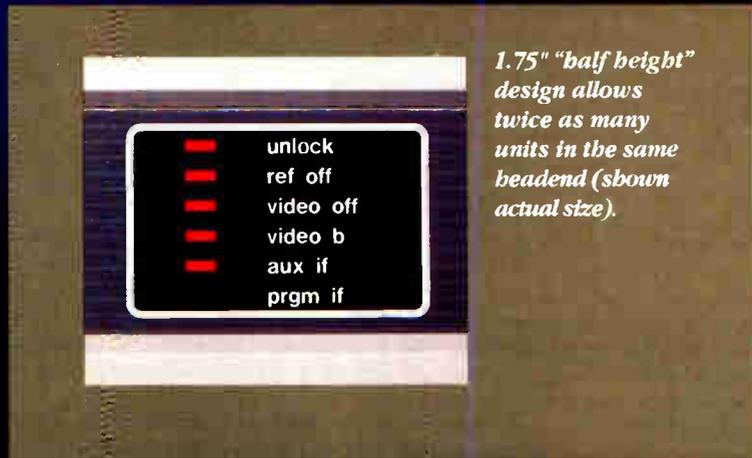
***Jerrold's New Commander 6 Frequency Agile 600 MHz Modulator
Outperforms All Others On The Market Today.***

You can now pack more power and performance into your headend than ever before. Jerrold's all new Commander 6 Modulator (C6M) gives you frequency coverage from 50 to 600 MHz and more standard features than any other unit on the market today. Microprocessor controlled tuning and automatically selected output band-pass filters allow you to combine 80 channels or more *without external filtering* and achieve better than 60dB S/N. Additionally, Jerrold continues to offer the cable industry's only phase-lockable agile unit with the C6MP.

PERFORMANCE ON COMMAND.



JERROLD
COMMUNICATIONS



1.75" "half height" design allows twice as many units in the same headend (shown actual size).



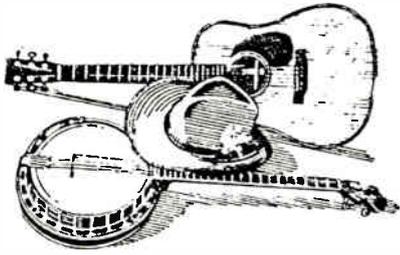
Engineered for maximum flexibility, this vanguard for a new line of powerful headend products includes IF switching, scrambling and stereo compatibility with front panel video and audio metering as standard features. All adjustments are accessed from the front panel.

Jerrold packs all this power into an efficient 1.75" of headend rack space allowing you twice the number of full-featured units per rack than has been possible.

To find out how you can tap the power and performance of the Commander 6 line of headend equipment, contact your Jerrold Account Representative or contact Jerrold Communications, General Instrument Corporation, 2200 Byberry Road, Hatboro, PA 19040. (215) 674-4800.

COMMANDER® 6.

GENERAL
INSTRUMENT



Awards Luncheon



Bill Riker presented a Special Recognition Award to MetroVision's Vic Gates for a technical marketing videotape produced by the MSO.



Fiber Optics 1990 Conference Committee members Pete Petrovich, Ron Hranac, Tom Elliot and Jim Chiddix received plaques for their work. (Not pictured: Mike Kaus, Dave Large and Bill Riker.)



SCTE's Ralph Haimowitz gave a plaque to the recently elevated Sierra Chapter, represented by Region 1 Director Pete Petrovich and member Steve Allen.



Ralph Haimowitz bestowed an award to representatives of the elevated Dairyland Chapter: Bill Kohrt (Region 6 director), John Boltik, Gary Wesa, Neal McClain and Al Actkinson.



After an introduction by Bill Riker (center), Texscan's Bert Henscheid donated a \$2,500 check for the SCTE's Tuition Assistance Program, accepted by CT Publications' Toni Barnett, Scholarship Committee chair.



Ralph Haimowitz awarded a plaque to representatives of the elevated Wheat State Chapter: Wendell Woody (Region 5 director), Larry Braun and Dick Abraham.



Ralph Haimowitz gave a plaque to the newly elevated Palmetto Chapter, represented by Jim Farmer, Region 9 director.



Representatives of the elevated Great Plains Chapter received an award from Ralph Haimowitz: Wendell Woody (Region 5 director), Jennifer Hays, Randy Parker and Herb Dougall III.



Bill Riker presented a mounted plaque to outgoing national President Jack Trower.



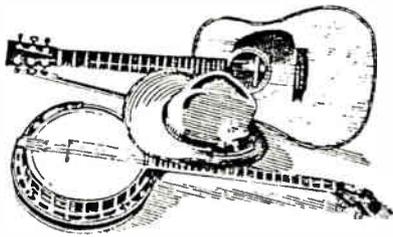
Members of the elevated Big Sky Chapter accepted an award from Ralph Haimowitz: Ted Chesley (Region 3 director), Marla DeShaw, Ken Young and Mike Mason.



Dan Pike, Les Read, Ralph Haimowitz, Pete Petrovich and Gary Selwitz received plaques for coordinating SCTE technical seminars at state or regional shows. (Not pictured: Randy Pattison and Dave Large).



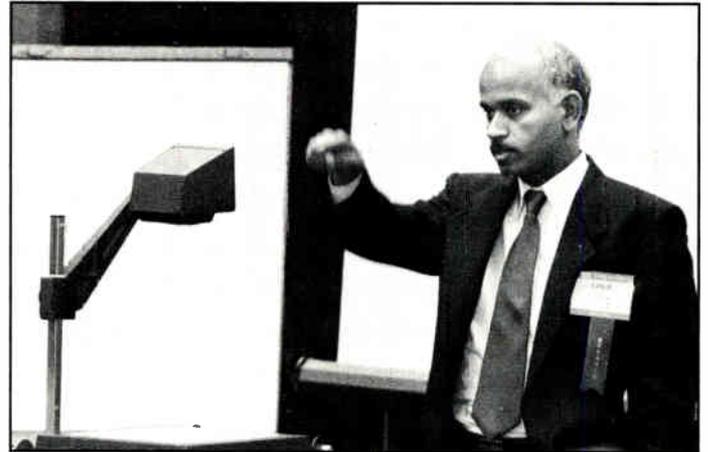
Representatives of the elevated Dakota Territories Chapter received a plaque from Ralph Haimowitz: Bill Kohrt (Region 6 director), Tony Gauer, A.J. VandeKamp, Rick Reed, Oscar Beck and Dennis Hilfer.



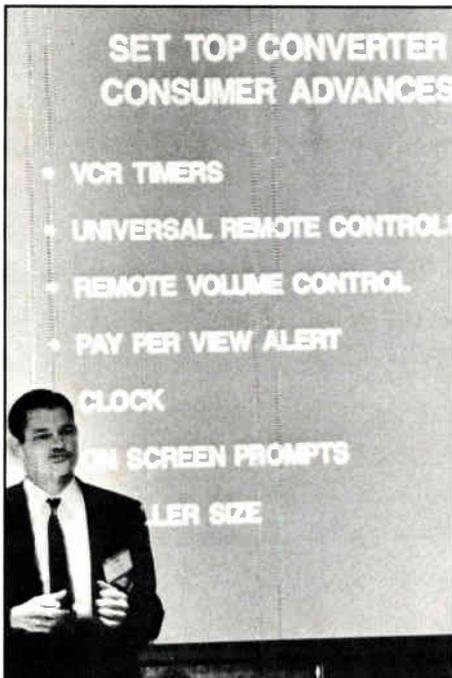
Expo workshops



Expo attendees packed the "Advances in signal security techniques" workshop led by Post-Newsweek's Ted Hartson and S-A's Jim Farmer.



Dr. Chak Gupta of Comm/Scope analyzed the role of inhibitors, humidity and absorbed anions in the "Advances in corrosion protection" workshop.



S-A's Jim Farmer described the latest bells and whistles of set-top converters as "Advances in signal security techniques."



John Wong of the FCC answered questions from concerned attendees during the "CLI ninjas" workshop.



Rikki Lee (editorial consultant) and Bill Cologie (Pennsylvania Cable TV Association) gave "Painless technical writing" tips.



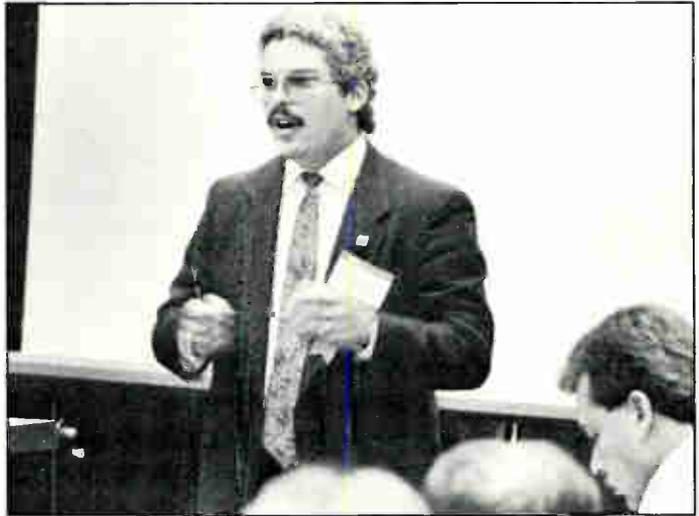
Ron Wolfe of the ATC National Training Center analyzed options for the Lake City Cablevision system in "Case studies in fiber optics."



Larry Lehman of Cencom Cable Associates presented one of the "Case studies in fiber optics."



Wavetek's Steve Windle and ComSonics' Don Runzo fielded questions during the "Signal leakage equipment calibration" workshop.



Barry Smith of Times Fiber discussed the problems of F connector corrosion and the solutions of "Advances in corrosion protection."



Adelphia's Roger Keith answered questions on compliance with safety rules following the "OSHA's gonna get you if you don't watch out" workshop.



"CLI ninjas" John Wong (FCC) and Brian James (CableLabs) reminded workshop attendees of the July 1 deadline; mutant turtle Leonardo (center) provided moral support.



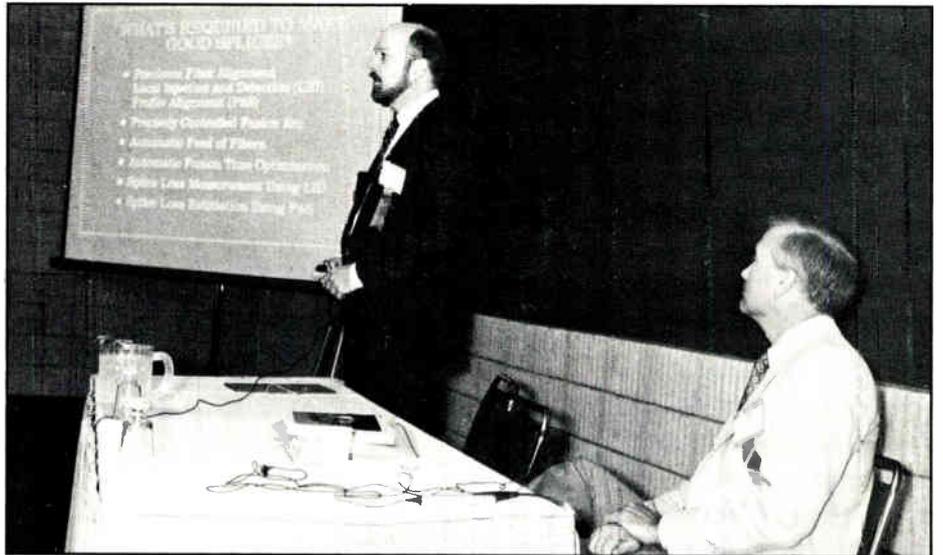
ATC's Steve Johnson responded to questions on testing with a spectrum analyzer after the "Video and audio measurements" workshop.



The OSHA compliance workshop drew consistent crowds who came to learn from SCTE's Ralph Haimowitz, Adelphia's Roger Keith and Warner's Alan Babcock.



Mark Connor (Siecor) outlined equipment used in "Fiber-optic testing."



John Midkiff of Siecor and Jim Abernson of AT&T Bell Labs made all the right connections during "Fiber-optic splicing."



The "Video and audio measurements" workshop, with CT Publications' Ron Hranac and ATC's Steve Johnson, gave students a chance to work with actual test equipment.

WHY CLONE AROUND. CHECK WHAT YOU GET FROM HUGHES FOR THE SAME PRICE.

	HUGHES	The Clone
Widest range of equipment and prices	✓	
Free proposals and applications engineering	✓	✓
Comprehensive hands-on training seminars	✓	
Maintenance manuals and schematics	✓	
Field upgradable equipment	✓	
Spare parts availability	✓	
Full systems warranty	✓	✓
24-hour service hotline	✓	✓
Customer serviceable equipment	✓	
Field service and sales personnel throughout US	✓	
Widest range of applications and performance	✓	
World leader in CATV systems for 24 years	✓	
Complete 3-hub system for \$95,000	✓	✓

For about \$95,000 you can buy a complete 3-hub microwave system from Hughes Aircraft Company... or you can buy a substitute without all the extras listed above.

With Hughes, you get to choose exactly the right system for your particular needs and budgets. And, when you select Hughes, the world leader in AML systems for over 20 years, you know you'll always have a source you can depend on.

So, if you'd like to get more than just a low price, call Hughes Aircraft Company, Microwave Communications Products: (800) 227-7359, ext. 6233. In California, call (213) 517-6233. In Canada, call COMLINK Systems Inc., Oshawa, Ontario, (416) 436-8888.



Hughes AML is more than hardware.



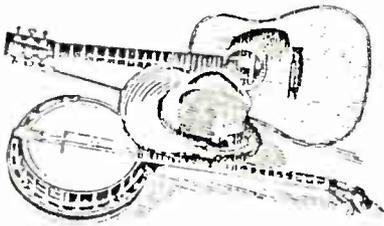


Exhibit floor, etc.



Expo '90 smashed previous attendance and exhibitor numbers.



Connie Buffalo of Jones Intercable's Business Learning Group demonstrated the newest interactive video training modules.



An active amplifier cascade room allowed vendors the opportunity to demonstrate their latest test equipment.



Tim Dugan of Times Fiber demonstrated the low loss characteristics of the company's 1 GHz cable.



Hundreds waited eagerly for exhibit doors to open, unveiling the latest as well as time-tested products from over 170 vendors.



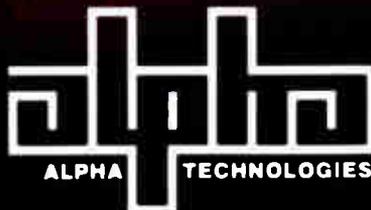
The National Cable Television Center and Museum showcased the early history of CATV technology with an assortment of gear from previous years.

ANNOUNCING: THE STANDBY POWER SYSTEM FOR THE 1990's

With the XP Series from Alpha Technologies, standby power has entered a new decade. All the industry-leading advantages of single-ferro design are retained. But the XP Series is the most modular, flexible and upgradeable standby system ever introduced, making it the standby system for the 1990's ... and beyond.



3767 Alpha Way
Bellingham, WA 98226
TELEPHONE:
206-647-2360
FAX: 206-671-4936



5700 Sidley St.
Burnaby, B.C. V5J 5E5
TELEPHONE:
604-430-1476
FAX: 604-430-8908

Let the Wavetek 1882A sweep you in

ONE of the most difficult aspects of making capital purchases for the cable industry is finding equipment that has an immediate as well as long-term pay-back. The Wavetek 1882A Sweep Analyzer offers the remarkable versatility and capacity to let you provide better subscriber service now and in the future — even if the conventional system technology changes.



A clear path home.

Today's complex systems contain many long amplifier cascades which can create signature build-up that distorts reception. In the eyes of your subscribers, that's not what they're paying for.

Storing and comparing successive amplifier response in the 1882A memory will allow you to detect the small changes that add up to major problems. Today, signature build-up can be a thing of the past.

No interference.

Why tolerate extraneous signals that simply load your system or interfere with revenue generating signals? That's precisely why you sweep, to make sure that your system properly passes each active channel.

The Wavetek 1882A utilizes the multitude of signals already on your system: to test the frequency response. So you're not adding extra carriers that can interfere with picture quality, set top converter operation, or VCR usage.

1000 MHz to grow on.

The growth of cable very likely means increased frequency response requirements — 600, 800 even 1000 MHz. Why buy a sweep system that can't accommodate these increased frequency ranges?



See the light.

Fiber optic cable is already being used to shorten amplifier cascade lengths.

The 1882A lets you sweep the amplifier cascades from the fiber node by simply storing your reference at the fiber node and sweeping the rest of the system as you normally would, without an elaborate field transmitter.

You could also test parameters most affected by laser nonlinearity — cross-mod, and second and third order distortion.

Elegant but easy.

The Wavetek 1882A does so much, but so easily. Most modes of operation are entered by pressing one, two or three keys. If you make a mistake, it lets you back up, asks you a question, or lists your options.

It takes only a few minutes to store your HEADEND,

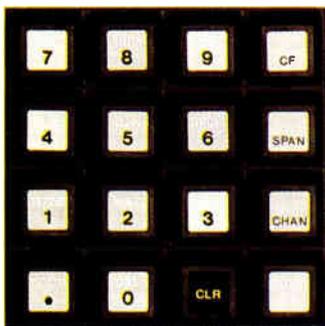
to the future.

Without interference.

FIRST AMP, or FIBER NODE reference — a fraction of the time other instruments require.

Then simply connect to your test point, press "3", "1", FUNCTION, and you are sweeping.

Because the 1882A is so easy to learn and use, your sweep techs will be more efficient and effective.



Fill in the blanks.

Before the Headend is turned on or when your frequency spectrum is not fully utilized, you still want to sweep your system. A special "blanking filter" available for Wavetek sweep generators will allow you to sweep unused spectrum and used spectrum at the same time.

Since you're generating a sweep signal only in the spectrum with no video or sound carriers, there is no chance of interference. You also sweep at sound carrier level so system loading is negligible.

Find the faults.

When you use a sweep generator with your 1882A, you can set up one of the channel plans for a small span and 100 KHz resolution. This will allow you to see standing waves reflected from almost any point in the span. No other non-interfering sweep system provides you with this type of resolution for fault finding.



Bring back the hard facts.

Sometimes you want to record a site problem for later analysis. With the 1882A you can store the sweep or analyzer results in memory, or print a hard copy with the P-1 printer option.

When you reach the end of the line.

Before your move on to the next trunk or line, make those end of the line measurements that ensure a quality picture for your subscribers.

The 1882A can measure C/N, second and third order distortion, X-mod and HUM — as easily as using the sweep. Just a few simple keystrokes, and you've finished a job well done.

Get the picture?

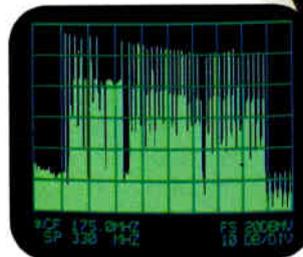
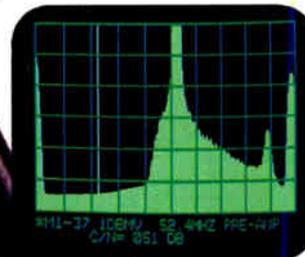
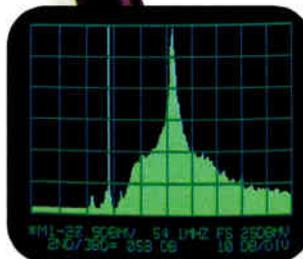
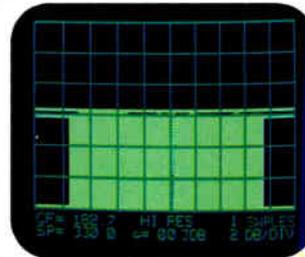
The 1882A will improve your profit picture by easily and effectively helping you deliver the best picture quality to your subscribers. No other instrument will work so hard to keep your system performing within its design parameters, now and well into the future.

And for all it does, the 1882A is the lowest priced complete system sweep available.

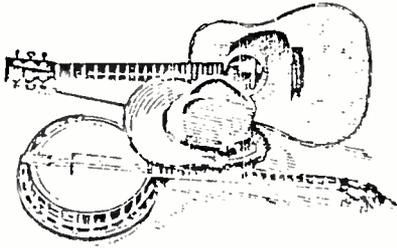
The Wavetek 1882A may be the single most important capital equipment investment you make.

For a demo, call Wavetek at **1-800-622-5515** or your local Wavetek representative.

Reader Service Number 25.



WAVETEK®



Nightlife and more



SCTE Membership Booth hucksters Rex Porter, Bill Kohrt and Pete Petrovich enticed attendees to take home an official expo T-shirt or other Society merchandise.



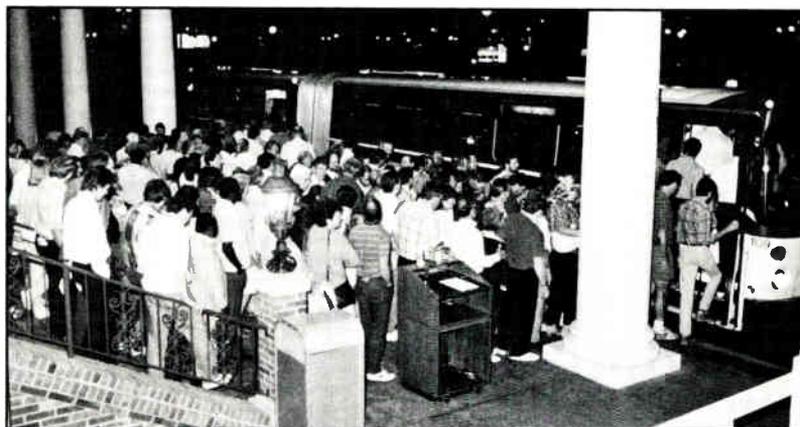
Channel Master and Viacom Nashville installed a microwave link to provide local signals to the exhibit area.



Visitors and NCTA Engineering Committee members heard updates of recent technical issues from Wendell Bailey and Walt Ciciora.



Region 9 Director Jim Farmer discussed SCTE concerns during a meeting of the Society's board of directors.



Country/western lovers and greenhorns alike boarded buses en route to Opryland for Friday's Expo Evening.



The SCTE Band's Howard Whitman and Cosmo Bertino practiced harmonies before their gig at the Opryland Hotel.



About 150 candidates took BCT/E and Installer Certification Program exams Sunday morning.



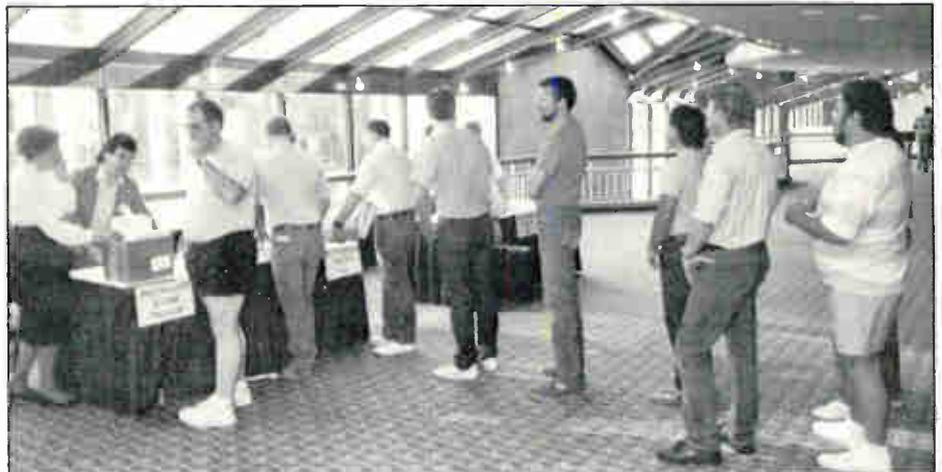
Hungry folks feasted on cocktails and down-home victuals at the Opryland Hotel during Expo Evening.



Jerrold Communications' Skip Litz welcomed attendees to Expo Evening.



The S-A party capped off Expo '90 with succulent food and superb live entertainment.



BCT/E and Installer Certification examinees stood in line to pick up their tests.

ATV status

(Continued from page 16)

an impossible constraint while fully delivering twice NTSC horizontal and vertical resolution. Alternately, it can simulcast on a completely separate RF channel a newly designed, non-compatible HDTV signal.

It is this simulcast solution that has been selected for standardization by the FCC, because it promises to deliver the highest quality of service to American homes. Simulcast transmission systems are being worked on by five proponents. Of the remaining two proposals, one is an EDTV and the other an IDTV system. The commission has indicated it will not consider setting a standard for EDTV (if at all) until it has selected a simulcast HDTV standard. IDTV, as defined, needs no FCC action, only marketplace introduction, since there is no apparent change in the emitted NTSC signal.

The simulcast approach

Given the FCC's preference for the simulcast approach, let's review it in some detail. Under this approach, HDTV program services would have to be transmitted simultaneously with their sister NTSC services, so that existing NTSC receivers are not made useless. The commission has ruled that the spectrum for these new channels will be found within the existing VHF and UHF bands. The obvious implication for broadcasters is that each TV station would need to be allocated an additional channel for a simulcast HDTV service. Some preliminary spectrum assignment scenarios indicate a serious possibility to achieve this for most broadcasters. Cable operators may someday need

to literally double their capacity for at least their broadcast channels—and perhaps *all* their channels.

In the long term, as simulcasting takes over, NTSC channels can be discontinued and the spectrum recovered for other uses. But there will certainly be a period of many years where cable systems will need the channel capacity to carry all the desired NTSC services as well as the new ATV simulcast services. Since the FCC's interests and power lie primarily in regulating broadcasters and in allocating the over-the-air spectrum, the broadcasters' concerns are dominating the development of ATV systems.

Fundamental to the success of any simulcast HDTV will be its ability to successfully propagate its signal without interfering with existing NTSC stations on the same channel in a nearby market; that is, "co-channel interference." Or, if in the UHF band, the HDTV signal should not cause UHF tuner distortions and impairments that have classically prevented assignment of a wide range of UHF channels above and below any existing UHF stations (the so-called "UHF taboos").

The approach being taken in some of the simulcast systems to solve these problems involves spreading the channels' transmission energy uniformly across the 6 MHz channel, thereby limiting peaks of power at particular frequencies or at particular points in time. Imagine an NTSC channel in which the sync pulses have been suppressed or encoded in some way, and you have the basic idea. With no sync pulses to visibly interfere with another over-the-air station—or to load a cable system's cascades of amplifiers and build peaks of cross-modulation and intermodulation distortion—spectrum can probably be found for broadcasters. Another benefit is ATV signals may load a cable system less than an NTSC signal does currently. →

REPRINTS
REPRINTS
REPRINTS
REPRINTS
REPRINTS

**Communication
Visibility
Information
Knowledge**

Reprints work for you.

For more information on
this effective marketing tool,
call Marla Sullivan at:

(303) 355-2101



**JONES
INTERNATIONAL™
LTD.**

INNOVATION. IMAGINATION. IMPACT.

Jones International, Ltd. delivers them all
in three industry-leading products.

MIND EXTENSION™ UNIVERSITY

A full spectrum of college credit and
continuing education courses through affiliated colleges
and universities across the United States.

Mind Extension University presents a cable industry first—
the Master of Business Administration (MBA) degree
through Colorado State University.

GALACTIC RADIO, INC.

High quality, cable-delivered FM stereo radio that features the best
in radio programming. New Age, jazz, country,
classical, adult contemporary, sports, talk, news—Galactic Radio
offers a choice for every taste, 24 hours a day.

BUSINESS LEARNING GROUP

Presenting interactive video training programs developed
specifically for the cable industry. From in-depth
engineering training to development of a sales culture, these
programs provide the training of the future—today.

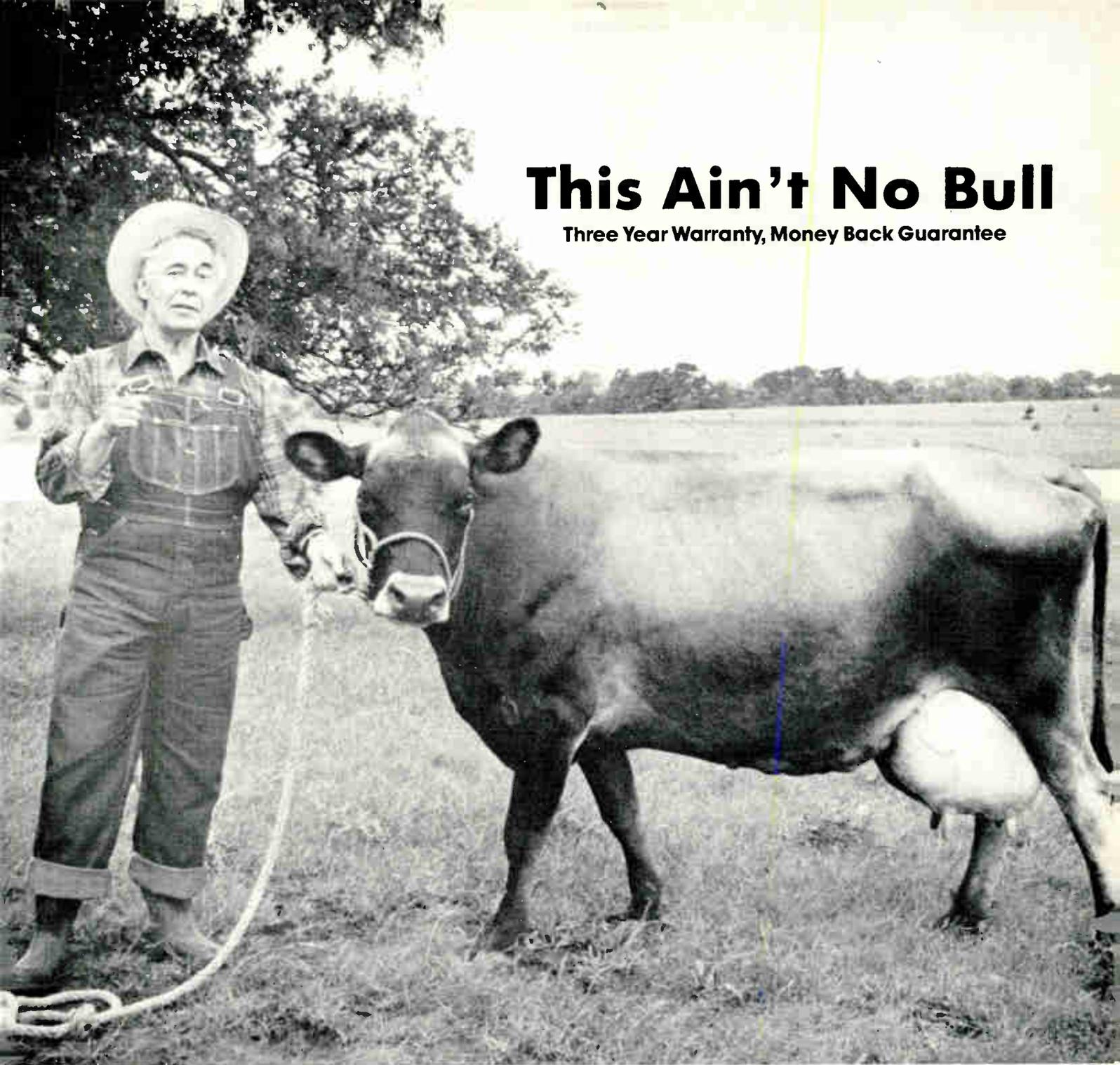
JONES INTERNATIONAL, LTD.

Expanding the horizons of cable performance.

For more information, call us at

1-800-525-7002.

Reader Service Number 27.



This Ain't No Bull

Three Year Warranty, Money Back Guarantee

Some people think there's a lot of **BULL** in this industry about Standby Power Supplies!

PWM REGULATION in standby mode and **CYCLE CHARGING** are both features patented by Control Technology. Both are standard on the 2 battery Citation II and the new 3 battery, 16 amp Citation III.

What this means:

- 15% more standby time than ferroresonant designs, typical
- Longer battery life, no chance to overcharge batteries
- Automatic self test; no need to climb the pole
- High Speed Overcurrent Shutdown, short-circuit proof
- All Aluminum with Alodine Plating and Epoxy Paint
- Modular construction

Control Technology offers a **THREE YEAR WARRANTY** plus a promotional **MONEY BACK GUARANTEE** on units purchased in 1990.

So take your choice, the Citation II or the Citation III. The finest units ever offered to the Cable Industry.... **AND THAT AIN'T NO BULL!**

Call toll free for details...1-800-527-1263



Control Technology, Inc.

1881 State Street
Garland, Texas 75042

The **PREVIOUSLY** Quiet Company

Reader Service Number 28.

Simulcast ATV, therefore—if designed wisely—has the potential to relieve a possibly frightening requirement for additional channel capacity. It can do this by lowering its impact on system distortion specs and allowing carriage of ATV signals with little penalty and perhaps even an improvement over NTSC.

Cable's challenges to ATV

Beyond these transmission parameters, the architecture of the cable business will impose additional requirements on ATV systems. Consider the following challenges: We will need a seamless interface to consumer equipment to avoid the difficulties we now put our customers through. There is time to plan this properly, if the cable industry makes its voice heard.

The subscription pay TV business and the pay-per-view prospects of ATV are staggering but only if we make sure the adopted system can be scrambled securely and descrambled in an addressable fashion. The scrambling, of course, must be under the control of the individual cable operator who markets to a customer base, and not merely under the control of the national programming provider. These may seem obvious requirements, but some ATV proponents may not be fully aware of our industry's needs.

Ghost cancelling is highly likely to be a standard feature of any ATV system, since broadcast's multipath problems and cable's microreflections are potentially ruinous to high resolution pictures. Whatever the ghost cancelling scheme, it needs to work as well over cable as it does on broadcast.

Cable, of course, has unique requirements for data transmission to subscribers' homes, and the ATV systems need to take our present and future needs into account.

Finally—ideally—the broadcast ATV system should be structured to allow cable operators to augment the normal 6 MHz channel with some additional spectrum to provide a higher performance level (primarily), better picture resolution and better motion rendition. We may need this capability to compete with home video, DBS and possibly telco transmission of very high quality HDTV.

Beyond these basic capabilities, any ATV system will need to meet cable's economics for production, its satellite interconnection practices, its headend design considerations and ideally be able to survive its customary distribution practices (including FM supertrunking, AML systems, fiber links, long cascades of trunk amplifiers and the usual complement of feeder actives and passives). Finally, there needs to be subscriber equipment that is reliable and cost-effective.

Meeting cable's requirements

How can we as an industry make sure the ATV system adopted meets these requirements? The answer is twofold. First, on behalf of the industry, CableLabs will be conducting a series of tests on each of the proposed ATV transmission systems. Under a \$2.5 million contract with the broadcasters' Advanced Television Test Center (ATTC) in Alexandria, Va., we will conduct cable transmission simulations with a test bed of our own design, operated by CableLabs personnel and according to test procedures developed by CableLabs and approved by the FCC ATV Advisory Committee.

CableLabs' tests will cover the following impairments: carrier-to-noise requirements, intermodulation distortion, effect of microreflections, incidental carrier phase modulation, discrete frequency interference, hum and low frequency noise, and the effect of high level sweep. Understanding how these tests will be conducted first requires an overview of the entire set of North American tests.

Overall, the ATV testing will take place in a total of three venues: 1) at the U.S. broadcasters' laboratory—ATTC—where basic (unimpaired) picture quality will be tested along with simulated over-the-air impairments and interferences; 2) at the CableLabs facility, where each ATV system will be tested under various conditions of cable transmission impairment; and 3) at the facilities of the Advanced Broadcast Systems (ABS) Test Centre in Ottawa. This subjective test operation will be operated by the Communications Research Center (CRC) of the Canadian Department of Communications. A consortium of Canadian interests is sponsoring CRC's conduct of the subjective assessments of quality and transmission performance.

The ATTC will perform the basic picture quality tests in which both broadcasters and cable operators have a vital interest. These are evaluations of the picture quality that each ATV system is ultimately capable of—assuming no impairment of or interference to the RF transmission channel. Test signals and pictures will be encoded by the ATV system's encoder, which in most cases involves some bandwidth reduction processing, then modulated to RF and finally demodulated by the proponent-supplied demodulator and decoded for display on a high definition video monitor.

Quality attributes to be evaluated include luminance and color resolution (both static and dynamic, and along three directional axes), color gamut and rendition, motion rendition, and dynamic range. Also to be evaluated will be performance with filmed program material and with electronic graphics material, each of which presents its own technical characteristics and potential problems.

The proponent systems' basic picture quality will vary depending upon the wisdom of the designers' choices of basic scanning format and bandwidth reduction/restoration techniques.

Transmission impairment and interference tests

Certainly as important as a system's basic picture quality is its performance in the face of transmission impairments and interferences. As previously indicated, benign interference performance will be of pivotal importance to the selection of an ATV system that is practical in today's crowded over-the-air spectrum. Broadcasters will test transmission performance in the face of various impairments, including random noise, impulse noise, multipath effects and airplane flutter.

Broadcast interferences to be tested include co-channel and adjacent channel, UHF taboo channel, and discrete frequency. Interference testing will be conducted in three directions—ATV channel interference into existing NTSC signals, NTSC interference into ATV signals and ATV into ATV interference.

CableLabs will conduct tests of at least eight typical transmission impairments common to CATV distribution systems. The following is an outline of these impairment tests:

Carrier-to-noise requirements: Depending upon the signal processing performed in the ATV system's encoder and the subsequent modulation techniques employed, there may be widely varying subjective results on picture quality as a result of noise introduced by trunk, feeder and line extender amplifiers in a cable plant. The CableLabs ATV test bed will couple a broadband noise source to the ATV RF signal. A panel of experts will determine the threshold at which this noise is perceptible in the ATV picture and will select various amounts of noise, from threshold to "very annoying" levels, for recording and later subjective assessment by lay viewers.

Intermodulation distortion: Non-linearities in active CATV

(Continued on page 80)



Headend **M** *Headquarters*

Let's face it. Most distributors claim to stock everything you could ever need in CATV equipment.

We don't.

What we *do* stock is the most complete line of headend equipment in the industry. Satellite receivers. Modulators. Processors. The entire range of truly essential headend equipment you need to stay in business or get started. Including the most-trusted names in the industry. Blonder-Tongue. Sony. R. L. Drake. General Instruments. Cadco. Names that have earned your respect with years of reliable, top-quality performance.

Better yet, we deliver. Fast. Whether you need another receiver or a complete headend.

And you can depend on us for the best support and service in the industry.

Period.

After all, it's not what we call ourselves that makes us THE Headend Headquarters. It's what we deliver.

Midwest Communications. The largest distributor of video equipment in America. And your Source for headend equipment and complete video systems.

the **SOURCE**

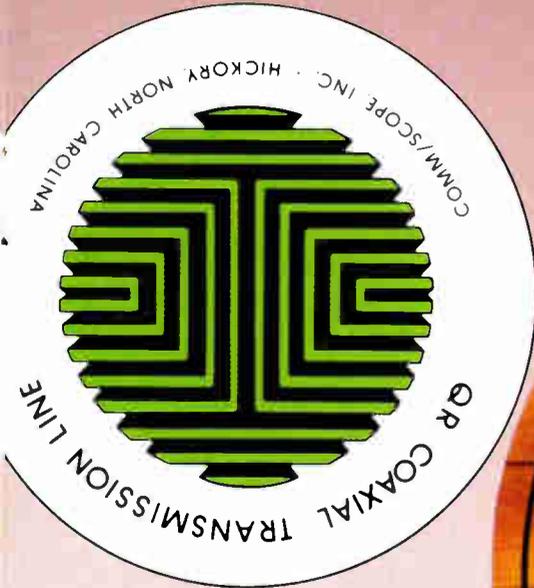
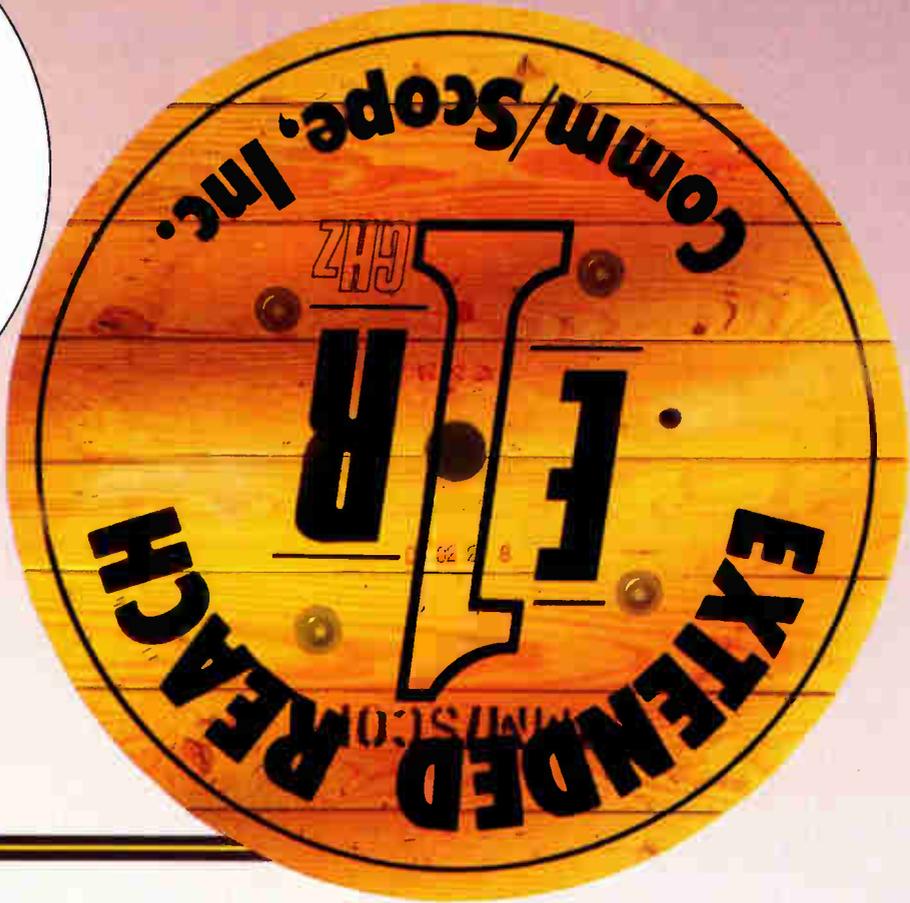


MIDWEST
Communications Corp.

One Sperti Drive
Edgewood, KY 41017
800-543-1584
(In Ky. 606-331-8990)

Reader Service Number 29.

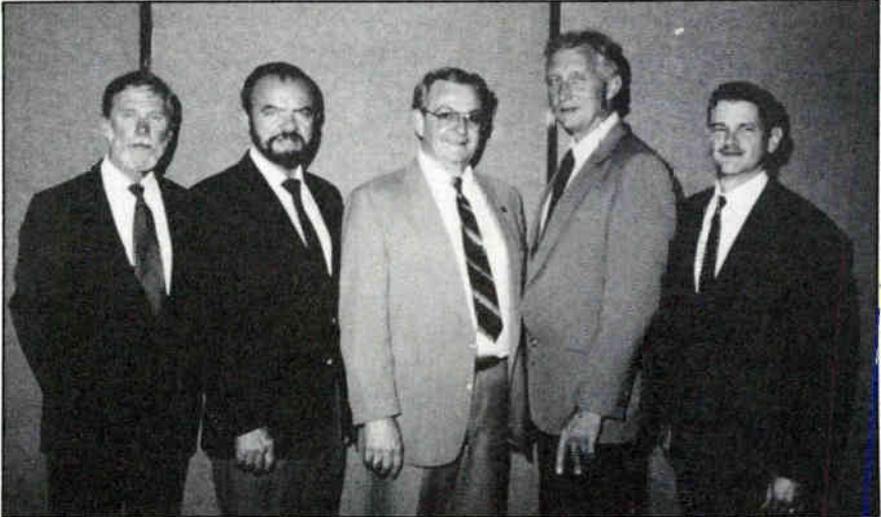
PLAN AHEAD OUR PART



the INTERVAL

SCTE

August 1990



Bob Fielder

SCTE's new officers are: Les Read, treasurer; Richard Covell, Western vice president; Wendell Woody, president; Vic Gates, Eastern vice president; and Jim Farmer, secretary.

Board of Directors Elects Officers for 1990-1991 Term

The SCTE Board of Directors elected the Society's officers for the coming year at its meeting held June 20 in conjunction with Cable-Tec Expo '90 at the Stouffer Nashville Hotel in Nashville, Tenn.

The Society's officers for the 1990-1991 term are:

President: Wendell Woody

Eastern Vice President:

Vic Gates

Western Vice President:

Richard Covell

Secretary: Jim Farmer

Treasurer: Les Read

This year's Executive Committee consists of Woody, Gates, Covell, Farmer, Immediate Past President Jack Trower and Bill Kohrt.

The current SCTE Board of Directors consists of:

Region 1 Director Pete Petrovich, Petrovich and Associates, serving California and Nevada; Region 2 Director Ron Hranac, CT Publications Corp., serving Arizona,

Colorado, New Mexico, Utah and Wyoming; Region 3 Director Ted Chesley, CDA Cablevision Inc., serving Alaska, Idaho, Montana, Oregon and Washington; Region 4 Director Leslie Read, Sammons Communications, serving Oklahoma and Texas; Region 5 Director Wendell Woody, Anixter Cable TV, serving Illinois, Iowa, Kansas, Missouri and Nebraska; Region 6 Director Bill Kohrt, Kohrt Communications, serving Minnesota, North Dakota, South Dakota and Wisconsin; Region 7 Director Vic Gates, Metrovision, serving Indiana, Michigan and Ohio; Region 8 Director Jack Trower, WEHCO Video Inc., serving Alabama, Arkansas, Louisiana, Mississippi and Tennessee; Region 9 Director Jim Farmer, Scientific-Atlanta, serving Florida, Georgia and South Carolina; Region 10 Director Michael Smith, Adelphia

Cable Communications, serving Kentucky, North Carolina, Virginia and West Virginia; Region 11 Director Pete Luscombe, TKR Cable Co., serving Delaware, Maryland, New Jersey and Pennsylvania; and Region 12 Director Walt Ciciora, ATC, serving Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont.

At-large directors include Richard Covell, Jerrold Communications; Tom Elliot, CableLabs; and Robert Luff, Jones Intercable.

"1990 is the year for great SCTE expansion again," Woody said, "along with greater achievements in training and education. Never before has our industry focused so much attention on education, and never before has the Society's role in technical training been more critical."



Bob Fielder

The board of directors addresses members' concerns at the Expo '90 Annual Membership Meeting held June 21 at the Nashville Convention Center.

Cable-Tec Expo '90 Draws Record Attendance, High Praise

About 1,600 attendees and 1,400 exhibitor personnel gathered at the Nashville Convention Center in Nashville, Tenn., from June 21 to 24 for the Society of Cable Television

Engineers' Cable-Tec Expo '90, the most well-attended and widely acclaimed SCTE expo to date.

The expo began with the Annual Engineering Conference, which was



SCTE President Wendell Woody (right) participates in the "Fiber-Optic Splicing Workshop" conducted in the expo exhibit hall.

held June 21 and consisted of a full day of technical and management papers and panel discussions that were presented to a capacity crowd by many of the industry's engineering leaders. Many important topics currently facing our industry were discussed, including cable links from the tap to the TV set, field supervision techniques and cable in the 1990s. The conference opened with a presentation by motivational speaker Donald Frost of C-4 Productions.

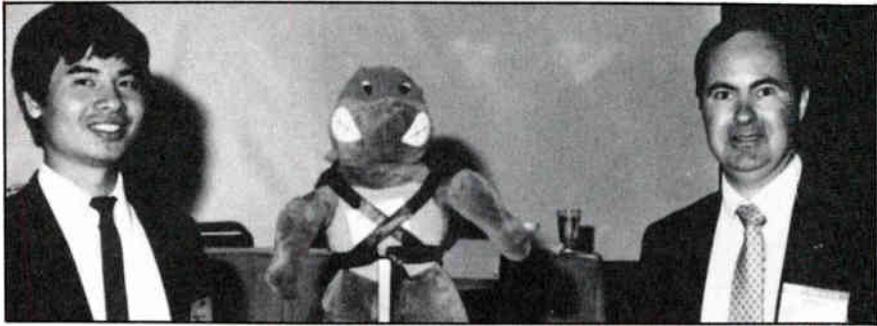
Participants in the panel discussions included: Richard Amell, Metrovision; Alan Babcock, Warner Cable Communications; Wendell Bailey, NCTA; Jim Chiddix, ATC; Walt Ciciora, Ph.D., ATC; Dana Eggert, Performance Plus; Tom Elliot, CableLabs; Tom Gillette, CableLabs; Kathy Keating, ATC; Gary Kim, *Multichannel News*; Paul Maxwell, Transmedia Partners; Larry Nelson, Comm/Scope; and Craig Tanner, CableLabs.

The Annual SCTE Awards Luncheon also was held June 21 and featured keynote speaker Dr. Richard Green, president and chief operating officer of CableLabs.

Following the conclusion of the Engineering Conference, the Society held its Annual Membership Meeting utilizing a new format that allowed SCTE members to pose questions and concerns directly to the national organization's board of directors.

Cable-Tec Expo '90 officially began on Friday, June 22 with the opening of 10 educational workshops that were presented to enthusiastic response from expo attendees.

The workshops included: "Advances in Corrosion Protection" with Dr. Chak Gupta, Comm/Scope and Barry Smith, Times Fiber Communications; "Advances in Signal Security Techniques" with Jim Farmer, Scientific-Atlanta and Ted Hartson, Post-Newsweek Cable; "CLI Ninjas" with Brian James, CableLabs and



"CLI Ninjas" John Wong of the FCC and Brian James of CableLabs are aided by Donatello the Turtle as they wage war with signal leakage during their popular technical workshop.

John Wong, FCC; "Case Studies in Fiber Optics" with Larry Lehman, Cencom Cable Associates and Ron Wolfe, ATC; "Fiber-Optic Splicing" with Jim Aberson, AT&T Bell Labs, Tim Gropp, AT&T and John Midkiff, Siecor; "Fiber-Optic Testing" with Mark Connor, Siecor and Louis Williamson, ATC; "OSHA's Gonna Get You If You Don't Watch Out" with Alan Babcock, Warner Cable Communications, Ralph Haimowitz, SCTE and Roger Keith, Adelphia Cable Communications; "Painless Technical Writing" with Bill Cologie, Pennsylvania Cable Television Association and Rikki Lee, CT Publications; "Signal Leakage Equipment Calibration" with Don Runzo of ComSonics and Steve Windle of Wavetek RF Products and "Video and Audio Measurements" with Ron Hranac of CT Publications Corp. and Steve Johnson of ATC.

Over 170 industry companies were on hand to exhibit at the Expo's sold-out exhibit floor, which opened Friday, June 22 at the Convention Center.

An exhibitor training center was set up near the exhibit hall allowing companies that exhibited at the show to offer formal presentations of their products and related technologies. Among the exhibitors that took part

in such presentations were AML Specialities Inc., Hewlett-Packard Co., Midwest CATV, Multilink Inc., Optical Networks International, Polychem Electronics, Tektronix Inc., Times Fiber Communications and Triple Crown Electronics Inc.

Friday's Expo Evening, sponsored by Jerrold Communications, saw more than 1,500 attendees converging to enjoy a sumptuous buffet at the famed Opryland Hotel, followed by a country music show at the legendary Grand Ole Opry.

Saturday, June 23 marked the conclusion of both the workshops and the exhibit floor, but Expo '90 was not yet over. Attendees enjoyed tours of the studio facilities of cable channel The Nashville Network on the following day, Sunday, June 24.

Additionally, 150 attendees participated in the BCT/E and Installer Certification Programs testing session also held June 24. Most participants took tests in at least two categories, with some taking on three or more during the 3 1/2-hour session.

Overall, the expo was a resounding success that generated very positive response and a great deal of enthusiasm among both attendees and exhibitors for future Cable-Tec Expo events.

Awards Presented at Expo '90



Bob Fielder

SCTE Executive Vice President Bill Riker presents Eastern Vice President and Region 7 Director Vic Gates of Metrovision with a Special Recognition Award honoring Metrovision's production of a technical marketing training videotape for the Society.



Bob Fielder

Hal Krisbergh of Jerrold Communications receives the 1990 President's Award from outgoing SCTE President Jack Trower.

Awards Presented at Expo '90



Bob Fielder

SCTE Western Vice President and At-Large Director Richard Covell receives the 1990 SCTE Member of the Year Award from 1989 award recipient Paul Beeman.



Bob Fielder

SCTE President Wendell Woody receives the presidential gavel, signifying the beginning of his term, from outgoing President Jack Trower.

Winners of Classic Cable Equipment Competition Announced

The winners of the "Classic Cable Equipment Competition," held at Cable-Tec Expo '90 in Nashville, Tenn., have been announced.

Co-sponsored by the National Cable Television Center and Museum (NCTCM) and SCTE, this contest invited expo attendees to bring with them what they considered to be a classic piece of cable TV equipment.

Over 50 submissions were displayed at the NCTCM booth at the expo exhibit hall. They were judged for uniqueness and historical significance by a panel of experts that included NCTCM Director Marlowe Froke and SCTE Executive Vice President Bill Riker.

The first prize went to Jeff Antonuk, chief technician with Midwest Video Electronics of Rhineland, Wis. His winning entry, an early 1950s tube-type bridger amplifier, earned him a camcorder (valued at more than \$1,000) donated by Zenith

Electronics.

SCTE Region 10 Director Michael Smith, a regional engineer for Adelfia Cable Communications in Staunton, Va., won the second prize of \$300 for a 1950s vectorscope that was manufactured by Wickes Engineering of Camden, N.J.

An honorable mention was awarded to George Gilkison of Santa Cruz, Calif. He displayed a cable TV amplifier that was built inside a coffee can.

The winning equipment is currently being considered for acceptance into the NCTCM collection as display pieces in the SCTE room at the NCTCM building.

Due to the success of the contest, SCTE and the NCTCM are planning to make the "Classic Cable Equipment Competition" an annual event, with the next one to be held at Cable-Tec Expo 1991.

SCTE Calendar

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

Dates for 1990

Aug. 1 New York City Meeting Group--Information to be supplied.
Contact: Andy Skop, (201) 722-1935.

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

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

- Aug. 10** Rocky Mountain Chapter--Radisson Hotel South, Englewood, Colo. Contact: Rikki Lee, (303) 321-7551. BCT/E examinations to be administered.
- Aug. 13** Greater Chicago Chapter--Location to be supplied. BCT/E testing to be administered. Contact: John Grothendick, (312) 438-4200.
- Aug. 13-14** Palmetto and Piedmont chapters--Kinston Plantation, Myrtle Beach, S.C. Topic: "New Technology for the '90s." BCT/E and Installer Certification testing to be administered. Contact: Rick Barnett, (803) 747-1403; and Rick Hollowell, (919) 968-4661.
- Aug. 14** Florida Chapter--Information to be supplied. Contact: Rick Scheller, (305) 753-0100.
- Aug. 14** Greater Chicago Chapter--Embassy Suites Hotel, Palatine, Ill. Topic: "BCT/E Category II Tutorial - Video and Audio Signals and Systems" with Ron Hranac of CT Publications Corp. Contact: John Grothendick, (312) 438-4200.
- Aug. 14-15** Ohio Valley Chapter--August 14: Cleveland. August 15: Cincinnati. Topic to be supplied. Contact: Jon Ludi, (513) 435-2092.
- Aug. 15** Delaware Valley Chapter--Information to be supplied. Contact: Diana Riley, (717) 263-8258.
- Aug. 15** Great Plains Chapter--Location to be announced. BCT/E testing to be administered. Contact: Jennifer Hays, (402) 333-6484.
- Aug. 15** Penn/Ohio Meeting Group--Location to be announced. Topic: "NCTA Adopted Technical Standards." Contact: Bernie Czarnecki, (814) 838-1466.
- Aug. 16** Southeast Texas Meeting Group--Warner Cable, Houston. Topic to be supplied. Contact: Tom Rowan, (713) 580-7360.
- Aug. 23** Dixie Chapter--Information to be supplied. Contact: Rickey Luke, (205) 277-4455.
- Aug. 28** Chaparral Chapter--To be held in Santa Fe, N.M. Topic: "BCT/E Category VII Tutorial - Engineering Management and Professionalism." Contact: Brian Throop, (505) 761-6200.
- *Aug. 28** Satellite Tele-Seminar Program, "*Cable Vs. The Telcos (Part One)*" with Gary Kim of *Multichannel News*, Steve Wilkerson of the Florida Cable Television Association, Gary Moore of Southern Energy Consultants and Mark Balmes of Southern Bell. Videotaped at Cable-Tec Expo '89 in Orlando, Fla.

- Aug. 29** New Jersey Chapter--Holiday Inn, Wayne, N.J. Topics: "BCT/E Category VII Review - Engineering Management and Professionalism" and "Financial Statements and the Technical Manager." Contact: Jim Miller, (201) 446-3612.
- Aug. 30-31** Great Plains Chapter--To be held in conjunction with the NCCA Show in Omaha, Neb. Topic: "Terminal Devices and Signal Security." BCT/E testing to be administered. Contact: Jennifer Hays, (402) 333-6484.
- Sept. 10-11** Dakota Territories Chapter--Golden Hills Resort, Lead, S.D. To be held in conjunction with the South Dakota Cable TV Association Show. Topics: "HDTV" and "Installer Certification Training." Contact: A.J. VandeKamp, (605) 339-3339.
- Sept. 11** Central Illinois Chapter--Sheraton Normal Hotel, Normal, Ill. Topic: "Vehicle Maintenance." Contact: Ralph Duff, (217) 424-8478.
- Sept. 13** Chesapeake Chapter--Holiday Inn, Columbia, Md. Installer Certification exams to be administered. Contact: Keith Hennek, (301) 731-5560.
- Sept. 13** North Country Chapter--Sheraton Midway, St. Paul, Minn. Topics: "BCT/E Category V - Data Networking and Architecture." Contact: Rich Henkemeyer, (612) 522-5200.
- Sept. 13** Big Country Meeting Group--Sweetwater, Texas. Information to be supplied. Contact: Albert Scarborough, (915) 698-3585.
- Sept. 16-17** Old Dominion Chapter--Holiday Inn, Richmond, Va. Topic to be announced. Contact: Margaret Davison-Harvey, (703) 248-3400.
- Sept. 19** Appalachian Mid-Atlantic Chapter--Holiday Inn, Chambersburg, Pa. Topics: "Digital Fiber Optics" and "1 GHz Distribution" with Dave Jordan and Jim Parker of C-COR. Contact: Richard Ginter, (814) 672-5393.
- Sept. 19** Greater Chicago Chapter--Location to be supplied. Topic: "BCT/E Category III - Transportation Systems." Contact: John Grothendick, (312) 438-4200.
- Sept. 19** Razorback Chapter--To be held in Little Rock, Ark. Topic to be supplied. Contact: Jim Dickerson, (501) 777-4684.
- Sept. 22** Rocky Mountain Chapter--Location to be announced. Topics: "Connectors and Cable" and "NEC Rules." Contact: Rikki Lee, (303) 321-7551.

Sept. 26 Great Lakes Chapter--Information to be supplied. Contact: Daniel Leith, (313) 549-8288.

Sept. 26 Piedmont Chapter--Location to be supplied. Topic: "Safety, System Grounding and Bonding." Contact: Rick Hollowell, (919) 968-4631.

Sept. 27-29 Dixie Chapter--To be held in conjunction with 1990 Alabama State Show. Contact: Rickey Luke, (205) 277-4455. Information to be supplied.

***Sept. 25** Satellite Tele-Seminar Program, "*Cable Vs. The Telcos (Part Two)*." Plus "*Local Origination Equipment and Its Use (Part One)*" with Jay Dorman of MCPS Video Industries Inc. and Lenny Melamedas of UA Columbia Cablevision of New Jersey. Videotaped at Cable-Tec Expo '89 in Orlando. To air from 12-1 p.m. ET on Transponder 2 of Galaxy III.

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

Legislative Watch: Technical Standards

By Stephen Ross, Esquire
and Robert Primosch, Esquire
Fletcher, Heald and Hildreth

Stephen Ross was recently appointed Of Counsel to SCTE by the Society's board of directors. In this capacity, he will update the board on activities in Washington, D.C., relating to cable regulation.

Legislative Watch is a new Interval feature offering reports from Ross on current legislative issues facing the cable industry.

This year's avalanche of pending cable legislation on Capitol Hill has inspired considerable debate on "high profile" issues such as must-carry, program distribution, rate regulation and telco entry. Given the political weight of these issues, it is not surprising that many Washington observers have paid relatively little attention to the issue of technical stan-

dards. Nevertheless, the cable industry's technical community must remain vigilant, for in one form or another technical standards will be an integral part of the industry's regulatory future.

The FCC initially adopted cable technical standards in 1972 pursuant to its landmark *Cable Television Report and Order*. Under those standards, the FCC required cable operators to meet minimum signal quality requirements for Class I (TV broadcast) channels, but did not impose such requirements for the video signals on Class II, III and IV channels. The FCC also permitted local franchising authorities to impose more stringent technical standards for all classes of channels. In 1974, the FCC concluded that local technical standards had created an inconsistent and therefore unworkable regulatory

framework for the industry, and thereafter restricted franchising authorities from imposing technical standards more stringent than those imposed by the FCC. In effect, the FCC's action pre-empted all government regulation of Class II, III and IV channels.

In 1985, the FCC concluded that the establishment of technical standards should be left to market forces. Accordingly, the FCC announced that it would no longer enforce any specific technical standards for cable system signal quality. In so doing, the FCC transformed its minimum performance standards for Class I channels into "voluntary guidelines." As before, local franchising authorities could not impose more restrictive requirements for Class I channels, and could not regulate Class II, III and IV channels at all.

Pursuant to a court challenge from the City of New York, the U.S. Supreme Court upheld the FCC's 1985 action as to Class I channels but ordered the FCC to reconsider its action as to Class II, III and IV channels. At present, the FCC is conducting a rulemaking in which the FCC has proposed to extend its Class I "voluntary guidelines" to the video signals on the other classes of channels, and to pre-empt local authorities from imposing more stringent local standards. This rulemaking is currently on the FCC's "back burner," and no action is expected for some time.

Although the FCC has not acted on its technical standards rulemaking, two recent cable bills introduced in Capitol Hill provide for federally-imposed technical standards. For example, the draft of the bill recently passed by the Senate Commerce Committee requires that all "must-carry" signals be viewable on all television receivers connected to a cable system, but that a "must-carry" station may be required to pay any costs

associated with delivering a minimum signal strength to the headend (-45 dBm for UHF signal and -49 dBm for VHF signals). The draft also requires the FCC to establish minimum technical standards and gives the FCC the power to enforce those standards. Most significantly, the draft also provides that once the FCC establishes its technical standards, local franchising authorities may not establish or enforce their own technical standards.

Similarly, the bill recently circulated in the House by Rep. Markey requires the FCC to establish minimum technical standards. By contrast, however, the Markey bill specifically permits local franchising authorities to condition the awarding of a franchise or franchise renewal upon the cable operator's acceptance of more restrictive local technical standards. Obviously, this is not a happy scenario for the cable industry.

In sum, although the Senate Committee bill has been receiving most of the press lately, the cable industry's technical community should not ignore the implications of the Markey bill. Unless forewarned, those legislators supporting the Markey bill may not recognize why the technical standards issue is so critical to the industry. Hence, all system operators must ensure that their representatives in the Senate and the House fully understand the consequences of locally imposed technical standards. Otherwise, the industry may find itself once again tangled in a web of local regulation from which it has been trying to escape for nearly 20 years.

If you have questions or comments concerning cable legislation, please send them to the following address:

Legislative Watch/The Interval
c/o SCTE
669 Exton Commons
Exton, Pa. 19341

Attendees Tour Nashville Network



Les Read

Expo attendees view The Nashville Network's satellite dishes during a tour of the channel's studios held June 24.



Les Read

Country music legend Roy Acuff (center) meets with expo attendees, including Jim Stilwell and SCTE At-Large Director Tom Elliot, during the tour.



SCTE Director of Chapter Development and Training Ralph Haimowitz and Region 6 Director Bill Kohrt congratulate officers of the Dairyland Chapter on having been elevated to chapter status.

Chapter and Meeting Group Spotlight

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

The Chesapeake Chapter had an attendance of 56 people at its second meeting of 1990, held April 12 at the Holiday Inn in Columbia, Md. According to chapter President Keith Hennek, the seminar was entitled "CLI, CLI and More CLI," and featured the FCC's Robert Mroz, Jim Walker and John Wong.

"Dom Stasi from Flight Trac briefed our members on flyovers," Hennek reported. In the afternoon, Fred Beau and Robert Gordon of Orion discussed ground-based measurements. The remainder of the

session offered short demonstrations of various CLI equipment by Vitek, Trilithic, Wavetek and ComSonics.

The Dairyland Chapter recently held a series of meetings offering training on the Society's Installer Certification Program. Steve Palchik of ATC Cablevision of Wisconsin conducted training sessions on the program April 11 and May 23 at the Howard Johnson Motor Lodge in Eau Claire, Wis., while Saconna Blair of Jones Intercable presented program tutorials March 28 and May 9 at the Amora Villa Motor Lodge in Appleton, Wis.

The chapter also utilized this unique two-meeting format for a series of sessions intended to train service technicians. Gary Wesa of ATC spoke at the sessions held May 30 and June 13 at the ATC/N.E.W.

Offices in Green Bay, Wis., and Joseph "Shaz" Sherer of Viacom gave presentations May 31 and June 14 at Viacom's office in Greenfield, Wis.

The chapter comments that it conducts seminars over two days to allow (attendees) more flexibility to participate in these technical training opportunities.

Eighty-three people attended **The Dixie Chapter's** May 16 meeting, which was held at the Holiday Inn Homewood in Birmingham, Ala. Secretary/Treasurer Rickey Luke reports that the event featured a series of presentations including: "Lightning Protection" with Jones Intercable's Roy Ehman, who covered outage causes and control and lightning protection for systems and headends; "CLI and Dipole" with Tommy Coolidge and Larry Searcy, who demonstrated the use of dipole antennas and covered CLI and leakage control; "Leakage Control" with ATC's David Franklin, who covered connectors and using the proper connectors and correct tools; and "Cable's Horizons" with SCTE Region 12 Director Walt Ciciora, also of ATC, who discussed CableLabs, consumer interfaces and competitive HDTV technologies.

The Florida Chapter attracted 96 attendees to its June 6 meeting, held at the Microdyne office in Ocala, Fla. The event featured the presentations "Lightning Protection and CATV Plant" with Roy Ehman of Jones Intercable, "Introduction to Microdyne" with George Bell of Microdyne, "Headend Delivery Systems and Operational Maintenance" with Jim Grabenstein of Microdyne, "Satellite Antennas, Field Alignment and Adjustment" with Leroy McKay and Mike Ruck of Microdyne and "New Developing Technologies" with Don Woodworth of Microdyne.

The meeting also featured the election of new chapter officers: Keith

Kreager, president; Pat Skerry, treasurer; and board members Denise Turner, Al Burnett and Lanny Dellinger.

The Heart of America Chapter held a seminar April 6 and 7 at the Best Western Bavarian Inn in Des Moines, Iowa, reports chapter Vice President of Membership Terry Olson. "Forty-three people attended the training sessions, which were devoted entirely to fiber optics. There were four excellent speakers who spoke on everything from the history of fiber to 'hands on' splicing experience. They were Rick Cole, Wendell Woody and Troy Warton of Anixter and Mike Witcraft of AT&T.

"After one technician was done splicing, I heard him say it was a 'piece of cake.' Well, maybe he exaggerated a bit, but it is something many of us will become familiar with over the next couple of years.

"Speaking of splicing, we also learned that the most common connector and splice the CATV industry uses is the F connector. This is not big news to us. But we all need a reminder to check and double-check the quality of our F connector installations."

The Inland Empire Chapter's May 30 meeting, held at Cavanaugh's Inn at the Park in Spokane, Wash., was devoted entirely to "Fiber Optics." Chapter Secretary Carl Sherwood reports that Mike Kaus of AT&T spoke on the production of fiber, the design and various types of fiber cable, splicing, loss, reflections and construction. Mike Kelly of Anixter Cable TV covered lasers, losses and budgeting for the design of a fiber system. Twenty people attended the meeting.

The Michiana Chapter's May 16 meeting, held at Gene Van's Studio in Mishawaka, Ind., featured presentations by Wendell Bailey of

NCTA on "Reregulation and Future Technologies" and Mark Carter of AM Communications on "Addressable Tap Security and Status Monitoring."

The Miss-Lou Chapter met April 20 at the Holiday Inn in Baton Rouge, La. A number of new chapter policies were discussed during the event's business meeting. The chapter now plans to administer BCT/E testing at every future meeting. The chapter also will provide chapter membership cards to each local member, as well as purge its membership list of all unpaid members.

Lynn Watson of Anixter discussed "CLI and the FCC's Form 320," providing, in the words of Vice President of Records Charles Thibodeaux, "a good interactive seminar between the speaker and the members." Chapter Vice President of Training Paul Valiante spoke on the BCT/E program. The 24 attendees then watched a videotape on BCT/E Category II, "Video and Audio Signals and Systems," and concluded the event with a BCT/E testing session.

The New England Chapter met April 25 at the Sheraton in Boxborough, Mass., reports chapter Secretary Jeffrey Piotter. "The morning session was devoted to BCT/E Category VI, 'Terminal Devices.' Joe Amado of Jerrold Communications covered this topic skillfully. The afternoon session covered BCT/E Category IV, 'Distribution Systems.' Richard Wraff of Scientific-Atlanta covered all aspects of a distribution system. There were 30 people in attendance."

The chapter's Upper Valley Group held its first meeting May 3 at the Sheraton North Country Inn in West Lebanon, N.H. Group Secretary Robert Solari reports that "Vin Kajunski of the FCC opened his presentation by explaining that he is the

only man in the New England area who has the authority to shut down a cable system if FCC regulations are not upheld. He gave an overview of the history of CLI and noted that, according to national statistics, the New England region is rated very high in terms of complying with FCC regulations. His presentation was excellent. Wendy Springer of ComSonics brought in CLI equipment and explained how to use it effectively. Her presentation also was excellent. Dan Monahan of TVC Supply brought in the Searcher line of CLI equipment and explained his procedures for using it. His presentation was, again, excellent. Looking at the big picture, I believe our first group meeting was very successful. Everyone left the meeting with knowledge and information they did not have when they came in, which is our main goal."

In reference to its June 27 meeting, held at the Holiday Inn in Wayne, N.J., The New Jersey Chapter's Secretary Jim Miller comments, "As lightning season is fast approaching, we thought it would be an opportune time to have a meeting dedicated to AC and standby powering. This meeting should have been titled 'Everything You Ever Wanted To Know About System Powering.'

"Bob Higgins of Vision Cable started the day off by presenting an IBM-compatible program used to calculate power requirements. This program was made available to all attendees. Chuck Turner of Control Technology gave an excellent graphic presentation on battery requirements, AC power and standby power. Greg Castelli of Daycom/Alpha reviewed maintenance of standby power supplies and the other options available. Jerry Schultz of Power Guard reviewed a new strand-mounted unit, and Dennis Geltmacher of Lectro reviewed his company's approach to

standby power supplies. Sixty-nine people attended the meeting."

The Oklahoma Chapter's May 9 meeting, held at the Applewoods Restaurant in Oklahoma City, featured a presentation by Dick Beard of U.S. Cable on fiber-optic construction, splicing, testing and installation. The meeting also featured Gary Beikmann of Monte R. Lee and Co. demonstrating and speaking about his company's CAD equipment for system layout and design.

The Old Dominion Chapter met May 6 and 7 at the Holiday Inn in Richmond, Va. Chapter Secretary/Treasurer Margaret Davison-Harvey reports that Sunday featured presentations by Buck Dopp of Storer and David Lee of Continental Cablevision on management's expectations of their technical staff in the '90s. "Off-Premises Addressability" was the topic of Monday's sessions, which featured speakers Scott Henry of Midwest Cable TV covering the Matrix system and John Cochran of Scientific-Atlanta covering addressable interdiction.

The chapter also reported on its June 3 BCT/E testing session held at the offices of Continental Cablevision in Richmond. Examinations were administered to 13 people at the event, which was proctored by chapter President Lonnie Elswick.

"Calibrating CLI Testing Equipment" was the topic of **The Razorback Chapter's** May 16 meeting, held at Howard Johnson's in Little Rock, Ark. The guest speaker, Mel Jenschke of TCA, stressed that CLI equipment be kept accurate. Thirty-nine people were in attendance.

The recently elevated **Sierra Chapter** presented a seminar entitled "The Real World of Fiber Optics" June 14 at the Roseville Community Center in Roseville, Calif. Speakers included Mike Kaus of AT&T, who presented the basics of fiber-optic

principles, including fiber fabrication, light transmission and cable specifications and manufacture. Mike Shafer of Anixter spoke on system design and architecture, AM and FM transmission, loss budgeting, laser transmitter types, real world applications and his personal experience from operating systems. Forty-five people were in attendance.



Attention CATV Wizard Owners!

Jim Kuhns, author of SCTE's *CATV Wizard* computer disk, has found a small "glitch" in the program for calculating CLI leakage. If you wish to have your disk corrected to contain the revised program, please send your *CATV Wizard* floppy disk to the following address:

James H. Kuhns
Continental Cablevision
10160 W. Nine Mile Rd.
Oak Park, MI 48237

Please note: The only way to have your *CATV Wizard* disk corrected is by sending it to Kuhns. Please do not return it to SCTE. Thank you for your cooperation!

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

Editors:—Howard Whitman
Bill Riker

HEAD WITH EXTENDED QR.

One of the problems of planning ahead is knowing what to plan for. The second problem, once you've gotten a degree of insight to the first, is knowing what you'll have to work with. Everybody already foresees the need for more bandwidth capacity. Whether it be for more channels, HDTV or whatever...you'll likely need a 1GHz cable product in your future.

The good news from Comm/Scope is that we have that cable product, Quantum Reach. QR is already the best handling cable made. It is lightweight yet offers 'heavyweight' performance. It is competitively priced, too. Quantum Reach offers advantages no other coaxial product can come close to. And, now, QR also delivers 1GHz bandwidth capacity. The kind of capacity that you'll need to have in your future plans.

Now, when you're planning ahead, you'll know what to plan with, QR. For more information about QR or any of our Extended Reach cable products, contact your nearest Comm/Scope representative or call Comm/Scope, Inc. (800) 982-1708 or (704) 324-2200.

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

Comm/Scope, Inc., P.O. Box 1729, Hickory, NC 28602. Phone: (800) 982-1708 or (704) 324-2200.

Reader Service Number 30.

ATV status

(Continued from page 60)

equipment produce spurious components that are visible in TV pictures transmitted via cable. With today's high channel capacity systems, intermod distortion is often the limiting factor in picture quality. Second- and third-order intermod products will be generated and their threshold of visibility determined, as well as a range of intermod distortion levels, to be recorded and later evaluated subjectively in Ottawa by the ABS Test Centre.

Microreflections: Signal reflections due to impedance mismatches between cables, splices, amplifiers, multitaps and other system components cause reflections that are likely to be visible in ATV pictures, and worse, may cause more objectionable effects in ATV than in conventional NTSC. Reflections induced on time- or bandwidth-compressed signals may be all the more visible with re-expansion of the signal at the ATV receiver. Threshold and wide-range subjective testing will be conducted.

Incidental carrier phase modulation (ICPM): This cable system impairment arises from the cumulative phase instabilities of satellite receivers, headend modulators and heterodyne processors, and set-top channel converters. Since many of the proposed ATV systems propose new modulation schemes, as opposed to the vestigial sideband AM method used for NTSC, we must investigate the effects of cable ICPM on these new ATV systems. ICPM may cause completely different subjective effects on ATV pictures. Threshold and wide-range subjective testing will be performed here as well.

Other impairments: In addition to the major categories of

impairments previously described, CableLabs will test the effects of discrete frequency interference, high-level sweep systems used by cable operators and hum and low frequency noise. Finally, each ATV system will have its peak power measured and analyzed for its possible impact on channel loading and overall distortion performance.

The testing schedule

Testing of the first system is currently planned to begin in early November. Testing of each system is expected to take a total of eight to 10 weeks in the broadcast and cable laboratories. An additional period of perhaps six weeks will be needed for subjective testing in a Canadian laboratory, which will run concurrent to the lab testing of the next ATV system. Lab testing of the seven systems should be completed by the end of April 1992.

Field testing will follow in the second and third quarters of 1992 according to procedures currently being developed by the FCC Advisory Committee. The committee's final report and standards recommendation to the FCC is due by the close of the third quarter of 1992. The commission plans to make its standards decision on a simulcast system during the second quarter of 1993.

You can see that although HDTV may grow slowly in the marketplace, the next 2½ years will involve intensive planning and decision-making. The cable industry's considerable engineering talent needs to participate in the planning and deliberations of the FCC Advisory Committee if we are to have an ATV system that meets our needs. Operators must send representatives to these meetings and make their views known. Please contact CableLabs if you need assistance in receiving the meeting schedules for the working parties of the committee. []

The message is clear

The future of fiber optics and computer networking is at FiberTour/ComputerNet'90



COMPUTERNET'90

October 24-26, 1990
World Trade Center
Boston

Discover new technologies and applications of fiber optics and computer networks at the largest national marketing event of its kind!

Plan to attend FiberTour/ComputerNet'90. For attendance/program information or details on exhibiting, call 617-834-4703.

Conference topics include:

Fiber optic applications...Fiber to the subscriber, CATV, broadband ISDN, SONET technology, video transmission, coherent communications, integrated optics
Networking options...Advanced future networks, FDDI, ISDN, LANs, wide and metropolitan area networks, fiber networking
Networking management strategies...OSI standards, LAN management, interoperability, private network options, network management perspectives
Fiber installation...Approaches and standards, outside plant, splicing, connectors, test and measurement

Sponsored by the American Electronics Association

Reader Service Number 31.

Z Coring Stripping Socket Tools



Vortex Design
Allows for
Zero Clogging
of Dielectric

Tapered stripping blade tapers the aluminum sheath of outer conductor ends: no burrs or sharp edges can be seen. This allows for easy installation of hex clamp nut. Also O-Ring will not be damaged, which leads to CLI leakage and connector failure.

196 Morgan Avenue
P.O. Box 955
Elyria, Ohio 44035
Office & Plant (216) 324-4941
Fax # (216) 324-4947



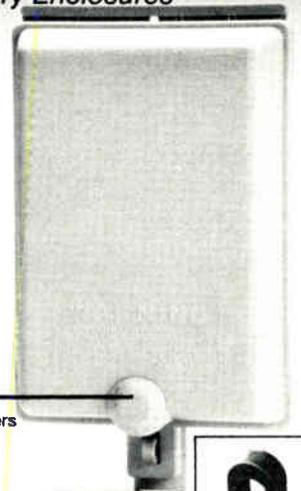
ENGINEERED TO MAKE THE DIFFERENCE

Reader Service Number 53.

THE ROUGHNECKS™

Subscriber Terminal Entry Enclosures

- Reduces Field Costs
- Dress Up Your Drops
- Improve the Perceptual Value of Your Service
- Increase Customer Response Time
- Protects and Shields the Weather Away from Your Drop Passives
- Reduces 3rd Party Tampering Patent Pending



Locking Terminator

Can be locked with any manufacturers locking terminator

For a Free Sample Kit for evaluation, prices & complete catalog, call or write our Distributor Representatives or



Engineered to Make the Difference

Replaceable Hasp



Patent Pending

196 Morgan Ave.
P.O. Box 955, Elyria, Oh. 44035
Phone (216) 324-4941
FAX (216) 324-4947

Reader Service Number 76.

Trackmolding, Riser Guard & Accessories

OLYMPIC

is architecturally more
attractive for apartment
& commercial post wiring.



For a
Free Sample
Kit for evaluation,
prices & complete
catalog, call or write
our Distributor
Representatives or TM



Engineered to Make the Difference
P.O. Box 955, Elyria, Oh. 44035
Phone (216) 324-4941

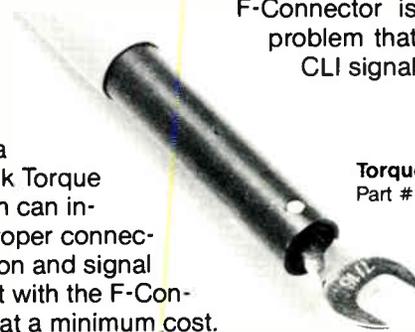
Reader Service Number 77.

CLI Maintenance Tool

Torque Wrench

Improper connection of the F-Connector is the #1 problem that leads to CLI signal leakage.

Using a Multilink Torque Wrench can insure proper connectorization and signal contact with the F-Connector at a minimum cost.



Torque Wrench
Part # 5525-TWD

© Aug. 1989

\$19⁹⁵
each

Call us for your nearest
Multilink representative

196 Morgan Avenue
P.O. Box 955
Elyria, Ohio 44035
Office & Plant (216) 324-4941
Fax # (216) 324-4947



Engineered to Make the Difference

Reader Service Number 78.

Cable's position

(Continued from page 21)

to our subscribers. It is only good business to deliver what subscribers want. Fortunately, broadcast technologists recognize the importance of cable. While acrimonious rhetoric is employed by some in the upper levels of broadcast and cable management, the engineering community is working together to ensure that things will work from a technical perspective.

Cable has a number of unique needs.

These include scrambling, encryption and addressability. Also, the cable signal must be delivered via satellite to cable headends. The energy in cable signals is important because of the number of signals carried. Unnecessarily high signal energy means amplifiers, laser diodes and other devices will reach into their non-linear regions of operation and generate undesirable distortions.

Cable should not lose sight of the population of NTSC receivers. There are currently nearly 200 million NTSC sets and nearly 75 million NTSC-based VCRs. In excess of 20 million new NTSC receivers

are added to this population each year. These NTSC receivers have a lengthy life expectancy, typically 12 to 15 years. Many survive well beyond that. They will be with us for a long time to come.

Given the cost and size of an HDTV receiver, it is likely that for a couple of decades only one HDTV receiver will exist in most homes. The rest of the home will be sprinkled with NTSC receivers. Thus the technical standard for HDTV must do nothing to impair NTSC receivers.

From a cost perspective, cable must be sure it does not have to raise rates for the NTSC majority to cover the costs of HDTV delivery to a small—less than 1 percent—opulent minority. This would make for bad business and very bad politics. We believe that this will not be necessary. Cable's best HDTV strategy is to improve plant to deliver the best NTSC possible. This will allow HDTV carriage without economic penalty.

Improving NTSC

For decades, NTSC was better than consumer electronics. In that situation, it makes no economic sense to deliver a signal that could not be displayed. Resources are better spent making sure more subscribers have access to signals and have this access at reasonable rates.

But things have changed in the last five years or so. Now, consumer electronic equipment can display more quality than the NTSC standard can support. It is now time for the transmission path to catch up to the capability of consumer electronics.

There are two fundamental constraints to the improvement of NTSC: compatibility with existing receivers and the existing huge population of receivers.

There are two kinds of picture impairments: those due to the NTSC baseband standard and those due to the manner in which the NTSC modulation structure interacts with the transmission path. The design of the NTSC modulation scheme makes it particularly vulnerable to transmission path problems. A modulation scheme based on modern communications theory would be substantially less subject to transmission path deficiencies. Unfortunately, such a scheme would be incompatible with the existing population of TV receivers.

Baseband impairments include dot crawl and cross color. Dot crawl is the movement of tiny dots along the edges of colored objects. Cross color is the spurious rainbow that appears on monochrome detail (such as Johnny Carson's checkered jacket). These are the consequence of the color information being

NOT ALL TDRs ARE USER FRIENDLY.

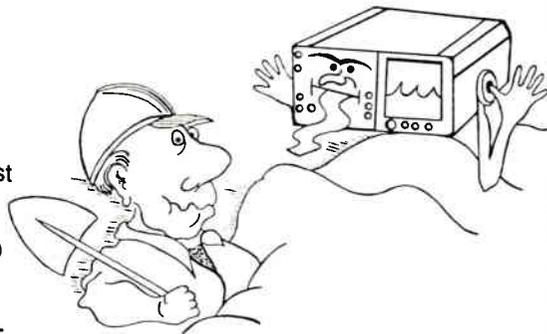
Most TIME DOMAIN REFLECTOMETERS (TDRs) require a college degree to operate. Many need programmer level interaction. And some cost an arm and a leg.

Not so with RISER-BOND INSTRUMENTS' TDRs. "High Tech Simplicity" means COST EFFECTIVE cable fault location.

RISER-BOND INSTRUMENTS earned its stripes by offering a wide range of



Model 1210 Universal TDR, Cable Fault Locator



portable TDRs, from the most powerful and versatile Model 1210 with auto-search and thermal printer, to the handy Model 2901B+ take-anywhere units.

Switch on and use — no tedious menus to drive through. Test and locate faults directly on any metallic paired cable, whether coaxial or twisted pair with no risk of damage and with absolutely no programming knowledge.

Only \$4,395 complete!

RISER-BOND

INSTRUMENTS

Reader Service Number 33.

505 16th St., Box 188
Aurora, NE 68818
1(800) 876-1161

In Canada Contact:

ARGUS TELECOM

1 (800) 363-1888

shoehorned into a black and white signal.

The two kinds of information get in each other's way. The process for combating this is called "comb filtering." There are a variety of techniques for improving the performance of comb filters. While all make some compromises, smart comb filtering does a very good job of minimizing these artifacts. Other NTSC artifacts include scan line visibility and flickering of bright image areas. These can be minimized by line doublers. They double the number of scan lines by estimating the information not transmitted between the lines. While this does not double the vertical resolution, it does minimize these NTSC artifacts.

Transmission path impairments are much more difficult to deal with. They come in two varieties: coherent and non-coherent. Coherent impairments are more severe. They include ghosts, micro-reflections, cross-modulation, co-channel interference and beats between carriers. Non-coherent impairments include random noise and impulse noise.

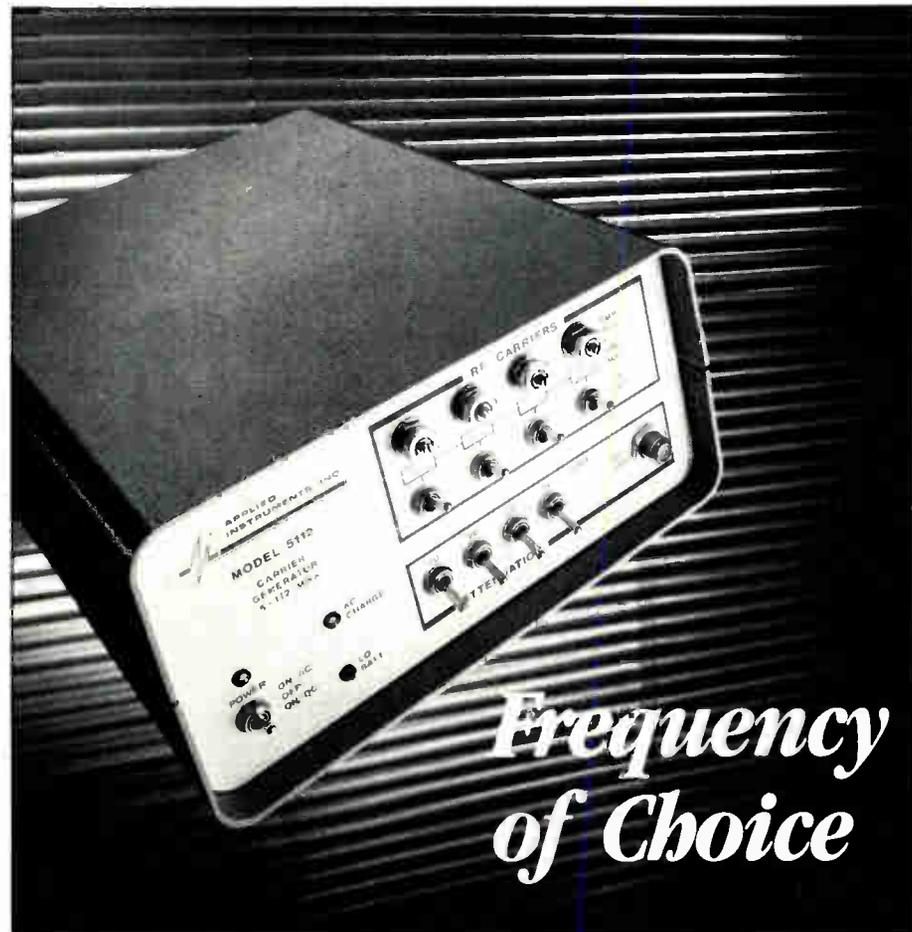
The principal weaknesses of the NTSC standard are its vestigial sideband (VSB) modulation scheme, the use of simple amplitude modulation, the interleaving of the color signal, the separate audio carrier and the addition of stereo. VSB modulation was used to save bandwidth. As a side effect, when the signal is distorted, VSB introduces complexities that are very difficult and expensive to remove. This is the biggest impediment to ghost cancelling.

The biggest impediment to cross-modulation and beats is the number of high energy carriers in the signal. The simple method of amplitude modulation makes the NTSC signal vulnerable to noise in the transmission path. These defects are extremely difficult and costly to attack while still remaining compatible with the NTSC standard. The NTSC standard has our hands tied; we have very few options.

There is one last improvement to NTSC that subscribers demand: more channels. More programming becomes available almost yearly. Subscribers are anxious to have it.

If we insist on remaining compatible with the large population of existing receivers, there is little we can do to improve system performance. After we exhaust the few tools available to us, we must upgrade the plant itself. Fortunately, this can be done in a cost-effective and evolutionary manner.

Two of the many techniques for improving NTSC that directly support a strategy for HDTV are the fiber backbone coupled with amplifier upgrades and super distribution. The first of these techniques



Frequency of Choice

Applied Instruments multi-carrier signal generators give you frequency of choice. Your choice of four individually or simultaneously activated RF carrier frequencies can be factory installed into either of two models. The rack-mountable 1645 model is designed for forward alignment of broadband local area networks. The fully portable 5112 model, designed for return alignment, features rechargeable NiCad batteries that provide up to 6 hours of continuous field use and RS 232C circuitry for remote activation. Together, they give you a complete multiple application RF test system for evaluation and maintenance of broadband local area networks. Delivery of custom built units takes as little as four weeks. Exercise your frequency of choice today. Call Doyle Haywood, President, Applied Instruments, or write for our full color brochure.

317-782-4331

Applied Instruments, Inc.
51 South 16th Avenue
Beech Grove, IN 46107



APPLIED INSTRUMENTS, INC.

BROADBAND COMMUNICATION INSTRUMENTATION

Reader Service Number 34.

yields more channels and less noise while the second reduces microreflections and non-linearities.

In the typical cable system (Figure 2), long cascades of amplifiers build up noise and limit bandwidth. While the cable itself is often capable of transmitting 1 GHz and more, the amp cascades are limited to 650 MHz or so. In addition, the long cascades are a serious reliability hazard.

The fiber backbone approach (Figure 3) breaks the cable system into a multitude of much smaller cable systems with amp cascades limited to four to six amps. Each of these small cable systems is fed with a

fiber link from the headend. The advantages include significantly lowered vulnerability to amp outages, reduced bandwidth restrictions and noise buildup due to amplifiers in series and greatly reduced ingress. The latter effect makes two-way cable practical.

A major attraction of the fiber backbone is that its implementation cost is low. Fiber is "overlashed" onto the existing trunk plant. The in-place cable is broken into segments and used for the small scale cable systems. Some of the amplifiers are reversed in direction. Nothing is wasted.

In the typical cable system, 10 percent

of the cable footage is in the trunk, 40 percent of the footage is in the tapped feeder and 50 percent is in the drops. The cost-effectiveness of the fiber backbone technique stems from the fact that it involves only 10 percent of the plant footage. In some design studies, the cost of implementing this upgrade came to less than \$25 per subscriber.

The fiber backbone effectively cures most of the ills of the trunk part of the plant. This improves NTSC delivery as well as prepares the trunk plant for HDTV.

If we now turn our attention to the feeder plant (Figure 4), we find that we must run higher signal levels to support the tapping of energy to serve drops to customers. The higher signal levels mean that we begin to reach into non-linear areas of the amplifiers' operating characteristic. Non-linear distortion builds up. In addition, the taps are not perfectly impedance-matched to the cable. Consequently, the signal is reflected back and forth between the taps resulting in a smearing of the picture. This phenomena is called "microreflection" for two reasons: The strength of the reflections is low and the time delay of the reflections is short.

Rogers Cable of Canada has suggested the answer to these difficulties. It has

called its technique "Super Distribution" (Figure 5). In one form of its implementation, line extender amps are structured to have up to three hybrid amplifier chips. One feeds the next line extender amp, one feeds half of the taps back to the previous line extender and the third feeds half of the taps to the next line extender. The existing tapped feeder cable is cut in half between line extenders. New, untapped cable is overlashed to connect line extenders.

The consequences are that the signal level between amps is lower since that cable is not tapped. The signal level on the tapped runs is lower because they are shorter. Non-linearities are reduced and they do not build up as in the previous structure. Also, signal leakage may be less of a problem because of the lower signal levels. In addition, the number of taps in series in any cable is drastically reduced thereby reducing the amount of micro-reflections experienced by any one subscriber. This technique effectively cures the ills of the feeder portion of the plant. Rogers estimates the cost of this upgrade to be less than \$25 per subscriber.

With fewer amplifiers in series, the constraints on their design and operation are reduced. Higher bandwidths become practical.

Recently, Dave Pangrac of ATC has developed an extension of the fiber backbone approach that takes fiber farther into the plant. In one version, passive splitters are added to the fiber run from the head-end. Then, shorter runs into the neighborhood bring the optical plant closer to the home. Even fewer amps are interposed between the subscriber and the headend. In another implementation, low cost lasers are used as repeaters to feed the branches at the end of the trunk run. The potential of optical amps promises to yield further evolution of this technique.

Ready for HDTV

If the assumptions on HDTV timing are correct and if the assumptions for the need of better NTSC in the shorter term also are correct, cable will be ready for HDTV long before consumers are ready to spend the money these new receivers will demand. This will happen in an evolutionary manner over many years. It will be a cost-effective approach that will generate compensating revenues and economies of operation.

Reprinted with permission from the National Cable Television Association's "1990 NCTA Technical Papers."

When we say it'll be there, it'll be there



From your initial contact with KES to the time your supplies arrive at your warehouse, I'm here to make sure you receive the most prompt, accurate service in the business!

Nancy Schramm
KES Customer Service
Representative

CATV SYSTEMS AND SUPPLIES

KES

Klungness Electronic Supply

IT'S NO LIE!

Reader Service Number 35.

(800)-338-9292

OPTICAL SOLUTIONS THAT OPTIMIZE PERFORMANCE.

Magnavox has a line of sophisticated fiber optic products, including transmitters, couplers and receivers, that work in unison with your RF equipment to bring cost-effective fiber optic quality to your coaxial system. The result is a system with higher subscriber satisfaction and plenty of room to grow.



AM fiber optic products are currently available in rack mount and strand mount configurations.

By upgrading with fiber optics you boost system capacity, reliability, quality and profits. By using Magnavox you get a quality system designed by fiber optic professionals.

So, bring your cable system into the 21st century with the Magnavox Fiber Optic System. Call your Magnavox representative to find out more.

MAGNAVOX

CATV SYSTEMS, INC.

100 Fairgrounds Drive, Manlius, NY 13104
(315) 682-9105 Fax: (315) 682-9006
Call 1-800-448-5171 (In NY State 1-800-522-7464)

Reader Service Number 36.

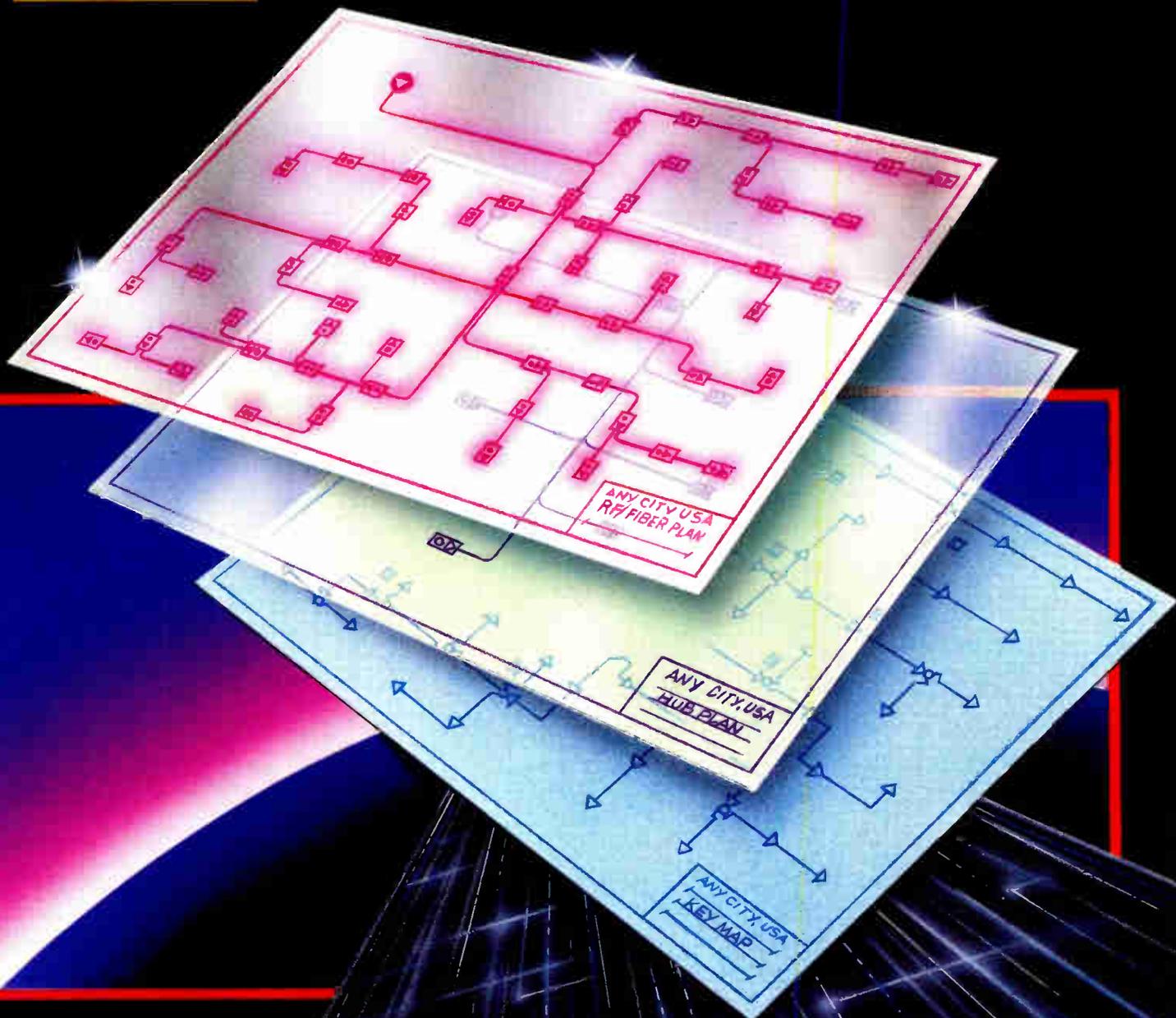
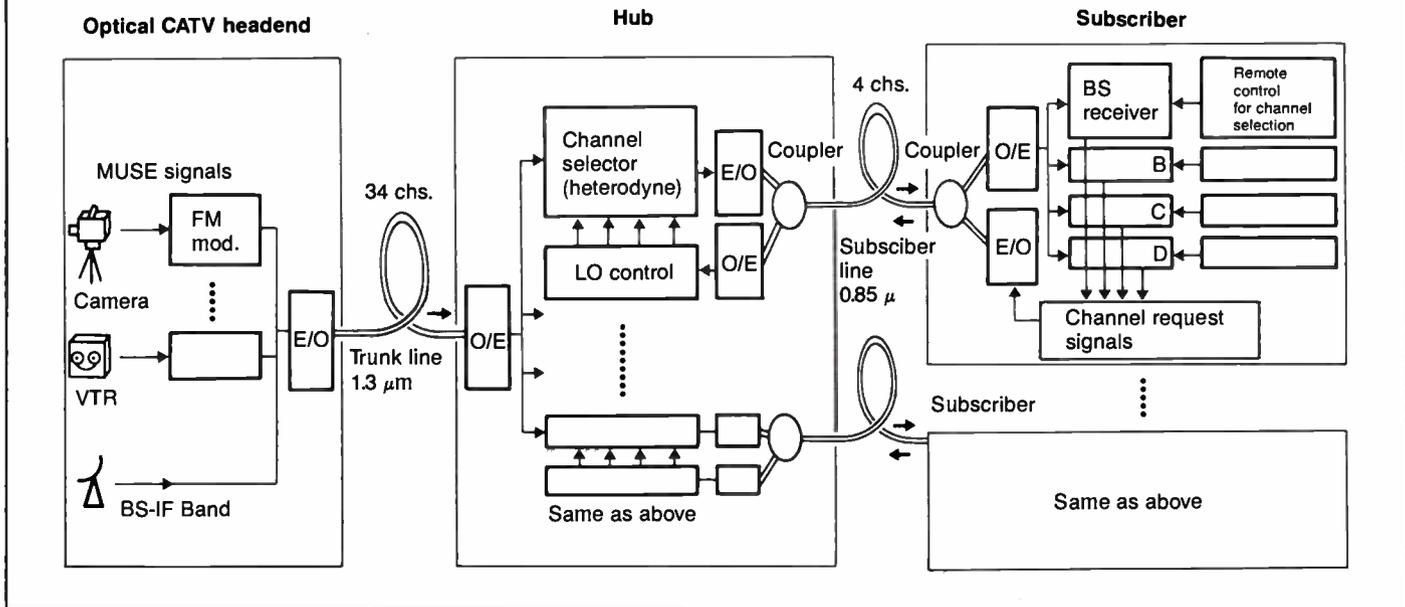


Figure 7: System configuration of demand access optical fiber CATV system



MUSE

(Continued from page 24)

than 44 dB (8.1 MHz). Thus, excellent HDTV pictures whose picture qualities are at least Grade 4 and whose unweighted S/Ns (signal-to-noise ratios) after demodulating are greater than 39 dB can be obtained.

Thus, this transmission experiment has proved that excellent HDTV pictures can be achieved by MUSE-VSB/AM cascaded transmission comprising a satellite and cable facilities.

Optical fiber CATV system employing demand access technique

The frequency allocation of MUSE-FM signals on the trunk line is shown in Figure 6. At the trunk line, 34 MUSE-FM signals are allocated with the frequency interval, 38.36 MHz, used in Japanese satellite broadcasting. At the subscriber line, any selected four channels are transmitted on the BS-IF band (1-1.3 GHz). The FM parameters of HDTV MUSE-FM signals are shown in Table 4.

The system configuration of an optical fiber CATV system for HDTV is shown in Figure 7. At the CATV headend, MUSE signals are frequency modulated and combined with the rebroadcasting MUSE-FM signals. Thirty-four channels of FM signals are transmitted over 20 km to the hub through a single-mode fiber by intensity modulation of an LD (1.3 μm).

At the hub, these signals are transformed into electrical signals. Any four signals can be selected by channel request signals from an individual subscriber employing a heterodyne technique. The selected four signals allocated in the BS-IF band modulate a low cost LD (0.85 μm) and are transmitted to each subscriber through an ordinary single-mode fiber.

At the subscriber, these signals are transformed into electrical signals, distributed to four conventional home receivers used for satellite broadcasting and then demodulated. The channel request signals are sent to the hub through the same fiber used for downstream transmission. The digital signal format of the remote controlled channel selector at the TV sets is adopted for the transmission of channel request signals.

The optical transmission parameters are shown in Table 5. Optical fiber couplers with a core diameter of 6 μm are used at both ends of the subscriber lines to obtain bidirectional transmission. These couplers also eliminate the higher order mode generated in the fibers when an ordinary single-mode fiber is used at a short wavelength.

The relationship between the received C/N ratio and the received optical power (P_R) when multiplexing 34 MUSE-FM signals on a trunk line is shown in Figure 8. In this figure, a dashed line indicates the C/N ratio when all channels are not modulated; a solid line indicates the effective C/N ratio, including distortion power as noise when all channels except the measured channel are modulated. In the frequency allocation chart shown in Figure 6, we can avoid the second-order dis-

Table 3: Experimental results

Facilities	Satellite system		Cable system				
	Frequency deviation (MHz)	Received C/N ratio (dB)	Received C/N ratio (dB)	Modulation depth (percent)	Unweighted S/N ratio (dB)	CTB (dB)	Grade of picture quality
Media General	16.8	23.5	44.5	83.3	41.0	-44	4
Jones Intercable	16.8	24.0	44.3	70.0	39.1	-53	4

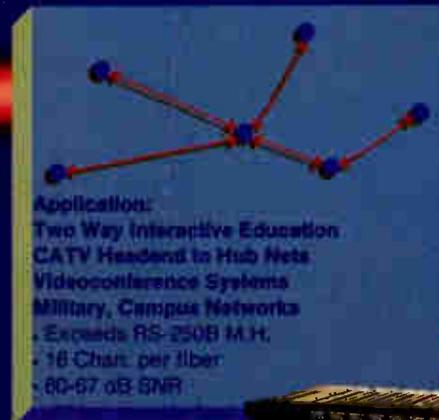
HIGH QUALITY FIBER OPTIC VIDEO

No Company Offers More Lightwave Video Solutions than American Lightwave Systems

LiteAmp™ AM OVER FIBER SYSTEM



FN6000 & FT1300 MULTICHANNEL FM SYSTEMS



LC SERIES SINGLE CHANNEL SYSTEM



ALS offers proven solutions and twelve years of fiber video experience, - more than any other lightwave supplier. Contact ALS with your application requirements.

ALS  **AMERICAN LIGHTWAVE SYSTEMS, INC.**

358 Hall Avenue, P. O. Box 1549, Wallingford, CT 06492, Phone (203) 265-8880, FAX (203) 265-8746



Table 4: Transmission parameters of MUSE

Items	Data
Video bandwidth	8.1 MHz
Frequency deviation	10.2 MHz
FM bandwidth	27.0 MHz
FM improvement	11.9 dB
Emphasis improvement	9.5 dB

tortions, but third-order distortions drop into the FM transmission band. The C/N ratio degrades effectively as the optical modulation depth (m) increases, because many third-order distortions also are frequency modulated and added in random frequency and phase, and behave like random noise. Therefore, the optical modulation depth giving the maximum C/N ratio can be determined when P_R is given. In the design for 20 km transmission on the trunk line, P_R is -12 dBm since the output of the optical transmitter is -2 dBm, and the optical loss of the fiber is assumed as 0.5 dB/km. In the case of Figure 8, the maximum C/N ratio that can be obtained is 28 dB.

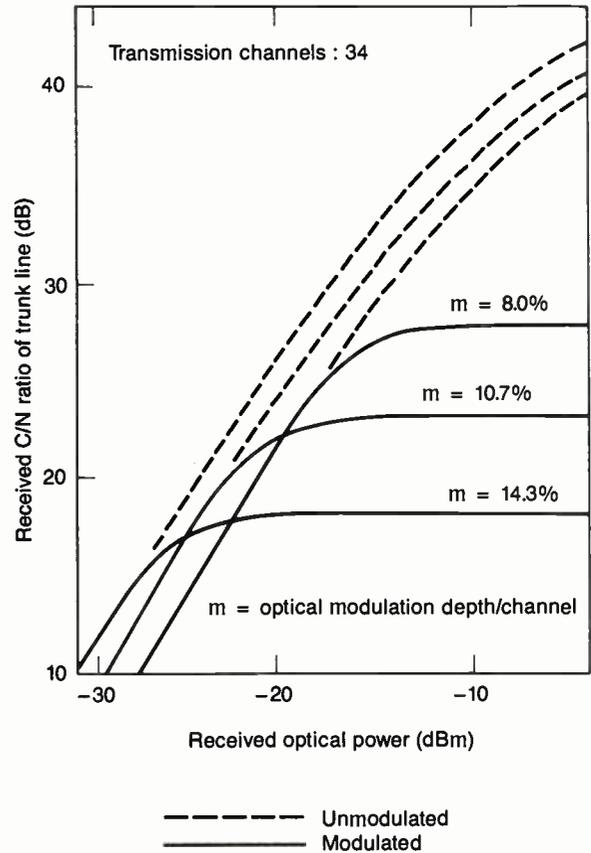
In the case of rebroadcasting HDTV from a satellite on CATV, the C/N ratio at a subscriber— $(C/N)_{total}$ —is given by the following equation:

$$\frac{1}{(C/N)_{total}} = \frac{1}{(C/N)_{sat}} + \frac{1}{(C/N)_{trunk}} + \frac{1}{(C/N)_{sub}}$$

where:

$(C/N)_{sat}$ is the received C/N ratio of the satellite link at the headend

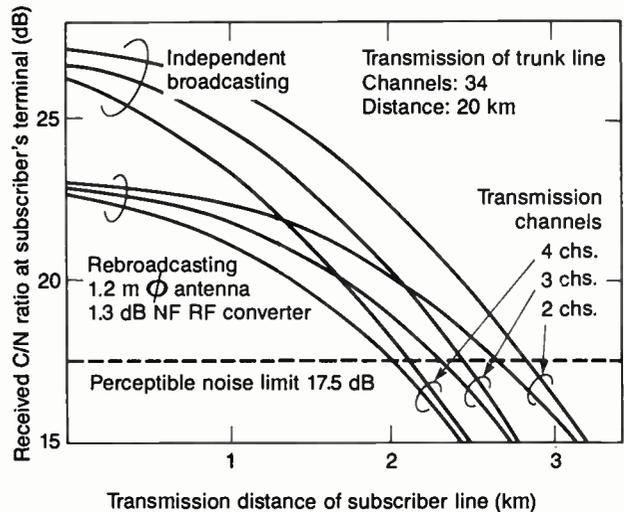
Figure 8: Received C/N ratio on trunk line

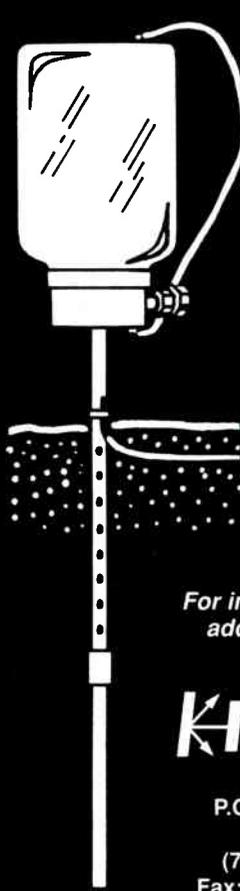


$(C/N)_{trunk}$ and $(C/N)_{sub}$ are the C/N ratios of the trunk and the subscriber lines, respectively.

We obtained $(C/N)_{sat}$ of 25 dB with a parabolic antenna of 1.2 meter diameter and an RF converter of 1.3 dB noise figure. If we design the system with $(C/N)_{total}$ of 17.5 dB, which gives the

Figure 9: Total C/N ratio of demand access optical fiber CATV system





DON'T LET THE DROUGHT KNOCK YOU OUT!

Your ground system is dry and not conductive. A scattered lightning cell appears and in the blink of an eye your equipment is down.

From mountain tops to the plains PolyPhaser's PolyRod systems can keep you communicating.

For information on this and our 450 additional Lightning Protection products, contact:

PolyPhaser CORPORATION

P.O. Box 9000 • 2225 Park Place
Minden, NV 89423-9000
(702) 782-2511 • (800) 325-7170
Fax: (702) 782-4476 • Telex: 272718

Table 5: Optical transmission parameters

	Trunk line	Subscriber line (Downstream)	Subscriber line (Upstream)
Optical source	InGaAsP-LD	GaAlAs-LD	GaAlAs-LD
Wavelength	1.3 μ	0.85 μ m	0.85 μ m
Threshold current	5 mA	15 mA	12 mA
Bias current of LD	40 mA	42 mA	16 mA (max.)
Optical power	-2 dBm (10/125)	+2 dBm (6/125)	-10 dBm (6/125)
Optical isolator	Isolation: 60 dB	not used	not used
Optical fiber	10/125 SMF		10/125 SMF
Optical coupler	—		2 x 2 type (0.85 μ m) 6/125 SMF
Optical receiver	InGaAs-APD	Si-APD	Si-PD

perceptible noise limit, the required C/N ratio for the cascaded transmission on the trunk and subscriber systems is greater than 18.4 dB.

The relationship between $(C/N)_{total}$ and the transmission distance of the subscriber line after 20 km transmission of the trunk line is shown in Figure 9 with the parameters of the number of channels on the subscriber line. Four MUSE-FM signals can be transmitted over more than 2 km, as shown in Figure 9.

HDTV on coax and fiber

The feasibility of HDTV services on coaxial cables has been demonstrated by this MUSE-VSB/AM transmission experiment. A demand access optical fiber CATV system for HDTV MUSE signals has been developed, and the possibility of the FTTH (fiber to the home) of HDTV also has been recognized.

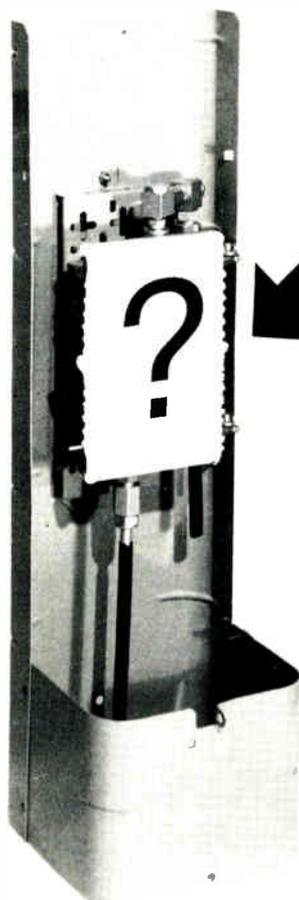
References

- 1 Y. Utsumi, S. Yamazaki, H. Arata, T. Susaki, M. Honda, Y. Iwadate, H. Miyazawa and T. Tokumoto, "HDTV Transmission Tests on Coaxial Cable via Satellite," *NHK R&D*, No. 6, pp. 34-47, August 1989.
- 2 R. Olshansky, V. Lanzisera, P. Hill, "Subcarrier multiplexed lightwave systems for broadband distribution," *IEEE Journal of Lightwave Technology*, LT-7, 9, pp. 1329-1342, 1989.
- 3 M. Maeda and M. Yamamoto, "FM-FDM optical CATV transmission and system design for MUSE HDTV signals," to be published in *IEEE Journal of Selected Area of Communications*, 1990.

Reprinted with permission from the National Cable Television Association's "1990 NCTA Technical Papers."

**LA SERIES DISTRIBUTION AMPLIFIERS
BEFORE YOU FILL
THIS SPACE....**

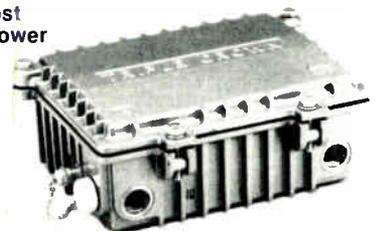
**TAKE THE TIME TO
FILL THESE SPACES**



COMPARE FEATURES	LA5000 SERIES	YOUR BRAND
Automatic Level Control	✓	
Selectable Equalizers & Slope Bandwidth	✓	
No Plug-In Pads or Equalizers Required	✓	
High Efficiency Switching Supply	✓	
External Matched Test Points	✓	
Universal Entry Ports	✓	
Input and Interstage Controls	✓	

The Triple Crown LA Series distribution amplifiers offer performance, features and flexibility unavailable from most competitive products. Our wide range of push-pull and power doubling models can be configured to exactly meet your needs.

Reader Service Number 39.



**TRIPLE CROWN
ELECTRONICS**

4560 Fieldgate Drive, Mississauga, Ontario Canada L4W 3W6 Tel: 1 (416) 629-1111 Fax: 1 (416) 629-1115

Antenna requirements

(Continued from page 27)

for a DBS (direct broadcast satellite) application and probably represents the maximum permissible limit of overdeviation. For cable TV applications a more conservative 25 percent overdeviation would probably be appropriate. For 25 percent overdeviation the constraint of Equation 5 becomes:

$$\text{EIRP} + 20 \log d \geq 47.03 \text{ dB} \quad (7)$$

The accompanying table shows antenna sizes for these cases.

MUSE: The link characteristics for the transmission of MUSE by satellite are described in Reference 2. In the reference a satellite link is described having an FM bandwidth of 27 MHz and a peak deviation of 5.4 MHz. Since the maximum baseband frequency is 8.1 MHz for the satellite transmission version of MUSE, it can be seen that the peak deviation of 5.4 MHz is exactly Carson's Rule deviation. For the 36 MHz bandwidth of a C-band satellite transponder, the corresponding peak deviation would be 9.9 MHz. Reference 2 indicates that the noise advantage due to emphasis in the MUSE system is 9.5 dB. An appropriate standard of quality for the reception of MUSE by cable systems is taken to be unweighted SNR of 41 dB. This standard is consistent with data presented in Reference 2. The requirement

$$\text{Unweighted SNR} \geq 41 \text{ dB is equivalent to the constraint: } \text{EIRP} + 20 \log d \geq 44.29 \text{ dB} \quad (8)$$

Antenna diameters required for C-band links of 36 MHz bandwidth

ATV system	Satellite EIRP (dBW)					
	35	36	37	38	39	40
NTSC	3.8	3.6	3.4	3.0	2.8	2.6
ACTV	3.8	3.6	3.4	3.0	2.8	2.6
(Broadcast standard)						
HDS-NA (25% overdeviation)	5.0	4.5	4.2	3.8	3.4	3.0
HDS-NA (50% overdeviation)	3.8	3.6	3.4	3.0	2.8	2.6
MUSE	3.8	3.6	3.4	3.0	2.8	2.6
SC-HDTV	3.8	3.6	3.4	3.0	2.8	2.6
HD-BMAC	4.5	4.2	3.8	3.4	3.2	2.8

This constraint, or minimum receive antenna requirement, is less stringent (smaller diameter antenna required) than the constraint for the reception of NTSC. The constraint for NTSC reception is:

$$\text{EIRP} + 20 \log d \geq 45.66 \text{ dB} \quad (9)$$

In other words, an antenna diameter adequate for the reception of NTSC also would be adequate for the reception of MUSE. For this reason the authors have elected to list the same antenna diameter requirements for MUSE and NTSC in the accompanying table.

SC-HDTV: The Spectrum Compatible HDTV (SC-HDTV) system developed by Zenith for terrestrial transmission has a top baseband frequency of 6 MHz. Very little information is

CONVERTER VALUE WITHIN YOUR BUDGET!

NEW and REFURBISHED
CONVERTERS & LINE EQUIPMENT
IN STOCK and AVAILABLE
for IMMEDIATE DELIVERY.

- JERROLD
- SCIENTIFIC ATLANTA
- PIONEER
- MAGNAVOX
- SYLVANIA
- C-COR

"CALL TODAY"

CCS CORPORATION



PHONE: 812-829-4833

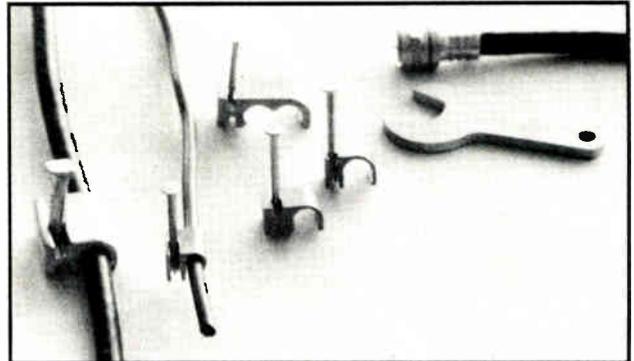
FAX: 812-829-4835

IN COMPLIANCE WITH THE FCC

Reader Service Number 40.

M & B Aluminum Cable Clip

Now Competitively Priced—The best Clip at any price!!



One cable clip does both jobs—professionally
attaches your drop cable and ground wire

Eliminates double inventory

Mini wrenches available with your logo inscribed.
Mail with your bills to your customers or attach to
your boxes for customer use.

Great company identification for only pennies.

Call or write for evaluation samples

National Sales Agent

Newhall Pacific (415) 625-9768

95 Concannon Ct. Oakley CA 94561

Reader Service Number 41.

published in the literature on how satellite links for SC-HDTV should be designed. It appears that the signal transmitted via satellite would be the same as the terrestrial signal (Reference 3). A comparison of the spectra of NTSC and SC-HDTV signals indicates that the satellite link requirements for the transmission of SC-HDTV are the same as for NTSC.

HD-BMAC: This system, developed by Scientific-Atlanta, is undergoing satellite transmission tests. There is at present no information in the literature on the design of satellite links for HD-BMAC transmissions. S-A has stated that its goal is to develop a system that will operate in a 27 MHz transponder with a CNR of 14 dB. If such a system were developed and if the 27 MHz-wide HD-BMAC signal were transmitted through a 36 MHz bandwidth C-band satellite transponder, the CNR would be (with the noise measured in 36 MHz) 1.25 dB lower than 14 dB; that is, 12.75 dB. However, increase in the peak deviation so that the signal occupied the full 36 MHz of the C-band transponder would, in all probability, increase SNR sufficiently to compensate for this decrease in CNR. This implies that a C-band link with a CNR of 12.75 dB could support the HD-BMAC system. This CNR requirement is 0.85 dB greater than the 11.9 dB requirement derived for NTSC (discussed previously).

The accompanying table shows the antenna diameter requirements for HD-BMAC that were calculated for this 0.85 dB CNR differential. It is likely, but unknown to the authors at this time, that the FM deviation increase will compensate for the 0.85 dB CNR shortfall. In such a case the antenna sizes required for HD-BMAC would be the same as required for NTSC.

Satcom C3 isodiametric contours

As a result of the calculations performed for the table, which

shows the required receive antenna diameter as a function of power radiated from the satellite, the EIRP contours of a satellite may be redrawn as curves of equal receive antenna diameter. This is done in Figure 1. This figure shows typical curves of equal antenna diameters or isodiametric contours for earth stations receiving ATV from GE American Communications' Satcom C3 satellite located at 131° west longitude. Satcom C3 is a planned next-generation satellite (launch date 1992) that will be equipped with 17-watt transponder amplifiers. The contours plotted in Figure 1 are for the satisfactory reception of HDS-NA with 25 percent overdeviation. This video transmission requires the largest receive antenna diameter of the ATV systems listed in the accompanying table.

It can therefore be seen from Figure 1 that an earth station located anywhere in the continental United States and equipped with an antenna approximately 3.8 meters in diameter will satisfactorily receive any of the major planned ATV transmissions. Cable headend earth stations would not be required to use larger antennas than at present.

References

- 1) Philips Laboratories, "HDS-NA," material presented to the FCC Advisory Committee on ATV, Nov. 16, 1988.
- 2) Y. Ninomiya, et al., "The Present Status of MUSE," *Signal Processing of HDTV*, L. Chiarlione (Editor), North-Holland (Publisher), 1988.
- 3) R. Citta, et al., "HDTV Adaptability to Multiple Media," *IEEE Transactions on Consumer Electronics*, pp. 195-201, Vol. 35, August 1989.

Part 2 will cover TVRO requirements for Ku-band reception and next-generation satellites.

Tools that work as hard as you do.

(Because you're the toughest critic we know)



Strand Brake and Roller

Ask Us About Our 3-Year Tool Warranty!

We Offer a Complete Line and Stocking of Aerial Tools for:

• CATV • Telephone • Fiber Optics



Jackson Tool Systems, Inc.

P.O. Box 6, Clayton, Ohio 45315

Phone (513) 836-2641

FAX (513) 836-0396

(800) 535-6470

Reader Service Number 42.

Ad insertion

(Continued from page 28)

end of the preroll period. The total time interval between the start and stop cues is therefore two minutes and seven seconds in this example. Each network defines its own preroll period and the inserter used for a particular network must be set to match this period.

Audible cues are those that are transmitted along with and can be physically heard as a part of program audio. The inserter can detect these cues without external decoding equipment. Inaudible cues are transmitted on a separate subcarrier from program audio and therefore cannot be heard as part of network programming. Since this is a separate signal, a demodulator is required to decode an inaudible cue.

There are a number of ways the networks transmit inaudible cues to the headend; two types of cues are used. Most networks use DTMF (dual tone multifrequency) cues. DTMF also is used by touch-tone phones; you can demonstrate these tones by using your keypad. Two tones rather than a single tone are generated simultaneously (dual tone); if you press a key on your phone you will notice that the resulting sound appears distorted due to the two tones being generated. The cable industry uses two four dual-tone sequences transmitted in rapid succession to begin and end the commercial break (multifrequency). Typically, the first three digits of each sequence will be the same with the last digit indicating start or stop. For example, the network may use "6-7-9-#" to signal the beginning of preroll and "6-7-9-*" to end the break and return to network programming.

The other type of cue used is the contact (or relay) closure. This system was first employed by MTV and is currently used

Major network local cue systems

Network	Frequency	Method	Subcarrier format
A&E	Program audio	DTMF	
BET	Program audio	DTMF	
CNBC	7.3575 MHz	DTMF	Digital
CNN	7.3575 MHz	DTMF	Digital
Headline News	7.3575 MHz	DTMF	Digital
CMTV	6.2 MHz	DTMF	Wideband
Discovery	6.8 MHz	DTMF	Wideband
ESPN	7.3575 MHz	DTMF	Digital
Family Channel	6.8 MHz	DTMF	Wideband
FNN	Program audio	DTMF	
HA!	6.8 MHz	Closure	Wideband
Comedy Channel	7.3575 MHz	DTMF	Digital
Lifetime	5.715 MHz	DTMF	Companded
E! TV	Program audio	DTMF	
MTV	6.62 MHz	Closure	Wideband
TNN	6.2 MHz	DTMF	Wideband
Nickelodeon	Program audio	DTMF	
TNT	7.3575 MHz	DTMF	Digital
Travel Channel	Program audio	DTMF	
Univision	6.2 MHz	DTMF	Wideband
USA	6.2 MHz	DTMF	Wideband
VH-1	6.8 MHz	Closure	Wideband

by MTV, HA! and VH-1. In this case, the network transmits a 19 kHz fixed frequency tone on a dedicated subcarrier throughout the preroll ad insertion period. This tone in turn closes a relay in the headend demodulator that, like DTMF, signals the start of the break. When the relay opens, the headend system returns to network programming. →

"Spots at the Speed of Light"

Optical Disc Insertion Systems

- High Quality (Up to 400 lines of resolution).
- Reduced Maintenance.
- Quick Access.
- Interface with UMatric and SVHS technology.

ARVIS™

The Right Spot At The Right Time

300 Second Ave., Waltham, MA 02154
1-800-272-7847 • In MA, (617) 890-5850

Reader Service Number 43.



Amplify Your Services

A classified in **Communications Technology** can boost the power of your business!

When you are looking for the right individual to fill a position or a source to advertise your products or services, look to the classified section of **Communications Technology**.

Call Patty Linster

for rates, information and assistance.

COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers

50 So. Steele • Suite 500 • Denver, CO 80209
Phone: (303) 355-2101 • TELEFAX (303) 355-2144

HIDE & SEEK.

**Don't play games with CLI compliance.
Rely on Trilithic for all your leakage needs.**

System leaks can hide anywhere from the headend to the house. But with Trilithic's complete line of CLI compliance equipment, you'll have no trouble seeking them out.

The Searcher Plus provides vehicle mounted and handheld calibrated leakage measurements. The Searcher midband channel receiver and the FDM Series of dedicated carrier receivers offer affordable

leakage monitoring. The TFC-450 and TFC-600 frequency counters insure that your carriers are on frequency. And our Cumulative Leakage Index Computing Software (C.L.I.C.S.) backs it all up.

Seek out system leaks with the most comprehensive line of CLI compliance products from Trilithic. Call your nearest Trilithic representative today for more information.



 **TRILITHIC**

9202 East 33rd Street, Indianapolis, IN 46236
800/344-2412 Toll Free 317/895-3613 (FAX)
317/895-3600 244-334 (TLX) (RCA)

FAX RESPONSE 1-800-876-2299
ID Code 032

CONTACT YOUR TRILITHIC REPRESENTATIVE

Winfield Scott & Assoc.
P. O. Box 1149
Grapevine, TX 76051
817/488-0029

Horizon Cable Supply
1021-A Calle Recodo
San Clemente, CA 92672
714/361-2011

Cable Products, Inc.
288 King Arthur Dr.
Lawrenceville, GA 30245
404/962-6133

TVC Supply Co., Inc.
1746 E. Chocolate Ave.
Hershey, PA 17033
717/533-4982

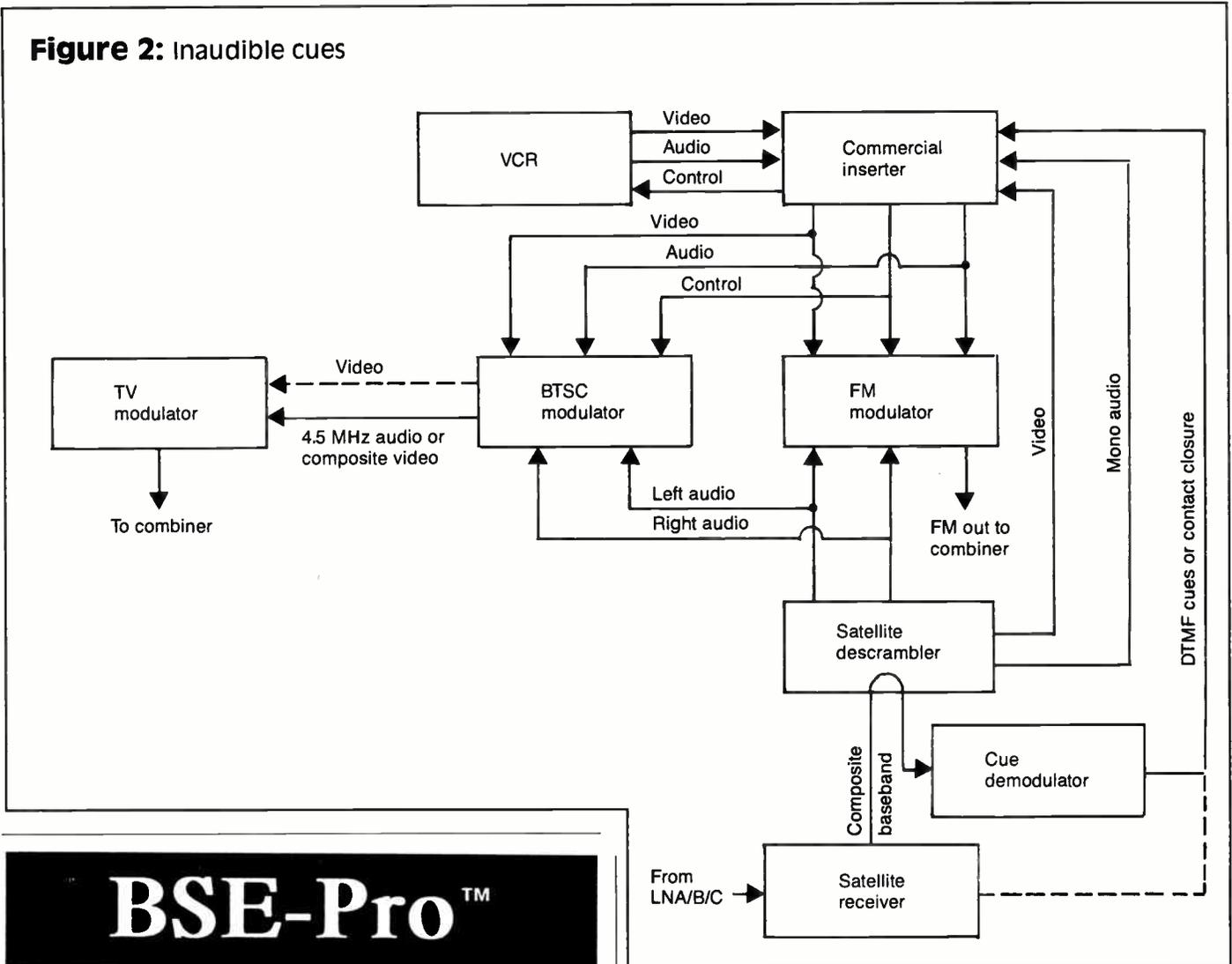
Com-Tek
1710 W. 9th St.
Sedalia, MO 63501
816/826-3011

Intek, Inc.
P. O. Box 487
Daleville, IN 47334
317/759-8122

D. F. Countryman Co.
540 N. Fairview
St. Paul, MN 55104
612/645-9153

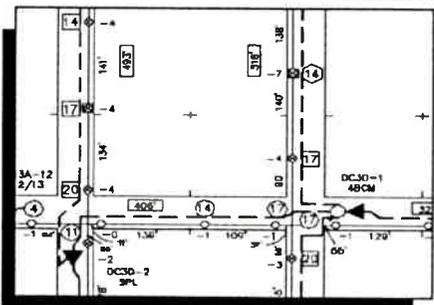
Reader Service Number 45.

Figure 2: Inaudible cues



BSE-Pro™

Computer Aided Engineering Software for CATV Design



Transfer BSE-Pro designs to maps using AutoCad and BSE-Pro CAD!



- Integrated Trunk & Feeder design
- AC powering & distortion calculations within the design
- Powerful BOM report generator + costs
- Global/branch design recalculations
- Global search
- Mixed amplifiers and levels
- Bi-directional
- More!!!

Acclaimed as the easiest program to use!

Working BSE-Pro Trial Disk For \$25!



3310 Western Dr.
Austin, TX 78745
512-892-2085
Fax 512-892-0959
American Express Welcomed!

Reader Service Number 46.

The means by which a network may transmit inaudible cues include the contact closure method and the use of a dedicated subcarrier. Three types of subcarriers are used: wideband analog audio (such as 6.2 or 6.8 MHz), narrowband companded audio (such as the 5.715 MHz subcarrier used by Lifetime), and narrowband digital. Note that while 6.8 MHz is used by non-scrambled networks for program audio, this subcarrier is not needed for scrambled program delivery. Since most domestic satellite receivers include a 6.8 MHz audio demodulator as a standard feature, some scrambled networks have elected to use 6.8 MHz to deliver their cues.

This method provides two advantages. First, the cues are inaudible, since the 6.8 MHz carrier is not required for program audio. Second, you need not purchase a separate cue demodulator since you can use the existing 6.8 MHz audio demod in your satellite receiver. Similarly, if a network transmits its cues on a 6.2 MHz subcarrier and you have a satellite receiver with either a 6.2 MHz fixed demodulator or an unused agile demodulator, you can use it to receive these cues. Programmers who use a companded subcarrier for cue transmission enjoy the cost savings associated with the reduced bandwidth requirements of this type of subcarrier on their transponder. Narrowband digital subcarriers provide bandwidth and corresponding cost savings while also giving the network the ability to transmit tiered cues (different DTMF sequences for different functions), addressing and electronic mail. The accompanying table lists

some major networks, their methods of cue transmission and their subcarrier frequencies.

With all this in mind, we can now put a headend system together. Figure 1 shows the headend configuration for a local ad insertion system with cues on program audio. As was previously mentioned, the inserter provides switching between the network and local commercial feeds. It also sends control signals to the VCR to start and stop the ad videotape. During normal network operation, video and program audio from the descrambler (or satellite receiver, if you are installing a system on a non-scrambled network) are input to the inserter and output to the TV modulator for delivery to the subscriber. When an insertion cue is received from the network, the inserter sends a signal to the VCR to enter the "play" mode while network audio and video continue to be routed to the output. After the preroll interval is completed, network audio and video are terminated and the ad's audio and video are input by the inserter and routed to the TV modulator. When the stop cue is received, the VCR is immediately switched to the "stop" mode and network signals are again output by the system.

Adding FM and BTSC equipment

The addition of FM and BTSC components only slightly complicates matters. For FM, during normal network programming, left- and right-channel audio from the descrambler or from an external stereo demodulator is input to the FM modulator and output to the cable combiner on a selected frequency, usually in the standard 88 to 108 MHz FM band. During local ad insertion, the audio output of the inserter is switched into an auxiliary input of the FM modulator and output to the combiner, allowing the ad to run on both the TV and FM outputs of the system. The

control signal used to switch the FM modulator between the main (network) and auxiliary (ad) inputs is a relay or latch circuit in the inserter that energizes at the end of preroll and de-energizes upon receipt of the network stop cue.

The BTSC modulator accepts the left and right audio input from the descrambler or stereo demodulator, or paralleled from the FM modulator at its main inputs and the output audio and control signals from the commercial inserter (or paralleled from the FM modulator) at its auxiliary inputs. The appropriate network or ad output is then routed to the TV modulator via one of several interface techniques that may be employed.

Figure 2 shows the headend configuration for an ad insertion system using inaudible cues. The primary feature of this system (as opposed to audible cues) is the interface to the inserter. If wideband analog DTMF cues are used by the programmer, either an internal demodulator in the satellite receiver or an external demodulator may be used. If the programmer uses a narrowband analog or digital subcarrier for DTMF cues or transmits a tone to generate a contact closure, then an external demodulator may be used. In either case, the inserter is configured for a third input to receive the cues, since they are no longer on program audio. All other interfaces for this application remain identical to those previously described.

The cable industry has seen tremendous growth in local ad insertion over the last several years and this rapid pace will continue. While commercial controllers and editing systems are becoming increasingly sophisticated, new programmers are offering you the opportunity to insert local ads onto their programming feeds. Understanding the equipment used and the interrelationships involved will help you to meet this challenge and realize the full potential of ad insertion. 

REPRINTS REPRINTS REPRINTS



Communications
Visibility
Knowledge
Information



Reprints work for you!

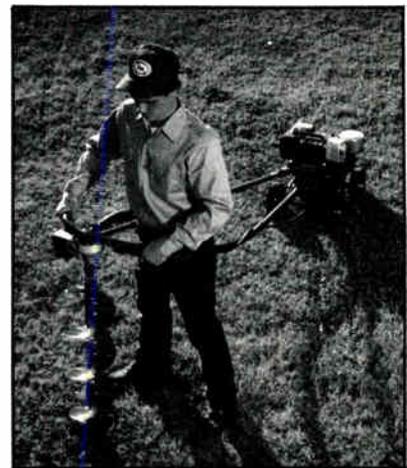
For more information
call Marla Sullivan at
CT Publications today!
(303) 355-2101

TORQUE- FREE

One-Man Earth Drilling

Safer, Faster, Easier

- Patented torque bar eliminates kick back.
- Simple, safe one-man operation cuts labor costs in half.
- Digs a fast clean hole in seconds — diameters of 1½" to 16".
- Available in mechanical and hydraulic models with a variety of auger selections.
- Centrifugal clutch protects the operator and the equipment.
- Complete selection of augers and accessories.



Also Available

Reader Service Number 47.

Send Today
for Complete
Information



LITTLE BEAVER INC.

P.O. Box 840 • Livingston, Texas 77351 • (409) 327-3121 • Telex: 386596 • Fax: (409) 327-4025

JULY 1990

Three unique tools to revolutionize your drop connector installations; everything you need to

STOP SIGNAL LEAKS

Hex Universal Crimp:— Properly crimps both RG-6 and RG-59 connectors with the same hex, therefore eliminating any installation guesswork as to which hex should be matched to the connector.

Torque Span Wrench:— Tightens the drop connector to a precise 20 inch lbs., allowing the wrench handle to visibly "break" producing a "snap" sound. The drop connector is now properly tightened.



CFS-6U Universal Drop Connector

Coaxial Prep Tool:— Consistently prepares all drop cable, braid, dielectric, and center conductor to the exact dimensions of 3/8" braid, 1/8" dielectric and 1/4" center conductor lengths with amazing repeatability and accuracy.

CFS-59U Universal Drop Connector

*Patent pending

By July 1, 1990, excessive signal leakage must be eliminated and then effectively contained to meet the minimum FCC cable operating specifications. PPC offers the **only** tools you'll need to get the job done.

These three unique tools, in conjunction with PPC's CFS-6U and/or CFS-59U connectors, will assist you in making all the necessary drop connector installation procedures required for **both** RG-6 and RG-59 cable, and they work universally! On single braid or tri-shield, from 40% braid right up to and including quad cable, this one tool set and our patented connectors con-

sistently provide positive and leak free connections.

For free information illustrating with clear, step-by-step photographs how to make cable preparation and connector installation simple and easy, write PPC or call toll free today: 1-800-468-2288.

The best connections in the industry.

Reader Service Number 48.



PRODUCTION PRODUCTS COMPANY
Division of John Mezzalingua Associates, Inc.
One Mezza Lane Manlius, New York 13104

BACK TO BASICS

The training and educational supplement to Communications Technology magazine.



Table of Contents

FM basics 98

Micah Martin of Paragon Cable of Portland reveals how it works and how to fix it.

Ground straps 102

Step-by-step instructions on how to install them are provided by Ron Hranac.

Hands On 106

Performance Technologies' Jud Williams tells how to maintain your power supplies during the hot summer months.

Formerly Installer/Technician

FM basics for cable TV

By Micah Martin

Institutional Network Technician
Paragon Cable of Portland

The FM services carried on cable systems seem to receive little attention until a subscriber has questions or a problem occurs. This article will give a basic overview of FM, how it is carried on cable and provide some troubleshooting tips.

Just as a cable system provides good reception of off-air TV stations, it also can give good reception of off-air FM stations. Cable FM also provides stereo simulcasts of cable-only services such as HBO, Showtime, MTV and TNN. Distant FM stations (such as Chicago's WFMT) and cable services (like the Cable Radio Network and Galactic Radio) are received by satellite and carried on the cable as well.

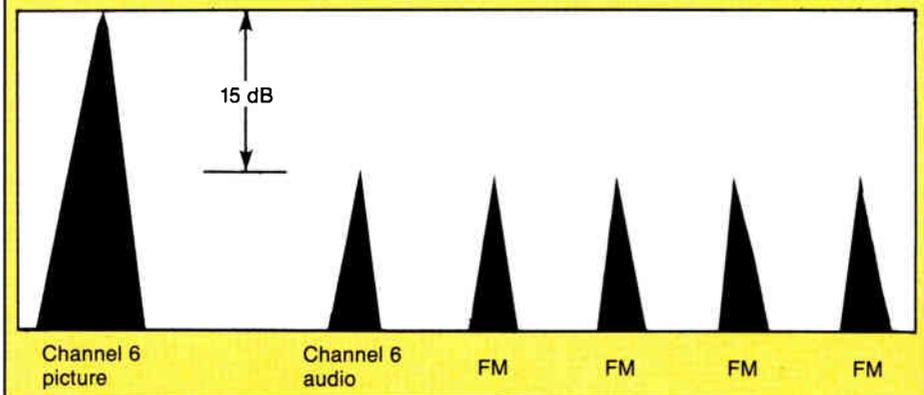
Amplitude and frequency modulation

AM is the acronym for *amplitude modulation*; FM is the acronym for *frequency modulation*. Amplitude modulation occurs when an audio (or video) source changes or modulates the height or amplitude of an RF signal. This type of modulation is used to transmit the picture information of a TV signal. Frequency modulation occurs when an audio (or video) source changes or deviates the frequency of an RF signal. FM is used to transmit the sound portion of a TV channel and also for FM broadcast stations. With no audio source present the frequency of the carrier wave will remain at a constant frequency, known as the *resting frequency*. A constant audio source applied to the carrier will cause it to shift back and forth in frequency.

As the audio source amplitude is increased, the carrier will shift back and forth to higher and lower frequencies. This carrier shift is called *deviation* and is measured in kilohertz (kHz). The deviation of an FM station is ± 75 kHz and the deviation of the sound carrier of a monaural TV channel is ± 25 kHz. The speed that the carrier deviates is proportional to the frequency of the audio source.

FM is less susceptible to noise than AM. This can be observed when a TV set has a weak signal, causing the picture to be so snowy that it is unwatchable—yet the sound comes in very well. This happens because noise tends to change the amplitude of a signal, becoming part of the AM signal. The received amplitude of an FM signal is limited by a circuit (called

Cable FM signal levels



a *limiter*) that clips off these amplitude changes caused by noise.

So far, only monaural (single-channel) FM has been discussed. Stereo (two-channel) FM is different in that it has a left and right signal. For transmission these are combined into a left plus right (L+R) and a left minus right (L-R) signal. When this composite information is recovered by an FM receiver, it is separated back into left and right signals, which are routed to their respective speakers to produce stereo sound.

Stereo broadcasts are compatible with mono receivers. When a stereo signal is received by a mono receiver, only the L+R is recovered, which provides a mono output of the program. Stereo receivers detect a 19 kHz pilot tone transmitted along with the L+R and L-R signals; the pilot turns on the receiver's FM stereo light and activates its stereo decoder circuitry.

Frequency spectrum

The FM spectrum is from 88 to 108 megahertz (MHz). These frequencies are between Channels 6 and 98 (A-2) on a cable system. FM channel assignments are spaced 200 kHz apart, allowing a total of 100 FM channels between 88 and 108 MHz. However, just as the Federal Communications Commission does not allow use of adjacent TV channels in a local area, the FCC also restricts FM stations in a local area to every other channel slot. Therefore, the off-air spacing of FM stations in a given market is a minimum of 400 kHz. Even though cable systems use adjacent TV channels, adjacent FM channel spacing is not recommended on cable because of the generally poor selectivity of most consumer FM receivers.

Typically in an area with strong local off-

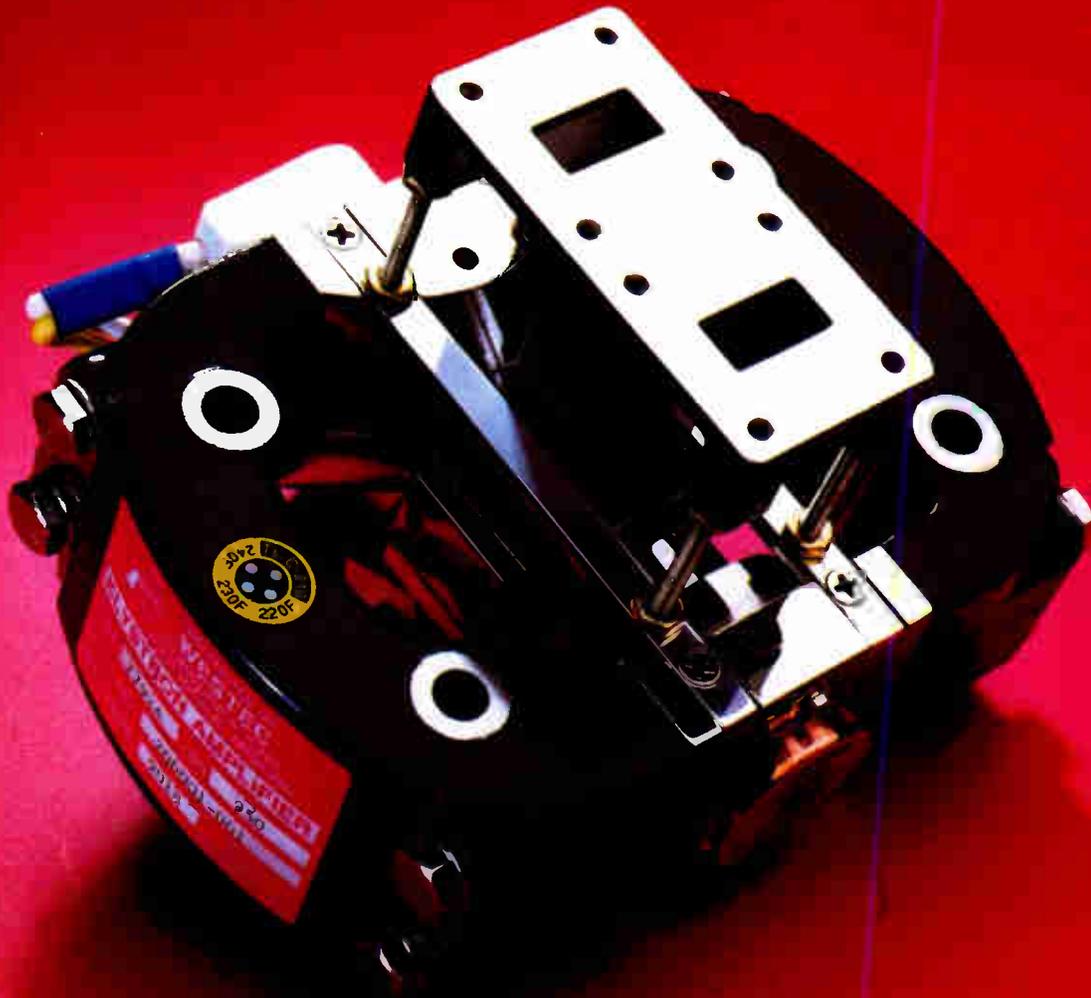
air FM stations, a cable system will carry the local stations on the cable at different frequencies and will not use the frequencies that off-air broadcasters in that area use. This shifting of off-air frequencies is necessary because most FM receivers have poor RF shielding and are susceptible to ingress from the off-air stations. Ingress on the same frequency that an FM signal is carried on will cause interference to the cable signal and poor reception.

Cable systems reduce the audio carrier signal levels of a TV channel to 15 dB below the video carrier to prevent interference to upper adjacent channels. FM carriers are usually carried 15 dB below the picture carriers, although some operators may run them 10 dB down. The accompanying figure shows typical cable FM operation. When measuring FM carriers with a signal level meter it is sometimes necessary to use the meter's speaker to correctly identify which FM station is being measured.

Installing FM

When installing FM service, an FM splitter designed specifically for that purpose should be used. Many of these splitters are actually directional couplers with a bandpass filter on the tap leg. These types of splitters are very desirable since they restrict non-FM frequencies from going to an FM receiver, limiting egress (leakage) of the cable signals. Conversely, ingress back into the cable system is also limited. Most FM receivers do not have 75 ohm F connectors and require a matching transformer to connect to the cable.

When connecting a matching transformer to the 300 ohm terminals on a receiver, take care to disconnect any antenna leads or jumpers for internal



As Good As New And **SAVE \$1,000.00**

WESTEC — Your AML Support System
“CPR for AML”



WESTEC COMMUNICATIONS

14405 N. Scottsdale Road, Scottsdale, Arizona 85254

(602) 948-4484

Microwave Service (800) 666-4441

FAX (602) 998-8701

Reader Service Number 65



Lemco

the tools of the trade

**Foreign dealer
inquiries invited**

**Call for your
free catalogue.**

(800) 233-8713

USA and Canada

(717) 494-0620

PA

RD2, Box 330 A

Cogan Station, PA 17728

antennas. Some receivers have a 75 ohm connection where the coaxial cable is stripped back and the center conductor is inserted under one terminal and the braid under another, then tightened down with screws. This is not the preferred method of attachment to a cable system and could cause problems.

Troubleshooting

Begin troubleshooting FM reception difficulties by verifying with the subscriber the exact complaint. Many times a problem is operator error or lack of information. For example: A subscriber complaint is that a favorite station now comes in poorly since the cable was installed. Often the sub is not aware that the location of the off-air station has been moved on the cable system. The sub needs to tune to the new cable frequency.

Another common complaint is the signal strength meter on the sub's receiver was pegged before cable was installed and now only reads one-half to two-thirds of the former reading. (The sound is fine, but the meter reads lower than before.) In large metropolitan areas with 100,000-watt FM stations, cable FM will often produce lower readings than those from the sub's off-air antenna. (This is also the case with off-air TV signals.)

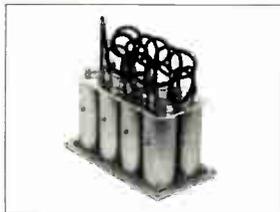
If a complaint is not an education problem, check signal levels. Disconnect the coax from the matching transformer, connect a signal level meter and read the signal strength. Remember, the signal will typically be 15 dB less than the video carriers in addition to the FM splitter loss. For example: Before the FM splitter the TV signals are 6 dBmV. $6 - 15 = -9$ dBmV FM carrier level before the splitter. Subtract the splitter loss and the balance is the signal that the meter should read at the back of the FM receiver. If not, find and replace the defective component. If the signal at the back of the receiver is good, verify that the matching transformer is properly connected. If the problem still persists, exchange the matching transformer with a known good one.

If after following the above steps the problem has not been remedied, then suspect a receiver problem. Substitute a known good receiver to verify a receiver problem. Because of the lower level of the FM signals, it is possible for a system carrier-to-noise or sweep response problem to affect FM performance.

Quality FM reception will increase subscriber satisfaction. Knowing how it works and how to fix it will allow you to respond to subscriber questions and complaints with professionalism and confidence.

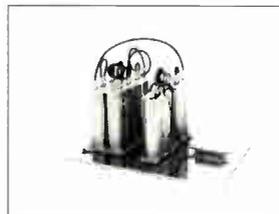
Sophisticated Cable Filters for Special Jobs - In A Hurry!

Channel Deletion/Reuse, Security, Interference, Co-Channel

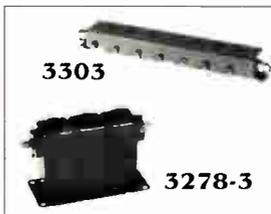


Channel Deletion
Filters For Any Channel
1 Week Delivery!

**"We Make Filters In A
Hurry For Customers
In Trouble!"**



Brickwall LPF Drops
Channel Blocks Clean
2 Weeks Delivery Max!



Bandpass Any VHF/UHF
Channel. Sniffer
Preselect. Isolate carriers
3 Days delivery!



Traps: Largest Variety
Negative, Positive, Tiering
Interference
Many Overnight!



**Call NOW For
FAST Help Or
Catalog C/87**

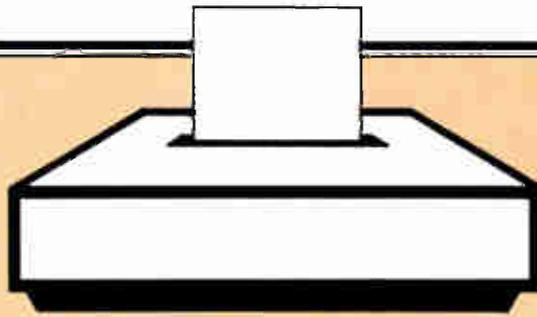
Products For:

- Channel Deletion/Reuse •Batch Decode/Conversion
- Co-Channel Suppression •Security/Interference •Bandsplitting
- Channel/Carrier Bandpass

Reader Service Number 51.

Microwave Filter Co., Inc. • 6743 Kinne St. • E. Syracuse, N.Y. 13057

Toll Free (US/Canada): 1-800-448-1666 • Collect (NY/AK/HI): 315-437-3953 • Telex: 249-613 • Fax: 315-463-1467



IT'S ABOUT TIME. . .

Your time! In less time than it takes to drink your first cup, you'll know the day's most important industry news.

CableFAX is the daily cable TV news source of the '90s from the most experienced team of journalists in the business -- the publishers of **Media Business, MSO, Communications Technology** and **International Cable**.

CableFAX cuts through the clutter and delivers in succinct, digest form, the top of the **real** news you need every business day.

For subscription information FAX us this form and we'll send you the facts.

_____ YES! Please FAX me **CableFAX** subscription information and a sample issue.

Send to FAX Number (_____) _____

Name _____

Title _____

Company _____

Phone (_____) _____

Use this form and FAX it to:

CABLEFAX

(303) 355-2144 or (303) 355-2158

Annual charter subscription rate \$995 -- effective until June 30, 1990.

CableFAX, A Transmedia Publication
50 S. Steele, Suite 700, Denver, Colo. 80209 (303) 355-2101

How to install ground straps

By Ron Hranac

Photos by Bob Sullivan

Article 820 of the National Electrical Code describes CATV subscriber drop grounding requirements and the methods of connecting the coaxial cable's shield to a suitable ground (see "NEC Article 820: CATV system protection and grounding," May 1990 C7). Appropriate attachments include a building's common utility ground, a grounded metal cold water pipe, power service equipment enclosures (for example, grounded power risers), metallic

service raceways, etc.

Connecting to cold water pipes or power risers often is done with flexible ground straps. Good grounds require proper installation of the strap to ensure mechanical integrity and a long-lasting connection. The relatively simple ground strap (not unlike the conventional F fitting) is somewhat craft-sensitive, and if not installed correctly can result in a poor or ineffective ground that may pose a safety hazard.

Improperly installed ground straps can loosen over time, or even be loose at the

"Mating of dissimilar metals will result in fairly rapid corrosion that will create a poor ground."

time of installation because the strap was tightened wrong and stretched. If rust, corrosion or paint is not removed before installation, the ground will be essentially non-existent. One common mistake is the use of copper straps on galvanized pipes; this mating of dissimilar metals will result



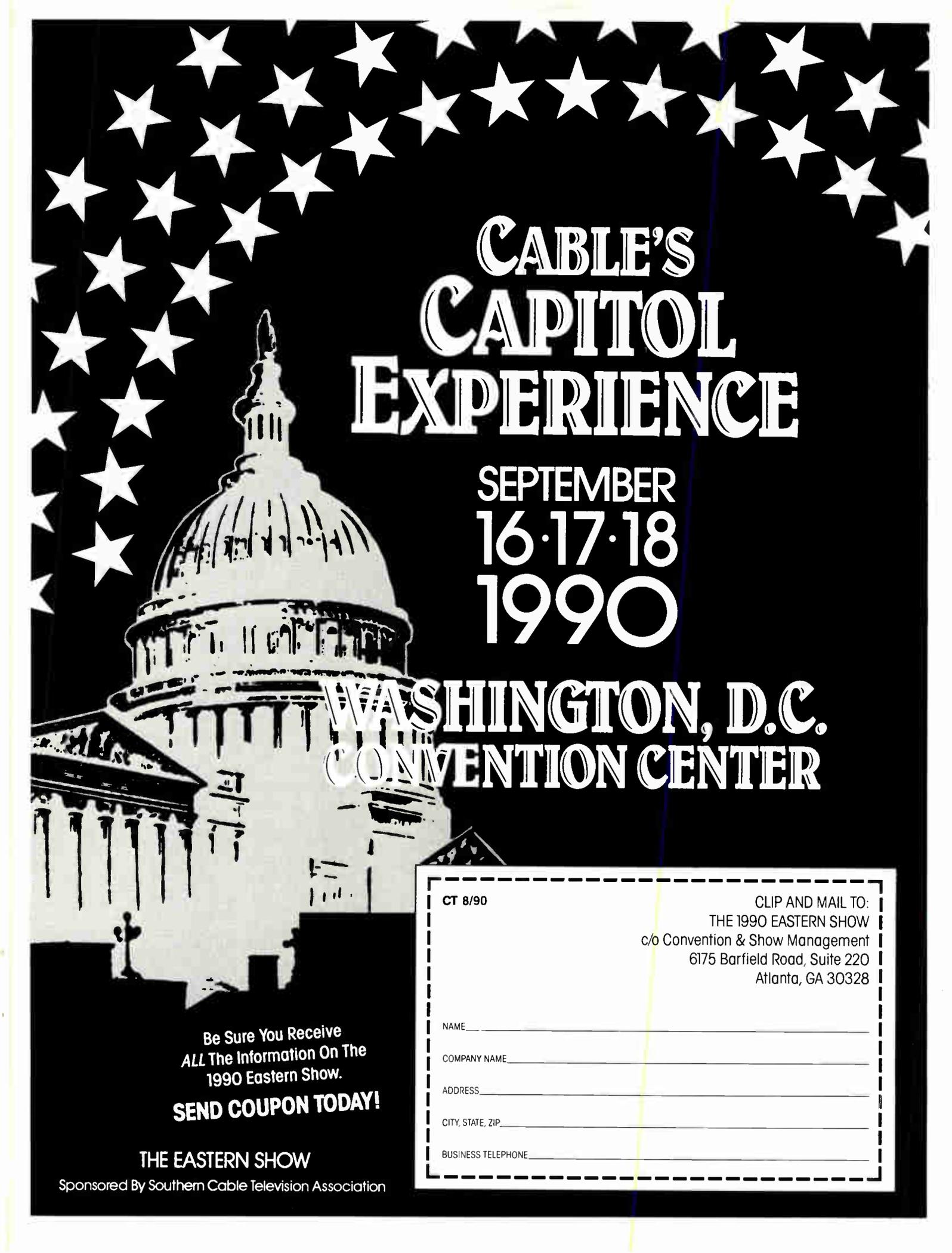
Step 1: Select the right strap for the application. Ground straps are available in a variety of lengths as well as composition (see text).



Step 2: Remove any corrosion or paint down to bare metal to ensure a clean surface that will provide a good ground connection. (Note: Do not remove the zinc coating on galvanized surfaces!) Install the strap on the pipe so the "U" shaped portion of the strap clamps itself to the surface. On larger diameter pipes, it may be necessary to form the strap to fit.



Step 3: Wrap the strap tightly around the pipe, then line up one of the holes with the strap's alignment tab. This will temporarily hold the strap in place. Do not tighten the strap at this point (that will stretch the strap or break off the tab).



CABLE'S CAPITOL EXPERIENCE

SEPTEMBER
16·17·18
1990

WASHINGTON, D.C.
CONVENTION CENTER

Be Sure You Receive
ALL The Information On The
1990 Eastern Show.
SEND COUPON TODAY!

THE EASTERN SHOW

Sponsored By Southern Cable Television Association

CT 8/90

CLIP AND MAIL TO:
THE 1990 EASTERN SHOW
c/o Convention & Show Management
6175 Barfield Road, Suite 220
Atlanta, GA 30328

NAME _____

COMPANY NAME _____

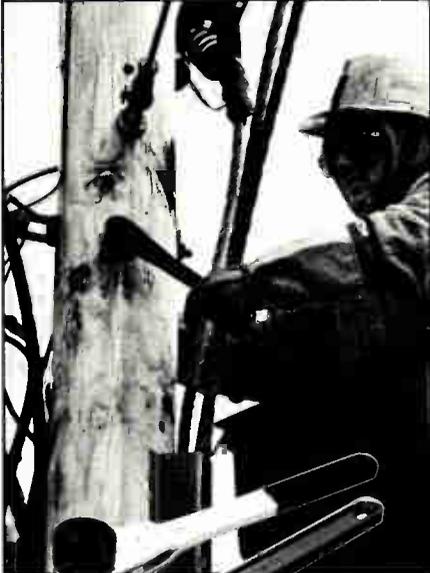
ADDRESS _____

CITY, STATE, ZIP _____

BUSINESS TELEPHONE _____

We've put an end to traditional utility pole fastening!

Introducing Lowell's Ratcheting Socket wrenches.



DOUBLE & TRIPLE SQUARE SOCKETS

For years, the only way to fasten was to use an open-end wrench and repeatedly position and turn. A tedious and time consuming job!

But now, American ingenuity has changed all that. Lowell, specialists in ratcheting tools, introduces unique Lineman's Combination Square socket/wrenches. They're specifically designed to fit the 3 most common pole fasteners. Their ratcheting action makes adjustments a fast, easy, more efficient way to accomplish more in less time. No more multiple tools. No re-positioning. One tool does it all!

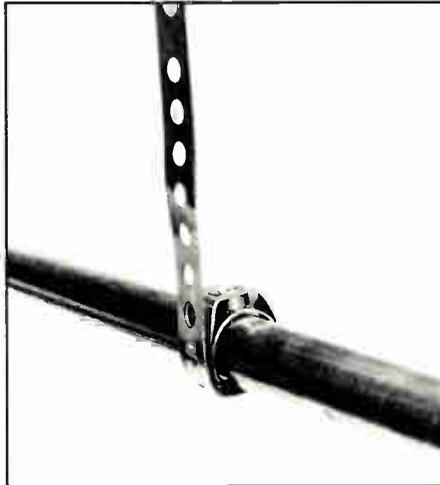
They also feature: • Unique bolt-thru design • adjust forward/reverse • position once • rugged construction • high quality • dependable • designed for Utility, Cable TV and Telephone Industry use.

Write or call now about the complete line of Lowell Utility tools and the name of your nearest distributor.



LOWELL CORPORATION

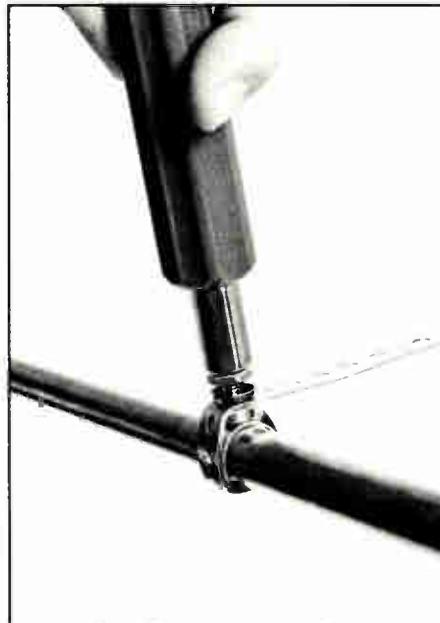
P.O. Box 15053, Worcester, MA 01615-0053
1-800-456-9355 (508) 756-5103



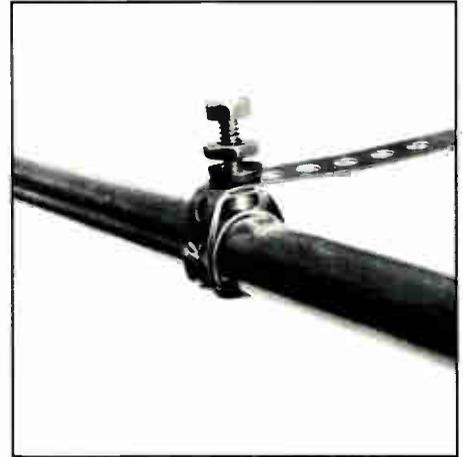
Step 4: Remove the bolt, grounding nut and cup washer.



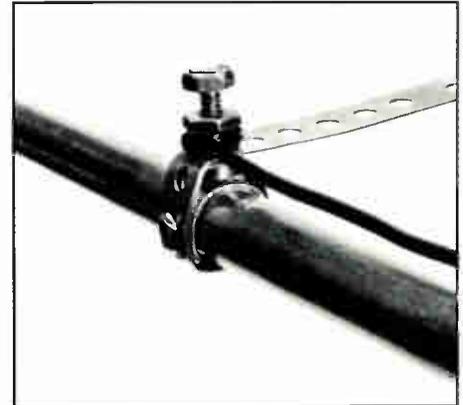
Step 5: Fold the strap over itself snugly until the second hole above the alignment tab lines up with the threaded hole for the bolt.



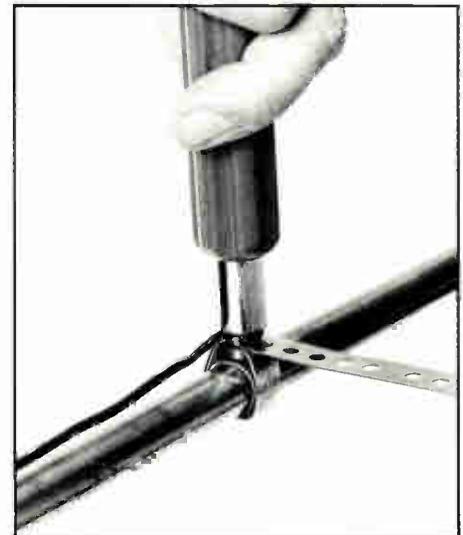
Step 6: Replace the bolt, nut and washer, then hand tighten.



Step 7: Continue to tighten the bolt to no more than 20-inch pounds; the strap should be snug on the pipe.



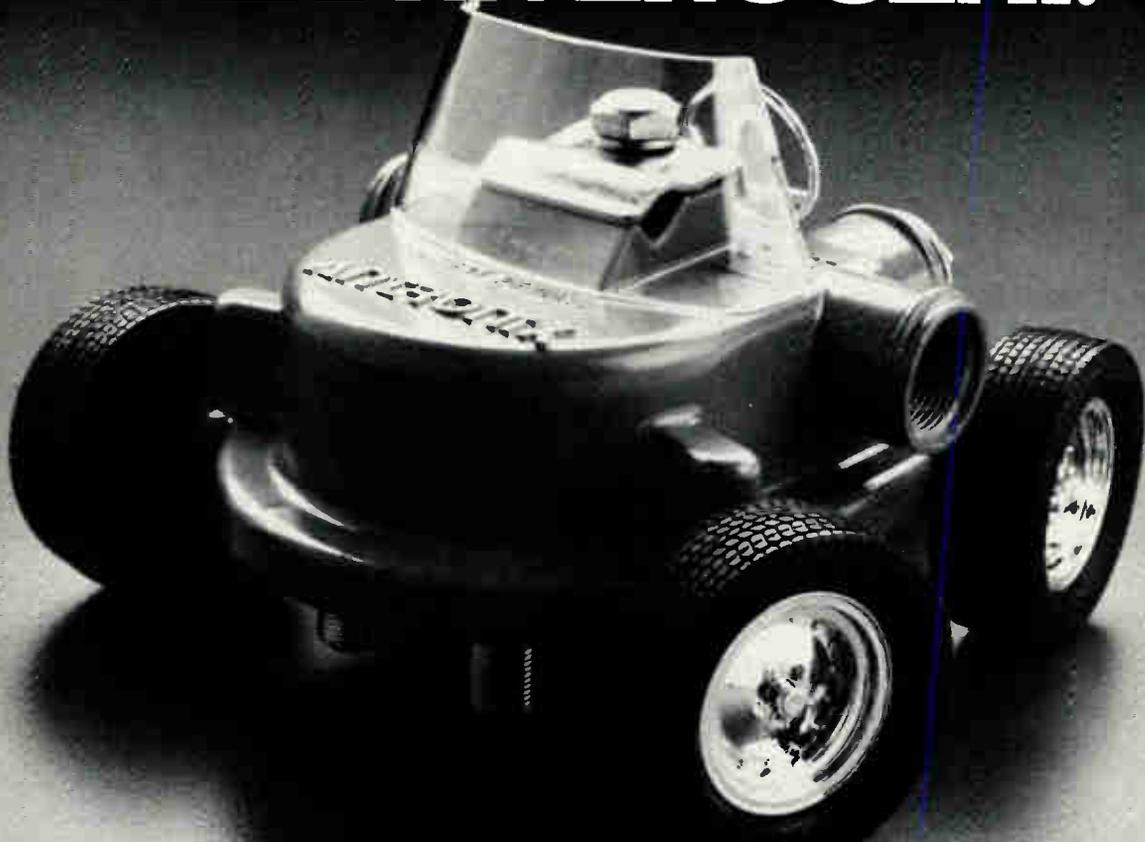
Step 8: Remove about 1 inch of insulation from the ground wire, being careful not to nick the wire. Insert the bare end in between the washer and grounding nut. The wire should be wrapped clockwise around the bolt, and the slot in the washer aligned with the ground wire.



Step 9: Tighten the grounding nut with an appropriate tool, but be careful not to overtighten.

(Continued on page 107)

THE NEXT TIME YOU START A BUILD, PUT YOURSELF IN THE DRIVER'S SEAT.



**Antronix® Introduces The Extended 6 Year, 6,000 Mile
No Questions Asked Unique Support Distribution Warranty
On All Antronix Brand Multi-Taps And Line Passives.**

Our Year-After-Year Extended Performance Warranty.

Over the years our Multi-Taps and Line Passives have continued to set new industry standards.



And now, because we're so confident in our ability to manufacture the highest quality Taps and Line Passives on the market today, another industry standard is about to be set.

Now, your participating Antronix Authorized Unique Support Distributor will extend our warranty on Antronix Brand Multi-Taps and Line Passives to 6 years for your next build, on system applications approved by Antronix. No questions asked.

Our Mile-After-Mile Price And Delivery Guarantee.

No matter if your next build goes just one mile or 6,000 miles, your participating Authorized Unique Support Distributor will guarantee you the same price and reliable on time delivery on all Antronix Brand Multi-Taps and Line Passives. All to insure your build gets finished on time and on budget.

Talk to your participating Antronix Authorized Unique Support Distributor. They have all the details. For the distributor nearest you call, 201-446-2626 and see how our commitment to putting you in the driver's seat is just one more way of setting another industry standard.

Extension Of One Year Warranty To Six Years, and the price and delivery guarantee are subject to prior approval, by Antronix, of system application.

ANTRONIX®

The Unique Support You've Been Looking For.

Reader Service Number 32.

ANTRONIX® SALES, 1990

QUALITY
Speed
EXCITEMENT

AT JGL ELECTRONICS WE INCORPORATE ALL THREE INTO EVERY JOB. ◆ OUR TECHNICIANS HAVE THE SKILLS NEEDED TO GIVE YOU THE HIGHEST QUALITY REPAIR AND CALIBRATION. ▲

JGL ELECTRONICS. THE QUALITY YOU DEMAND. THE SPEED YOU REQUIRE. THE EXCITEMENT YOU APPRECIATE. ● CALL JGL ELECTRONICS — WE'RE READY TO MEET YOUR NEEDS. ◆



JGL
ELECTRONICS, INC.

4425 BLACKSTONE DRIVE
INDIANAPOLIS, IN 48237

317-783-8130
800-888-8130
FAX 317-787-3180

Reader Service Number 54.

Standby battery care in hot weather

By Jud Williams
Owner, Performance Technologies

This summer has been a particularly tough one on standby batteries because of record-breaking temperatures, particularly in the Southwest. We are experiencing more frequent brownouts and power interruptions because of the added drain on the utilities. Therefore, it is more important than ever to check out CATV power supply equipment and perform preventive maintenance on it.

Battery chargers in the inverters require attention and must be set to the correct output level. Overcharging of batteries can be a problem depending on the type of batteries used. Bear in mind that flooded wet cells, recombination and gel cells are all lead acid batteries. The latter two are more recent developments; there are still some questions as to their benefits.

One thing is certain: Both recombination types and gel cells experience considerable internal heating while being charged. This may explain why expansion of battery cases sometimes occurs. While there is some internal heating of flooded wet cells, this has not been a problem. Some of the older power supply cabinets offer a very tight fit for batteries; therefore, it can be risky to use anything other than flooded wet cell batteries. Other types of batteries with cases that tend to expand may be impossible to remove from the cabinets.

Charging the battery

The question of proper charging is always a consideration when extreme temperatures are concerned. There are basically two types of battery systems: the two-battery 24 volt and the three-battery 36 volt arrangement. The main difficulty with multiple battery systems is the inability for each of the batteries to receive an equal charge. This may be caused by the way the batteries are interconnected. The eight- or 10-gauge wire with crimped-on terminals could be the culprit. Where large banks of batteries are in use, they are normally joined together by very heavy copper bus bars. These offer practically no resistance to the flow of current, so the batteries stay in balance much better.

Since cable TV standby batteries are not interconnected in this fashion, special care must be taken to make sure that the connections between the batteries are kept as short as possible, while using the heaviest gauge of wire available and making sure the connections are clean and tight.

When three-battery systems are tested to determine their ability to hold a charge, it is best to use a battery tester that will draw two or three times as much current as the inverters themselves normally draw. Also, the tester should be able to accommodate a digital voltmeter so that the loaded voltage may be logged for future comparison. It is best if the tester has an automatic timer to provide a repeatable reference for the tests. Some power supply manufacturers consider that any battery (in a three-battery system) whose potential varies more than 0.3 volts from the others should be replaced. Manufacturers also recommend that matched sets of batteries be used as often as possible.

According to most accepted standards, a lead acid battery is at full charge when it reaches 12.65 volts. When the batteries reach full charge, no more than 200 mA of current should be drawn from the charger. Anything in excess of this will dissipate as gassing in the case of vented wet cells and heat buildup in the recombination types. Gassing reduces the acid level of the battery so that it gradually dries up if not maintained properly. Excessive charging of recombination batteries often causes the plates to buckle and possibly short out, making the battery become useless. These batteries also have vents and lose irreplaceable fluid by gassing.

There are several schools of thought concerning the boost voltage that some inverter battery chargers put out. It is claimed that the boost or equalize somehow stirs up the fluids inside the batteries, which in turn curtails sulfating (an action that causes an insulating film to build up on the plates). All that is happening is that the batteries are being overcharged, causing excessive gassing to the detriment of the battery. Maybe there is a trade-off here. Possibly the boost does reduce the effects of sulfating. But does the bat-

"Special care must be taken to make sure that the connections between the batteries are kept as short as possible."

tery last any longer—or does the excessive gassing actually kill off the battery sooner?

Most standby power supplies have voltage adjustments on their battery chargers. Under what conditions should adjustments be made? Some manufacturers say that the settings should be done at the factory, while others claim that it is OK to make settings in the field. There seems to be much confusion on that particular question. If the power supply is set up so that it can be adjusted in the field, it is best to use a very accurate digital voltmeter (not all of them are very precise, with some having inaccuracies as much as 0.5 volt).

Multiply 12.65 volts by the number of batteries and carefully adjust to that level. Even when the label on the battery states that it should be set to 14 or 15 volts, it is referring to an ambient temperature of 77° F. Standby batteries are subjected to temperatures far in excess of that, so they require less voltage the hotter it gets.

It is quite difficult to verify if the inverter charger is delivering current to the batteries. There are two ways to determine this. First, immediately following a load test measure the voltage across the batteries and note if the last digit of the voltmeter changes up and down by 0.1 volt. If the charger is not working, the last digit will not change. The second way to check is to set your digital voltmeter to the lowest (most sensitive) range and measure between each end of the longest wire connecting between the battery and the inverter. Since the wire represents a resistance, there will be a slight drop of several millivolts, possibly ranging between 20 and 30 mV. If a voltage is present across a resistance then there is, of course, current flowing.

Wear protective clothing

One of the most important considerations when checking inside the battery compartment of a power supply during hot summer weather (as well as any other time) is to wear protective clothing and a face shield as protection against the possibility of a battery explosion. Remember, the person to whom it happened never thought that it would.

Ground straps

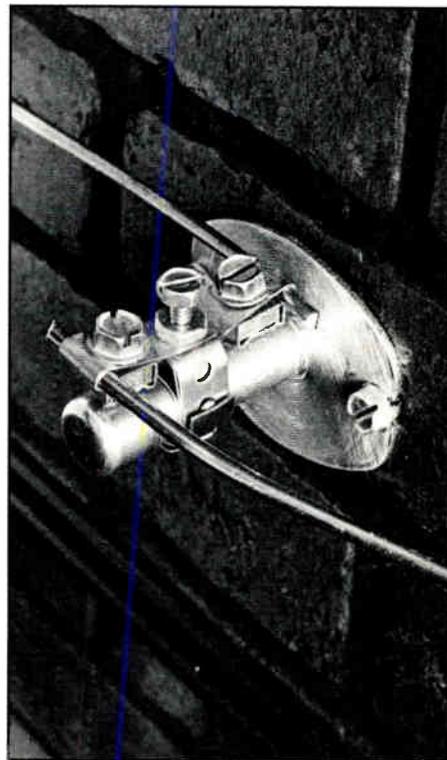
(Continued from page 104)



Step 10: Wrap any remaining strap around itself.

in fairly rapid corrosion that will create a poor ground (zinc ground straps should be used on galvanized pipes). The same problem will occur with aluminum surfaces; again, zinc straps should be used.

The accompanying photos demonstrate the right way to install ground straps. In these examples, Sachs Communications' SC13B series of straps are used. The procedure for other brands will vary from what is shown here; you should contact the specific manufacturer of the straps you use if you have questions.



Step 11: If you need to connect more than one ground wire or use larger wire than the strap's nut, bolt and washer can accommodate, special attachment clips are available.

Confessions of A Tailgater..



"I've been a Tailgater for years. Our crews like them because they're so versatile and functional. I wouldn't recommend any other truck bed system now."—Jim Fox, Monterey Peninsula TV Cable. General managers and chief techs are discovering that The Tailgater Truck Bed System offers distinct advantages over other systems currently available:

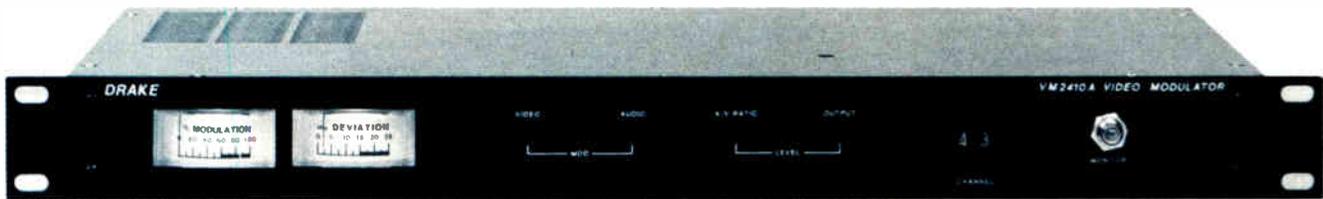
- Greater Available Payload
- Better Payload Organization
- Increased Payload Security
- Better Operator Visibility From Cab
- Greater Durability and Transferability—Outlasts Truck After Truck!
- Lighter Weight for Better Gas Mileage
- More Features for Less Money
- More Usable Space Than Shells or Bodies

To find out how your company can become a Tailgater, call or write us today. You'll be way out front tomorrow.

TAILGATER

561 Brunken Avenue, Suite H, Salinas, California • (408)424-7710
Reader Service Number 55.

BUILT FOR PERFORMANCE



VM2410A VIDEO MODULATOR

The R.L. Drake Company is proud to present the VM2410A agile modulator with features to satisfy the most demanding engineering requirements:

- Frequency agile with 60 channel coverage from 50MHz to 400MHz.
- IF loop-thru connections for scrambling encoders or IF stereo processors.
- Lower noise floor for larger, multiple modulator installations.
- Video low pass and SAW filtering offers quality performance in congested systems.
- High power output adjustable to +57dBmv.
- Full front panel metering and level controls to simplify installation and operation.
- Automatic channel offsets where specified by F.C.C. document 21006.

Contact us for the name of your nearest Drake Distributor

DRAKE[®]

R.L. Drake Company
540 Richard St., P.O. Box 112
Miamisburg, Ohio 45342, U.S.A.
Fax: (513) 866-0806
Telex: 288-017
Phone: (513) 866-2421

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

Reader Service Number 57.

How to make time for writing

By Rikki T. Lee
Editorial Consultant

Monday, June 18, 8:30 a.m. Introduction: In the dentist's office.

I have three choices as I sit in the waiting room: 1) thumb through an old issue of *People*, 2) hum along with the background music or 3) start writing. Since my hygienist has a history of being late, this seems like a good time and place to keep writing until she calls me.

It's like this: You'd like to write but your schedule is full. You're way too busy. Unfortunately, it's a common problem: little or no time to write technical papers, articles or seminar presentations. Plus there doesn't seem to be any more time in the day—maybe a little less.

Time compression techniques

But you can *make* time! How? Just squeeze as much as you can out of the time you already have and use it more efficiently. For example, instead of waiting idly for appointments (while your watch measures the time wasted), bring along a notebook and start writing that paper. And instead of sitting angrily in your car during traffic delays (while your watch ticks away), record your remarks for later transcription.

Constantly be on the lookout for opportunities to compress the most of out of your time, whether before, during or after working hours. And, yes, weekends. Last night, before the baseball game began, I wrote an outline. So my thoughts will stay on track, even if I don't.

Monday, June 18, 9:45 a.m. Rules of the road: Stuck in traffic.

Construction has traffic on the highway at a standstill. Being caught in a jam often raises my blood pressure 30 points, but not today: I'm dictating a few more paragraphs. When in a car, speak instead of write; it's important to keep both eyes on the road and both hands on the wheel. Driving and writing don't mix; the combination isn't safe.

Also, it's risky to dictate in fast-moving or city traffic. This is the same reasoning behind not using your car phone while you drive 55 mph, make turns, drive in hazardous conditions or approach pedestrian crossings. People do it, but it's unsafe. Concentrating on one activity at a time, either driving or speaking, should be the rule of the road.

Writing your paper during odd occasions such as these consists of a "pre-first draft," not yet ready for editing. When writing, jot down your thoughts in complete sentences whenever possible. Don't use abbreviations or shorthand because you never know when you'll be looking at your notes again. A few weeks later when you take them out, your notes might be in-

decipherable. Also, preface each spurt of writing or speaking with the date, time and topic to maintain the proper sequence.

When you've finished the entire project, input everything on a word processor, keeping the topics in outline order. This hard copy becomes your first draft and will probably require more editing than usual. Sentences tend to be shorter and para-

SIMULSAT® Sees Them All

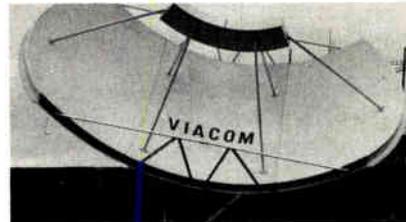
si • mul • sat (sī 'm'l sat') n. [for SIMULtaneous SATellite reception] 1. Receives 35+ satellites. 2. Eliminates need for antenna farm!

SIMULSAT is "the antenna that sees the future," because it's built to meet future needs. It's the only antenna available today with built-in growth capabilities.

- Earth Station Heating Systems
- Parabolic Antennas—1.8-32 meter

SIMULSAT

RECEIVES 35+ SATELLITES. SIMULSAT antennas can view all domestic satellites at once, with uniform performance on each satellite. SIMULSAT antennas can see from Satcom IR (139° W) to Spacenet II (69° W).



VS.

THE ANTENNA FARM

Eliminates need for antenna farm. Invest in one SIMULSAT rather than several earth stations. That means one foundation, one (smaller) site, one installation, one planning commission to deal with, and one capital outlay.



Expanded 70° View Arc • C-Band • Ku-Band



Antenna Technology Corporation
1140 East Greenway, Suite #2
Mesa, Arizona 85203
(602) 264-7275
Telex: 187217 - Intelx
FAX # (602) 898-7667

Reader Service Number 58.

graphs choppy when your time to concentrate is at a premium. (Traffic is loosening up. Over and out.)

Tuesday, June 19, 12:12 p.m. Places to write: Supermarket checkout.

Three shoppers stand in line ahead of me, and they're all clutching their checkbooks. But while these people glance at the tabloid headlines or search the last-minute munchie racks, I have another five minutes or so to write. Sure, some people give me curious looks, but who cares?

To make time, you must first find it. Perform a mental autopsy of the previous day. In your mind, go through all the events:

preparations for work, your commute, meetings, lunch, TV viewing and so on. Then ask yourself, "Did I purposely waste any time?" Also try to recall any unexpected gaps (late appointments, cancellations, etc.) that caught you with nothing to do. Calculate how many "no-brainer" minutes you spent.

Tomorrow, approach things differently. Be prepared with your notebook or recorder at a moment's notice, in almost any situation.

Have to stop now. The cashier asks me, "Paper or plastic?" Paper, of course. It's better for the environment—and you can

write on it!

Tuesday, June 19, 7:42 p.m. Writing "on the fly": Walking the dog.

This is a great time to dictate. Evening joggers and just-arriving workaholics might think I'm chatting with Rover, but what do they know?

If your paper requires a bit of reading and/or research before you begin the actual writing, take advantage of the longer periods of time that you ordinarily spend in unwinding. For example, instead of eating (or drinking) your lunch at your favorite bar and grill or taking an extended coffee break at the company lounge, visit the library or lab.

While you're reading or testing, take legible notes in your writing notebook. This allows you to refer to your notes when constructing your outline (also in your notebook) and writing the paper. Make certain you keep a copy of each day's notes, just in case you lose your notebook.

When it's time to write or dictate, you don't always have to stay on target. In fact, you can do a little bit of rambling, doodling or digressing whenever you get stuck. This'll help you get launched if you have trouble scribbling down your ideas or self-consciously talking into a recorder. Sooner than you think, words and sentences related to your topic will pour out. Then, when you input, eliminate the excess words.

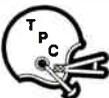
Being aware and prepared

Sorry, writing on the fly (that is, at the first sign of idleness) isn't easy. It takes self-discipline to get started plus awareness of your surroundings and self-control to keep you going. If you're a hopeless time waster, you can change your habits but you'll have to do it gradually. On the other hand, know when *not* to write. Unless you regularly wake up and hurriedly jot down exciting inventions, dreams and ideas in the middle of the night, avoid keeping your notebook on your bedtable. Don't disturb or needlessly delay your usual time to sleep.

So, here are some final tips on your new hobby, writing in motion:

- 1) Reduce your pleasure reading during the periods when you're writing.
- 2) Cut down on the amount of television you watch; tape any special programs for viewing after you've written the paper.
- 3) Begin by not wasting time, then find ways of saving your time: postpone unnecessary trips, shop quicker, take fewer catnaps, etc.

The time to write is ripe. And the minutes keep ticking past. 



NEXUS

- True Spot Random Access
- Programming Versatility
- Multiple VTR Control



MEDIUS

- Dynamic Random POD
- Totally Automated
- Internal Verification Buffer



ON-Q

- Dynamic POD Sequential
- Low Cost
- Automatic POD Formation
- Upgradeable to Random POD or Random Access



ADMINISTRATOR

- Menu-Driven Software
- Networkable
- Extensive Reports Package

SCORE BIG

WITH

TPC

" "  " "

ADPOD

ADMINISTRATOR

ON - Q

MEDIUS

NEXUS

KICKOFF THE FALL SEASON WITH THE BEST LINE UP OF COMMERCIAL INSERTION AUTOMATION SYSTEMS IN THE LEAGUE.

CABLE'S AUTOMATION EXPERTS



**Telecommunication
Products Corporation**

1331 South 7th Street, P.O. Box 476,
Chambersburg, PA 17201

Telephone: (717) 267-3939

Reader Service Number 59.

THE ONLY GIG IN TOWN!

lifelife™

Town, country, or city, there's only one cable available with 1GHz bandwidth and that's T10 from Times Fiber Communications. T10, the highest bandwidth drop and semiflex cable in the industry, is now ready for delivery. This cable is *the* solution for upgrades or rebuilds, since it is compatible with your present configuration and your future requirements.

T10 will carry more channels with better picture quality than ever before. And, T10's higher bandwidth capability will support the new high definition television signals. The cable is triple bonded to eliminate cold temperature pullout problems and provide added resistance against moisture and corrosion.

T10 is a product of the acknowledged leader in cable technology — Times Fiber Communications. When it comes to making sure your upgrade or rebuild brings future returns, specify the Only Gig in Town — T10.

For more information, see your TFC representative or call 1-800-TFC-CATV.

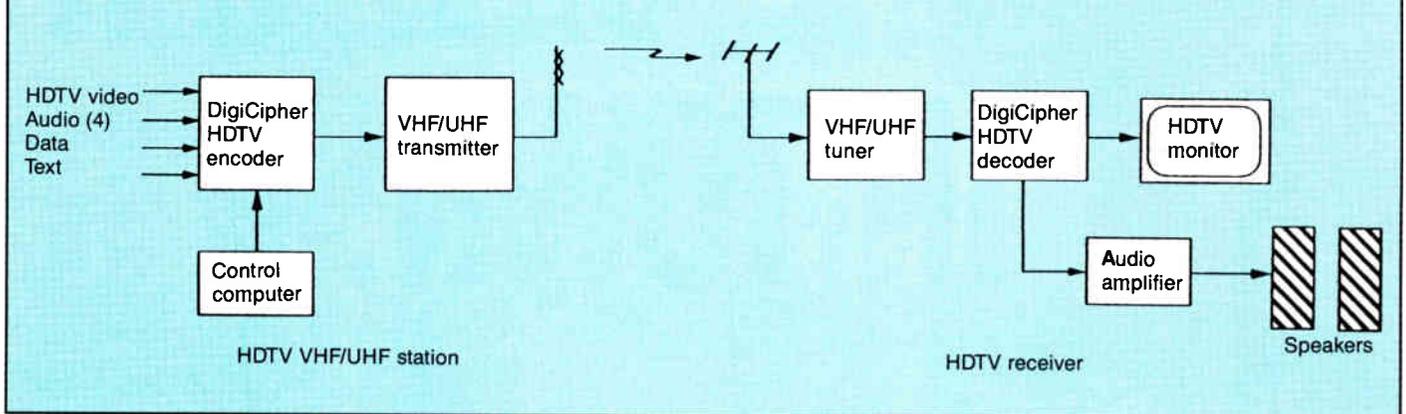
TFC TIMES FIBER COMMUNICATIONS, INC.[®]
a company of
LPL Technologies, Inc.

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

TFC...Where technology meets the bottom line.

Reader Service Number 60.

Figure 1: System block diagram



General Instrument's HDTV proposal

By Lawrence W. Lockwood

President, TeleResources
East Coast Correspondent

As various HDTV proposals have been presented for consideration, I have provided brief overviews of each in past col-

umns. Well, another has been submitted to the Federal Communications Commission just before the deadline date for acceptance for testing by the ATTC (Advanced TV Test Center). This proposal by the General Instrument (GI) Corp. is



"Since the world seems to be rapidly migrating to an all-digital universe, it is most encouraging to see a proposal for an all-digital HDTV system."

Figure 2a: Encoder block diagram

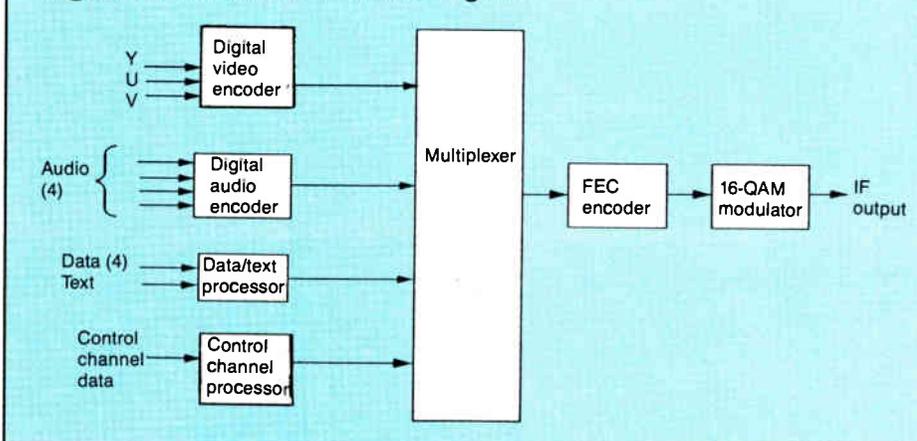
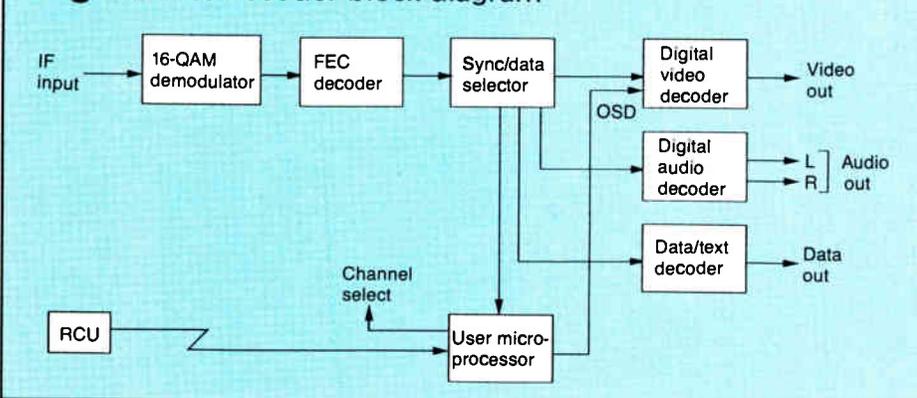


Figure 2b: Decoder block diagram



DigiCipher—a simulcast system—and is causing some excitement since it is the only one that is purely digital from start to finish.

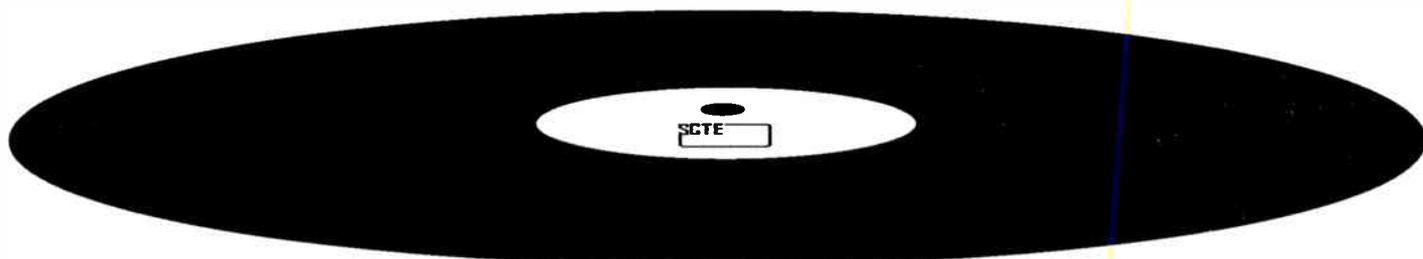
All the previous HDTV schemes incorporate significant digital signal processing (DSP) to accomplish the bandwidth compression required to fit the HDTV signal in a standard 6 MHz TV channel (and DSP in the receiver to recover the HDTV signal for display). However, the

HAVE YOU HEARD?

The Society of Cable Television Engineers'

CABLE-TEC EXPO '90

attracted



RECORD ATTENDANCE!

Even if you weren't in attendance, you still have the opportunity to get "on track" with the cable TV industry's premier technical training event!

NOW AVAILABLE!

CABLE-TEC EXPO '90 PROCEEDINGS MANUAL

A comprehensive collection of technical papers presented in the Annual Engineering Conference held June 21, as well as supplementary material for the Cable-Tec Expo workshops conducted June 22 and 23. This deluxe publication is an invaluable educational souvenir of these exciting events!

INCLUDES:

- * Field Supervision
- * Tap to TV
- * Cable in the 1990s
- * Corrosion Protection
- * CLI Ninjas
- * Fiber Optics
- * OSHA Safety Rules
- * Technical Writing
- * Signal Leakage
- * Video and Audio

PRICE: ONLY \$35



Satellite Tele-Seminar Program

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

Upcoming 1990 Programs:

- videotaped at Cable-Tec Expo '89 in Orlando, Fla.
- August 28: "Cable Vs. The Telcos (Part One)"
- September 25: "Cable Vs. The Telcos (Part Two)" plus "Local Origination Equipment and Its Use (Part One)"
- October 30: "Local Origination Equipment and Its Use (Part Two)"

COMING SOON: TELE-SEMINAR PROGRAMS VIDEOTAPED AT CABLE-TEC EXPO '90!

ALL PROGRAMS WILL AIR FROM 12 NOON TO 1 P.M.
EASTERN TIME ON TRANSPONDER 2 OF GALAXY III.

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

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

Figure 3a: Digital video encoder block diagram

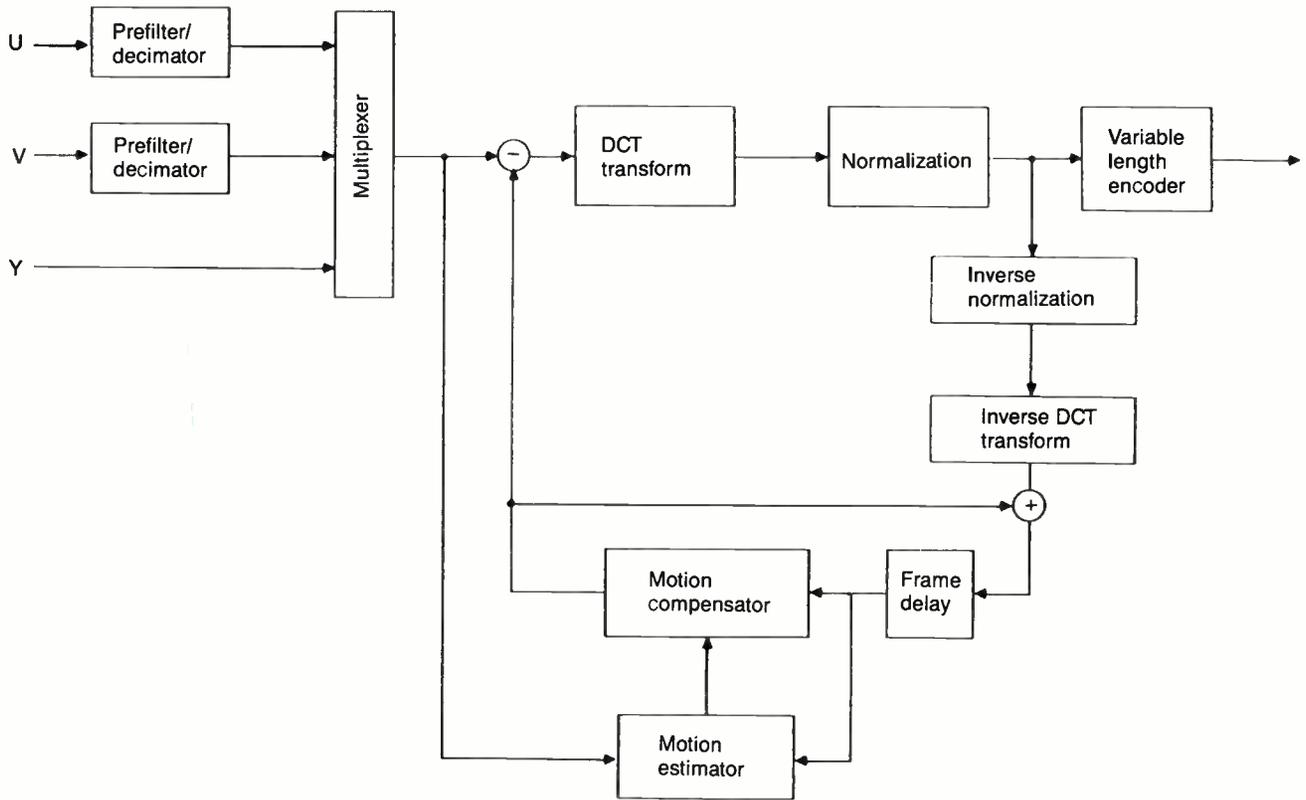
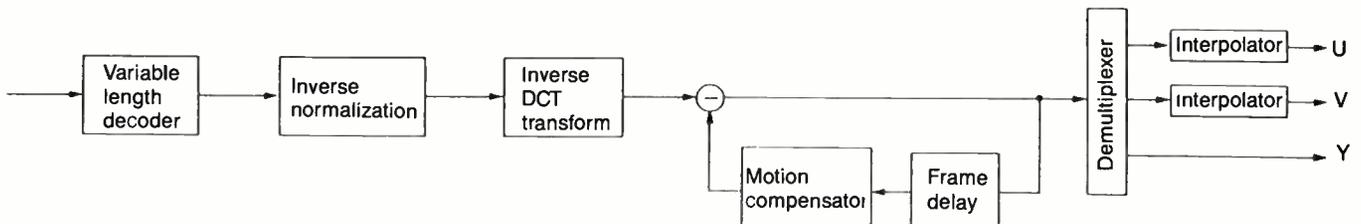


Figure 3b: Digital video decoder block diagram



REPRINTS

**Communications • Visibility
Knowledge • Information**

Reprints work for you!

For more information call Marla Sullivan at
Transmedia Partners today! (303) 355-2101

transmission in all the designs use analog modulation for at least part of the transmission signal—Zenith uses a hybrid signal; the lows are digital and the highs are analog (see "Zenith and Compatible HDTV," *CT*, November 1988). But in the DigiCipher system the signal is *all* digital between the camera and the display, *including* the transmission. If this proposal fares well in testing it should prove welcome to those who have lobbied extensively for digital HDTV. One such industry leader is John Sie, senior vice president of Tele-Communications Inc. (the largest MSO), who has long proclaimed that we should not hurry into a "premature analog standard" but wait for a "processed

HIGH RELIABILITY

... around the world.

The New Power Cast™ Ferroresonant Power Supply. Put It Where You Want It, Anywhere In The World.

It's such a simple idea: construct a power supply with fewer internal parts so there's less to go wrong. Heat sink its transformer into a cast aluminum housing for maximum heat dissipation. Make it adaptable to power configurations around the world. Protect the electronics with a weather-proof seal. And engineer the entire unit so that it mounts easily on a pole, a pedestal, and even the strand.

But the simplest ideas are often the most revolutionary. And that's the idea behind the new Power Cast™ power supply.

Make Your System Right From The Start.

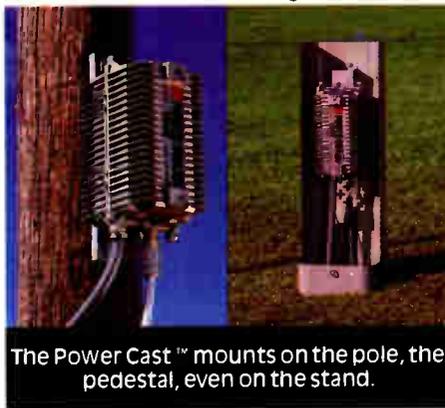
Jerry Schultz and our Power Guard engineers spent five years designing, planning, and testing the Power Cast. They wanted to make sure it had all the features you demand—no matter where in the world your system may be.

For instance, the placement of your power supply is very important because of local costs, regulations, controls, and specifications.

Anticipating these problems, we made the Power Cast so you can mount it anywhere. Whether that's on a pole. In a pedestal. And even on the strand itself. So it's the ideal power supply solution for off-premise addressability. And the

POWER CAST

Patent Pending



The Power Cast™ mounts on the pole, the pedestal, even on the stand.

Power Cast is light enough so that it weighs less than most trunk amps. Plus it's the first power supply specifically designed with fiber optics in mind.

The Sky's The Limit Once You Have The Power Cast.™

The Power Cast is available in various power configurations to meet your country's specifications.

All models feature:

- strand/pole/pedestal mounting
- cool, quiet operation
- fiber optic compatibility
- input/output surge protection
- 90% - 93% efficiency rating
- time delay

We also offer an anodized model for underground and coastal environments.

So order your Power Cast evaluation unit today. You'll see how the Power Cast power supply keeps on hanging in there—giving you performance you can count on anywhere in the world.

International Distributors, Let's Talk.

Power Guard is the fastest growing manufacturer of power supplies for CATV.

To help us grow internationally, we are seeking foreign distributors. If you are interested in representing an aggressive, quality manufacturer, please contact us.

 **POWER GUARD**

801 Fox Trail
P.O. Box 2796
Opelika, AL 36801
USA

Ph: 800-288-1507
205-742-0050

FAX: 205-742-0058

Reader Service Number 61.

Figure 4: Data multiplex format

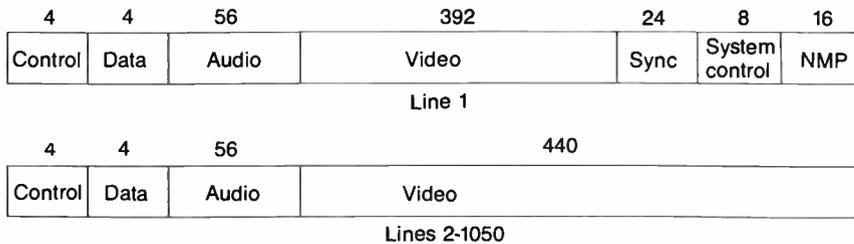
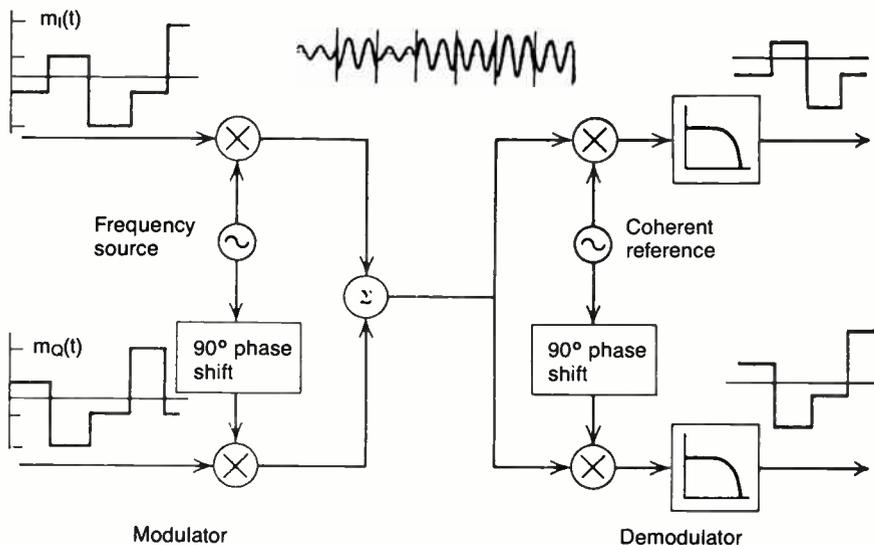


Figure 5: Block diagram of 16-QAM modulator/demodulator



DigiCipher system parameters

Parameters	Value
Video:	
Aspect ratio	16:9
Raster format	1050/2:1 interlaced
Frame rate	29.97 Hz
Bandwidth	
Luminance	22 MHz
Chrominance	5.5 MHz
Horizontal resolution	
Static	660 lines per picture height
Dynamic	660 lines per picture height
Horizontal line time	
Active	27.18 μ sec
Blanking	4.63 μ sec
Sampling frequency	51.8 MHz
Active Pixels	
Luminance	960(V) \times 1,408(H)
Chrominance	480(V) \times 352(H)
Audio:	
Bandwidth	15 kHz
Sampling frequency	44.05 kHz
Dynamic range	85 dB
Data:	
Video data	13.83 Mbps
Audio data	1.76 Mbps
Async data and text	126 kbps
Control data	126 kbps
Total data rate	15.84 Mbps
Transmission:	
FED rate	130/154
Data transmission rate	19.43 Mbps
16-QAM symbol rate	4.86 MHz

digital HDTV" capability. Testing will determine if that time has come with this GI proposal.

The details of the digital techniques used in the TV signal compression are beyond the scope of this short column. There are general texts and a number of recent papers addressing some of the latest procedures applied specifically to HDTV (and NTSC) compression^{1,2,3,4}. Suffice it to say that they all use various methods of taking advantage of redundancy inherent in any TV signal. There is a good deal of repetition of pixel (picture element) values within a frame and, of course, a great deal of repetition from frame to frame. To the cognoscente, DigiCipher uses a discrete cosine transform (DCT), Huffman coding and a proprietary sort of temporal differential encoding (DPCM) for motion compensation.

DigiCipher system overview

The following brief system description

is excerpted and abbreviated from the material General Instrument submitted to the FCC. The key parameters of the DigiCipher HDTV system are listed in the accompanying table.

For error-free transmission of the digital data, powerful forward error correction coding (FEC) is used. Forward error correction coding means that the FEC code that is multiplexed into the data stream accomplishes the task of detecting any data error in transmission and then makes the necessary correction to produce the original data without requiring any data retransmission. The claim is made that at a C/N (carrier-to-noise ratio) above 19 dB, essentially error-free reception can be achieved (one undetected error event per day). Figure 1 shows the overall system block diagram.

At the TV station the encoder accepts one high definition video and four audio signals and transmits one 16-QAM modulated (more about this later) data stream.

At the consumer's home, the DigiCipher HDTV receiver receives the 16-QAM data stream and provides video, audio, data and text to the subscriber.

Figure 2a shows the block diagram of the encoder. The digital video encoder accepts the luminance (Y) and chrominance (U, V) inputs with 16:9 aspect ratio and 1,050 line interlaced (1,050/2:1) at a 59.94 field rate. The sampling frequency of the analog-to-digital (A/D) conversion is 51.80 MHz for Y, U and V. The digital video encoder implements the compression algorithm and generates the video data stream. The same for the audio data stream. The multiplexer combines the separate data streams into one data stream at 15.8 Mbps. The FEC encoder adds error correction overhead bits and provides 19.42 Mbps of data to the 16-QAM modulator. The symbol rate of the 16-QAM signal is 4.86 MHz.

Figure 2b shows the block diagram of the decoder. The 16-QAM demodulator



**CALL
QRF**

**FOR
HYBRID
PRICES NOW!**

**WE WILL MEET ANY
LEGITIMATE PRICE QUOTE**

WE WANT YOUR BUSINESS

QUALITY RF SERVICES, INC. TESTS EVERY HYBRID FOR GAIN, SECOND ORDER, THIRD ORDER AND CURRENT CONSUMPTION. WE WILL ALSO TEST COMPOSITE TRIPLE BEAT AND RECORD THE WORST CASE READINGS ON REQUEST. FOR THE FIRST TIME IN QRF HISTORY, WE WILL ALSO SELL UNTESTED HYBRIDS, AS OUR COMPETITORS DO! TO SAVE YOU EVEN MORE MONEY!

(UNTESTED HYBRIDS WILL NOT BE SHIPPED UNLESS YOU REQUEST THEM)

THE CHOICE IS YOURS!

IF YOU ARE ORDERING FROM THE ORIGINAL MANUFACTURERS (JERROLD, SCIENTIFIC ATLANTA, MAGNAVOX, C-COR, TEXSCAN, ETC.) WE CAN SAVE YOU A BUNDLE!

LARGE QUANTITIES • IN STOCK • NO MINIMUM • SAME DAY SHIPPING

With confidence in our products, money back guarantee, experienced personnel and a proven track record, why would you settle for less?

WHEN ONLY EXCELLENCE WILL DO!

QUALITY R.F. SERVICES, INC.

850 Park Way, Jupiter, Florida 33477

(800) 327-9767 (IN FL.) (800) 433-0107 (407) 747-4998 FAX (407) 744-4618

Reader Service Number 62.

DMV

receives the IF signal from the VHF/UHF tuner and provides the demodulated data at 19.42 Mbps. The demodulator has an adapter equalizer whose function is to combat multipath (also called "reflections" or "ghosts") that may be in the transmission. It is claimed to cancel multipath of up to 2 μ s. The system also will have a single echo cancellation equalizer for a long multipath of up to a line time (32 μ s).

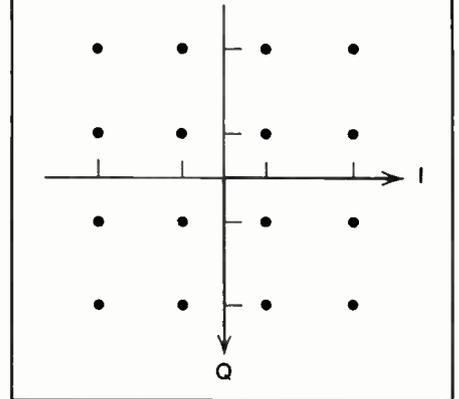
The FEC decoder's function is to correct random or burst errors in the data stream. The "sync/data selector" maintains overall synchronization and provides

video, audio, data/text and control data streams to the appropriate processing blocks. The control channel processor decodes the program related information. The user microprocessor receives commands from the remote control unit (RCU) and controls various functions of the decoder including the channel selection.

Digital video processing

The digital video encoder is shown in Figure 3a. The decimator performs the function of filtering or reducing the bandwidth of the chrominance signals (U, V) relative to the luminance. In all current

Figure 6: Signal constellation of 16-QAM modulation showing I (in phase) and Q (quadrature)



color TV systems, chrominance bandwidths are less than luminance bandwidths since the eye is less sensitive to detail in color than it is in black and white. The resulting chrominance signals are multiplexed with the full bandwidth luminance signal and all components are then subjected to the same processing. At the decoder (Figure 3b) the components are again separated and the chrominance signals are interpolated back to full resolution. The discrete cosine transform (DCT) performs a key function in the compression (for details of the transform see References 1 and 2). The normalization function and the "variable length encoder" (where the Huffman coding is done) both further improve coding efficiency. The motion compensation function with use of the frame delay essentially compares two successive

WASHINGTON CABLE SUPPLY, INC.

We carry a full line of Cable T.V. Equipment and Accessories with:

- Competitive Pricing • Product Knowledge
- Excellent Service

We work with some of the Best in the Business:

- Gilbert • Jerrold
- Comm/Scope • Belden
- Pyramid • Pico Macom • LRC • Carlon
- Bashlin • Tyton • Multilink • 3M

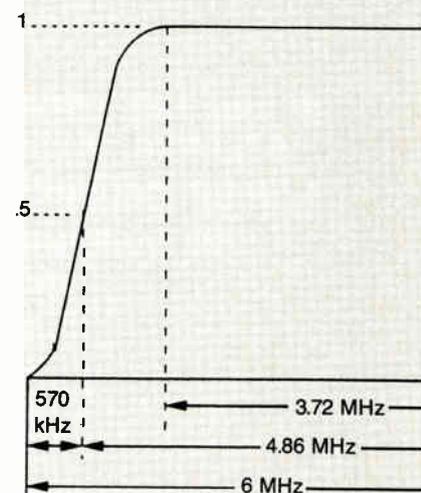
3182 Bladensburg Rd., NE
Washington, DC 20018
FAX #: (202) 832-2449

Call for Competitive Prices or More Information

1-800-888-0738

Reader Service Number 63.

Figure 7: IF output spectrum



frames to determine what motion has occurred and with the "motion estimator" performs further compression.

Data multiplex format

Figure 4 shows the data transmission format, which is really the sequence of the bits of the compressed video, audio, data, text and control channel after multiplexing as they are ready for transmission. Each line has a fixed allocation of 4 control channel bits followed by 4 allocated data channel bit positions. The next 56 bits represent audio data. The remainder of the 504 bits are dedicated to video for lines 2 through 1,050. Line 1 differs in that the 48-bit portion 457 through 505 presents information for frame synchronization and some other data control.

Digital transmission

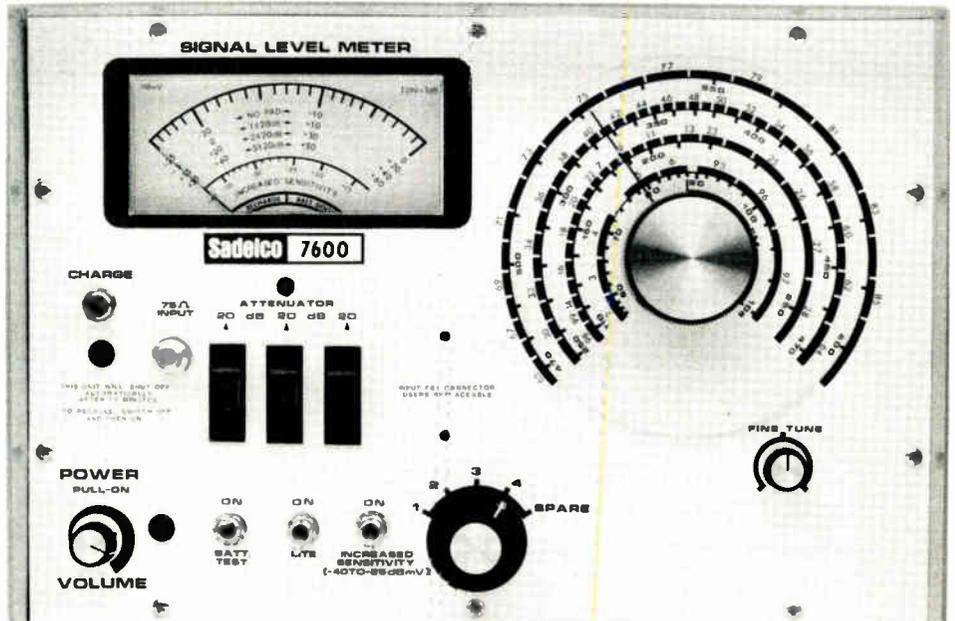
The modulation selected for digital transmission is a 16-QAM and is a significant portion of the total compression required to transmit the digital HDTV in the 6 MHz RF channel. As shown in the table, all the previously described digital compression of the HDTV signal achieves a total data rate of 19.43 Mbps for transmission. This 19.43 Mbps must be transmitted in a 6 MHz RF channel so a digital modulation technique used in many data transmission schemes (telephone transmission among others) called "16-QAM" is used. QAM stands for *quadrature amplitude modulation*. In this technique two binary AM signals are modulated in quadrature. See Figure 5.

Quadrature modulation is the same type of modulation used in NTSC TV for chroma modulation of the 3.58 MHz color subcarrier. In it a carrier is shifted 90°

600 MHz . . . \$795. or less*

Sadelco's New 7600 Signal Level Meter

Designed for the Budget Conscious Installer and Technician

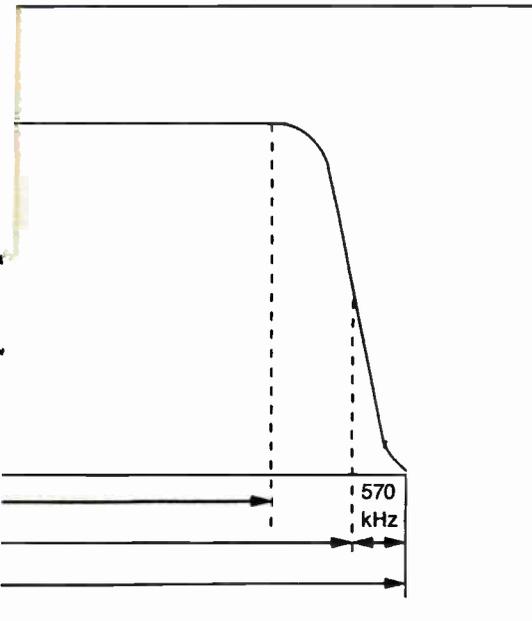


* contact your favorite distributor
price subject to change without notice

for more information call or fax . . .

Sadelco, Inc. 75 West Forest Avenue | Tel: 201-569-3323
Englewood, N.J. 07631 | Fax: 201-569-6285

□ Distributed in Canada by: Anixter Canada, Inc. and Deskin Sales, Corp.
General Rep. for Europe: Catec AG, Luzernerstrasse 145a, 6014 Littau, Switzerland.



to obtain the second carrier (the quadrature carrier). In 16-QAM a different four-level signal is modulated on each carrier. A four-level signal can be represented by two bits. Thus in a data period each carrier can transmit two bits each, totaling four bits for each period, or a data rate reduction of four times. Consequently in DigiCipher the total compressed data rate of 19.43 Mbps is transmitted at a data rate of 4.86 Mbps. Such a signal is often represented in a plot called a "signal constellation," as shown in Figure 6.

Proper signal filtering (a 15 percent roll-off raised cosine, for example) will be provided to prevent adjacent channel interferences (see Figure 7). For more detailed

treatments of QAM see References 5, 6 and 7.

Conclusions

General Instrument has proposed its DigiCipher HDTV scheme. In it a 1,050 line, 2:1 interlaced, 29.97 frame/second HDTV signal with a luminance bandwidth of 22 MHz and a chrominance bandwidth of 5.5 MHz is compressed digitally and transmitted digitally in a standard 6 MHz TV RF channel. Since the system requires substantially lower C/N and lower power, the taboo channels may be used (GI states a 20 dB lower transmitter power than that required for current transmission can be used). A satellite channel can carry

DIGITAL MAPS

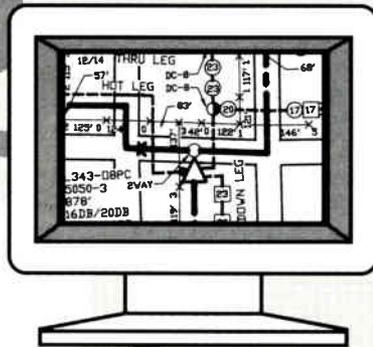
READY TO RUN

ADC gives you accurate maps of the entire U.S. on computer disk – street by street, city by city. Ready to run on your CAD or GIS program.

Create custom maps for installation and service. Add technical data and details to any map. Plan for expansion. Map new territories.

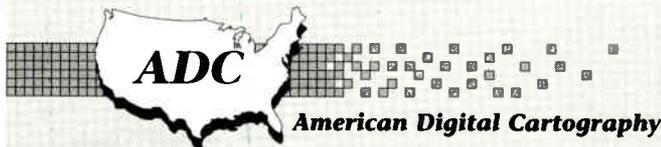
ADC maps give you streets, highways, waterways, contours and elevations, single or double line roads, color-coded details and more.

Work smarter, faster and with greater accuracy. Call or write for more information and a free map sample.



Customize Your Map to Show:

- utility poles
- cable routing
- splices and anchors
- amplifiers and power supplies
- technical data



PH: 414-733-6678

715 West Parkway Blvd. • Appleton, WI 5491A • FAX: 414-734-3375

FMT411F SUBCARRIER MODULATOR

- ALL THE QUALITY YOU'VE COME TO EXPECT FROM LEAMING
- ECONOMICAL PRICE
- SUITABLE FOR TRANSMISSION VIA FIBER OR MICROWAVE



Each FMT411F modulator transmits one program audio channel. The FMT411F transmits the program material on any specified frequency between 4.5 & 10 MHz, 52 & 88 MHz or 88 & 126 MHz. Audio bandwidths of 3.4 kHz, 7.5 kHz, 10 kHz, or 15 kHz are available. Typical uses for the FMT411F include modulation of an audio signal to 4.5 MHz for transmission via fiber or microwave.



15339 Barranca Parkway, Irvine, CA 92718
Ph: 714/727-4144 • Fax: 714/727-3650

Reader Service Number 66.

two DigiCipher signals and the transmission allows the use of a smaller dish size compared to other analog or hybrid TV systems.

There are some concerns that must be answered with the testing. Since DigiCipher is an interlaced system, its lower vertical resolution must be compared to those systems that use progressive scanning with their higher vertical resolutions due to their higher Kell factor.

Another concern requiring close examination in testing (particularly, field testing) is the performance of the 16-QAM modulation, especially in terrestrial broadcast. QAM is sensitive to noise (gaussian, impulse and multipath) and phase changes. (See Reference 8.) Digital transmission has many advantages over analog transmission but in the presence of noise it does not degrade gradually as in AM but at a given point tends to fall abruptly and unfortunately very badly. Terrestrial broadcast is a *much* tougher transmission medium for a digital signal than others that may be used for HDTV; i.e., cable or DBS (direct broadcast satellite). The interference problems in terrestrial (noise, multipath, phase complications, etc.) are significant concerns in maintaining the integrity of the transmission. Of course, testing will produce the answers.

However, since the world seems to be rapidly migrating to an all-digital universe, it is most encouraging to see a proposal for an all-digital HDTV system—especially from an all-American company.

References

- 1 "Digital Television," R. Stafford, Wiley, 1980.
- 2 "Digital Coding of Waveforms," N. Jayant, P. Noll, Prentice-Hall, 1984.
- 3 "A Tutorial on Digital Video Compression Techniques," J. Waltrich, 1990 *NCTA Technical Papers*.
- 4 "Video Compression: Gift or Menace?," J. Chiddix, *CED*, June 1990.
- 5 "Information Transmission, Modulation and Noise," M. Schwartz, McGraw-Hill, 1980.
- 6 "Digital Telephony," J. Bellamy, Wiley, 1982.
- 7 "Digital Communications: Microwave Applications," K. Feher, Prentice-Hall, 1981.
- 8 "Performance of High Level QAM in the Presence of Impulsive Noise and Co-Channel Interference in Multipath Fading Environment," Y. Kim, *IEEE Transactions on Broadcasting*, June 1990.

Author's note: DigiCipher is a trademark of General Instrument Corp.



**SWEEP SYSTEMS
FOR THE '90s**

**CALAN 1776/1777
Integrated Sweep Receiver/Spectrum Analyzer**

Improving picture quality is the fastest, most obvious way to improve subscriber satisfaction.

CALAN's integrated 1776/1777 helps you do just that. This portable, rugged system enables you to perform sweep and distortion measurements easily, quickly. With CALAN's flexible set-up capability, guard bands and phantom carriers, you can test and maintain your cable plant with no discernible interference to the home viewer. . .even when scrambled channels are in use.

As the only company specializing in CATV sweep systems, CALAN offers a lot more than quality and proven reliability. We provide unmatched customer service and support. . .along with system package pricing that makes CALAN your cost-effective tool for the '90s!



CABLE AND LOCAL AREA NETWORKS

CALAN, INC.

Dingman's Ferry, PA 18328

1-800-544-3392 • In PA: 717-828-2356

Reader Service Number 67.

**The
right tool for
subscriber
satisfaction!**

Power Guard's 60 VAC Power Cast power supply

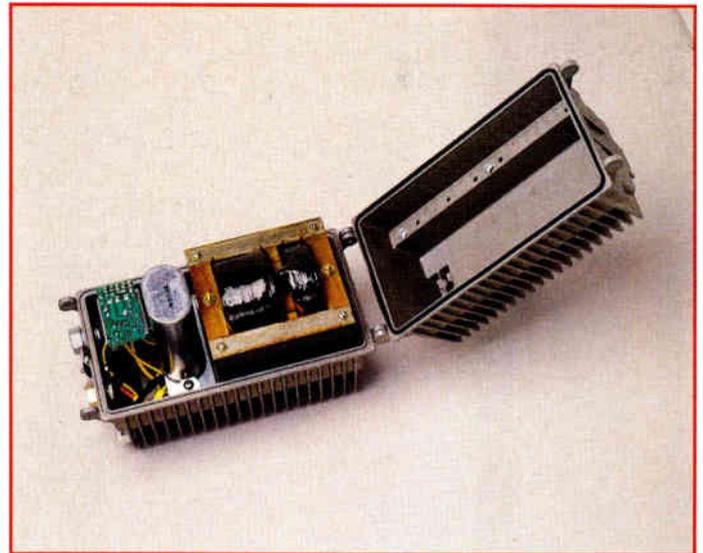
By Ron Hranac

Most cable systems use 60 volt ferroresonant power supplies to operate the active devices in the trunk and feeder portions of their plant. These power supplies are generally either non-standby or standby designs, with features and capabilities varying somewhat from manufacturer to manufacturer. Most evolutions in power supply technology occur in the standby versions, with improved charging circuits, inverter designs and battery management.

It's difficult to improve upon non-standby designs, other than perhaps incorporating more efficient ferroresonant transformers to help systems reduce long-term operating costs. But one manufacturer has made a change in conventional power supplies; not so much the contents but the packaging. Power Guard recently introduced its Power Cast power supply, which is one of those ideas you see every now and then that inspires you to think, "Why didn't someone think of that before?" So we obtained one for testing and gave it a good workout in Jones Intercable's corporate evaluation lab.

About the product

Instead of the more typical stamped metal box, the Power Cast

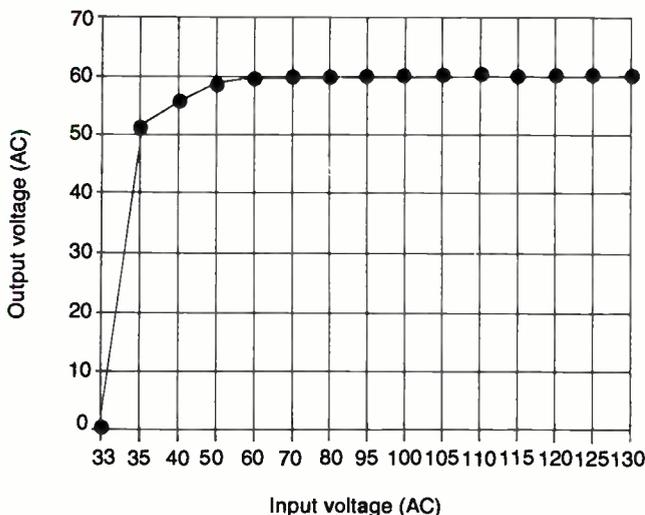


Courtesy Power Guard

Internal components are mounted to dissipate heat effectively. An optional PIP surge protector module for the unit's output is shown at the left of the capacitor.

Figure 1: Regulation test (7 ampere load)

Input voltage	Output voltage	Input voltage	Output voltage
33	0.00	100	60.30
35	51.40	105	60.40
40	55.90	110	60.40
50	59.10	115	60.40
60	59.70	120	60.30
70	60.00	125	60.30
80	60.10	130	60.30
95	60.30		



power supply is inside a cast aluminum housing about the size of a line extender or small trunk amplifier. The obvious benefit is the flexibility that this packaging provides. The power supply can easily be mounted on the pole, pedestal, wall or even the strand.

It is designed to operate over a 95 to 130 VAC input while maintaining a regulated 60 VAC quasi-square wave output. The version we tested (PC1-6015) is rated at 15 amperes maximum output at 90 percent efficiency—performance fairly typical of modern CATV ferroresonant power supplies.

The power supply is inside a finned cast aluminum housing that is 6 inches wide, 8 inches deep and 12.5 inches wide. Out-of-the-box weight is about 36 pounds. The unit is shipped with strand mount brackets, and optional pole/wall mount brackets are available from the manufacturer. Also available is a breaker box assembly that includes a line cord, utility outlet, circuit breaker and an MOV-type (metal oxide varistor) input surge protector that plugs into the 120 VAC utility outlet. Power Guard also can provide an optional output time delay plug-in module, as well as a PIP (transorb) or crowbar output surge protection. List price for the Power Cast without options is \$305.

Lab measurements

The regulation of the Power Cast was tested with a 7 ampere load (low efficiency) and a 15 ampere load (maximum efficiency). The input voltage was varied from what produced no secondary output up to a maximum of 130 VAC. Figures 1 and 2 summarize the power supply's output voltage regulation performance, which was quite good and exceeded the manufacturer's own specs.

Power Cast also was tested at full transformer saturation, which was found to be 25 amperes with the output short-

circuited. This load was maintained over an entire weekend and resulted in the output PIP surge protector module failing (as it was designed to do). When this module fails it allows the power supply to continue operating. The short circuit was removed from the supply's output and it resumed normal operation.

Perhaps the biggest concern evaluating this product was how well it dissipates heat. Placing a ferroresonant transformer and its related components in an enclosed environment is certainly asking for possible problems. Power Guard considered this, so the transformer is well sunk to the housing and the fins do an excellent job of removing excess heat.

Numerous temperature measurements were made of the transformer, capacitor and other internal components using a remote probe and Fluke 51K/J digital thermometer. Various spots on the housing's exterior (including the fins) also were measured with a special surface probe. Since ferroresonant transformers generate more heat with reduced loads, all temperature measurements were done with a 7 ampere load.

At 68° F ambient (in the lab), the highest transformer temperature was 182.6°. The highest capacitor temperature was 138.6° and the housing just below the transformer was 132.2°.

Further measurements were made with the power supply in direct sunlight and an ambient temperature of 100°F. The transformer maximum was 172°, the capacitor 135.2° and the housing 125.2°. With a mild breeze and an ambient temperature of 97° F, the transformer measured 168.2°, the capacitor 132.2° and the housing 121.4°. From this, it is apparent that the Power Cast adequately dissipated heat. In fact, it ran cooler outside in the sun (with open air circulation) than it did inside an air-conditioned lab with no air circulation!

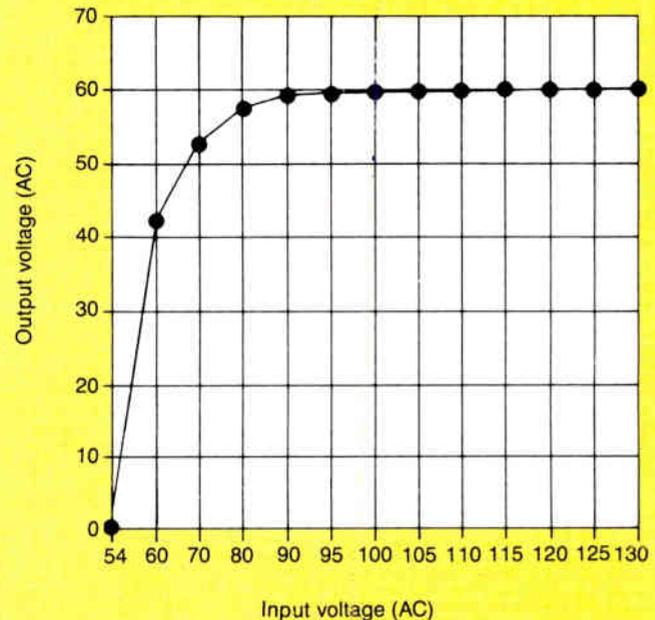
I was further concerned about the life expectancy of the capacitor operating at those temperatures. Should the power supply's capacitor dry out and fail because of the heat, the ferroresonant transformer circuit would no longer be self-regulating and its output voltage would drop. However, the capacitors used in the Power Cast are rated for operation at 90° C (194° F) at 660 VAC.

I called Cornell-Dublier, the manufacturer of the capacitors used by Power Guard. The engineer I spoke with explained that the capacitor is designed to last a minimum of 60,000 hours (6.85 years) at its *maximum* ratings. He then performed the calculations of MTBF (mean time between failure) for operation of the particular capacitor used in the Power Cast at its measured temperature and actual operating voltage. His comment was something to this effect: "This capacitor should last forever."

For weatherproofing, the power supply housing includes a perimeter gasket in the lid. Moisture ingress that sometimes occurs with conventional device housings should not be a problem, though, because the housing is vented through the external AC connection (utility box). Therefore, no opportunity should exist for a pressure differential to develop with temperature

Figure 2: Regulation test (15 ampere load)

Input voltage	Output voltage	Input voltage	Output voltage
54	0.00	100	59.80
60	42.50	105	59.80
70	53.00	110	59.90
80	57.70	115	59.90
90	59.40	120	60.00
95	59.60	125	60.00
		130	60.10



changes. Any moisture that might accumulate inside would be evaporated via the venting action and internal heat.

Comments

Power Guard thought this product through rather thoroughly when designing it. Possible heat-related problems have been addressed by good heat sinking of internal components, the use of high temperature parts and adequate dissipation with a finned housing. Surge protection is available for both the input and output, affording a higher level of comfort.

Ferroresonant supplies have been with us for a number of years, and this design is not a radical departure from what is already available. Its packaging is what sets it apart from other non-standby designs, allowing system operators quite a bit of flexibility for creative installations—including on the strand.

For more information, contact Power Guard, P.O. Box 2796, Opelika, Ala. 36801, (205) 742-0055.

**WANTED
USED VCII's**
Red, Yellow or
White Labels
We buy or trade
VCII's
(918) 836-8401

VIDEOPHILIP II REPAIRS
Fast Turnaround for Out of Warranty Repairs
Commercial Units Only




1575 N. 105th E. Ave. / Tulsa, Oklahoma, 74116 (918)836-8348
VideoCipher® is a Registered Trademark of General Instrument Corporation

***DRAKE IRD
\$599***
*WITH TRADE IN OF
WORKING WHITE LINE VCII
TULSAT CORPORATION
(918) 836-8348

Reader Service Number 68.

Help Wanted

ATREX INC.

A national installation contracting company has standing need for experienced installers. Call 1-800-874-4505 for details and locations!

HELP WANTED

Installer/Technician Northeast Kansas/Southeast Nebraska area.

Contact: Tristar Cable
P.O. Box 1829
Junction City, KS 66441

TECHNICAL MANAGER

Evaluates and assures the performance of the head-end, AML microwave and all passive and active technical devices for signal sources to destination. Responsible for the technical design of the system upgrade plan including all phases of plant, microwave and fiber optics and provide technical support to plant operations manager and upgrade manager. Minimum three years of CATV experience required. Formal or military electronic training desired. Microwave and/or fiber optics experience helpful. Send Resume. EOE

Cox Cable, Oklahoma City, INC.
2312 NW 10th
Oklahoma City, OK 73107

CATV CONSTRUCTION CREWS

- AERIAL & UNDER GROUND SUB-CONTRACTORS
- AERIAL SUPERVISOR
- AERIAL FOREMEN
- UNDERGROUND SUPERVISORS
- SPLICERS
- DROP CREWS
- INSTALLERS
- LINEMEN ETC . . .

Contact:
EARLY & SONS INC.
58 S. Kimball St.
Bradford, Mass. 01835
ATTN: DICK EARLY JR.
508-374-8033
508-374-1876 FAX
LONG TERM EMPLOYMENT
M/F/EOE

Leader in the placement of Cable Television Professionals
Call Toll Free 800-433-2160; In Texas, call 817-599-7623; FAX 817-599-4483

TECHNICAL MANAGEMENT

PROD ENG, SE, 50K
RF DESIGN, SE, 50K
PROD ENG, E, 50K
FIBER ENG, SE, 65K
STAFF ENG, NE, 40K
PL MGR, TX, 35K
PL MGR, E, 40K
TCH MGR, SE, 40K
TCH MGR, MW, 40K
CH TCH, TX, 32K
PL MGR, N, 40K
DES MGR, W, 30K
SERV MGR, W, 40K
CH TCH, S, 28K
CH TCH, NE, 32K
CH TCH, W, 28K
CH TCH, SE, 25K
CH TCH, MW, 30K
CH TCH, S, 28K
DESIGNER, S, 24K

TECHNICIANS

SW TCH, E, 12/HR
LN TCH, FL, 10/HR
LN TCH, NE, 11/HR
LD TCH, S, 10/HR
LD TCH, MW, 12/HR
SW TCH, E, 12/HR
SW TCH, E, 13/HR
HDEND TCH, SE, 20K
SERV TCH, MW, 9/HR
SERV TCH, SE, 7.50/HR



JIM YOUNG & ASSOCIATES

One Young Plaza 1235 Ranger Highway Weatherford, TX 76086

Call for information about these and many other opportunities nationwide

Applications Engineers

What cable did for TV, DCR will do for stereo

Digital Cable Radio, the hot new 24 hour all-music service, is the most dramatic development in entertainment since the arrival of CATV itself. Explosive growth is creating great opportunities in our Applications Engineering Department for west and midwest locales.

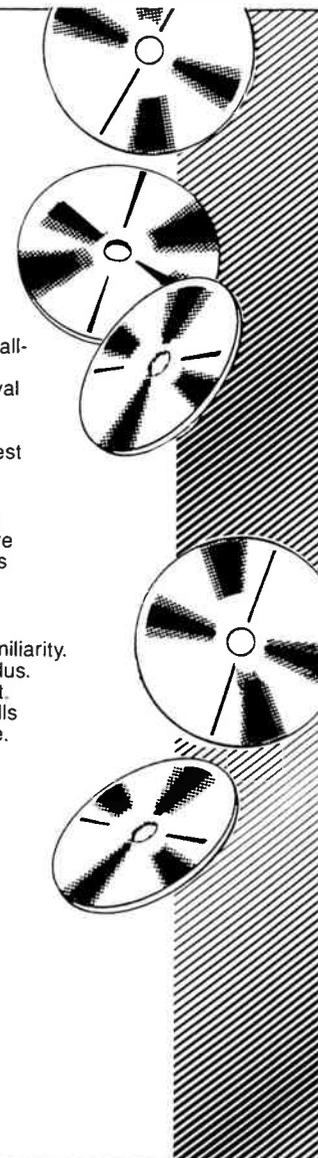
Selected candidates will interface with DCR customers, sales and engineering staff. Will travel 70% across the U.S. to ensure flawless launch of DCR involving applications engineering, training, and sales support.

You'll need at least 5 years CATV experience, knowledge of CATV headends, microwave and fiber optics and computer familiarity. Jerrold Addressable System background a plus. BSEE or equivalent CATV experience a must. Strong interpersonal and communication skills coupled with enthusiasm and self confidence.

To find out more about these unique ground-floor opportunities, send resume to: Ed Zakrzewski at Digital Cable Radio, 2200 Byberry Road, Hatboro, PA 19040.



A Service of Jerrold Communications
General Instrument
An equal opportunity employer



TECHNICIANS/INSTALLERS

Riverview Cablevision is looking for experienced technicians and installation Q.C. personnel. 2-4 years experience, N.J. driver's license & good driving record required. Excellent compensation and full benefits available.

Apply in person or mail resume to:



**Riverview Cablevision
Associates**

4007 Park Avenue
Union City, N.J. 07087

Service Technicians

Friendship Cable, a subsidiary of Buford Television, Inc., has openings for Service Technicians in Arkansas, Missouri and Florida. Applicants must have previous cable television experience, a valid driver's license, and a good driving record. Company will assist with relocation costs if necessary.

We offer a competitive salary and a generous benefits package. Please send resume or call for an application to:

Buford Television, Inc.

PO. Box 9090
Tyler, TX 75711

214-561-4411
EOE/M/F

POSITION WANTED

Cable Engineer: Professional with 15 years CATV experience, knowledge of all types of systems, willing to travel in U.S. or abroad. Available for position with system, supplier, manufacturer or programmer. Contact:

Charles Preston,
2285 Tally Drive,
Chamblee, GA 30341,
(404)455-8147

— Fees Paid —

Call or Write
WICK KIRBY
(708) 369-2620
P.O. Box 2347

Naperville, IL 60567
FAX: 708-369-0126

**CABLE SEARCH
ASSOCIATES**
Professional Search
and Placement

FOR SALE

Magnavox - Line Gear
S/A FF and Regular Line Gear
Power Supplies - \$115
Taps and Splitters, etc.

TM BROKERS

Equipment Wanted
Phone or fax
208-687-2289

AERIAL BUCKET TRUCKS

Large selection geared for CATV

**STANDARD TRUCK &
EQUIPMENT CO.**

1155 Hill St. S.E.
Atlanta GA 30315

Phone: 1-800-241-9357



BUCKET TRUCKS

Professional Services

WILLIAMS SOFTWARE SERVICES

- Apple, Macintosh applications
- Apple, Macintosh Internals;
NuBus card, SCSI driver
- Motorola 680XX Assembler & "C"
Tom Williams 718-528-7360

Broker will pay high commissions for leads or information leading to selling or purchasing of small CATV systems or small SMATV systems. Call Cam Sheffner or Robert Buttera at 714-652-3457.

INCREASE YOUR REVENUE

Local Cable Advertising
Insertion Consulting
Eight years experience in all
markets. Start ups or existing
operations. 817-860-5330

CATV system in Harland, KY. Excellent buy, county franchise good for 15 years, 300 subscribers, most of the plant is new. Will build additional 600 homes (no overbuild) for a labor cost of .50 per foot complete. Total cost= \$300,000. Call Robert Buttera (Broker). 714-652-3457 FAX: 714-929-2696.

Equipment For Sale



We Buy and Sell Converters, Line
Actives and Passives 300 Mhz and Above -
Magnavox, Jerrold, S/A, Pathmaker.

CALL (619) 757-3008 or
FAX (619) 757-4048

Anthony's
MANUFACTURING SERVICE

PLOW BLADES
Irrigation/Wire/Combination
For Any Machine—For Any Application

(800) 383-PLOW
(719) 475-PLOW P.O. Box 17701
Colorado Springs, CO 80935



LIQUIDATION SALE

OAK RM 358-3
500 Pcs, as is 50¢ ea.
OAK M 358
2000 Pcs, need repair 50¢ ea.
Rebuild W/90 Day warranty \$10 ea.

SA 6703

300 pcs, WORKING, no remotes
\$1 ea

JERROLD 58 — 2/4
1000 pcs. \$17 ea

WANTED

JERROLD DRX 3 DIC,
OAK N12 Ch. 2 or 3
SA 8500 & 8550

Highest Prices Paid

**CABLE EQUIPMENT
BROKERAGE CO.**
818-709-3724
818-709-7565 FAX

MLE

Main Line Equipment Inc.
1650 W. 180th St., Gardena, CA 90248

**WE BUY USED
CONVERTERS-LINE GEAR
WE SELL REFURBISHED
CONVERTERS-LINE GEAR
AT REASONABLE PRICES**

1-800-444-2288
FAX 213-715-6695

Emergency Alert Systems

BY
Idea/ONICS

69 Channels
14 day delivery
Compatible with all headends

AFFORDABLE

24 & 88-Channel units also available
(701) 786-3904

Now!

Quality Refurbished
CATV Equipment
(614) 221-3131
CABLE LINK, INC.



WANTED!

SURPLUS CABLE INVENTORY

- Jerrold • Hamlin • Scientific Atlanta
- Pioneer • Oak • Zenith
- Head End Gear • Line Amps

**WE BUY SELL OR TRADE!
Cable Line
415-566-8914**

Equipment Repair

**Repair//Rebuild of
Commercial Insertion
VCRs for Cable**

Call for Quote and References.

**Dallas Video Repair
214-350-4062**

COMMERCIAL VIDEO CYPHER REPAIRS

Fast Turnaround — Tulsat Corp.
1575 N. 105th Ave., Tulsa, OK 74116
(918) 836-8348

**WANTED TO PURCHASE OR TRADE
Dead or Alive VC II's
Red, White or Yellow Label
(918) 836-8401**

ACS

**" The Cable Equipment
Repair People "**

- Line Amplifiers and Headend Equipment Repaired All Makes And Models
- Signal Level Meters Repaired and Calibrated
- Flat Rate Labor Plus Parts

For reliable, guaranteed repairs, please send your cable equipment to ACS.

ADVANCED CABLE SERVICES

Division of Aaron Communication Services Inc.

2369 S. Trenton Way,
Unit H

Denver, CO 80231
FAX: (303) 337-3084

Call (303) 337-4811

We Market Used Equipment

**To place a classified,
call 800-325-0156.**

CLASSIFIEDS INFORMATION

Three Easy Ways To Place Your Classified Ad

- Fill out the attached classified ad form and return it to CT Publications Corp.
- Call (303) 355-2101 for assistance with your ad placement.
- To save time and mailing costs, use our TELEFAX (303) 355-2144.

Mechanicals

2 1/4" x Depth
Minimum: 1" in depth, additional 1/2" increments

Classified

12 point Helvetica boldface heads
9/10 point Helvetica medium body copy

Display Classified

Typestyle same as classified or as specified by advertiser. Any display ad designed by publisher will be subject to production costs of \$50 per hour. Maximum: 1/2-page display advertisement.

Publisher's Policy

1. Advertisements costing less than \$200 must be paid in advance.
2. Deadline will be 1st of each month prior to publication date.
3. Ad copy must be submitted in typed format.
4. Cancellation date will be the 1st of each month prior to publication date. No cancellations accepted after this

- date. Cancellations must be received in writing.
5. The contents of advertisements are subject to publisher's approval.

Rates

Classified 1 column x 1 inch = \$90
Display 1 column x 1 inch = \$95

Ad Information

Date of Insertion _____

Headline _____

Copy (attach additional sheet if necessary) _____

Address _____

Blind Boxes are available. CT 8/90



Cable System Maintenance Inc.

QUALITY YOU CAN SEE COAST TO COAST

- *System Sweep(CaLan) *Fine/Rough Balance
- *Prewire (CATV,Phone) *Drop Transfer

1996 Creek View Ct. *Jax, FL 32225
FL(904)565-1821 CA(805)254-7964

AUGUSTA COMMUNICATION, INC.



- Installations, Audits
- CLI Drop Replacement
- Prewire & Postwire
- M.D.U. Upgrades
- Aerial & Underground Construction
- All Mapping, C.A.D.

P.O. Box 11117 • Martinez, Ga 30917
Bob Luta • 404-863-8851

THE CABLE CONNECTION

"We Turn You On"

- Strand Mapping
- CATV Construction
- As-Built Mapping
- MDU Engineering
- Splicing
- Audits
- Drop Rebuilds
- Trapping
- Drop Installation
- Pre/Post Wire

Joseph P. Baldwin, Owner
(919) 799-6430

126 Trombay Drive
Wilmington N.C. 28403

MIDWEST CABLE SERVICES



— NATIONWIDE BUYERS —
CATV SCRAP CABLE AND USED LINE GEAR

322 N. Michigan St.
Plymouth, IN 46563

(219) 936-2545
FAX (219) 936-5749

CABLE Engineering Support Services INC.

101 Dry Creek Cove Circle
Laceys Spring, Alabama 35754
(205) 883-1101

*We Specialize In All
Aspects of CATV Engineering*

- * Complete Mapping Service
- * System Design
- * Drafting Services Featuring Intergraph CAD
- * Full Digitizing Service Including use of USGS Maps
- * CLI Evaluation
- * Head-End Setup and Consultation
- * Custom Software Development

HIGH TECH - NOT HIGH PRICED



AERIAL MEASUREMENTS, INC.
CATV SYSTEM LEAKAGE SURVEYS
BROADCAST ANTENNA PATTERNS

**DESIGNED BY FIRST CLASS ENGINEERS
PRECISION MEASUREMENTS ARE OUR SPECIALTY**

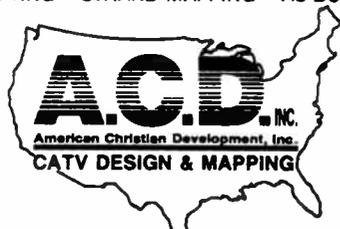
Dave Bishop

P.O. Box 261
Burrton, Kansas 67020
(316) 763-2098

Glenn L. Bell

2750 S. 167th West
Goddard, Kansas 67052
(316) 794-2334

USGS-CAD MAPPING • COMPUTER AIDED SYSTEM DESIGN
DRAFTING • STRAND MAPPING • AS-BUILTS



318 Government Place • Williamsport, PA 17701
717-323-9028 • 1-800-448-5087

CMS CHARACTER GENERATORS



ONLY \$399.00

Dickel Communications Co.

P.O. Box 229 Solvang, CA 93463

805-686-4440

FAX 805-688-4853

NaCom

BUILDING COMMUNICATION SYSTEMS THROUGHOUT AMERICA

- Full Installation Services
- Converter Exchanges, Audits, Special Projects
- MDU, SMATV, LAN, Pre/Postwiring
- Aerial/Underground Construction (Including Fiber Optics)
- Strand Mapping (AutoCAD)
- Field Engineering, Make-Ready, As-Builts
- RF Design (CADSUM II)
- CLI Detection/Correction

1900 E. Dublin-Granville Road, Suite 100A, Columbus, OH 43229
• (614) 895-1313 • (800) 669-8765 • FAX 9614) 895-8942

TSB, Inc.



- DESIGN, STRAND MAP, AS-BUILTS
- CAD DRAFTING SERVICE
- HEADEND RACKING AND RENOVATIONS
- CLI
- TAP AUDITS
- ONSIGHT TECHNICAL TRAINING
- STRUCTURAL ANALYSIS OF TOWERS
- FIBER OPTIC DESIGN AND CONSULTING

Sales: (708) 541-3993 P.O. Box 244 Engineering:
FAX: (708) 541-8596 Yankton, S.D. 57078 (605) 665-1393
FAX: (605) 665-1708

CABLE CONSTRUCTORS, INC.

IRON MOUNTAIN, MICHIGAN
COAX - FIBER

QUALITY SERVICE PERFORMED ON A TIMELY BASIS
• SINCE 1957 •

MAPPING • DESIGN • CONSTRUCTION • ENGINEERING

CABLE CONSTRUCTORS, INC.

1-800-338-9292

KLUNGNESS ELECTRONIC SUPPLY (KES)

1-800-338-9299

SAVE YOUR MONEY.

Lower your costs for programming, equipment,
and service through group purchasing. Join today.



14809 West 95th St. Lenexa, KS 66215 913-599-5900

White Sands

Jumper Cables

Custom connectors and cables for all aspects of CATV

Gilbert AHS
PPC
LRC and others

All types of cable from
Belden
Comm Scope
Times

Quick delivery on all colors and lengths
Write or call (602) 581-0331

P.O. Box 43437, Phoenix, AZ 85080-3437

RTK CORPORATION

120 Floral Avenue, New Providence, N.J. 07974
(201) 665-0133
Fax #201 665-0990



Quality Installation
& Maintenance Services

TRANSMEDIA PARTNERS

Patty Linster
Account Executive

CABLEFAX • COMMUNICATIONS TECHNOLOGY
INTERNATIONAL CABLE • MEDIA BUSINESS
MEDIA BUSINESS REVIEW • MSO • NEWSPAPERS & TECHNOLOGY

50 South Steele, Suite 500 • Denver, Colorado 80209
Telephone: (303) 355-2101 FAX: (303) 355-2144



Design Extender Inc. Engineering Services

Field Engineering	System Audits	Upgrades
AS-Builts	Map Maintenance	Design Analysis
Make Ready Survey	System Design	Intergraph
MDU Survey	Redesign	Digitizing

3317 N. Hwy 94 • St. Charles, MO 63301
314-949--9223 • 1-800-666-MAPS
• FAX YOUR REQUESTS OR MAP ORDERS •
FAX # 314-949-9226

SPECIAL VOLUME PURCHASE OFFER
"Cable Television - Second Edition"
by Bill Grant

400 page, hard cover text on CATV technology

1 copy - \$ 30.00 each 36 copies - \$ 24.00 each
 18 copies - \$ 26.00 each Larger orders - call for quote

*Above includes shipping inside US
 Shipping costs billed outside USA*

GWG Associates, RD 1, Box 367 D
Schoharie, NY 12157 (518-295-7954)



For Aerial and
 Underground
 Construction
 Services

Est. 1972

**"Fiber
 Optic
 Specialist"**

Kennedy Cable Construction, Inc. Reidsville, Georgia
 (P.O. Box 760) 30453, (912) 557-4751 WATTS 1-800-673-7322

ERIC POTH



PRESIDENT

Excalibur Cable Communications, Ltd.

37 SYCOLIN RD.
 LEESBURG, VA 22075

ENGINEERING AND DESIGN - UNDERGROUND CONSTRUCTION
 SPLICING - POST/PREWIRES - INSTALLATIONS
 AERIAL CONSTRUCTION - REBUILDS - CLI DETECTION & REPAIR
 Toll Free 1-800-462-3811 — (703) 478-8448—FAX (703) 478-8818

California Amplifier

*"U.S. manufacturer of low noise amplifiers and block
 converters for C-Band, Ku-Band, VSAT, and MMDS."*

Dennis Schwab
 Vice President, Marketing

California Amplifier, Inc.
 460 Calle San Pablo
 Camarillo, CA. 93012 USA
 Phone: (805) 987-9000 FAX: (805) 987-8359
 Telex... 469193

- Aerial & Underground Construction
- Strand Mapping
- System Design
- Residential & MDU Installations
- Subscriber Audits
- Proof of Performance
- Fiber Optics and L.A.N. Services



Cablemasters Corp.
 Our Name Says It All
 Contact:
 Bernie Czarniecki
 (814) 838-1466
 P.O. Box 219
 Lake City, PA 16423



**ENGLISH
 ENTERPRIZES**

**"SERVING THE
 INDUSTRY
 SINCE 1974"**

**THE INSTALL
 PEOPLE**

P.O. BOX 6515
 Orlando, Florida 32853
 1-407-859-6511

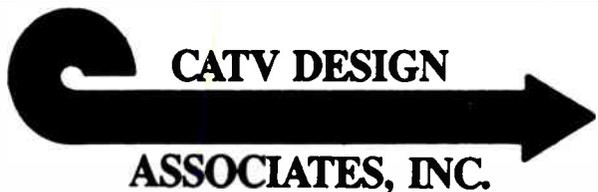
- LAN
- Audits
- Installations
- Drop Transfer
- Prewire/Postwire
- Underground/Aerial construction
- Fiber Optics

JOHN JAMES CATV SERVICE

Specializing in:
 ■ Headend Proofs
 ■ Repairs
 ■ FCC Offsets

1218 Franklin Cir., NE.
 Atlanta, GA 30324

404-636-1031



- Design
- Strand Mapping
- As-Built Mapping
- System Analysis

- AutoCad Drafting
- LinexCad Drafting
- Cad Training/Setup
- Drafting Services

3100 S. LAMAR, SUITE 101, AUSTIN, TX 78704

STEVE WILLIAMS (512) 444-2461
 President

DOUG BURNS
 Vice President

dB-tronicsSM CONVERTER REPAIRS

■ get converted!!

SCIENTIFIC ATLANTA 8550 \$23.95 *
 GENERAL INSTRUMENT DPV5 \$22.95 *
 PLAIN JANE DIGITALS \$13.95 *

* (Flat rates including parts, labor and a 6 month warranty)

For more information call Chris or Keith @ 1-800-356-2730

(401) 392-0563

AXSYS COMMUNICATIONS, INC.

Network and Fiber Optic Systems
 Design • Installation • Testing

20 Biscuit Hill Road
 Foster, RI 02825

Call Us Last

After you've gotten the big prices and the big promises from the big guys, call us. CTI offers

- new restored equipment
- software
- industry expertise
- marketing
- personalized service
- consulting services
- low prices

Cable Technologies International, Inc.

Suite 107 1051 County Line Road
 Huntingdon Valley, PA 19006

Tel (215) 953 0100 FAX (215) 322-6127

New Construction • Installs • Balancing • Splicing

Bigham

Cable Construction, Inc.
Performance Built Our Company
Specializing in Rebuilds

Harold Bigham
 (904) 932-6869

P.O. 903
 Gulf Breeze, FL 32562

* VIDEO PAGE GENERATOR & TOUCHTONE RELAYS *

300 Page "NTSC Video Display"

Character Generator

COMMODORE 64
 EPROM Auto Boot Included

High resolution "Video Page Gen."
 Displays up to 300 pages in any format or sequence; Full screen, color display, scroll, flash, vary height, 24Hr. clock Local & modem control. NTSC video out, cable+EPROM "VIDG" \$189.95

* C64 "Head End Manager" *

Programs & sends On/Off Touchtone Sequences, Controls all relays from Keyboard or external modem. Daily, weekly, monthly, 28 digits per event. Program 100's of TSDQ/QUAD & RL4 Alarm clock, local or modem control! EPROM Cartridge "TPSG" \$249.95

TSDQ TOUCHTONE DECODER & QUAD RELAY CONT.

TSDQ \$ 89.95 QUAD \$ 99.95

RL4-F \$199.95

DIGITAL VOICE RECORDER Model DVM \$179.95

Combine our decoder and R.F. switch boards to control your head end sites from your office

TSDQ Touchtone 4 digit dec. mom. & latching relay expands to QUAD; 4 On/Off DPDT relays controls 1 RL4. TSDQ \$89.95 "QUAD" \$99.95

RL4 Switch Video or R.F. >65 DB Iso. DC to 600 MHz. 4 A/B -75Ω Relays "F" con. "RL4F" \$199.95

Digital voice recorder, 30/60 sec. CD Hi Fidelity REC & PB buttons, Mic & Spk. jacks, 1 Watt audio continuous repeated message. "DVM" \$179.95

ENGINEERING CONSULTING
 583 Candlewood St. Brea, Ca. 92621
 TEL: 714-671-2009 FAX: 714-255-9984

Ask for free product catalog



CONTRACT INSTALLERS, INC.

UHF Radio Equipped Trucks • Uniformed Installers

HOUSE INSTALLATIONS

Aerial — Underground — Pre-wire

APARTMENT INSTALLATIONS

Post wire — Pre-wire — Commercial Building Tap Audits

Install or Remove Traps and/or Converters
 Drop change over for System Rebuilds

LENNY FISCHER
 P.O. Box 1564
 Appleton, Wisconsin 54913-1564
 (414) 582-7087

MONTIE FISCHER
 P.O. Box 1058
 Fort Walton Beach, Florida 32549-1058
 (904) 651-5154



"Committed To Service Excellence."

Plant Construction - Maintenance

Customer Installations

(619) 442-0713 • FAX (619) 442-1480
 (714) 542-1055 • FAX (714) 542-0726

1639 E. Edinger, Unit C, Santa Ana, CA 92705

GREATER VISIONS

"Communication You Can See"

- C.A.D. Drafting Service
- Engineering
- Project Cost Analysis
- Construction

10102 Hwy. 105 W.
 Montgomery, TX
 77356

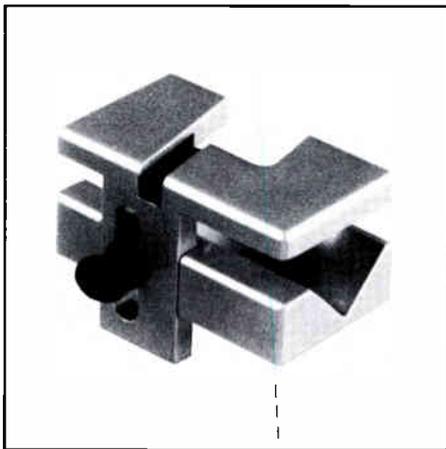
David Christy
 409-588-2099

519 E. Center
 Sikeston, MO
 63801

is capable of supporting the highest levels of research in lightwave communications, optical signal processing and high-speed logic devices.

The unit generates programmable patterns up to 512 Kbits long, allowing STM-16 patterns to be generated in one page. The Pseudorandom Sequence Patterns (PRBS) can be varied from 10^{-7} to $2^{31}-1$, and their mark ratio can be varied. Two complementary data outputs and three clock outputs are provided. Data pattern length can be up to 524,288 bits, and word pattern can be up to 16 bits. The unit will convert eight external data inputs at one-eighth of the basic clock rate to one serial data output available at the front panel. The multiplex (MUX) function works as a byte-to-bit serial converter that converts eight separate inputs into one pattern output.

Reader service #89



Stripping tool

Lemco unveiled its Model X0690 jacket stripping tool that can be used to remove the plastic jacket from all coaxial cables from .412 to 1 inch. The tool prepares all cable sizes by adjusting the upper plate to the cable size and snugging the thumb screw in about three seconds. The product works on both standard and heavy jacket thicknesses and the blade never touches the aluminum shield. It is made of aluminum and finished with a gold chromate conversion coating.

Reader service #132

Trap, connectors, ground blocks

Regal announced several new products, which included its new RNT series negative trap. It is a 600 MHz, four-pole trap configured to withstand temperature extremes. Its design is said to eliminate the traditional O-ring seal, which may fail

over time and allow moisture ingress to affect the notch frequency of the device. The trap housings are individually machined from solid brass for signal leakage integrity. Capacitors within the hermetically sealed housings provide stable notch characteristics over a full temperature range. According to the company, the combination of brass airtight housing and the company's electronics yields consistent specifications from unit to unit. The product will be available for VHF, midband and superband channels.

Also introduced were the new F-81 splice connectors (RF-81 and RF-81H) and low profile ground blocks (RGB-81LP). The company's exclusive feature of flat F ports on both ends is said to improve RFI integrity. The F-81 connectors use brass for corrosion protection. The 1.1-inch long RF-81 is configured for in-line splicing only and the 1.4-inch long RF-81H version is used for wall plates and demarcation points. The extended thread length of the RF-81H allows for plate thickness with sufficient length for male connectors and sealing sleeves.

The RFB-81LP ground block features a compact design that eliminates unnecessary cable bending when mounted within the Keptel on-premises box. Upgrading the F-81 barrel from ordinary die-cast zinc to brass is said to extend the life of the mechanical interface and reduce replacement. The ground block provides a positive connection between drop cable and ground wire, which is said to make the installation of the RGB-81LP precise and simple.

Reader service #120 (trap), #119 (connectors), #118 (ground block)

Standby supply

Control Technology introduced the Citation III standby power supply, which features PWM regulation in standby mode and battery saving cycle charging. The 16-amp, three-battery product is said to offer greater efficiency in standby; PWM into a standard cable load is typically 10 to 15 percent better than ferroresonant technology, according to the company. The cycle battery charging is claimed to provide longer battery life due to the more forgiving nature of cycle charging as compared to constant charging systems.

An automatic self test evaluates all aspects of the system every 10 days, including batteries. The product has high speed overcurrent shutdown, battery overcharge alarm and all-aluminum construction.

Reader service #85

Stripping tool

Ben Hughes/Cable Prep introduced the CPT stripping tool for preparation of RG-6 and RG-59 drop cable. The tool removes the cable jacket, cuts foil and braid and exposes the center conductor in one step.

The stripping dimensions are set to industry standards and it has non-adjustable tool steel blades that come in snap-in replaceable cartridges.

Reader service #117



UPS

Perma Power Electronics introduced its local area network (LAN) compatible uninterruptible power systems. The new line features the 500 VA Model SPS-500L and the 1200 VA Model SPS-1200L. The new units are Novell-tested and approved and are compatible with other major LAN systems, including 3-Com and Ethernet and with the UNIX and XENIX as well as the MS-DOS operating systems. The models are designed to signal the loss or disruption of commercial power, power restoration and power shutdown conditions.

These models are designed to signal the loss or disruption of commercial power, power restoration and power shutdown conditions. The company offers separate interface cables to meet the specifications of the most popular LAN systems. The LAN-ready Perma Power systems provide backup power to the network when power fails, sending a signal to the fileserver to alert users to the status of the power line and that the fileserver is operating on backup power.

Reader service #96

Switch star system

The Cablestar switch star system was introduced to the North American market by Cabletime. According to the company, the system delivers a wider range of cable TV, data and telecommunication services into the home than with any other cable TV system currently available.

It was designed for larger cable sys-

tems that are now increasingly being planned with up to 64 subscribers served from each switch point. The system has increased channel capacity, up to 550 MHz per trunk, with a dual trunk capability as standard, giving up to 1 GHz of spectrum. Services offered with the system include channel tiering, impulse PPV, audience analysis, telephony, interactive television and data.

Reader service #136

Editing systems

Channelmatic Inc. announced its new line of Compeditor automatic editing systems. The line consists of the Series 300, Series 400 and Series 600.

The Series 300 features the ECU-300 with A/B roll and optional DTMF encoder for three VCRs. The Series 400 has the ECU-400 with continuous roll, a 1,000-event memory and optional FSK or DTMF encoder for four VCRs. The Series 600 features the ECU-600 with continuous roll, 2,000-event memory and optional FSK or DTMF encoder for six VCRs.

Reader service #135

Cable locator

The Pin-Pointer from Xetron Corp. locates buried cables, pipes and power lines and provides automatic depth read-out. Shorts and contacts can be quickly pinpointed and analyzed.

The product is switchable for low-frequency, high-frequency and 60 Hz detection. The low frequency mode provides monitoring over longer distances, though it must be connected (conductively coupled) to the cable or inspection wire.



The high frequency mode requires no direct connection. When the product is in the low-frequency or high-frequency mode, the power line signal is screened out so that 60 Hz "noise" won't interfere with locating cables or detecting breaks and shorts.

Reader service #104

Test set

Tau-tron, a unit of General Signal, announced enhancements to its Model 5300 DS3/DS1 channel access transmission test set. The new features are said to make the portable unit easier to use and reduce the time needed to run turn-up tests and maintenance operations. Remote access to all of the unit's capabilities is now available using the company's instrument control software (ICS). ICS runs under MS-

DOS and is also available for the company's Model 5108 DS1 test set.

Other enhancements include the display and reporting of DS2 status and alarms, simultaneous display of four separate measurements on the front panel display and DS1 B8ZS line coding. It also includes simplified menu structure to access test parameters and a rugged, multi-position carrying handle.

Reader service #106

Barker system, event controller

Telecommunication Products Corp. introduced its Barker System that provides a completely automated pay-per-view promotional channel. It is comprised of a character generator, a videotape player and a control unit, which is used to control switching functions between the character generator and the VTR. The system works as follows: A sequence of pages may be programmed and saved into the character generator to be switched later out over the air by the control unit. The tape player (or satellite feed) plays a series of movie promos. At a designated time, the control unit can switch to the character generator. The control unit may be purchased separately to control existing character generators and videotape players.

The company also announced it made an agreement with T. Edward Black to work together in developing and marketing headend and station automation systems. The initial product is the Queue Master timed event controller developed by Black as a replacement for old Kavtrol systems. The package features the multiple vendor/multiple bus capabilities the

QUALITY IS AN OBSESSION

CATV/LAN SERVICES

FROM

DUMBAULD AND ASSOCIATES



9034 N. 23rd Avenue Suite 6
Phoenix, Arizona 85021
(602) 870-4977 FAX (602) 870-4820

Mapping and Designing

- o As-Built/Sitemap/MDU
- o New Build/Plans Extension
- o Rebuild/Upgrade/Retrofit
- o AutoCAD Mapping

Testing, Analyzing and Repair

- o CLI and Leakage Testing
- o Autotest (Automated signal testing/analyzing)
- o Span Analysis (Retrofit cable analysis)
- o Head End Monitoring and Telemetry
- o Power Supply, Upgrade, Monitoring, Repair

Customized

Services/Software

- o Third Party Quality Control
- o Plant Asset Inventory
- o Plant/Subscriber Audit
- o Preventive Maintenance Program
- o School System Consulting
- o Hardware Design and Implementation
- o Bar Code Automation
- o As-Built Database Software
- o Power Supply Database & Maintenance Software
- o BOM/Purchase Requisition Software
- o Engineering Project Tracking Software
- o AutoCAD Enhancement Software

Let our well established, versatile, and experienced team serve your many needs.

Reader Service Number 70.



PHILIPS

**Scope Buster
Prices!**

call

800-882-NTSC

Waveform monitors

800-882-NTSC

Vectorscopes

800-882-NTSC

Complete line

800-882-NTSC

Lowest prices...

800-882-NTSC

Anywhere

800-882-NTSC

Cash discount

800-882-NTSC

Immediate shipment

800-882-NTSC

Free 2nd day air

800-882-NTSC

Quality

800-882-NTSC

Who ya gonna call?

800-882-NTSC



TEST &
MEASUREMENT
INC

7500 Six Forks Road
Raleigh, NC 27615

Kavtrol was noted for. The system is based on a rack-mounted industrial 386 PC and the software program (called Queue Master) provides real time control of devices from a switch schedule on disk. The product is said to be different from other automation systems in that devices are controlled by words entered as text into a free-form log, which allows freedom in the type and structure of commands sent to devices.

Reader service #108 (Barker system), #107 (event controller)

Pedestals

In September, Reliance Comm/Tec's Utility Products will release a new line of pedestal products. The Access 360° pedestals are plastic or metal and have 360° access. According to the company, the pedestals will have greater stability and greater volume.

The pedestals have a smooth, rectangular design that is said to better fit the shape and volume requirements of tap and passive equipment. They feature lift-off covers and are available in either heavy gauge mill-galvanized steel or low temperature strength, UV resistant plastic.

Reader service #100

Control box

The Service Control Box was unveiled by Telecrafter Products. It has extra wide foam encased cable feed slots that provide a snug fit for cable and expand to accommodate conduit. A 1-inch diameter knockout offers easy rear-entry to the enclosure, which is said to be perfect for prewire installations.

The unit is 8½ inches high, 6¼ inches wide and 2¾ inches deep. It is made of impact resistant, UV-stabilized, talc filled polypropylene.

Reader service #99

Audio manager

Audio Rider 2000 is a division of Real-time Electronics Inc. The Audio Rider 2000 is designed to manage audio levels on a cable system and solves the problem of audio shift from channel to channel and program to program. The system matches the audio level of 120 channels to a single software reference.

The system is a complete microprocessor-based audio management system comprised of a rack-mounted computer that directs and coordinates the operation of up to 60 intelligent gain control units (IGC) units. Each IGC controls two mono-

phonic or one stereophonic audio channel for a total of 120 audio channels. It continually monitors the actual sound level of program material and using a Fast Fourier Transform (FFT) determines what changes are necessary to move the sound level of an individual channel to within the target range.

Reader service #92



Dehydrator

The ADH-2 dehydrator introduced by Environmental Technology is designed for pressurizing waveguide, air-dielectric coaxial cable, feedhorns and similar applications with dry air. The unit features rack mounting (outdoor mounting optional) and automatic regeneration that eliminates the need for manual reactivation or replacement of the desiccant.

A LED display provides parameter, functional and error code data. Other features include built-in test and fault diagnostic capability along with an alarm relay and indicator for critical problems. Additional status indicators provide power, warning and alarm status information. The unit operates from 120 VAC and 208/240 VAC at 50 Hz/60 Hz. Units compensate for powerline and voltage fluctuations.

Reader service #95

Multitap

Toner Cable Equipment announced its new multitap, the Quadtap. It is directionally coupled and has 32 or 48 ports with groups of four different tap values. The tap measures 6 inches by 8 inches.

The product is manufactured to United International specifications for U.K. systems. It is said to lend itself to high density cable systems.

Reader service #133

Fall arrest device

Scepter's Pole Shark fall arrest device is said to function fully on icy, wet or snow-bound poles. The reversible gaff wheel

Launching a new SCTE year

By Wendell Woody

President, Society of Cable Television Engineers

First, I want to thank the 1990 SCTE board for electing me to this office to serve them and the Society as president for the upcoming year. I will devote a significant amount of time and effort to the Society and serve it with honor.

In addition to strong leaders on this board, we have three past presidents; it's as though George Bush's staff included Gerald Ford, Jimmy Carter and Ronald Reagan! (Well, maybe that example would not universally be acknowledged as advantageous!) However, it will certainly be a tremendous advantage to have three of our SCTE past presidents serving on this year's national board: Bob Luff, Ron Hranac and Jack Trower.

Bob Luff served two terms as president back when the Society was coming out of financial problems, developed the BCT/E program and had less than 20 chapter/meeting groups and less than 2,000 national members. Bob is serving his sixth term on the board, so we plan to draw extensively upon his experience and talents during this year.

When president, Ron Hranac rapidly expanded the Society in membership growth and chapter development. Most significantly, he helped establish a working relationship with other engineering and technical organizations, which included: American Radio Relay League (ARRL), Society of Broadcast Engineers (SBE), National Cable Television Association (NCTA) and the U.K. SCTE. As an example, the SBE had a booth at our 1990 Nashville Cable-Tec Expo. In turn, we will have a booth at the national SBE conference in St. Louis on Oct. 4-6.

Our immediate past president, Jack Trower, started his term in office last year by stating, "We have reached a point in our growth cycle, that it is now time to completely evaluate our Society and shore up its foundation and structure so that we will have a stronger base for all future growth." Thereupon, both the chapter and national bylaws were addressed. More work is required in this area and will be completed this year. As past president, we look for-

ward to Jack's continued guidance, support and follow-through on this and other programs he initiated.

1990 is the year for great expansion again, along with greater achievements in training and education. Never before has our industry focused so much attention on education, and never before has the SCTE's role in technical training been more critical. I will be looking to the membership to work on our subcommittees and program development this year. Please contact me if we can count on you for support in this important area.

It is my strong belief the strength of the Society is in its membership, and the success of the Society is in membership participation in the programs of the Society. In this critical period, the future of the Society is tied directly to what we contribute to the CATV industry: professionalism in the technical community.

Attention, chapter and meeting groups! Please add me to your mailing lists! During this year of my presidency, I will focus heavily on membership participation and activities and would appreciate hearing from you regularly. In my traveling this year, I plan to visit and address as many groups as possible. This would also include situations when your SCTE function is in conjunction with a state or regional conference.

I encourage strong leadership through your elected network of regional directors to our national board. In addition, I'll maintain a presidency open door policy via: telephone, fax, letters and visits to meetings, seminars and shows. I am interested in your ideas to improve our Society; and if you have concerns, please express them, too. I am particularly interested in you: Are you available for subcommittee and program work? If so, what, when, where and how? Please contact me *any time*:

Wendell Woody
1500 N.E. 49 Terrace
Kansas City, MO 64118
Bus. (816) 454-5421
Res. (816) 454-3495
FAX (816) 454-5097



"During this year of my presidency, I will focus heavily on membership participation and activities."

Nashville Expo evening

For those of you who missed the stage action at the Grand Ole Opry event, here's a recap of some interaction with the performers: At the beginning of their performance at the Grand Ole Opry, the Four Guys acknowledged last year's board director, Bob Price, and some 1,500 SCTE Expo attendees in the audience. Thereafter we gave (threw) Grandpa Jones one of the green CTT/Jerrold souvenir scarves. Thinking it came from an autograph-seeking fan, he signed the scarf and threw it back. So we likewise signed it and tossed it back to him...then he tossed it back!

Later in the Opry performance, Little Jimmy Dickens accepted one of the green scarves, acknowledged the SCTE group in the audience and in return received a very strong round of applause. It was definitely a fun evening for all who were able to attend!

Again, thank you for your confidence and support. I look forward to a successful year—with your help!

DX does it again!

Introducing the new DIR-647 Integrated Receiver/Descrambler

For over 30 years, DX has been at the forefront of technological advances in the satellite communications industry.

The DIR-647 represents our latest innovation and reflects our unwavering commitment to excellence. It's the newest, most advanced commercial IRD available, measuring a space-saving 3½" with a host of features, including C/Ku-band compatibility, that ensure maximum flexibility and efficient operation.

Over the years, DX research and manufacturing has continued to meet the critical demands of large CATV operators by introducing high-

performance products unsurpassed for reliability, quality, and value. The DIR-647 is the latest in a long list of breakthrough solutions in satellite communications, and has been engineered with one goal: to help you deliver the clearest, sharpest pictures possible.

The DX challenge

Call us. We'll prove to you how superior the DIR-647 really is, and what it can do for your cable system. Write or call DX Communications, Inc. today.



Ahead in
Satellite Communications
Technology

DX COMMUNICATIONS, INC.

A Subsidiary of C. Itoh & Co. (America) Inc.

10 Skyline Drive, Hawthorne, NY 10532 • (914) 347-4040

Manufactured by DX Antenna Co., Ltd., Japan

Reader Service Number 73.

VideoCipher® II is a registered trademark of General Instrument Corporation

We're so proud of the quality, testing & reliability of our strand...



...we put our name on it!

Imported strand must pass Anixter Cable TV's strict three-part quality control testing program before it is worthy of our name.

Our strand must meet the American Society for Testing and Materials (ASTM) standards for elongation, splices, tensile strength and more, before we'll accept it. We personally inspect each container of strand and produce a written report covering tests which analyze preforming, winding and

recoiling characteristics. We also inspect the reels to ensure each one meets our stringent quality standards. Finally, we send strand samples to an independent testing lab to verify our manufacturers' claims.

If the strand meets our standards, we put our name on it. If it doesn't, we reject it.

You know it's quality strand when you see our name on it.

ANIXTER CABLE TV

WEST-ANAHEIM: (714) 779-0500, (800) 854-0443; **DENVER:** (303) 740-8949, (800) 841-1531; **SEATTLE:** (206) 251-6760, (800) 426-7665; **MIDWEST-CHICAGO:** (708) 350-7788, (800) 544-5368; **CLEVELAND:** (216) 526-0919, (800) 321-8068; **DALLAS:** (214) 446-CATV, (800) 231-5006; **IRON MOUNTAIN, MI:** (906) 774-4111, (800) 624-8358; **SKOKIE, IL HDQTRS:** (708) 677-2600; **EAST-ATLANTA:** (404) 840-7901, (800) 242-1181; **LONG ISLAND, NY:** (516) 293-7788, (800) 645-9510; **NEW JERSEY:** (201) 328-0980, (800) 631-9603; **ORLANDO:** (407) 240-1888, (800) 477-8396; **CANADA-CALGARY:** (403) 250-9646; **MONTREAL:** (514) 636-3636; **TORONTO:** (416) 568-8999; **VANCOUVER:** (604) 321-5885.

In an emergency, weekends and holidays or after 5 P.M. call toll free 1 (800) 323-8166.
CORPORATE OFFICES, ANIXTER CABLE TV, 4711 Golf Road, Skokie, IL 60076, (708) 677-2600

©1990 Anixter Cable TV

Reader Service Number 74.