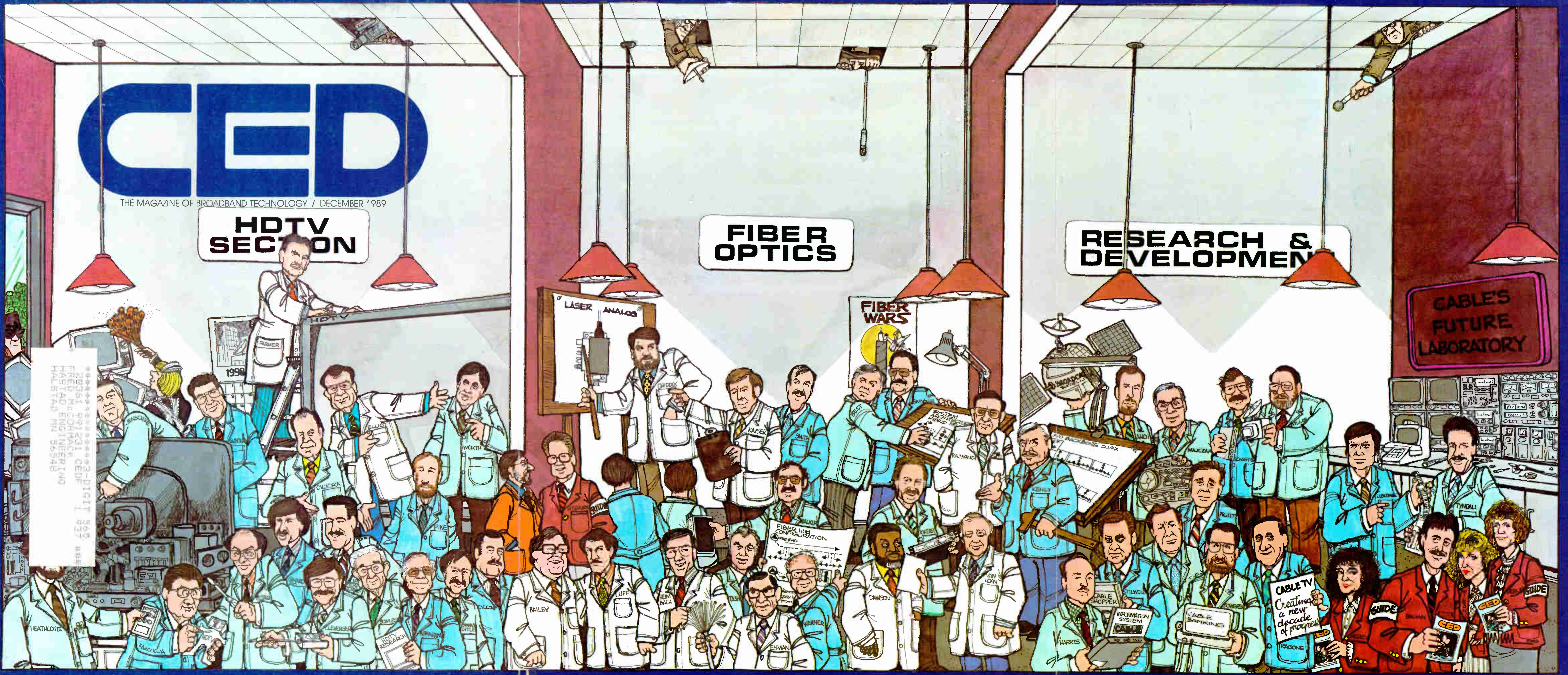
CED

THE MAGAZINE OF BROADBAND TECHNOLOGY / DECEMBER 1989



GUARANTEED CONSISTENT QUALITY. YOU HAVE OUR NAME ON IT.

Comm/Scope. Year after year, you've come to associate that name with consistently high-quality cable products. And there's a good reason.

Every reel of Comm/Scope cable, drop cable as well as trunk & distribution, has to pass stringent testing in our plant before it goes out to you. We've been doing that ever since we started making cable. And we're never going to change.

All you have to do is look for our name on the cable. Then you know what you're getting. Guaranteed consistent quality cable. Reel after reel after reel after...

Call your nearest Comm/Scope representative or call us at 800/982-1708 (800/222-6808 in North Carolina).

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

PO Box 1729, Hickory, NC 28602. Phone: 800-982-1708 (800-222-6808 in NC). Fax: 704-328-3400. Telex: 802-166.

Reader Service Number 1

WHAT'S BEHIND THE OVER 1,200 PEOPLE CO

A company is more than a name. It's the people who make up that company. The people who back-up both the name and the product. At Comm/Scope, we have the right people behind the name and the product. Dedicated. Professional. People committed to seeing that you get the best quality cable products.

These Comm/Scope employees are actively involved in our Total Employee Involvement practices which ensure that only the highest quality product standards acceptable to you, our customer, are followed. In short, the Comm/Scope name on the product is

COMM/SCOPE NAME?
MMITTED TO QUALITY.

just like having each of our people sign their names. Because they all want you to know that you can rely on the name, Comm/Scope *and* the people behind it.

Call your nearest Comm/Scope representative or call us at 800-982-1708 (800-222-6808 in NC).

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

Reader Service Number 1

PO Box 1729, Hickory, NC 28603. Phone 800-982-1708 (800-222-6808 in NC). Fax: 704-328-3400. Telex: 802-166.

Panasonic Built. From The Inside Out.

Every time you install a Panasonic® CATV converter, you're assured of uncompromised quality and performance. Because Panasonic CATV converters are designed and manufactured by its parent company, Matsushita Electric. Which means each CATV converter is Panasonic built. From the inside out.

Take the Panasonic TZ-PC140/170 Series. Employing the latest in manufacturing technology, Panasonic converters are built to exceptionally high quality standards. It's the quality your subscribers have grown to expect from Panasonic. And that will help avoid costly service calls.

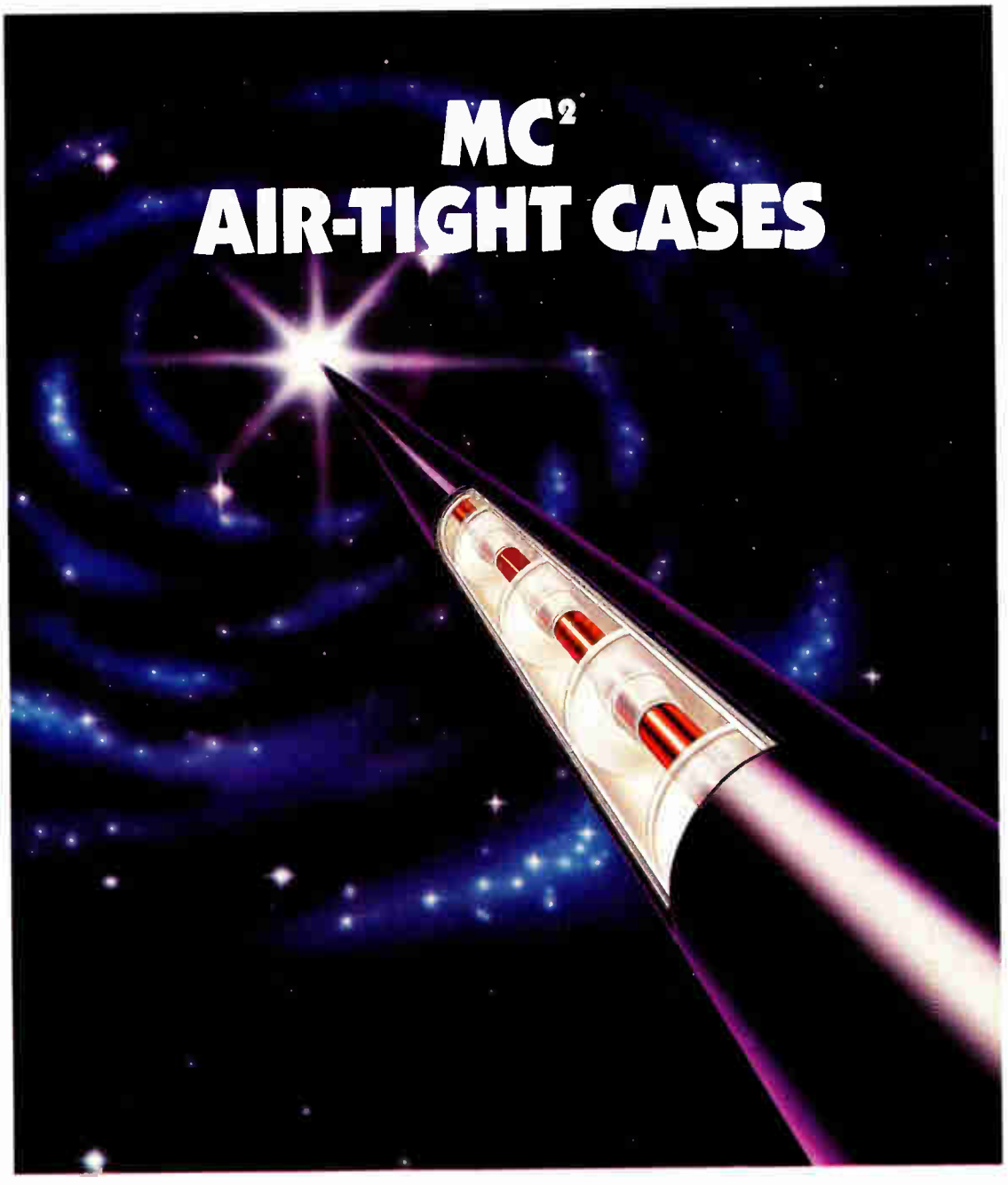
And to provide today's subscribers with the sophistication they associate with all Panasonic video products, the TZ-PC140/170 Series provides features like BTSC stereo compatibility, skip-scan tuning and remote volume control (170 Series), to name a few.

Panasonic CATV converters. Built for you and your subscribers the way all converters should be. From the inside out.

Panasonic
Video Communications

For more information call:
Northeast 609-589-3063 Midwest 513-530-9216
Southeast 404-925-6845 West 415-947-0147

Reader Service Number 2



Facts For The Perfect Offense.

With MC², the facts speak for themselves:

Fact: Hermetically-sealed, compartmentalized structure makes moisture ingress unlikely—highly localized, if at all.

Fact: The 93% velocity of propagation allows one size smaller diameters than foam cables—more MC² per duct.

Fact: Superior attenuation allows about 20% fewer amplifiers in new-builds—stronger signals in rebuilds and upgrades.

Fact: Total bonding assures maximum loop-strength and minimum suck-out. Exceptional bending ability.

Case closed.

The Choice Stops Here

QUALITY
TECHNOLOGY
SERVICE

Reader Service Number 3

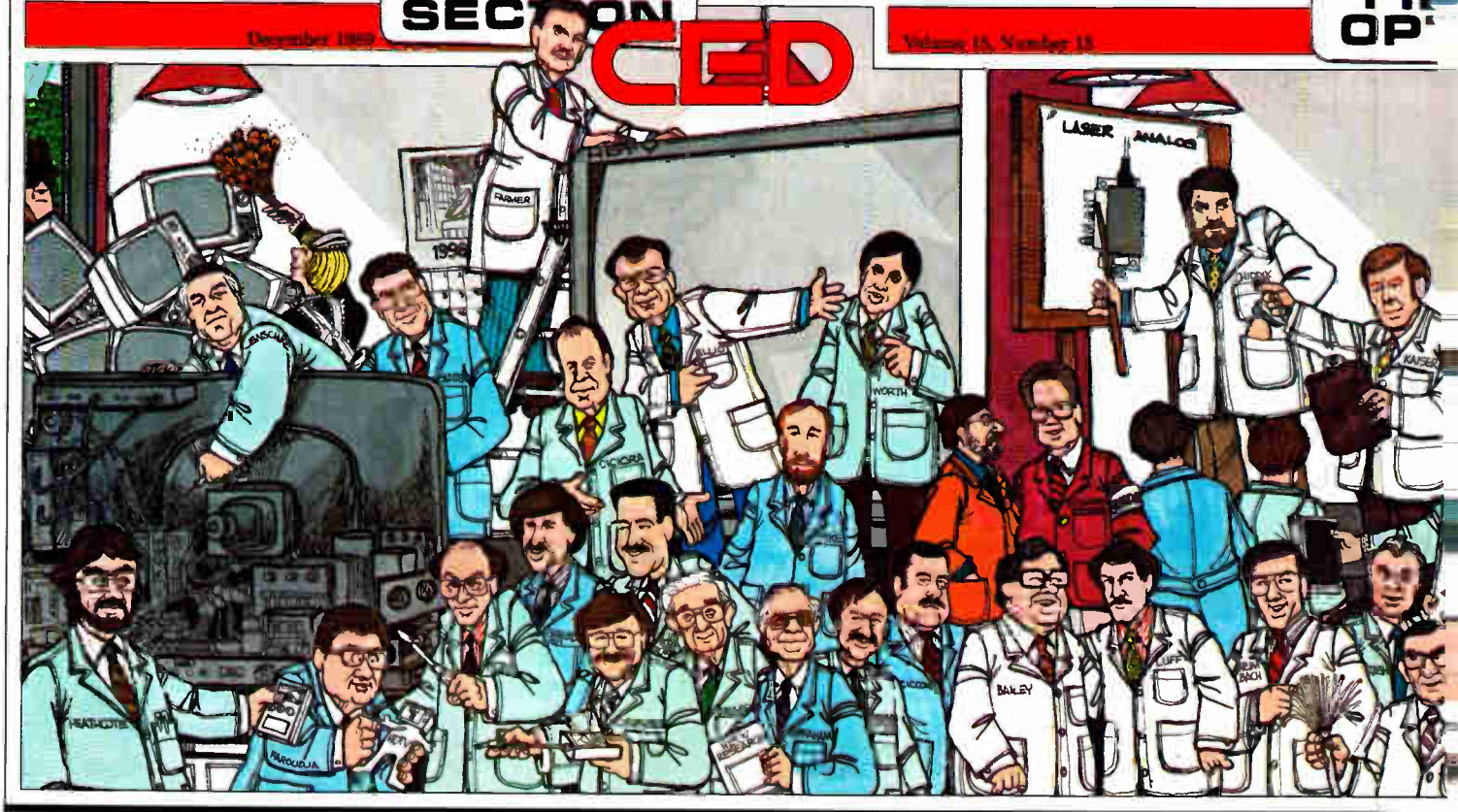
Trilogy
COMMUNICATIONS INC.

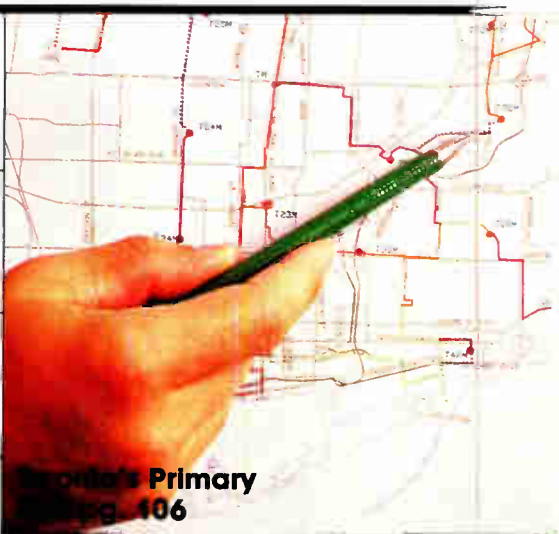
Call or write for our free sample and brochure: TRILOGY COMMUNICATIONS INC., 2910 Highway 80 East, Pearl, Mississippi 39208
800-874-5649 • 601-932-4461 • 201-462-8700

HDTV SECTION

CED

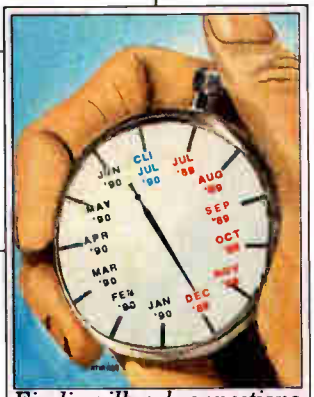
December 1989 Volume 15, Number 13





About the Cover:
With the Western Show focusing on a new decade of television, cable engineers are getting ready for the future. This month's cover illustrates the top MSO's engineers as they head into the '90s. Illustration by Rob Pudim

CLI COMPLIANCE



Finding illegal connections may solve some leakage problems. See page 125.

DEPARTMENTS

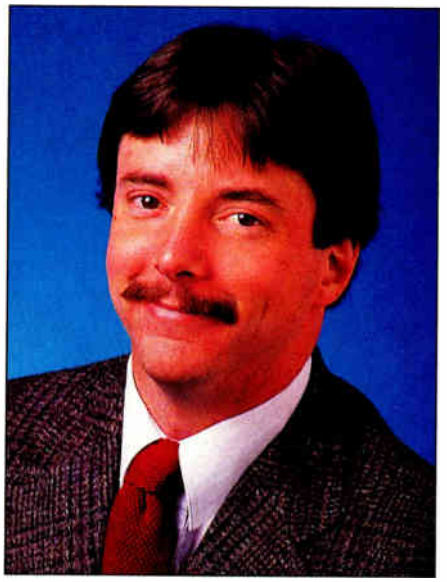
CED. (USPS 330-510) (ISSN 1044-2871) is published monthly except twice in May by Thomson Retail Press, 600 S. Cherry St., Denver, CO 80222. ©December 1989, Volume 15, Number 13. Subscriptions free to qualified industry readers. All other one-year subscriptions are $36, prepaid in U.S. funds only. Second-class postage paid at Denver, CO. and additional mailing offices. CED is published on behalf of the cable television and broadband communications industries. POSTMASTER: Please send address changes to CED Circulation, 600 S. Cherry St., Suite 400, Denver, CO 80222. MEMBERS OF THE BPA.

Forget the single-wire telco theory

With all the debate surrounding eventual ownership of the "one wire to the home," it's easy to lose sight of the reasons why there *will* be more than a single wire to American residences and each will be owned by different masters.

It seems that the telcos' latest sport is getting the cable industry worked into a lather over the one-wire issue by lobbying Congress and telling anyone who will politely listen that they see no need to spend hundreds of millions wiring the country with duplicative fiber networks. They wonder why cable operators refuse to see the light and allow them to build the networks while cable administrates the whole thing.

If given a level regulatory playing field, the telcos argue, they could integrate voice, data and video over a single fiber and efficiently provide the country with everything it needs.



On the surface, the argument seems sound. But, in reality, cable is already ahead of the telcos in fiber deployment (not in amount installed, but in depth of integration) and is moving further ahead every month. And, quite simply, cable operators are used to operating in a competitive environment and telcos are not.

Detractors say cable is monopolostic, that there is no competition for franchises, etc. Even if that were true, cable is faced with having to compete for entertainment dollars with scores of alternative providers. Cable knows how much subscribers will pay for movies and special events. Telcos just seem to know how much they can increase their rates before state PUCs say "no."

A recent study by the Rand Corporation concluded that telcos haven't a prayer of making a fiber-based broadband switched video service (ISDN to the home) work economically, especially when faced with competition from cable. TCI's John Sie suggests that Americans are best served by cooperation between cable and telcos, with each delivering what it is best at doing. "If we unnaturally force both modes on a single system," Sie states, "the performance will suffer drastically, becoming totally inefficient and ultimately failing to serve either mode."

We agree. The surest way to destroy what is perhaps the best telecommunications system on the planet is to give everything to one player. After all, if the telcos can't get consumers to buy call-waiting, call-forwarding or special ringing features, what makes them think they can market entertainment services? And besides, if telcos really can cost-effectively replace all the copper currently in the ground and subsidize fiber with revenue generated from POTS, like they say they can, we say let 'em do it.

A couple of other things: Help us in welcoming Dr. Walt Ciciora, vice president of technology at ATC, to the pages of *CED*. He'll bring his unique perspective on issues such as advanced TV and its relationship with CATV to the magazine. We're proud to have him join our ranks.

Also, if you've got an idea for a technical paper percolating in your head, don't forget to get an abstract to the NCTA by the end of the year. Ideas chosen by a committee appointed to review papers will be included in the 1990 NCTA Technical Papers and presented in Atlanta in May.

Roger J. Brown

Roger Brown
Editor

CED

William McGorry, Group Publisher
Robert C. Stuehrk, Associate Publisher

EDITORIAL
Roger Brown
Editor
Kathy Berlin
Managing Editor
George Sell
Contributing Editor

CONSULTING ENGINEERS
Chairman
Wendell H. Bailey, NCTA VP, Science and Technology

MEMBERS
Jim Chiddix, Senior VP, Engineering and Technology, ATC
John Dawson, Engineering Consultant
Roy Ehman, Director of Engineering, Jones Intercable
Tom Elliot, Director of Research and Development, Tele-Communications Inc.
Jim Farmer, Principal Engineer, Scientific-Atlanta
Paul Heimbach, VP Engineering, Home Box Office
Fred Kaiser, President, Alpha Technologies
Dave Large, Director, Video Product Planning, Raynet Inc.
Robert Luff, VP Technology, Jones Intercable
Steve Raimondi, VP Engineering, UA Cablesystems Corp.
Joe Van Loan, Engineering Consultant

PRODUCTION
Jeff Knight, Production Director
Don Ruth, Art Director
Elaine Callahan, Production Manager
Dick Benson, Circulation Director

ADVERTISING
Cathy Wilson, National Sales Manager
Judy Medley, Account Executive
Curt Stocker, Classified Sales Manager

MARKETING AND SUPPORT
Michelle Pazar, Author Support and Quality Assurance
Linda Hendrick, SCTE Chapter Support

OFFICE
Denver 600 S. Cherry Street, Suite 400, Denver, CO 80222 (303) 393-7449. Fax (303) 393-6654.

Better VideoCipher® Solutions

NEXUS builds two VideoCipher® solutions to satisfy all your descrambling needs - the Nexus IRD-1 Integrated Receiver Descrambler and the VCMB VideoCipher® Mainframe. Nexus was the first manufacturer in the world with two commercial VC®II products approved by General Instrument.

To **maximize the reliability of your headend,** Nexus applies three innovative design principles to every product we manufacture. We:

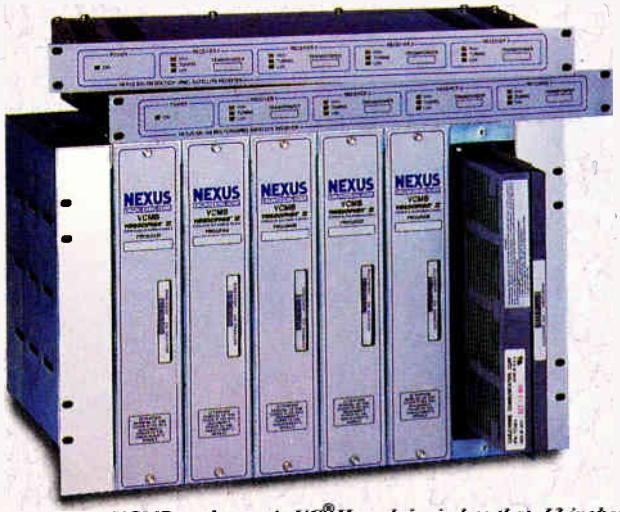
- *decrease power consumption,* by designing more efficient products,
- *lower operating temperature,* by locating the power supply outside the unit, and
- *design more advanced circuits* which require fewer interconnections.

The IRD-1 and VCMB offer exceptional reliability because they consume less power, have fewer interconnections and generate less heat.

The VCMB's unique vertical orientation significantly increases airflow and further improves reliability.

Both products are incredibly easy to maintain. Unique front-loading of the VideoCipher®II modules greatly reduces service time. And both units offer significant space savings over stand-alone VC®IIs.

The Nexus IRD-1 packages a commercial satellite receiver and a VC® II module in 2 and 5/8 inches of rack space.



The Nexus VCMB packages six VC® II modules in less than 13 inches of rack space.

All Nexus headend products are covered by our **FAMOUS FIVE-YEAR WARRANTY.*** VideoCipher®II modules are covered by General Instrument's warranty.

*Contact us for details.

Compare our lower power consumption, reduced heat generation and increased reliability to all other VideoCipher® solutions.

TEL:(206)644-2371 BELLEVUE, WA. or (604)420-5322 BURNABY, BC. FAX:(604)420-5941
WRITE:NEXUS ENGINEERING CORP., 7000 LOUGHEED HWY., BURNABY, BC. V5A 4K4

NEXUS ENGINEERING CORP. PERFORMANCE YOU CAN SEE. rely on

MARKETED EXCLUSIVELY BY

Channell Commercial Corporation

800/423-1863

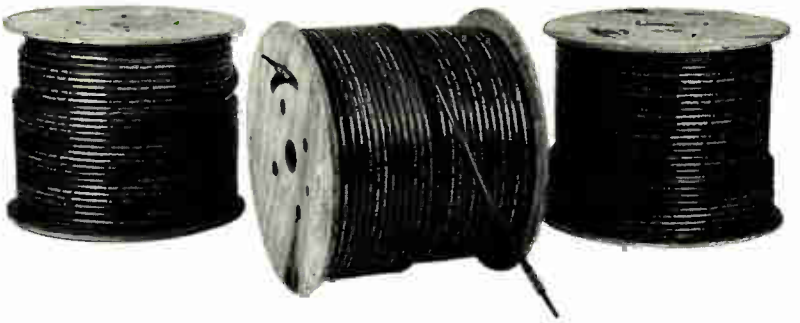
800/345-3624

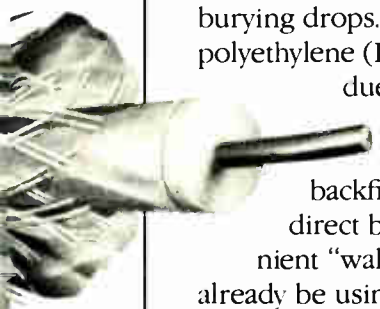
in CA

Integral Corporation

with Integral's Cablecon® Drop-in-Duct!

Integral and Channell: Setting the standards for underground plant.





Integral's new Cablecon Drop-in-Duct (DID™) eliminates the "crunch" when direct burying drops. Manufactured of high density polyethylene (HDPE), DID is tough and durable, due to its ratio of diameter-to-wall thickness. Resistant to shovel impact and hostile backfills, DID can be easily installed by direct burying, or with the same convenient "walk behind" equipment you may already be using.

Marketed exclusively by Channell Commercial, DID is available in two colors (gray or terra cotta) so that your CATV underground plant can be easily identified from other utilities. Available in 10MM, 13MM or ½" duct sizes with your choice of RG service wire, DID is easy to order and is an excellent, low-cost solution for protecting your underground drop. DID is available in 1,000' or 2,000' reels and is backed with the only pass-through warrantee from Comm/Scope, Inc. and Times Cable in the CATV industry.

With millions of feet of direct buried drop already installed in North America, industry leaders predict that 100% of it will be replaced within five years. To reduce this statistic, DID will undoubtedly play a major role, but if any of your **existing** direct buried plant gets damaged, Channell's KCP™ Series Splice Kits offer another great solution. KCP Series Splice Kits permit easy repair of drop or coax and protect CATV connectors in both underground and aerial applications. Inexpensive and effective, they're the only splice kits available in the CATV Industry with a **money back guarantee.**

Drop-in-Duct for tomorrow's requirements and KCP Series Splice Kits for yesterday's plant. Just two more ways that Integral and Channell are setting the standards for underground plant. To put our high standards to work for you, call **800/423/1863 (800/345-3624 in CA) toll free** today.

KCP2000

See us at the Western Show, Booth #1129.

Channell COMMERCIAL CORPORATION

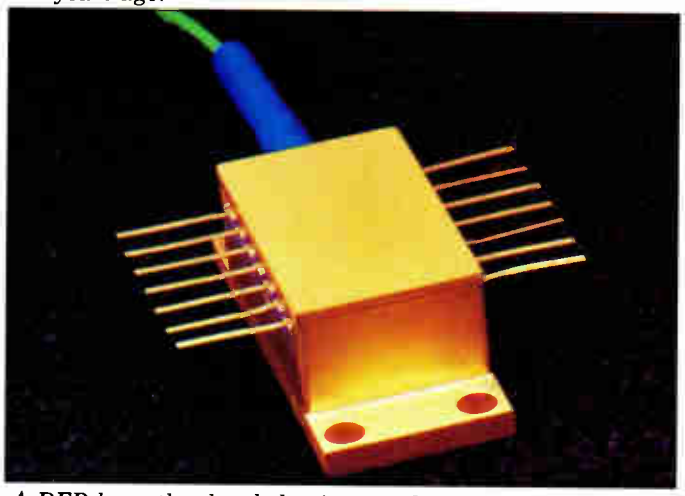
Reader Service Number 5

COLOR BURSTS

Jerrold announces breakthrough in DFB laser development

The world's first high performance distributed feedback (DFB) laser engineered specifically for cable television applications has been designed by Ortel Corp. as part of its proprietary research agreement with the Jerrold division of General Instrument.

The new laser will make its debut at the 1989 Western Cable Show in Anaheim later this month, according to David Robinson, director of Cableoptics, Jerrold's fiber optic research unit. When volume production begins in the middle of 1990, the laser will deliver guaranteed minimum specs of 56 dB carrier-to-noise and -65 dB for both composite triple beat and composite second order over a 15 km link with a 7 dB loss budget, Robinson added. Those numbers are slightly better than the specs originally requested by ATC engineers two years ago.



A DFB laser that has led to improved performance in AM video transmission

The Jerrold system, utilizing the new laser, will offer 80 channels of video delivery over two fibers. In fact, Jerrold engineers expect to continue to offer two-fiber systems for the "indefinite future" because of distortion limitations.

Field tests of the entire system will begin in April of next year, starting in a Cablevision Systems Corp. system in the Northeast, and will ultimately be up and running in eight to 10 test sites, said Robinson. By the end of 1990, Robinson said that as many as 100 transmitters per month could be produced at Jerrold's Tucson, Ariz. production facility, which currently churns out pre-packaged headends.

The laser, which was designed specifically for AM video transmission, offers improvements within the optical cavity of the semiconductor itself as well as coupling efficiencies to get the enhanced performance, according to David Grubb, Jerrold's manager of analog programs. Future performance enhancements are expected to permit additional channel loading, perhaps to as many as 60 channels per fiber.

To date, the enhanced C/N and distortion figures have been confirmed in the Ortel and Jerrold labs and was scheduled to be tested in ATC's Denver lab in late November, said Jim Chiddix, senior vice president of engineering and technology at the second-largest MSO.

less about your construction material needs.
CATV. The supplier who gives a dam.

All from quality manufacturers and ready to ship nationwide.
For quick service, call any of our offices today. Just tell 'em the Beav sent you.

MIDWEST
CATV
A division of Midwest Corporatio
More than supplies. Solutions

Reader Service Number 6

Eastern Region
WV 304 624-5459
WV 800 532-2288

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 214 271-8811
Outside TX 800 421-4334

Western Region
Denver, CO 800 232-9378
Phoenix, AZ 800 782-4566

Robinson said the laser's cost will be "at or below current system" prices initially, with appropriate price reductions coming after production ramps up. However, in many ways, the laser, which operates at 4 milliwatts, will allow for enhanced system efficiencies because its output can be split as many as four times to reduce the number of transmitters needed in a system.

The transmitter unit will reportedly offer new features, for which there are patents pending, Robinson said. The modular design will offer plug-in laser units and a return path receiver and automatic laser alignment will be featured as well.

A major step

Although he had not yet tested the device, Chiddix was encouraged by Jerrold's announcement. "We're very excited," he stated. The performance numbers are "a little better than the original goal" that ATC postulated, he added. Chiddix, who along with Dave Pangrac, originally conceived the idea of the fiber optic backbone, has long urged manufacturers to develop lasers specifically for video transmission. "This is the first laser designed for CATV use, not a modified digital telephony component. It's an event of some significance," he said. "It may be just a step, but it's a major step."

Chiddix also expressed enthusiasm for the possibility of further price breaks, which will allow the industry to embrace AM fiber on a more widescale basis. "The manufacturing process promises to give high yields on a consistent basis, which is a key to price reductions," he added.

Robinson said he expects to enjoy a temporary technology lead of 12 to 24 months before other fiber vendors perform similar breakthroughs with their DFB lasers. Conversely, Scientific-Atlanta doesn't expect to be behind Jerrold technologically by the time next summer comes around. "We have seen steady improvements in lasers as vendors...understand their applications better," said David Fellows. "There's no doubt those are good specs but they're a year away from delivery and a lot can happen in a year. Those numbers, projected out to the middle of next year, don't look like a breakthrough has occurred."

As part of the development process, Jerrold engineers are performing laser reliability tests to determine a typical laser's mean time before failure (MTBF). Temperature cycling, AM performance and RF drive cycling tests are being executed to produce statistical life expectancy data. Robinson said his group has targeted an MTBF at 10-years.

Orchard establishes fiber research lab

Not to be outdone, Orchard Communications has established its own optoelectronics research laboratory in order to develop "suitable technology for AM applications (of fiber optics) in cable television," said Dean Bogert, director of systems engineering at Orchard.

Ongoing research will result in a new product announcement, perhaps as early as the first quarter of 1990, said Bogert. Target specifications of such a system, which will be designed to deliver 60 video channels over a single fiber with 12 dB of link loss, are 55 dB signal-to-noise, and -65 dB for both composite triple beat and composite second order.

Orchard has been researching such a system since 1988 and recently concluded that the product it could offer would rival—but not surpass—similar products already on the market. "We didn't think it was adequate to meet the needs of the CATV industry," Bogert stated.

Therefore, the lab was established in Cambridge, Mass. to develop a new or improved laser and associated electronics to provide high quality signals. The long-term objective of the lab, according to Bogert, is to assess, prototype and develop products with "novel" components.

The lab will be supervised by Rob Plastow, manager of optoelectronic research and development. Plastow holds undergraduate and advanced degrees in physics from Cambridge University and was previously employed by Plessey Research in the United Kingdom and Lasertron of Burlington, Mass.

Cablevision Systems uses 1550 window

The first use of the 1550 nm "low loss" window by a cable television operator utilizing AM transmission methods goes to Cablevision Systems, and the results were excellent, said Al Johnson, director of technical operations for the MSO.

To date, cable operators have exclusively used the 1310 nm window for AM transmission of video. However, the 1550 window provides better attenuation specifications.

Thirty-nine channels of video were sent via DFB laser over three fibers a total of 14.6 miles without repeating in the Yorktown Heights system in Westchester County, N.Y. Carrier-to-noise ratios varied from 54.5 dB to 56 dB, and triple beat was -67 dB, said Johnson. The link's loss budget was about 5 dB. The link was installed to replace a decommissioned headend in the Bedford area which was difficult to access.

Power for the '90s

Sporting a 20 percent reduction in weight and a much smaller physical size, Alpha Technologies Inc. will be demonstrating its new standby power supply at the Western Show in Anaheim. Dubbed the "Power for the '90s," by Alpha executives, the XP Series power supply uses the company's existing circuitry but instead of traditional switches, the controls, indicators and selectable options are done by fingertip, on a membrane touch pad.

Alpha, which spends between five

Alpha's XP Series standby power supply

and eight percent of its total revenue on research and development, transferred some of the technology from its uninterruptible power source research to develop the new XP Series. "We've focused a tremendous amount of design engineering talent on it," said Bob Bridge, sales manager for Alpha Technologies. "We've implemented a lot more advanced digital technology in what's traditionally been thought of as perhaps an analog type product."

Because of its modular design, the product is "backward and forward compatible," stated Bridge. This design allows operators to add features which may be needed later without having to make the initial decision when purchasing the unit. Any addition or

the SOURCE

Take your signal from Sony.

For CATV, SMATV, broadcast or business television, the FSR-1100 is the most reliable, flexible, high performance commercial satellite receiver available for the money.

Whether you're operating on the Ku or C band, Sony's FSR-1100 receiver provides the superior video and audio reception viewers expect. The FSR-1100's unique adjustable detector bandwidth allows quality reception even under adverse signal conditions. And its advanced operating features make it easy to use.

When you choose the FSR-1100 you're choosing Sony quality. Sony's unsurpassed experience and commitment to excellence in professional broadcast and industrial video equipment coupled with Midwest's outstanding support and service make a winning combination that can't be beat. Get the picture? You will if you take your signal from Sony.

For more information about the Sony FSR-1100, call one of our sales representatives today.

SONY® is a trademark of Sony.

MIDWEST
Communications Corp.

One Sperti Drive
Edgewood, KY 41017
1-800-543-1584
In Kentucky, 606-331-8990

Reader Service Number 7

removal of parts can be accomplished on site in the field.

The unit will also accommodate any manufacturer's status monitoring unit, added Bridge.

"We've simplified the product too," said Fred Kaiser, president of Alpha, referring to the single circuit board used by the XP Series versus the traditional two to seven boards currently used. "But we're still relying on our proven circuitry," Kaiser added. "We haven't touched that."

Alpha will maintain its present pricing for the new product, according to Kaiser. "We've been looking at a lot of new capabilities, benefits and features that standby power supply can incorporate for some years," he said. "We've finally found a way to put them all into a product and bring it to the market at a reasonable price."

Canadian operator launches first FM link

Although Rogers Cablesystems—the largest cable operator north of the border—is certainly the most aggressive user of fiber optics, it isn't the only one.

CF Cable TV, based in Montreal, reportedly became the first Canadian operator to utilize an FM fiber path to link two headends, when it fired up a new headend in Kirkland in early October. Thirty-seven channels of video (instead of the traditional 35) are being provided over 35 kilometers of fiber to more than 24,000 subscribers.

Phase II of the project will consist of a third headend fed by fiber, eliminating 35 amplifiers and forming a ring of fiber around the area to provide improved reliability (built-in redundancy) and better signal quality. According to CF Cable, when the project is completed next year, more than 25 percent of the franchise territory will have its signal fed by fiber, reaching approximately 55,000 homes.

Advanced TV systems making progress

Despite the apparent lack of tangible news, it appears there is at least significant thought going into the race to establish an advanced television production and transmission standard. Some of the highlights from the past month:

- Zenith Electronics Corp. has developed a new production standard designed specifically for American HDTV, according to Wayne Luplow, executive director of Zenith's advanced research and development. Luplow presented the standard during a meeting of the Society of Motion Picture and Television Engineers in early November.

In addition to supporting Zenith's "Spectrum Compatible HDTV" proposal, the new standard features progressive-scan technology to provide "improved image detail and elimination of motion artifacts such as jagged edges;" square pixels, or picture elements, which allow programmers to more cost-effectively create special effects; and technical compatibility with today's NTSC television system, making it easier to evolve from NTSC to HDTV, and compatibility with the proposed 16-to-9 "common image format" for simple conversion between HDTV formats.

Prototype HDTV receivers will be tested with the proposed standard and discussions are underway to develop prototype studio equipment for the new standard proposal.

- A Philips Consumer Electronics executive urged industry cooperation and the adoption of a "two-pronged approach" to bring advanced television to North America.

Dr. J. Peter Bingham, president of Philips, speaking before an Electronic Engineering Times conference, said introduction of ATV services was being hampered by a lack of industry cooperation. He said Philips is prepared to "cooperate in bringing ATV to the United States. We're ready to learn from others. Where it's appropriate, we're ready to help others."

Bingham endorsed a two-pronged approach to advanced television: the introduction of enhanced NTSC first (which could be "introduced quickly,"), followed by later introduction of true HDTV.

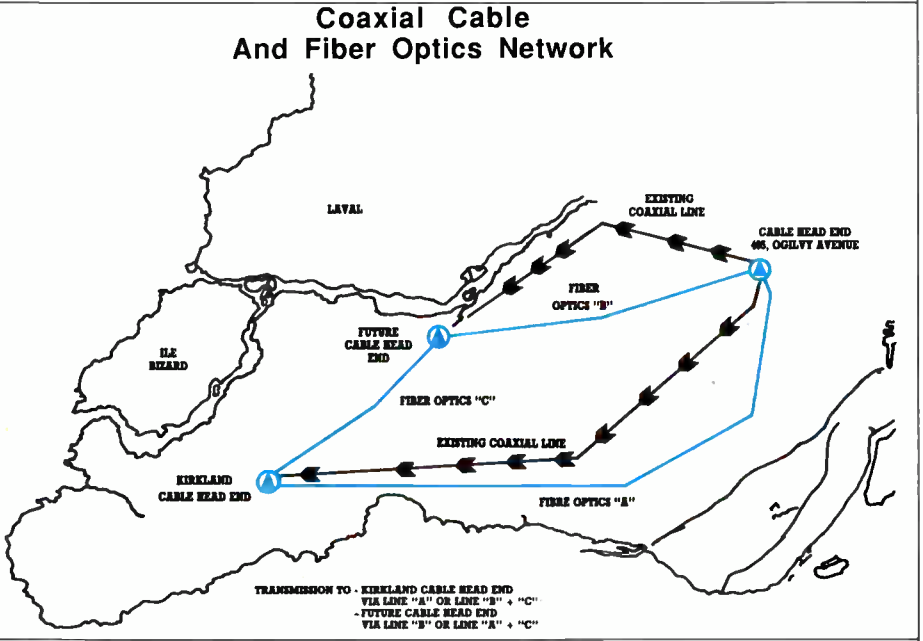
"Philips is ready to start building EDTV sets very quickly," said Bingham. "We're only waiting for the TV industry to agree on uniform standards and get government approvals."

- Bellcore researchers have demonstrated a system that can transmit and receive a compressed digital HDTV signal over more than 40 kilometers of fiber optic cable, reportedly with no loss of picture quality.

The system was built using a combination of proprietary experimental and off-the-shelf components. An analog HDTV signal was converted to digital at 622 megabits per second, transmitted over the fiber and then returned to analog form at the receive site. Work continues to compress the signal to 155 megabits/second.

The system was designed to be compatible with all proposed HDTV formats and presently "takes up only a few square feet of table space," according to a Bellcore spokesman.

—Roger Brown and Kathy Berlin



CF Cable's fiber optic trunking system serving the Montreal area

When it comes time to increase channel capacity, available headend 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 headend environments. Setup, maintenance 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.

See the entire Standard line at the Western Cable Show, December 13-15, Booth #150 & 152.

Reader Service Number 8

MATERIAL

arconi Made Waves With Wireless Transmission...

Jerrold Cableoptics™ Proves History Repeats Itself!

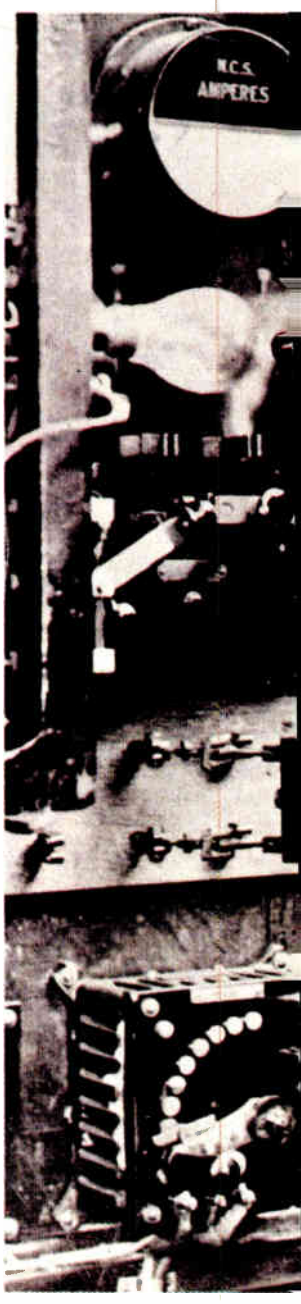
Inspired by the radio wave theories of Heinrich Hertz, Guglielmo Marconi built and perfected the world's first wireless telegraph.

Spending tireless hours in the attic of his father's estate, Marconi attached extra wires to his spark transmitter, resulting in major transmission distance advances. And, when the experiments were moved outdoors, his greatest technical triumphs materialized—literally out of thin air.

He first discovered that by grounding a transmitter, the signal range was greatly increased. He then discovered that upright antennas would send messages the farthest. By 1901, transmissions from his radio towers were the first to cross the Atlantic. But perhaps Marconi's most important triumph was his ability to recognize, early-on, that technological success is totally dependent on viable commercial applications.

Today, Jerrold's own staff of "Marconies" is developing Cableoptics™. Optical broadband technology is giving cable operators the ability to send video signals farther than ever with virtually no loss in quality, supplementing their current RF systems.

Jerrold is the technology leader of the cable industry. Like Marconi, we turn technical advances into practical, reliable solutions. For over 40 years, we have been partners with cable operators in developing new ideas for the marketplace. With Cableoptics™, Jerrold is making big waves in today's cable industry and is giving a whole new meaning to the term "wireless" transmission.



CABLEOPTICS

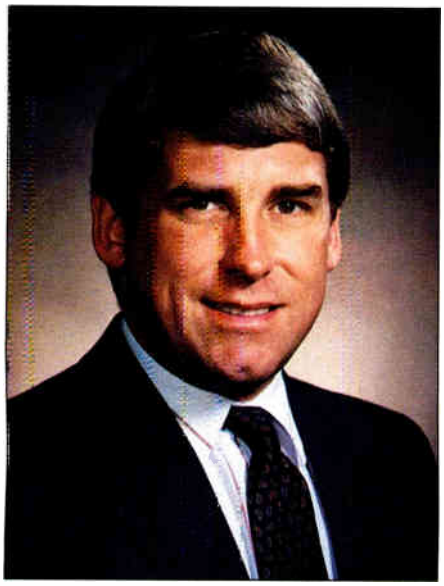
Visit our Booth at the Western Show.

JERROLD

GENERAL INSTRUMENT

2200 Byberry Road, Hatboro, PA 19040 215/674-4800

I Z A T I O N



Andy Paff

A decade for reality

With 1990 just a turn around the corner, the cable industry is moving into an era where past technological dreams are now becoming a reality. In all probability, high definition television will be in the home during the next decade, the legendary 1 GHz platform will be old hat, interactive cable will become revenue producing and optical technology will be used to its fullest potential.

However, in order to confront and manage these technological changes, the '90s also require personnel ready to embrace and adopt a new way of thinking. And while there are many in the industry who fit the bill, Anixter Cable TV's Vice President of National Accounts Andy Paff has been engaged in this type of thinking since his indoctrination into cable 12 years ago.

A different beginning

Paff didn't begin his cable career in the field. Rather, his initiation came after receiving his masters of science in communications from the University of Illinois in Urbana. In 1976, finding that he was "lucky" enough to get an assistantship, Paff began teaching and working with Don Mullally in the field of public broadcast.

During this time, cable came into Paff's world through a secondary contract (mutually exclusive to the cable franchise) with ATC and the university. ATC was to provide the university with a sophisticated on-campus system that could be used for the delivery of both informational and local programming as well as data for energy management.

Because the university was concerned with energy management and peak power levels, engineers from both ATC and the university developed ways to shut down the air conditioning and similiar functions via the coaxial cable. "It was an eye opener as far as new business and that's where I got into cable," says Paff. "I had some responsibility looking at FM subcarriers as to how we make that spectrum available.

In 1982, after spending six years at the university, Paff felt "I had become sort of commercial and cable in a non-commercial environment and that was a conflict." Deciding to cut the umbilical cord, Paff relocated to Boulder, Colo., and started Summit Telecommunications Services, which began exploring new business opportunities.

The company eventually focused on franchising and Paff soon found himself "barnstorming" in areas like Texas, Oklahoma, Arkansas and Utah. After signing 20 franchises in 18 months, Paff felt the franchising days winding down and hooked up with Viacom Cable in Pleasanton, Calif., as its manager of new business development, under the direction of Dave Archer.

"Viacom was looking at data at the time, along with making more and better use of its assets—its plant on the pole," says Paff. "I felt our focus was particularly on data communications and we did some things with packet switching, which was a new technology." One of the department's success stories was developing one of the first wide area networks for the city of Mountain View, Calif. Unfortunately, once the product was in place, the real question became its use.

"We started to look around at what we could sell," reflects Paff. "That's really what the issue came down to. The problem is, there really hasn't been an application that has grabbed the imagination of the American public. I suspect it's going to come from the generation that grew up with computers and how those computers are integrated into their everyday life. So the application side of it I think, even today, is still more critical than the technical side."

While at Viacom, Paff also became involved with pioneering the use of ANI (automatic number identification) for pay-per-view (PPV) purposes. Because Viacom jumped into PPV early, the need for order fulfillment of a nightly product resulted in the creation of two field trials: the local regional Bell operating company-based ANI system and AT&T's 800 service. Paff's responsibility was to bring Zenith, PacTel and Viacom's engineering and MIS departments together to make the local trial work.

Telco or cable?

In 1987, Viacom went through a buyout and Paff was forced to make a choice. "It's sort of been the dilemma in my career as to whether to go into telephone or cable," muses Paff. "Do I jump all the way into telephone or all the way into cable? With the buyout, it was clear I had another choice to make since Viacom was not going to focus on the new business side for a lot of good reasons. So I managed to avoid making that decision by going to work for ATC (in Denver, Colo.) in a very similar capacity, looking at primarily data and fiber optics."

As manager of telecommunications services for ATC, Paff was responsible for the evaluation and implementation of a digital tecommunications business within the company. Paff focused on product definition, operations and sales in startup markets, which led ATC to begin providing high speed enhanced digital communications through fiber optic, broadband and microwave technology in five locations.

Unfortunately for Paff, ATC relocated its corporate offices and toward the end of '88, Paff was again looking at deciding between cable and telephone. "There were a lot of other people wondering where the cable industry was headed," says Paff. "Would it continue to look at itself as an entertainment medium?

Not willing to relocate his family again, Paff decided not to move with ATC and began looking at opportunities with both MSOs and non-cable entities. It was at this time that Anixter Cable TV came into the picture. "I started to look at the way the industry was reacting to the future with respect to fiber optics and better programming and decided it was time to go with the cable side," states Paff. "It was an excellent decision."

Since Anixter has a policy of never directly approaching people (custom-

ers) about jobs, Paff contacted the company and said he'd like to talk about its fiber product. That started the conversation which led to Paff joining Anixter a couple of days before the '88 Western Show as director of new technology.

Moving fast

"I've been off and running ever since," says Paff. "This company moves very quickly." As director of new technology, Paff was responsible for deploying Anixter's Laser Link, field services and making sure the customer understood the product and supervising Laser Link's performance. Paff also evaluated possible new applications, which he then fed back to the research and development staff.

"I've always been on the peripheral side of cable," states Paff. "It takes a long time to ferment a new project to the point that it's significant, and then you let it go and start on something else. But here (Laser Link) is a new product but it is also something that's being sold, a dramatic, unique commitment from Anixter to start to become a technological leader in the cable industry with such a new product as fiber."

Eight months later, Paff was promoted to his current position of vice president of national accounts. Although Paff credits part of the promotion to his flexibility, he feels Anixter saw "my commitment to the customer. And that's my primary thing. I look at most of those customers, even the ones I don't know, as friends and my word, I take that very seriously."

Paff also takes his involvement with the Society of Cable Television Engineers (SCTE) very seriously. Having already lectured in seven SCTE meetings this year, Paff feels it's important to talk to others in the industry if you have something to contribute. "We also get a lot of feedback from the field through the SCTE," says Paff. "People come to these things and tell you about problems you didn't know existed. It's definitely a two-way street."

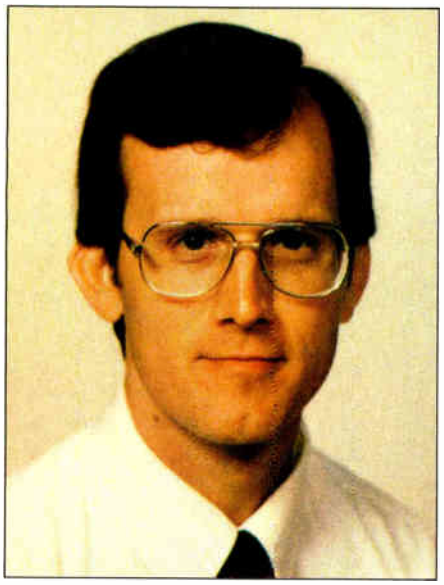
Looking back on his past history with cable and new businesses, Paff sees himself as prepared to thrive in cable's future. "Throughout the years, as you look at all these new business opportunities and you only have time to deal with some, you learn very quickly how to separate that out or give it a certain amount of time to become profitable," says Paff.

"That becomes very important in terms of personal survival but it also (relates to) the cable industry as it faces some dilemmas as an industry—(such as) what to do about HDTV, whether to spend a lot of resources for something that isn't quite defined or do something that will cover you there and still enable you to make better use of something you've got today.

"I think I have enough of that experience," he continues, "I think I've accumulated the ability to understand what will work and what will not work. And where you can't be 100 percent accurate, you tend to get a pretty good feeling."

So as the industry moves into the next decade, as the cable plant is reconfigured with the addition of fiber optics and the 1 GHz platform is implemented, Paff intends on "being able to fill whatever need comes up with Anixter." And while the 1990s are promising much and demanding even more, "it's really kind of an exciting time," says Paff. "As we go into the '90s, it's the first time we see visible, tangible evidence that is occuring at a very rapid rate. And that's exciting." ■

—Kathy Berlin



Compression, limiting & clipping

Like it or not, audio is an important part of what we do. As such, we should be careful about maintaining the integrity of the audio source material, just as we would work to process the video signal through our headends with no apparent distortion.

One difficulty with that simplistic thought is that audio levels don't seem to be consistently delivered from our various sources, and in fact, seem to vary "all over the map" on a daily basis, according to many MSOs. It is then left to the operator to figure out how to best "process" the audio on his channels so that the loudest passages from each program are consistent!

This month, we'll take an in-depth look at compression and limiting as well as a third process called clipping, in order to better understand their impact on the delivered audio quality.

Compression

Compression is a form of audio processing in which the entire dynamic range of the program material is reduced. Soft audio passages are made louder, and loud audio passages are made softer. This is similar to a form of audio automatic gain control, or AGC, and is shown in Figure 1b.

By Chris Bowick, Director of Engineering, Headend and Earth Stat on Products, Scientific-Atlanta

Compression is regularly used in FM radio broadcasting to raise the perceived loudness level of the station. In the extreme, compression could reduce the dynamic range of the audio to almost nothing, meaning that no matter what the program content might be—soft background music or a loud battle scene—the audio levels would appear the same.

Compression isn't necessarily a bad thing, and is used quite often where loud is considered good, such as with rock music. Try compression on a classical musician who uses dynamic range as part of his or her performance, however, and you are liable to get a dirty stare. In reality, though, compression is not usually accomplished in the extreme outlined above. Rather than AGC the audio to one level no matter what the dynamic range might be, compressors are usually a bit less obtrusive, and are usually specified according to the amount of compression that they provide.

Limiting

Audio modulation limiting is another form of audio processing that is sometimes used and is shown in simplified form in Figure 1c. With modulation limiting, no attempt is made to provide AGC to the audio information. Soft passages will remain soft, and most loud passages will remain loud. If set up correctly, the dynamic range of the audio passage will not even be affected.

The modulation limiter does nothing to the audio until a particular threshold is reached: for TV audio, this threshold is 25 kHz deviation. The limiter is used to help ensure that we do not exceed this deviation. Note in Figure 1c that the input waveform is not clipped at 25 kHz deviation, but instead, is compressed. In order to do this, at the specified threshold point the gain of the limiting amplifier is instantaneously reduced by an amount dependent upon the instantaneous amplitude of the audio input signal, to prevent the audio output amplitude from ever exceeding a specified level on extreme peaks.

Note that a modulation limiter can be used as a crude form of compressor by simply overdriving the input to the limiter with normal program audio. If this is done, the louder audio passages (in fact any audio louder than our specified threshold) will be compressed (or AGC'd) to our threshold level. Quiet audio passages will *not* be increased in amplitude as they would have been with a true compressor.

Clipping

Clipping is a rather drastic form of processing, and is shown in Figure 1d. Note that, in this case, rather than reduce the gain of the amplifiers in the audio path when the audio input signal exceeds a certain threshold, a clipper actually "chops off" the peaks of the waveform, creating harmonic distortion. This type of processing is rarely (knowingly) used and is mentioned here only to help distinguish between clipping and limiting.

Compressors and limiters are each faced with the rather complicated dynamics of a complex audio waveform, and substantial efforts are made during the development effort to "optimize" the attack and release times of the electronics. The optimization is often subjective however and as a result, is dependent upon the calibrated ear of the design engineer. ■

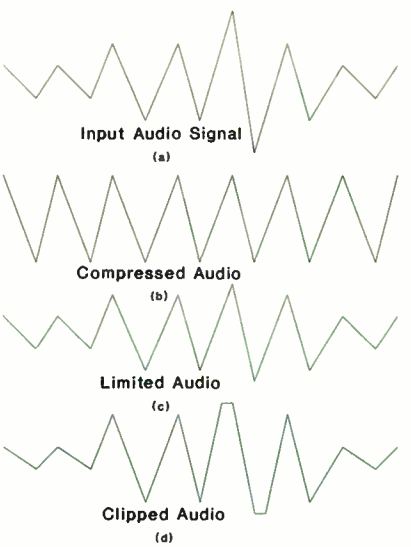


Figure 1

References

1. Bowick, Chris, *From The Headend*, "Headend audio loudness control," CED, November 1987.

2. Farmer, Jim, "Setting and maintaining modulation levels," circa 1977.

3. Sedacca, David, "Practical considerations for BTSC stereo in the CATV plant," 1987 NCTA Technical Papers.

Wouldn't it be nice if C-COR rebuilt homes, too?

Like our cable system rebuilds, you'd have the technology of tomorrow, today. And if you preferred, we'd custom build it. Your warranty would be three times the industry standard. You could reach us 24 hours a day for personalized service and fast turnaround on repairs.

You'd have the best home on the block.

If this kind of innovative service, advanced product line and commitment to quality hits home, let us show you what we can do for your business. Call 1-800-233-2267. In PA, 1-800-356-5090. Or write: C-COR, 60 Decibel Road, State College, PA 16801.

But please. Limit your rebuild requests to cable systems. We don't do houses. Yet.

C-COR® ELECTRONICS INC We're Out To Give You The Best Reception In The Industry.

Reader Service Number 12

Vertical integration

One of the problems with the cable industry, according to some of its competitors, is that there's too much 'vertical integration'. What they're referring to is the fact that some cable operators have ownership interests in cable programmers.

There's nothing unusual or sinister about vertical integration. It's rather common for manufacturing companies to own divisions that supply them with raw materials and also to own wholesale or retail distribution outlets for their manufactured goods. Indeed, vertical integration is particularly prevalent in the entertainment industry. ABC, NBC, CBS, and Fox, for example, all own broadcast stations as well as programming networks.

Integration more efficient

Economists generally recognize that a principal reason why companies integrate vertically is that integration can give rise to efficiencies in production and distribution that enable the companies to compete more effectively, providing better products at lower prices. These benefits are readily apparent in the cable industry.

To be successful, for example, a cable network needs to provide programming of sufficient quality and uniqueness to appeal to viewers and to increase cable system penetration. A program network owned by an MSO can benefit from the MSO's expertise regarding the unmet tastes and demands of existing and potential subscribers (and of cable operators) in designing its format and selecting its programming.

Furthermore, vertical integration can result in the financing (and therefore, the availability) of more program services than would otherwise exist. There are already more than 60 satellite delivered networks, and it may be increasingly difficult and costly for a new program service to obtain financing from a commercial bank or lender, to whom any new service might appear risky. MSO investment may be a less costly and more feasible alternative.

In any event, the proof is in the pudding. Several high quality program services have been created or sustained because of investments by cable operators, including, for example, Discovery, C-SPAN, Black Entertainment Television, CNN, Nickelodeon, and Bravo. Cable subscribers have thus been the beneficiaries of vertical integration.

Competition doing the talking

It's generally cable's competitors who are complaining about vertical integration in the cable industry. Broadcasters and movie studios (and, in some cases, vertically integrated companies that own both broadcasters and movie studios) complain that a vertically integrated MSO will not carry unaffiliated program services. Alternative distributors of video programming, such as multichannel multipoint distribution service (MMDS) operators, complain that vertically integrated programmers will refuse to make their services available to them in order to protect their cable affiliates from competition.

As a general economic matter, vertical integration can conceivably pose anticompetitive problems of this sort. In some industries under certain circumstances, vertical integration has in fact been abused to deny competitors access to suppliers or buyers of their goods or services. Where there is evidence that this has occurred, the antitrust laws can be invoked to remedy the situation.

To determine whether the costs of vertical integration outweigh the benefits in any particular circumstances, you have to look at the evidence. The National Cable Television Association asked an economist with particular expertise in the area of vertical integration to examine the facts. Here's what Professor Benjamin Klein from UCLA found:

"It does not appear that vertically integrated MSOs are excluding competing cable networks from their cable systems. First of all, ownership of cable systems nationwide is not sufficiently concentrated to enable even the largest MSO to eliminate competing programmers by excluding them from its systems. In any event, the evidence shows that vertically integrated MSOs simply are not systematically excluding programming networks in which they have no ownership interests.

"In fact, it appears that the four largest vertically integrated MSOs are actually **more** likely than non-integrated cable operators to carry the most popular cable networks in which they have no ownership interests. In other words, subscribers who are served by a vertically integrated MSO enjoy at least as wide a selection, and perhaps even a wider selection, of the most popular cable networks as the customers of non-integrated cable operators."

Professor Klein also found that vertically integrated MSOs were not using their ownership of program networks to exclude competing distributors of video programming. Professor Klein pointed out that exclusivity arrangements between programmers and cable operators would not necessarily be anticompetitive if they occurred, and that such arrangements in other industries are often pro-competitive. In any event, however, they're not occurring in the cable industry in a way that excludes competitors. Home satellite dish owners and program distributors and MMDS systems currently have access to most if not all cable networks, including the most popular and including those that are owned in whole or in part by cable MSOs.

So, the bottom line is that vertical integration is helping to expand the range of programming available to consumers without having any discernible anticompetitive effects.

If vertically integrated companies were to abuse their combined ownership of cable systems and programmers to exclude competitors unfairly, the antitrust laws would provide a more than adequate remedy. But the evidence indicates that a general prohibition or restriction on vertical integration in the cable industry would do far more harm than good. ■

By Michael Schooler, Deputy General Counsel, NCTA

BY THE YEAR 2000, ALL AMPLIFIERS MAY BE THIS GOOD.

With the Magnavox *Spectrum 2000* Series you don't have to wait that long.

Introducing the shape of the future in amplifiers. Developed through extensive research, the new *Spectrum 2000* is the most technologically advanced amplifier series available. Inside and out.

Designed to shield your broadband electronics from the merciless elements, the *Spectrum 2000* housing* is unlike any other. Computer designed convection fins provide superior heat dissipation in either vertical or horizontal installations—keeping internal modules cool. Plus, our improved weather and RF seals lock out external elements.

Our extended 5/8 inch ports are standard and are designed to accept a heat-shrink seal where the cable enters the housing. And our optional right angle ports even eliminate the need for 90° and 180° connectors making it a snap to mount in aerial, vault and pedestal installations. For ease of maintenance, the cover is reversible and always opens in the most convenient way. And it closes tight so no special tools are needed.

The *Spectrum 2000*'s 600 MHz 2-way chassis features improved surge characteristics for protection against transient power surges and color coded fuses for quick identification and easy replacement.

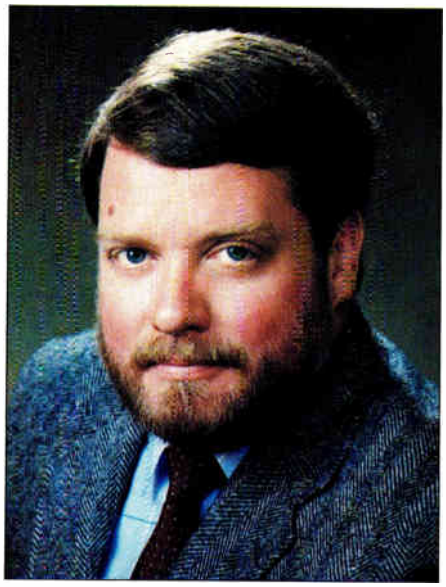
Available in a variety of bandwidths and bandsplits for worldwide usage, the *Spectrum 2000* amplifier is compatible with all Magnavox modules manufactured since 1972.

Bring your broadband system into the next century with the *Spectrum 2000* amplifier series. Call your Magnavox representative for more information.

*Patent Pending

MAGNAVOX

CATV SYSTEMS, INC.
100 Fairgrounds Drive, Manlius, NY 13104
(315) 682-9105 Fax: (315) 682-9006
1-800-448-5171 (In New York 1-800-522-7464)



The role of the cable system engineer

I spent a fair number of years of my life as a cable system engineer, with a broad, but vaguely defined, set of responsibilities. I grappled with day-to-day problems while trying to provide some general overall direction to the system's technical activities. During that period, I never really sat down to try to define my job—I seemed to be too busy doing it.

I have spent the last few years in a very different role and have visited a fair number of cable systems. I find myself in a position to observe the operation of various systems with a degree of impartiality. I am asked periodically to comment on organization charts and job descriptions and to comment on technical operations.

There is certainly no one "right" way to organize a cable system, or any other organization for that matter. There are, however, some key roles, which must be played by someone who is technically knowledgeable.

No magic

Over the years I have come to believe more and more that an organization plan is something which facilitates the operation of an organization, rather than a magic formula for success. Most importantly, it provides a way to carefully fit the strengths and weaknesses of available individuals into the job at hand.

All too often I see organizations harm themselves, as well as the careers of perfectly competent individuals, by trying to force people into boxes on a nice, neat organization chart with preconceived roles. The far more intelligent solution seems to be to evaluate the strengths and weaknesses of the people who are available to fill management positions, and then build a structure around them. If there are specific skills which are missing, that is the time to go out and hire someone new.

Some engineers are fully able, through a combination of education, experience, personality, and just plain ambition, to perform a number of roles. These obviously need to include a basic "how things work" perspective on their cable system, but often also include skills in managing the technical work force, purchasing materials, negotiating with contractors, and relating to franchising authorities as well. Nearly as often, one or more of those elements may be missing. Nevertheless, there are enormously successful organizations where the engineering leader is responsible for only the highly technical aspects of the business, and field supervision and administrative duties are assigned to individuals who have talents in those areas.

Every organization has a core management team, and someone who truly understands the workings of the system and the technical options available really needs to be part of that team. Ideally, that person should report directly to the leader of the organization, and be included in discussions of major decisions and direction. The cable television business is consumer driven, but it is technically enabled, and if cable management fails to recognize that point, it does so at its own peril.

There are several key roles for a cable system engineer. Perhaps the most fundamental is to act as "puzzle master" for the system. A cable television network is made up of many small pieces. Each piece is relatively simple, but in the aggregate the resulting network can be exceedingly complex.

Furthermore, over the years, the configuration of the cable network builds up a great deal of intertia. Thus, relatively simple decisions, often arrived at without much thought in the early stages of a cable system's development, can provide massive constraints as the system reaches maturity after years of growth.

It is therefore critical that the organization have, speaking as a peer with the rest of the management team, someone who can understand, picture, and articulate the overall complexities of the network. It is also important that that individual have a vision not just of how the system works today, but what options are available for growth and expansion a decade or more into the future. When decisions are made which compromise any one of those options, it is most important that everyone on the management team understand fully what they are giving up, and what it means in the long run.

Organizations which choose to structure themselves with the engineer viewed as a nerd locked in a closet, who reports to an assistant vice president in charge of quarterly cash flow, puts themselves at risk. If an organization does not have its senior engineer sitting in its decision-making counsels routinely, even when issues are discussed which are not obviously engineering issues, I believe that it is not structured intelligently.

Doing things the right way

A second critical role for the system engineer is to act as the guardian of the system standards. From that person should spring a fundamental vision about the "right way" to do things; especially simple seeming things like the selection of drop materials, the establishment of procedures used to install them, and the policing of those procedures. It is not hard to find a way to cut costs in buying materials, hiring installation or construction contractors, and avoiding training sessions. Such short-sighted activities, however, put the enormous asset that is a cable system at long-term risk.

Thus, a system engineer is really someone who, through years of experience and training, fully understands cable systems, how they work, what factors affect their limitations, and the way in which they are the sum of their parts. If that person is also a wizard at managing large groups of people, or negotiating programming contracts, that is a wonderful bonus. But whether or not that is true, it is critical that the engineer be a key member of a cable system's management team. ■

By Jim Chiddix, Sr. Vice President, Technology and Engineering, ATC

"Your cable system uses Pioneer converters. What do you think of them?"

"We're completely satisfied. Pioneer has always met our expectations and needs."

"They must be doing something right. Look at all the success they have had over the years and again in '89."

"So why argue with success and longevity? Pioneer is here today...and will be here tomorrow."

Consolidation fuels productivity drop

The October meeting of the NCTA Engineering Committee was held in Washington, D.C. and chaired by Walter Ciciora. The first item of business was a review of the subcommittee chairmen's meeting held the previous day.

Many of the chairmen were unable to attend the meeting due to previous commitments. Part of the problem appears to be a result of the reduction in the number of engineers in the industry with an increased demand on their time. The output from subcommittees has been reduced as well because there are fewer people with time available to work on the committee.

Washington updates

Wendell Bailey provided a summary of issues in Washington. The FCC has been petitioned to again look at the revised rules on terminal devices. Scientific-Atlanta has requested they remove the requirement for maximum output level from converters while General Instrument has requested clarification on whether refurbished equipment must meet the new standards.

The FCC is now seeking approval on its new Form 320 which will be required for CLI or flyover submissions. One form must be submitted for each community identifier, however, only one set of data need be submitted.

The syndex rules are expected to go into effect in January. While the FCC is being taken to court over the requirement, the outcome is not at all sure and no stay of the rules has been granted. Operators should be ordering equipment and following up on broadcaster requests to ensure that they are ready at the beginning of the year.

Both the House and Senate have a number of committees holding meetings which in one way or another address the cable industry. The industry will be required to justify its actions and continued unregulated status before many of these committees. Poor service and significant rate increases will not help the situation if consumers inform their representatives that they are not pleased with the industry. This industry must improve its image to the consumers and thereby improve its image in Congress.

By Brian James, Director of Engineering, NCTA

Subcommittee reports

Signal Leakage—Ted Hartson. Requests are still being received from operators for seminars on the implications of the aeronautical regulations and methods of bringing a system into compliance. If a system has not yet developed a plan and implemented it there is a high probability that the system cannot be brought into compliance by July 1, 1990.

ARRL—Robert Dickinson. There is only one unresolved case of interference which is progressing. In general, the league is happy with the efforts the industry has put forth in solving the interference problem and working with hams.

CableLabs—Tom Elliot. A technical advisory committee meeting will be held at the Western Show. All members of the Labs have been asked to notify the Labs with the name of their official TAC representative.

SCTE—William Riker. The CableTec Expo '90 will be held in Nashville on June 21-24. The call for papers is out for the seminars. An installer membership category with a reduced rate has been created along with a certification program. The next Board meeting will be held in Nashville and nominations are open for the open director positions for the 1990-92 term.

National Electrical Code—Jim Stillwell. The 1990 code is now available for purchase. This code is only a guideline and does not take effect in a state or community until it is adopted by the state.

IEEE—Lawrence Lockwood. The current issue of Spectrum has two good articles on HDTV. Manufacturers are removing "ST" type optical connectors from equipment because they have excessive reflections resulting in poor link performance of AM optical links.

Advanced Television Systems Committee—Judd Hoffman. The committee has been reorganized into transmission and production specialist groups. The transmission group is tracking the development of advanced TV systems while the production group is attempting to come up with a production standard for HDTV transmission.

MultiPort—Joe Van Loan. Two more manufacturers of decoders have indicated an intention to produce MultiPort decoders. Approximately 30 systems are using the decoders and RCA is continuing to provide lists of consumers who have purchased MultiPort sets. The Consumer Electronic show in January will have a MultiPort workshop for set dealers. The Port will be displayed again at the Western Show.

EIA/NCTA Joint Committee—Walt Ciciora. The development of a program identification system for VCRs is progressing. The channel numbering plan is being reviewed and expanded to include aeronautical offsets and channels up to 1 GHz.

CEBus—Judd Hoffman. The release of the power line portion of the spec is on target for a November release. The coax bus portion of the spec will have a conflict with the cable channels as they use some channels in the 740 to 800 MHz band.

HDTV—Nick Hamilton-Piercy. CableLabs is funding the development of the cable tests procedure. At this time there is no provision for testing security systems. The cable system characteristic tests performed by CRC have not been analyzed due to a reduction in funding. The analysis of the reflection characteristics should be completed by the end of the year.

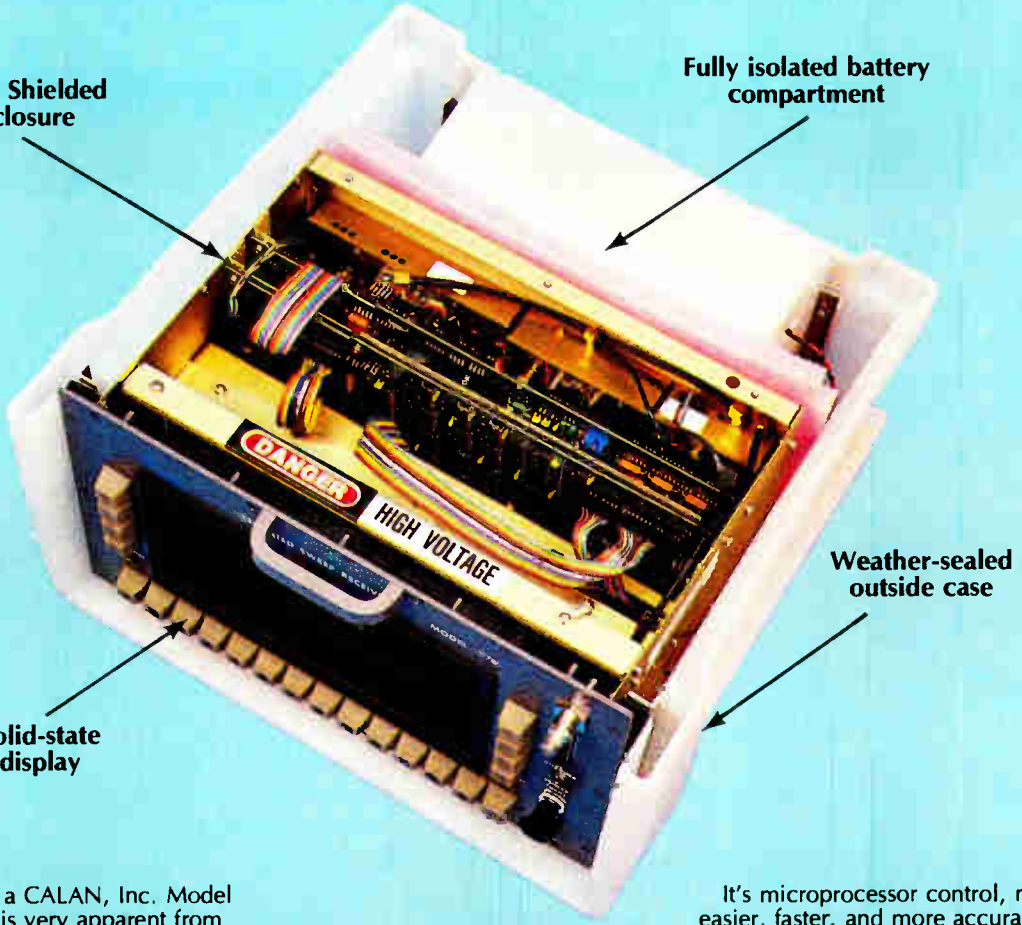
Satellite Practices—Norm Weinhouse. A meeting of the subcommittee and VideoCipher representatives will be held this fall to review problems with equipment failures and lengthy repair times. Some programmers are still supplying inconsistent or incorrect video and audio levels resulting in cable operators' inability to maintain good audio levels between cable channels without resorting to an automatic level control system.

New business

Effective meetings—S. Lippoff of A.D. Little gave a presentation of effective ways of reducing travel while increasing committee and meeting effectiveness. The methods included extensive use of fax, conference calls, electronic mail and bulletin boards. NCTA is looking into setting up a bulletin board for the Engineering Committee.

Micro-cell telephone—Robert Boroughs. Micro-cell telephone systems are becoming popular in Europe where people can pick up a portable phone in a shopping center and make or receive calls while in the center. The cable industry should investigate the possibility of being the link for these systems. ■

The Inside Story on Reliability



Reliability built into a CALAN, Inc. Model 1776 Sweep Receiver is very apparent from the outside: the totally weather-sealed case; the ruggedized overall construction; the moisture-sealed key covers on the front panel.

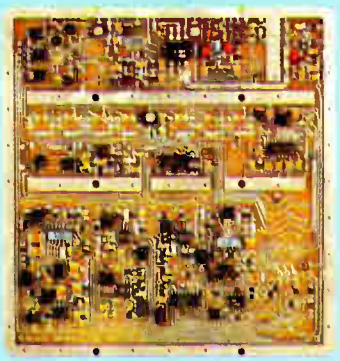
But what really makes this unique equipment reliable is on the ***inside***.

It's high-reliability components throughout the design, allowing incredible stability over temperature and humidity extremes.

It's complete RF shielding, allowing extended dynamic range for precise tests like Composite Triple Beat.

It's a solid-state Electro-Luminescent display, replacing the outdated CRTs.

It's new Surface-Mount RF Technology, making critical RF boards more reliable and more accurate than ever possible before. And a battery compartment that is totally isolated from the electronics, for absolute protection of the unit.



CALAN Surface-Mount RF Technology

It's microprocessor control, making testing easier, faster, and more accurate.

But all of these careful design criteria would be useless without the 75 years of CALAN engineering experience that went into the unit, making it the most reliable test equipment available today.

But if you ask a CALAN user, he'll most likely tell you that he hasn't seen the inside of his unit...just the outside, improving his system performance with no interference, and allowing more with his limited maintenance budget.

Maybe that's the **real** inside story.

CALAN

CABLE AND LOCAL AREA NETWORKS

CALAN, Inc., R.R. 1, Box 86T, Dingmans Ferry, PA 18328 • (717) 828-2356

Reader Service Number 15

Market driven network planning

Several weeks ago at a telco/cable conference in Washington, these things were said:

- One, a past government official stated that he believes there is a consensus within our government that the United States desperately needs an improved telecommunications information age infrastructure. For example, he said, we need fiber networks to tie together our super computers *and therefore we need fiber to the home.*
- Two, Ray Smith, CEO of Bell Atlantic, said that our existing telecommunications infrastructure is becoming the laughingstock of the world. He said that 4 million French are using Minitel *and therefore we should have fiber to every home in America.*

Equipment Inventory - HE / CO to Hub / Remote

	A/D	20:1 MUX	Laser Transmitter	Isolator	Laser Receiver	1:20 DEMUX	Video Switch	20:1 MUX	WDM
AM Fiber	-	-	10	10	10	-	-	-	-
Digital Fiber	140	7	407	7	407	7	1 124X1600	400	400

	Bridger Amplifiers	Line Extender Amplifiers	Power Supplies	Laser Receivers	WDM	1:20 DEMUX	D/A	RF Combiner	LED Transmitter	Converter/ Control Box
Coax	4	48	52 (Company)	-	-	-	-	1	-	600
Digital Fiber	-	-	400 (Customer)	400	400	400	8000	400	400	600

Figure 1

Expanded View of Digital Fiber Network - Remote Site to Home.....

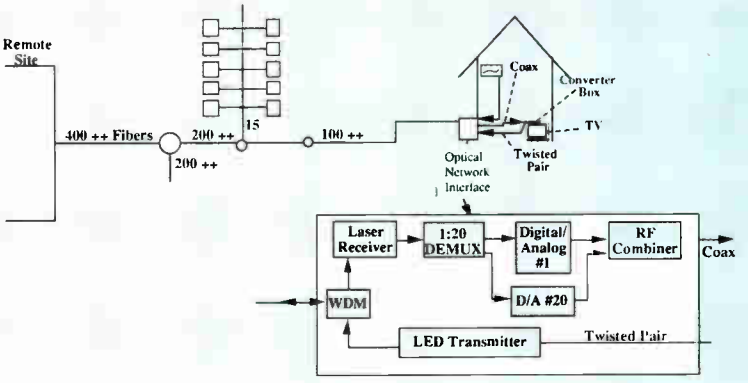


Figure 2

Scared, worried and angered

It scares, worries and angers me when super computers and videotext services delivered via twisted pair networks are used to prove that we must spend $400 billion—Smith's own estimate—to deploy fiber to the home. Let's concentrate first on understanding how to serve America and based on that deploy the right technology.

I will do that by starting with a market view of what the customer wants and then, based on some observations of the implications of those customer desires, we will build what is the ideal network to meet that demand.

These market and customer observations will be based on simplistic facts. This is not a presentation of theoretical market research, but just a highlight of what the video customer is buying and viewing now and drawing some implications on what a video network should be able to do.

Let's begin this simple view with a look at the installed base of home video viewing equipment. I always like making special note that in America there are more homes with televisions than telephones, so the true universal service in our country is, in fact, TV. It is also important to note that this embedded base of VCRs and TVs (a total of more than 200 million pieces of equipment) are all analog devices and most have direct coax connections.

It should be the purpose of a video network to enhance the customers' equipment, not replace it. Certainly the home video products are advancing quickly in their capabilities and functionalities. A new VCR or TV will probably have these features—some of which have become a significant challenge to cable TV.

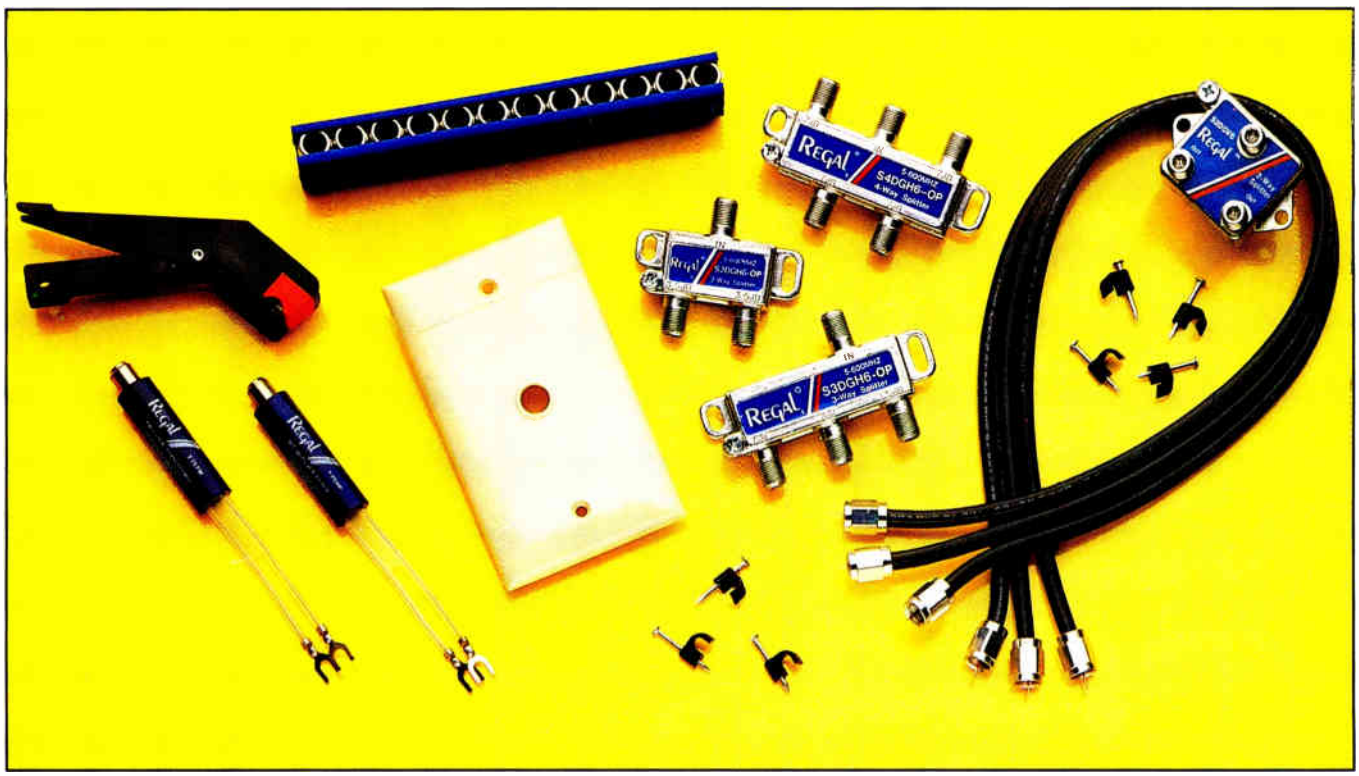
Don't forget the TV

The challenge to a video network planner is to enhance and add to all of the features that the customer has already purchased. It seems trite to say, but in fact seems to be frequently forgotten, that the end node of a video network is the TV and thus must be

Thomas F. Gillett is vice president of business development and technology transfer for Cable Television Laboratories Inc. Gillett is responsible for the business analysis and planning of the operational, functional and technical performance of cable distribution networks.

Prior to joining CableLabs, Gillett was director of advanced operations testing for GTE where he was responsible for the conception, planning and execution of GTE's fiber optics/video services test bed project in Cerritos, Calif.

Picture Perfect.



Quality Drop and Installation Material from Anixter Cable TV.

Quality matters. To your picture, your dependability...your customers. So why settle for drop and installation material from so-so manufacturers and suppliers, when Anixter Cable TV offers the best products and service available? Anixter can take you from the tap to the converter with quality products such as Diamond hardware, Regal passives, and Raychem F-connectors—everything you need delivered on-time from a regional warehouse near you. Call Anixter for picture perfect results—every time.

Visit us at Booth #532 at the Western Cable TV Show.

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) 625-5110; **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

included in video network planning.

The developments in home TV equipment can be summarized in this way: the home viewing experience is evolving toward the movie theater experience. The screen size is increasing, the picture resolution is getting greater and the audio quality is improving. While those things are happening on the equipment side, what is the customer watching on his or her TV?

The number of choices available via cable TV networks is continuing to increase. According to the latest *Television and Cable Factbook*, there are nearly 100 national and 40 regional cable services. Not only are the choices increasing, but the delivery into the home is too; for the average cable system now delivers over 35 channels....

But, unfortunately I guess, cable viewing is not the only video choices available to the consumer. The VCR tape purchase and rental business continues to grow. It is important that video network planners understand this market. This $9 billion business is certainly hit run—that is the demand for "Roger Rabbit" will be extremely high (during) its release month, but will die off quickly over the next three months or so.

Yet, although hits are very important, the most successful distributor, Blockbuster Video, now stocks 10,000 titles per store. So the consumer wants not only the few hits that are hot at release date, but also a large selection of other titles.

Watching video this way provides the customer with many features that may be a challenge to network delivered video. Customer control over viewing time, number of times viewed, and ability to pause are important considerations to our network planning.

Different needs

From a viewing perspective, then, the number of choices is continuing to increase, but the demand, and thus the traffic characteristics, vary significantly between the choices. What might be the optimum network for viewing the high demand shows may not be the right network for the infrequently watched show.

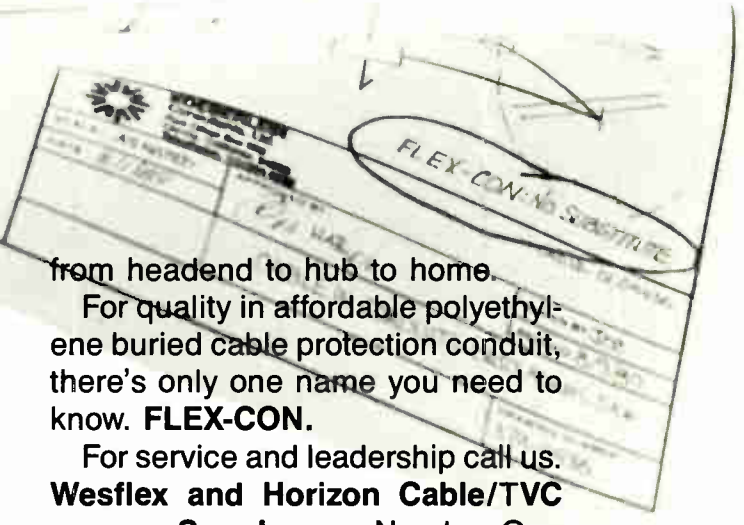
The implications of these market and customer observations on the design of a video network delivery *into* the home are these:

- The network should be compatible with and complementary to the in-home equipment. The number of channels delivered to the TV or VCR must be high, the media needs to be coax and the home functionalities (especially switching performed in the TV or VCR) must be supported.
- The viewing experience in the home should continue to evolve toward the theater experience. The quality of audio and video must increase, especially to properly drive the larger screens.
- Programming choices need to continue to increase. The proliferation of topic specific magazines are an example in that media of how our media—video—will continue to expand. Yet the optimum way to deliver the Super Bowl to tens of millions is different from how to deliver, for example, a show on astrology.

Which approach is best?

I will discuss some video network

FLEX-CON.™ IT MAKES BURIED CABLE PROTECTION EASY.



From trunk to distribution to drop cable protection conduit, Wesflex and Horizon Cable/TVC Supply deliver FLEX-CON **on time, when and where you want it.**

That's why CATV System Operators rely on FLEX-CON conduit for positive buried cable plant protection. Simple to install, direct bury or pull, FLEX-CON is your strongest link from headend to hub to home.

For quality in affordable polyethylene buried cable protection conduit, there's only one name you need to know. **FLEX-CON.**

For service and leadership call us. **Wesflex and Horizon Cable/TVC Supply**, your Number One conduit connection!

HORIZON
CABLE · SUPPLY

1021-A Calle Recodo
San Clemente, CA 92672
Telephone: 714/361-2011
Facsimile: 714/361-2106

WESFLEX
INCORPORATED

1880 Garden Tract Road
Richmond, CA 94801
Telephone: 415/233-6670
Facsimile: 415/237-7322

Reader Service Number 18

Expanded View of AM Fiber / Coax Network - Hub Site to Home.....

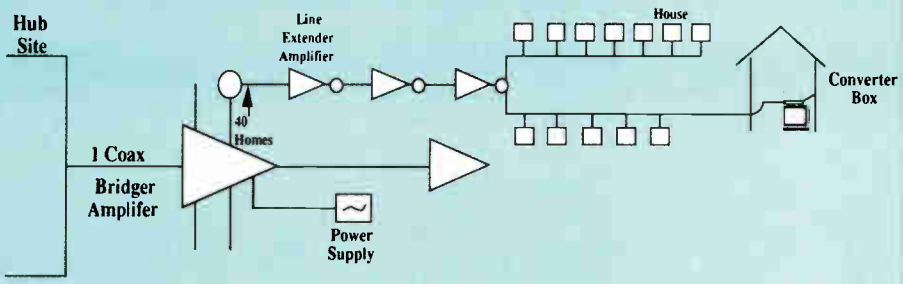


Figure 3

Equipment Inventory - HE / CO to Hub / Remote

	A/D	20:1 MUX	Laser Transmitter	Isolator	Laser Receiver	1:20 DEMUX	Video Switch	20:1 MUX	WDM
AM Fiber	-	-	10	10	10	-	-	-	-
Digital Fiber	140	7	407	7	407	7	1 124X1600	400	400

Figure 4

planning principles, show the two primary potential network alternatives, then prove (allowing for some poetic license) which network is in fact best.

Video network planning principles are made up of three major areas:

- The functionality or capabilities of the network. In this area, although it should be extremely obvious, it is critical to remain focused on the objective of complementing the customers' home equipment investments and meeting his needs and wants.
- On the quality front, it is imperative that the customer perceives that he is receiving an excellent picture. This is especially important to video networks because the standard against which we are being compared is the quality delivered via the VCR or laser disk.
- And, do not lose sight of the fact that the desire for technical elegance should also include an objective of doing something as simply as is possible.

See Figure 1 for simplified block diagrams of the two leading contenders for video networks into or to the home. On the top, of course, is a network using both fiber and coax. The fiber from the headend to the remote site uses AM

Convert To Cable Services

FOR QUALITY, DELIVERY, PRICE AND SERVICE

Jerrold #DPV7

Scientific Atlanta #8590
Remote Control #8550-475

Jerrold Remote Control #RC550

Scientific Atlanta #8529
Remote Control #8550-175

Jerrold #DQN7

CALL US
NOW FOR
YOUR NEXT ORDER.

Cable Services Company, Inc.

2113 Marydale Ave. • Williamsport, PA 17701 • 717-323-8518 • 800-233-8452 • In PA: 800-332-8545 • FAX 717-322-5373

Reader Service Number 20

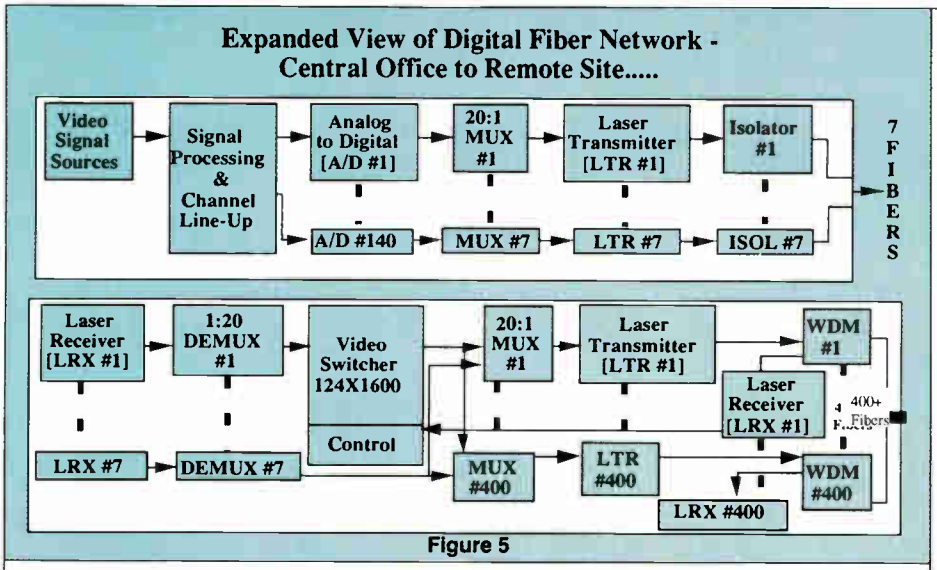


Figure 5

techniques and the delivery from the hub to the home is via a coax tree-and-branch network.

On the bottom is the all-digital, all-fiber network. The fiber from the central office to the remote site uses digital techniques and from the remote site to the home is a star, all-fiber digital network.

Fiber or coax?

Topographically, there are some similarities in the two networks. Both utilize fiber to get the video sources closer to the customer via some remote electronics. The debate is clearly digital vs. analog and whether the distribution to the home should be star fiber or tree-and-branch coax. Let's prove which is best.

My hypothesis is this: A fiber/coax hybrid network using AM/VSB modulation can provide all video services better, sooner and more economically than a switched-star, digital, all-fiber network.

While the "extensive" proof of this follows, I submit as supporting evidence to the obvious logic and truth of this statement the following supporting evidence—US West's network planned for Hong Kong. The telco planning what is currently the world's largest cable TV newbuild realizes that a fiber/coax network is the best choice. Funny how reality—or common sense—strikes when you get down to spending some money.

The full proof of this hypothesis is based on these assumptions:

An area of 400 homes to be served, an area that would typically be served by one remote or hub site (although it turns out the size does not make a lot of difference to the proof).

AM fiber is assumed to be able to deliver 15 channels per fiber and we will allow digital to evolve beyond where it is today and give it the ability to deliver 20 per fiber.

Because of the programming demand indicated earlier, the system should be able to deliver at least the equivalent of 1 GHz or 140 channels per home.

Taking inventory

The proof technique used will be to do an equipment inventory of what each alternative requires in order to serve these 400 homes. In the AM/fiber hybrid method, we take our existing channels, split them over 10 laser transmitters and send the signal down to the hub site via 10 fibers, where it is received and collected and then used to drive one coax. (See Figure 2.)

AM is perfectly compatible with the coax which is then, in turn, compatible with the TV. The electronics in the hub site do not require any special environmental concerns so they can easily be integrated into the network.

However, the digital fiber alternative to get from the central office to the remote site is much more complex. (See Figure 3.) The top is the equipment necessary at the CO and the bottom is what is needed at the remote site. (Unfortunately, this is such a busy figure we did not have room to label those for you.)

While both alternatives start with the same sources, things quickly change. Each channel needs to be digitally encoded, then they are collected in groups of 20 and sent out over seven fibers. At the remote site, the signals are demuxed and then, because I assume that the 20 channels per fiber will also exist to the home, there needs to be some switching so that the 140 total choices are delivered through the limited capacity digital fiber. I assume here that the top 16 watched video channels are essentially broadcast on everyone's fiber and the remaining four channels are switched. Thus, in this scenario, there is a need for a 124 X 1,600 digital video switch.

After that there is a need for 400 laser transmitters, one per home. Then, because there is a need for an uplink from the home to control the selections made in the switch, and because we must assume that the twisted pair has now been replaced by the telco with this fiber, that uplink must be via the

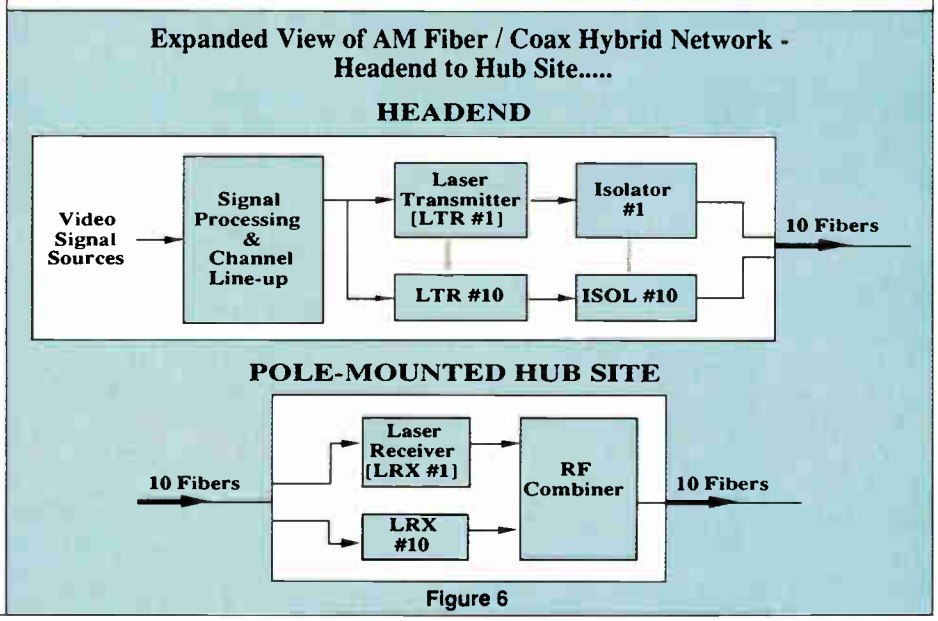


Figure 6

HIGHER PERFORMANCE

Alpha Technologies' standby power supplies and Johnson Controls' Dynasty Gel Cells: a combination that rises above all others to achieve the very best in service life, performance and value. That's why more and more MSO's agree: Dynasty Gel Cel batteries are the best choice for their standby power needs.

Dynasty Gel Cell batteries live longer. They use a technology uniquely suited to the demanding CATV environment for standby power systems: the toughest environment for any battery. And Dynasty batteries are produced with a commitment to quality unmatched by other battery manufacturers. Alpha shipment coordination system ensures that your Dynasty Gel Cells arrive fresh and on time so their valuable lives aren't spent waiting for installation. Alpha's battery chargers are temperature compensated - solving the common problem of overcharge in warm weather and undercharge in cold - assuring you get the maximum in service life from your Dynasty batteries.

We're not promising everlasting life, but Dynasty Gel Cell batteries from Alpha and Johnson Controls will provide a longer, more productive service life than any other standby battery for CATV. You don't have to reach for the stars for that kind of performance, just reach for the phone. Alpha Technologies' power supplies and Johnson Controls' Dynasty Batteries: the two technologies that have become an industry standard.

JOHNSON CONTROLS®

alpha ALPHA TECHNOLOGIES

3767 Alpha Way, Bellingham, WA 98226-8302
TELEPHONE: 206-647-2360 FAX: 206-671-4936

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

Reader Service Number 21

fiber and thus 400 wave division multiplexers will be needed to segregate the upstream and downstream channels. Then leaving this remote site will be 400-plus fibers, counting spare fibers.

One other important point is the physical difference between this remote site and the previous hub site. Unlike the small non-environmentally controlled hub used in the hybrid network, this remote is a large box or hole in the ground that probably requires environmental protection.

For those trying to keep score, an inventory of the equipment need by each alternative to get from either the headend or central office to the hub or remote site is provided. (See Figure 4.)

It is easy to see why electronic equipment manufacturers and their own commission sales people prefer the all digital solution. But let's keep building our networks to the home and see what happens. (See Figure 5.)

Home run

Here we have the fiber/coax hybrid network leaving the remote site and getting to the home. From the hub site there would be a maximum of two bridger amplifiers on any one trunk, so in our case there would be two trunks. Off of a bridger amplifier we would take groups of approximately 40 homes and the farthest home from the bridger amplifier might be three line extender amplifiers into the network.

The coax can go directly into the home and all 140 channels interface directly with the TV or converter box. For this example I have assumed an in-home converter box, but for many systems the coax would in fact go directly to a cable-ready TV.

Note that each amplifier does require power, paid for by the cable company. As we will see in the diagram of the next network, powering is an important issue.

Figure 6 is a view of how the digital all fiber network gets from its remote location to the side of the home. The 400-plus fibers are tapered down through the network and eventually one fiber attaches to the optical network interface device on the side of the home. In the ONI, shown in the lower right portion of Figure 6, the fiber signals are converted back into analog on coax and 20 channels are sent into the home to the TV. Coming back to the ONI, presumably via the twisted pair still in the home, are the control signals that would be sent back to the remote site when the customer made a program selection that was not within the 20 already into the home.

Note that the ONI requires power and that is assumed at this point to be customer provided power. Note also that the ONI shown here is only doing video functions and significant additional electronics are required to have it handle voice and data as well.

Figure 7 shows the equipment inventory for both alternatives. The top depicts what is necessary to get to the remote or hub site and the bottom shows what's needed to get from there to the home.

Delivering channels

How might all of these channels be used?

There are four possible categories of channels. They are: basic cable; premium cable; pay-per-view; and what could be called personal selection channels (to do such services as interactive, two-way and real video-on-demand).

For arguments sake, let's assume that the first three types add up in some sort of combination to 100 channels. That would leave 40 channels for personal selection. Now, coming from a telco traffic engineering background, I feel comfortable with a ratio like 40 channels (trunks in telco parlance) to 400 homes for this type of service. Networks have always been based on intelligent sharing of resources. I see no logic to having four personal selection trunks dedicated to each customer.

There is a lot yet to be learned about how to utilize 140 channels to the home and my feeling about a 10 to 1 sharing being appropriate has got to be proven via actual market tests; but this sort of lineup does, in my opinion, allow for the customer to have unrestricted access to any video service they may want. And, in fact, this type of network encourages the continued development of multiple video suppliers to develop more and more programming choices.

While the AM fiber/coax hybrid enriches the customers' home equipment investments, the digital fiber one is highly complex, much more costly, will probably be less reliable and wastes much of the customers' investments.

I realize that Bellcore is working diligently on developing video switching capabilities—frequently disguised as broadband ISDN. But video switching is here. Every TV and VCR has one and in the newer sets it is capable of selecting 180 channels and the total price is probably $20. I sincerely doubt that the B-ISDN switch is going to be able to equal the price, performance or customer friendliness of TV switching.

The hybrid network efficiently shares network resources without compromising functionality or quality; while the all fiber one has wasted excessive dedicated resources that are an expenditure of significant unnecessary capital.

The hybrid network optimally meets all of the customers' needs, while, unfortunately, the all-digital fiber network reminds me of ISDN, which is definitely a technology in search of a customer.

And, the real nice thing about fiber hybrids is that it perfectly positions the user to evolve to whatever might be the next right network, even, a long time from now, an all-fiber one. ■

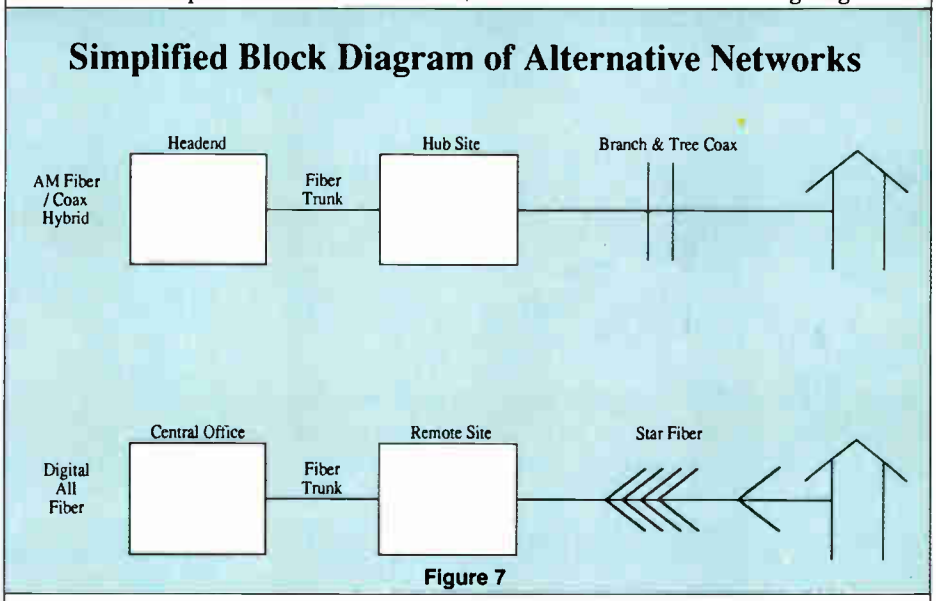


Figure 7

A TIGHTER GRIP ON YOUR CONNECTOR AND YOUR CASH.

Fight corrosion now and you'll save headaches and dollars later. Meet the truly weatherproof connector developed by Amphenol,® a leader in the connector industry for over 50 years. With two weathertight seals inside, and a unique third seal which your installer adds by giving the connector a simple crimp with an inexpensive hand tool.

With this remarkable self-contained unit, there's nothing to drop, fumble, lose or leave out. Both sizes (6 Series and 59 Series) are differentiated with distinctive nut designs so your installer can see and feel the difference. Installation is easy, economical, and virtually trouble-free – taking only ⅔ the time required by conventional connectors.

Best of all, you'll be keeping both your labor costs and your cumulative leakage index under control. Corrosion leads to outage problems, expensive service calls, and soon, FCC penalties.

Amphenol® 6 Series Environmental Connector

Amphenol® 59 Series Environmental Connector

For more information, call 1-800-TFC-CATV. Or write us at 358 Hall Avenue, Wallingford, CT 06492.

All connectors are not created equal.

TFC

TIMES FIBER COMMUNICATIONS, INC.®

LPL Technologies Inc.

Where technology meets the bottom line.

For more information, call 1-800-TFC-CATV
Distributor: The Drop Shop 1-800-526-4100

Reader Service Number 22

THE MATRIX SYSTEM™

The Matrix System is the off-premise addressable trap system that saves the operator time and money. Truck roles are reduced and addressability makes churn profitable.

The Matrix System takes the electronics out of the residence and places it where the operator has easy access. Therefore, no recovery problems to deal with. Now you can improve customer service by providing timely channel upgrades.

Finally, a user friendly service for your subscriber. And for the operator, increased revenues using pay per view.

Two proven technologies. Traps for security and addressability for control. Distributed only by Midwest CATV.

For more information, give any of our sales representatives a call.

Corporate Offices
Charleston, WV (1 304 343-8874)
Clarksburg, WV (1 304 624-5459)
Outside WV (1 800 532-2288)
Lafayette, IN (1 317 448-1611)
Within IN (1 800 382-7526)
Outside IN (1 800 428-7596)
Ocala, FL (1 904 854-6511)
Within FL (1 800 433-4720)
Outside FL (1 800 433-3765)
Pottstown, PA (1 215 970-0200)
(1 800 458-4524)
Garland, TX (1 214 271-8811)
(1 800 421-4334)
Denver, CO (1 303 773-2205)
(1 800 232-9378)
Phoenix, AZ (1 602 233-3555)
(1 800 782-4566)

Patent Pending.
Reader Service Number 23

MIDWEST CATV
A division of Midwest Corporation

More than supplies. Solutions.

The challenge of off-premises addressability

A marketplace need for automating control of broadband CATV signal delivery is described. Past and current efforts to produce equipment meeting this need are outlined, and some concepts for future approaches are suggested. The economic forces at play in the implementation of such a system are described, along with an approach for modeling the operating cash flow needed to offset the required capital investment. The conclusion is drawn that a need for such a delivery technology does exist, and is likely to grow as competitive forces increase the cable industry's need to improve compatibility with consumer electronic equipment, deliver an increasing number of switched video (pay-per-view) services, and control operating expenses. Meeting this need is seen, however, to involve significant technical and economic challenges.

Over the last several years the cable industry has been undergoing a reappraisal of the role which addressability should play in its operating systems. While there is not yet industry consensus, the outcome of this debate will be a major factor in determining cable's future. On the one hand, some operators are moving aggressively away from addressability, finding refuge in the simple negative and positive trap technology which initially built the pay TV business. Other operators are moving more aggressively into addressability because of their belief in the future of pay-per-view (PPV) services.

By James A. Chiddix and David M. Pangrac, American Television and Communications Corp.

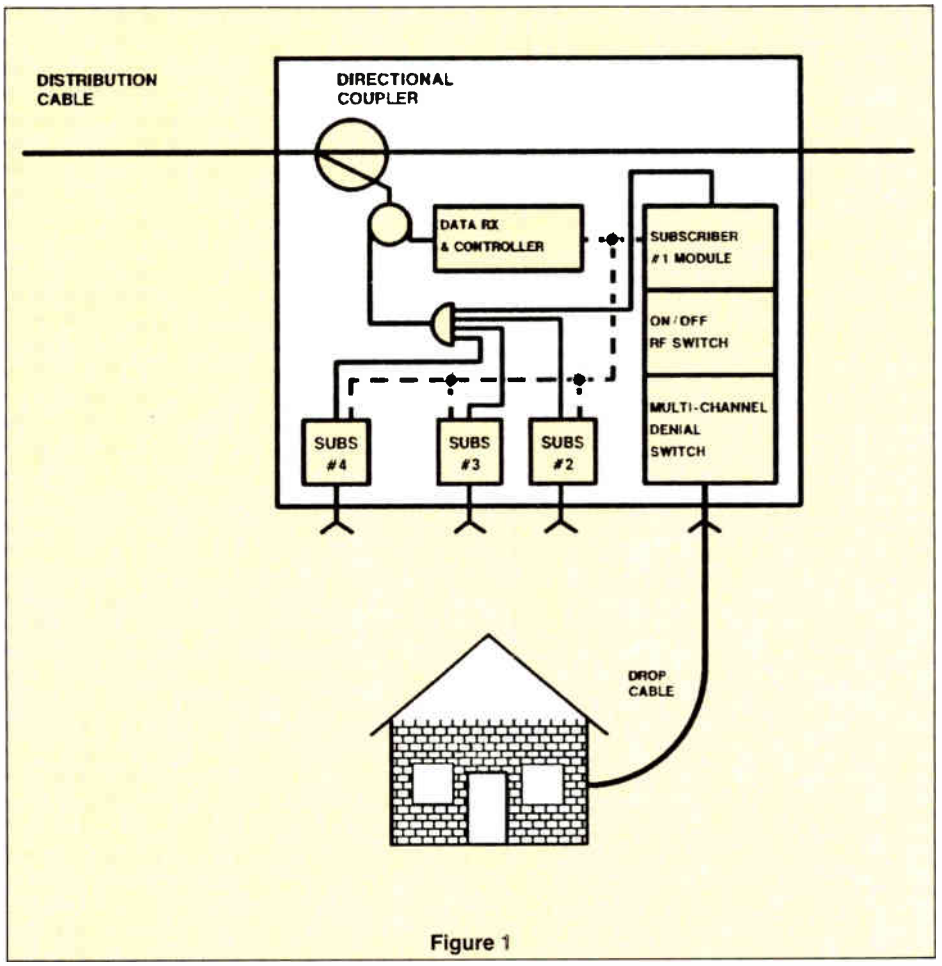


Figure 1

The original dream of addressability encompassed automated delivery of multi-pay and PPV, operating savings from reduced truck rolls, reduced converter losses, and the ability to market more flexibly. In retrospect, we see a number of unanticipated problems. Addressability introduced additional layers of complexity to virtually all operational aspects of our systems, and there were varying degrees of success in coping with this. Some vintage addressable converters were unreliable, wiping out potential operating savings and angering subscribers to boot. While most addressable set-top units being delivered today have achieved acceptable reliability, these problems will be with us for some years in our universe of older converters.

Additionally, the multi-pay environment did not require the number of channels once expected. Three or four services appear to meet the needs of most markets and trapping is often a viable delivery option. Problems with consumer friendliness, which resulted from the introduction of scrambled signals at the same time that "cable-ready" consumer equipment was being introduced in volume, were largely unforeseen, but have growing significance. According to research done by ATC over a large sample, more than 52 percent of cable subscribers own cable-ready TV sets and more than 68 percent have VCRs. As an industry, we have not been particularly successful in addressing the resulting issues. This is worrisome in an increasingly competitive market.

The experience of a number of operators indicates that there is additional revenue available from PPV, although the magnitude remains unclear. In addition, our most likely long-term competitors, who will employ direct broadcast satellites and switched telco delivery systems, may well be capable of PPV delivery to all of their subscribers. Thus, to the extent that PPV offers

Eagle's Outdoor Addressable Trap System

Try One "On the House"!

Eagle's new outdoor addressable Trap system is available, **now!** After conducting our own intensive lab and field tests for over eighteen months, we discovered this system offers so many benefits to cable systems and cable subscribers that the only way you can possibly appreciate them is to allow you to field test one in **your own system**.

That's why we've decided to make this offer. For a limited trial period, **We will install an Eagle Outdoor Addressable Trap Test System in your cablesystem at no cost or obligation to you!**

If you currently use a trap system or you're looking to replace your converter/descramblers don't miss this opportunity to try the most "user friendly" addressable system ever developed for the cable industry!

A "short list" of Outdoor Addressable Trap System features includes:

- 4 or 8 tiers of negative, positive or multichannel addressable filters; 256 combinations selectable
- Consumer friendly with VCRs, cable ready TVs and remote controlled TVs
- Controls signal delivery to multiple TVs from one trap switch
- Allows you to use your present negative or positive traps
- All service disconnect capability; over 80dB isolation
- No need to enter home for audits
- IBM PC or compatible computer control
- Compatible with billing systems
- Optional **Impulse Pay per View** unit allows subscriber to order premium programming without calling cable system
- Auto-dialer transmits customer usage back to system using store and forward techniques
- Pre-authorize customers for limited amounts of pre paid programming
- Parental control of premium channels or all service

☐ **YES!** I am currently using traps in my system or I am considering replacing my existing converter/descramblers.

☐ **YES!** I would like to take advantage of your FREE OFFER. Please contact me to schedule a **FREE trial installation** of Eagle's Outdoor Addressable Trap system.*

FREE TRIAL OFFER!

*Units available for trial installation are limited and trial period is subject to the discretion of Eagle Comtronics.

Name _____

Cablesystem name _____

Address _____

City _____ State _____ Zip _____

Phone ( ) _____

Mail This Coupon
or CALL TOLL FREE
800-448-7474 Today!

EAGLE COMTRONICS INC.

4562 Waterhouse Road
Clay, NY 13041
(315) 622-3402

In Canada: Deskin Sales • Montreal • Toronto • Vancouver • 416-475-1172

In Europe: Electro Service • Belgium • 011-32-15-20-95-75 • Cablecom AS • Norway • 011-47-34-67000 • Sweden • W. Germany • 011-211-41-7010

things that consumers want, our moving away from addressable technology may put us at a further competitive disadvantage.

The operating economies which are an unrealized part of addressability's potential are more important than ever. This is true in improving present-day margins, as well as in positioning for future price competition. In addition, skilled labor will continue to become more expensive and increasingly scarce in years to come.

We also need to capitalize on the proliferation of cable-ready equipment, with its potential to decrease the need for capital investment inside the home. Further, the consumer expects us to be compatible with the equipment he purchases. While traps can satisfy the need for broadband, unscrambled delivery to the home, in the long term it is important that we explore ways to combine this feature with addressability.

The heart of the challenge is the separation of scrambling from addressability, and the provision of unscrambled, broadband signal delivery under addressable control. A generalized approach which would meet these goals is shown in Figure 1. This represents a device located outside a subscriber's premises which would allow broadband unscrambled delivery of all services ordered by that subscriber. The device would have the ability to control the subscriber's service and to intercept premium services not ordered by the subscriber. This would allow a subscriber to use any cable-ready equipment he might own, and to receive all services to which he subscribed at all outlets within the home. Any TV or VCR not having the channel tuning capabilities necessary to receive this service would, of course, need an RF converter. However, subscribers with cable-ready equipment would not need any additional equipment inside their homes. The cable operator would have full control over each subscriber's reception.

The system outlined would behave very much like a current CATV system with individual channel traps except that customer connection, disconnection and changes in authorized services would be fully automated. This would have a number of implications. First, there would be an opportunity to substantially reduce operating costs through the elimination of physical visits to the subscriber's home in order to change the status of his service. This would be further enhanced by an expected increase in drop reliability due to a dramatically reduced need to physically handle drops. Once installed, drop cables could be permanently secured and waterproofed, removing a major cause of service calls.

The system would have the positive consumer equipment interface aspects outlined above, avoiding a significant cause of subscriber dissatisfaction in systems that currently use scrambling as a means of signal security. The cable company would reduce the amount of equipment necessary inside the home, which would result in a decrease in related capital and operating expenses as the universe of cable-ready equip-

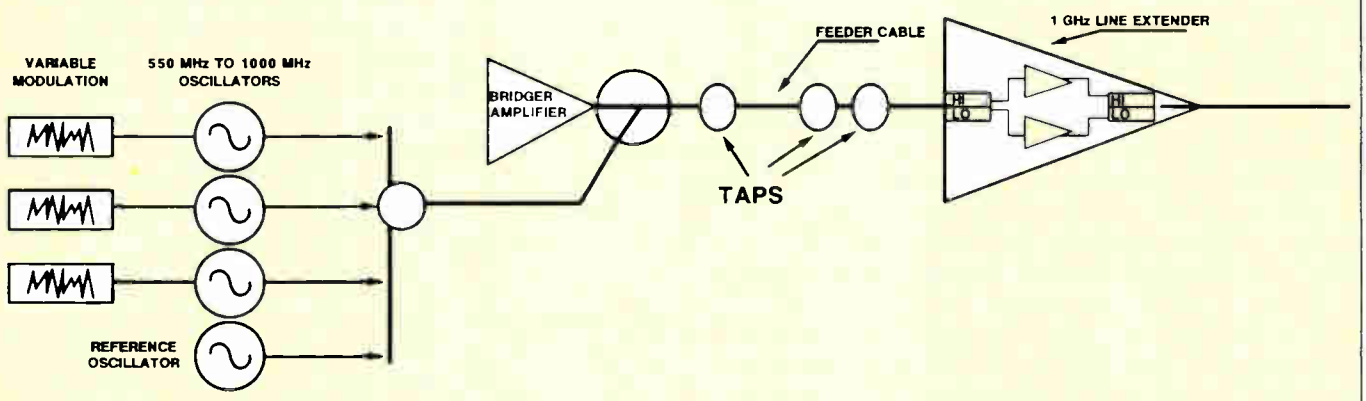


Figure 2

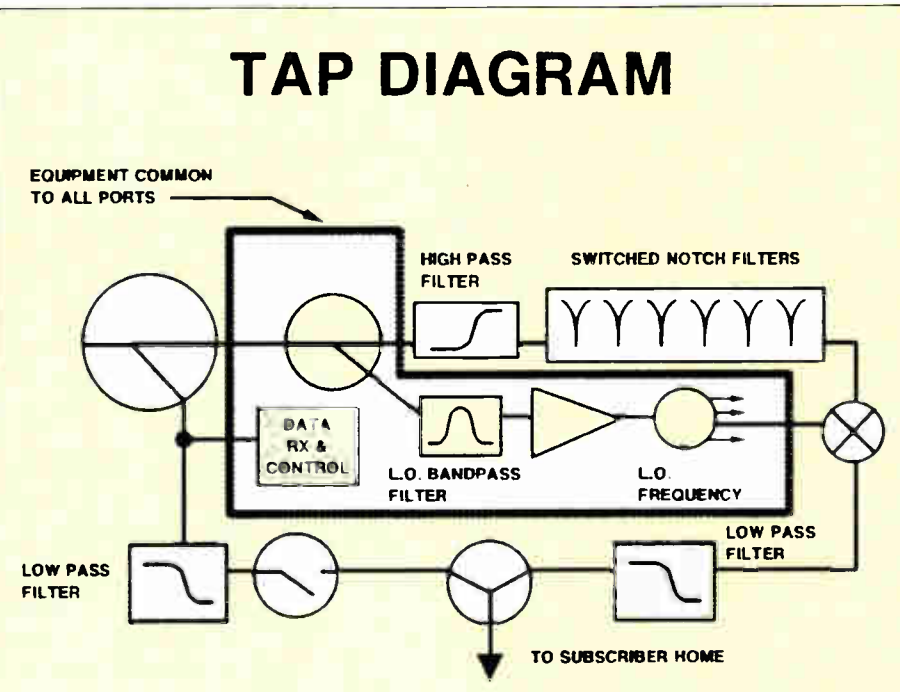


Figure 3

ment continues to increase.

In addition to reducing operating costs and improving customer satisfaction, the system outlined would also be capable of providing PPV services to any subscriber. Marketing flexibility would be increased with the ability to demonstrate cable's products for any period of time desired.

Finally, such a system begins to set the stage for the future. The ability to authorize "slices" of spectrum leaves open the door to controlling potentially non-standard HDTV signals. In addition, this form of addressability would, in essence, provide distributed video switching which could ultimately result in selective delivery of video to individual homes if combined with switching elsewhere in the network.

Technical challenges

While there are a number of conceptual approaches to realizing off-premises broadband addressability, implementing such technology in a practical way poses a number of challenges. Clearly, an outdoor device can be built with the capability of turning a drop off and on via remote control. The control system would, in fact, be very much like that used for addressable descrambling systems today, and PIN diodes or relays could serve to disconnect an unauthorized drop with sufficient signal isolation. Additionally, there are a variety of approaches available for selective delivery of individual channels to the subscriber drop cable. These include fixed frequency and frequency-agile positive and negative traps, as well as various types of fixed and frequency-agile jamming signals to be summed with individual unauthorized channels.

The challenges in realizing a practical off-premises broadband addressable system arise from the need to deliver unimpaired signals on authorized channels, to remove or disrupt video information from unauthorized channels sufficiently to prevent practical use, and to prevent defeat scenarios which would involve signal processing inside the home. In addition, powering a large number of active devices in the CATV system is not a trivial matter. If these devices were to be powered from the CATV plant, it is likely that a substantial increase in system power supplies would be required, necessitating a significant capital investment in power supplies, and adding to increased ongoing power expenses.

An additional concern is the maintenance and reliability implications of the addition of large numbers of active devices to the network in a hostile physical and electrical environment. While this is partially true of addressable set-top converters as well, it should be remembered that a number of years passed before satisfactory reliability was achieved with those devices. Prior to that time, significant expense and subscriber disruption was caused by converter malfunction and failure. If off-premises broadband addressable devices cannot be produced with very high long-term reliability, it is clear that any operating cost reductions will be more than offset by maintenance costs, and subscriber satisfaction gains created by compatibility with cable-ready equipment will be destroyed by dissatisfaction due to service disruptions.

Thus, the goal of mass-producing an affordable, practical device for selective broadband signal delivery located outside the home, with a high degree of reliability, is a major challenge. This is further exacerbated by the hostile environment in which such a device must be placed, with the hazards of moisture, wide temperature variations and electrical discontinuities caused by power utility fluctuations and surges. This challenge has defeated several attempts in past years to produce such equipment.

Past approaches

The attraction of off-premises addressability is not new. A system was developed by AMECO in the late '70s which utilized relays along with a data receiver in a line extender housing to produce an off-premises addressable tap. Latching reed relays were used to turn off and on individual subscriber drops, and to switch in and out a single negative trap on each output. The system was field tested, but was never implemented on a large scale, possibly due to the advent of multi-pay services at about that time as well as possible concerns about cost-effectiveness.

In the early '80s, an addressable tap was marketed and was installed in a few cable systems by Delta-Benco-Cascade. The system was sold in both an outdoor, four-port addressable tap configuration and an addressable wall-plate configuration for loop-wired multiple dwelling units. The DBC system used phase modulation of the AC powering waveform to transmit data

from each power supply location to each tap or wall plate. This allowed the construction of an exceedingly simple data receiver within each tap, with a more complex RF data receiver located at each power supply receiving addressable instructions from a computer at the headend.

The DBC addressable tap could turn signals on and off using PIN diode RF switching, as well as control two pay channels using a negative and a positive trap. The product was ultimately discontinued and all known installations were dismantled, due to reliability problems with both the tap units and the data modulated power supplies. This is a clear illustration of the lack of reliability destroying any possible operating cost savings.

During the early to mid-80s, a variety of off-premises converter systems were developed and tested. These included the DST system developed by ATC and Toshiba, Texscan's TRACS converter system, C-COR's SCAT system, and Times Fiber's Mini-Hub I and II (Mini-Hub I used multi-mode optical fiber for the connection from the addressable converter to the home).

While these approaches differed in specifics of powering, design and construction, the essentials of an addressable set-top converter were located outside the home, with only a control head at the television set. Upstream signals from the control head instructed the external converter as to which channel to tune, and a single channel was delivered downstream to the television. Sometimes, provision was made for several control heads and converters to share a single drop, using several channels. The external converter electronics contained a data receiver which received authorization information from the headend. All of these systems were field tested, and some were installed in some quantity in operating cable systems.

The introduction of these systems coincided with an increasing proliferation of cable-ready consumer equipment. These systems shared all the consumer interface drawbacks of addressable descrambling converters, and most lacked any ability to deliver broadband signals to the home for use by cable-ready TV sets and VCRs. In addition, the electronics moved outside the home were the inner-workings of a highly complex RF hetrodyne converter, and most systems had a variety of reliability problems. Consumer interface problems and the failure to realize operating economies proved fatal to these approaches, and all have been discontinued from production and most removed from service.

Thus, attempts to date to accomplish practical off-premises addressability have been defeated by failure to achieve cost-effective operation on a scale which justifies the capital expenditures involved and, in the case of off-premises converters, to provide sufficient subscriber utility. The lessons which appear to have been learned are that broadband signal delivery from an off-premises device is important, both in terms of consumer interface issues and achieving a practical level of the simplicity, and that reliability is an absolutely critical factor in implementing this technology.

Experiences with powering such devices from the cable system clearly involved high costs for additional power supplies and for the substantial number of kilowatt-hours required. Approaches which used powering of the drop from the home avoided those problems but necessitated accessing the home, and added a new source of trouble calls due to subscribers inadvertently disconnecting power.

Current approaches

Three basic approaches to off-premises broadband addressability are currently available commercially. The first involves "signal interdiction" in an addressable tap at the pole. Variations of this are offered by AM Communications and Scientific-Atlanta. In both cases, the pole-mounted tap includes a data receiver and a jamming oscillator or oscillators which are frequency agile, and can be selectively switched onto a subscriber output port. In the case of the AM Communications product, a single oscillator can frequency hop to as many as 16 channels, while Scientific-Atlanta employs four frequency agile oscillators which can cover a large number of channels.

In both systems there is a clear tradeoff between the number of channels which share an oscillator and the level of security and "signal masking" on unauthorized channels. Both allow a decrease in the number of channels sharing an oscillator to allow better masking of particularly controversial programming. While there are differences in features and costs between the two systems, both are currently being installed, or will be installed in the near future. This will, hopefully, result in the capture of meaningful data about their reliability and the actual operating savings realized.

A second approach to broadband addressability which is currently being offered by Jerrold, Eagle, and Midwest CATV has been termed "on-premises addressability." This approach essentially automates the insertion of positive and negative traps at a location outside each home, as opposed to a location at the pole or equipment pedestal. In these approaches, a data receiver controlling PIN diodes turns the drop off and on and switches positive and negative traps in and out of the circuit. They receive their power from inside the home and can be located in an environment less hostile than that of pole-mounted equipment.

Advantages of this approach include an incremental investment which can be selectively deployed against subscribers most likely to order PPV services, or against some other rationale. Drawbacks include the inability to share system costs across more than one subscriber, concerns about physical security, and a technical and practical limit to the number of channels which can be controlled.

A third category of broadband addressability is being offered for the multiple dwelling unit environment. These generally are capable of turning individual drops on and off remotely, as well as deleting a few channels with traps or jamming. This technology is relatively simple, with the cost of the unit being shared by many subscribers. These units seem to be finding utility in multiple dwelling units with high subscriber turnover, especially in resort and university environments. Units are currently available from Electroline, Augat and Times Fiber.

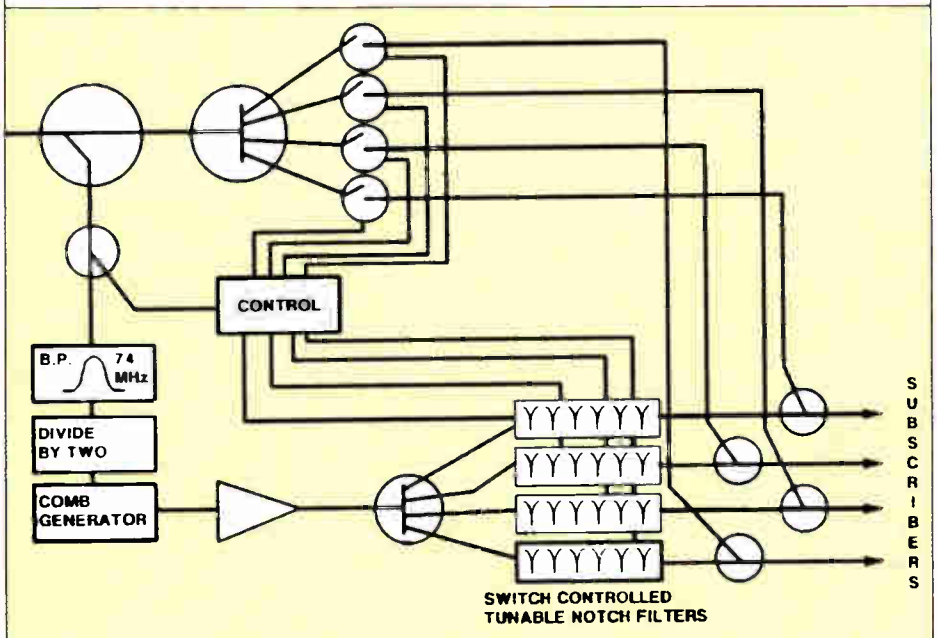


Figure 4

Alternate approaches

In thinking through other possible approaches to off-premises broadband addressability, the goals are to shed complexity and to share costs, while maintaining the ability to turn off and on individual subscriber drops and to control a reasonable number of individual channels. Figures 2 and 3 show such an approach. In this approach, a number of jamming oscillators, at frequencies well above those of the channels delivered by the CATV system, are located at the bridger amplifier. These are modulated to provide a high degree of video and audio masking to channels with which they are ultimately mixed.

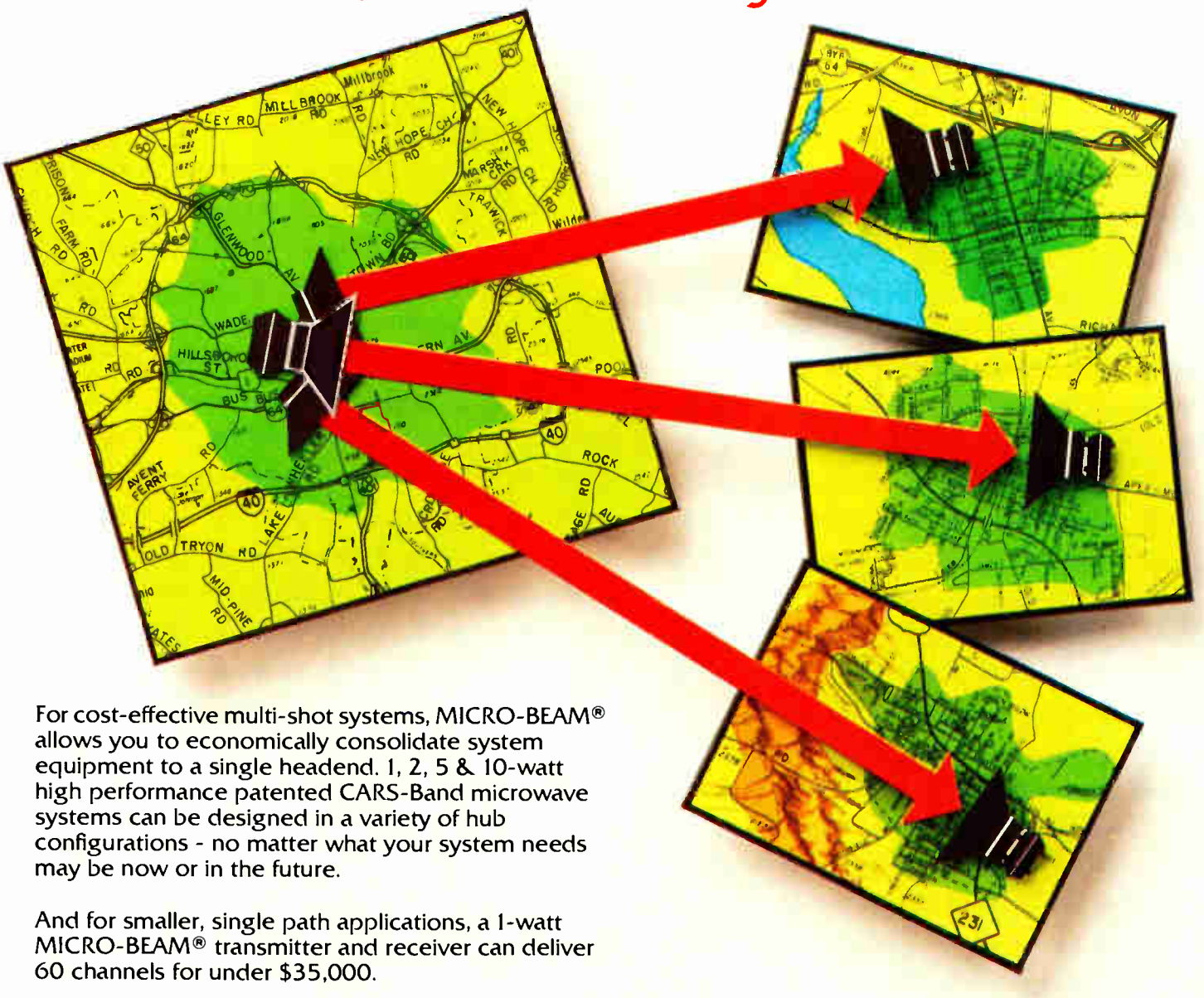
Also located at the bridger amplifier location is an unmodulated master oscillator, also well above the frequencies of interest in the system. These signals are combined with the bridger output, and are transported through distribution at high frequency. This requires tap electronics capable of passing frequencies perhaps as high as 1 GHz. It also requires that line extender amplifiers make provision for amplifying these frequencies. Because noise and distortion are not of great concern with regard to these signals, a separate amplifier stage for the high frequency jamming signals could be used within line extenders, in addition to a high-performance broadband amplifier for the CATV signal spectrum.

Figure 3 shows the inner workings of the tap. Switched notch filters are used to turn off and on individual jamming oscillators. The master oscillator frequency is recovered and applied to a mixer, heterodyning the jamming oscillators down to their final frequencies within the CATV band. The summing of the switched jamming frequencies with the CATV spectrum results in a broadband signal to the subscriber with unauthorized channels obliterated. Notch filtering of jamming signals could also be performed after down conversion. This approach would allow one oscillator per channel, since the cost of oscillators would be shared across many subscribers.

Figure 4 shows another possible arrangement, using a jamming oscillator at 74 MHz, between channel 4 and channel 5, located at the headend. Within the tap, this jamming frequency would be divided by two and applied to a comb generator which

Under $95,000!

MICRO-BEAM® 5-Watt Transmitter, 3 Receivers, 60 Channel System...Installed.



For cost-effective multi-shot systems, MICRO-BEAM® allows you to economically consolidate system equipment to a single headend. 1, 2, 5 & 10-watt high performance patented CARS-Band microwave systems can be designed in a variety of hub configurations - no matter what your system needs may be now or in the future.

And for smaller, single path applications, a 1-watt MICRO-BEAM® transmitter and receiver can deliver 60 channels for under $35,000.

All MICRO-BEAM® Systems are:

- **Fully weatherized for tower mounting**
- **Rigorously tested and computer monitored for1000 hours**
- **In-stock, giving you the fastest lead time in the industry**
- **Backed by a 24-hour, 7-days a week technical and warranty service.***

*Continental U.S. Only.

The MICRO-BEAM® standard equipment and service package comes complete with everything you need to make your system operational (excluding antennas and towers), so you won't have to worry about "high cost" options.

For more information on how you can make your cable system more profitable, contact:
Jim Crownover, MICRO-BEAM® Sales Manager.

See us at the Western Cable Show, Booth #128-130.

Channel Master® Division of Avnet, Inc.
P.O. Box 1416, Industrial Park Drive, Smithfield, N.C., 27577 (919) 934-9711
Prices subject to change without notice.

Reader Service Number 27

would generate multiples of 37 MHz. This would result in interfering carrier frequencies at 111 MHz, 148 MHz, 185 MHz, 222 MHz, etc. These jamming frequencies could then be selectively filtered before being combined with the CATV signals to each subscriber. Thus, a degree of system simplification could be achieved at the cost of some inflexibility regarding the channels used for premium services.

These are but a few of the possible approaches to an off-premises broadband addressable signal delivery system. Since such systems incur significant penalty for both initial capital expense and complexity, there is a premium to be obtained by simplifying the system and spreading the cost of expensive components or subsystems across a number of subscribers.

Economics

There are a number of positive and negative forces at work when we examine the cost-effectiveness of off-premises broadband addressability. Economic modeling of the equilibrium between these forces can become highly complex, as there are many variables. While only field experience will resolve some of these issues, it is worth examining key factors in building an economic model.

Reduction of subscriber visits. This has the potential to be a major justification for the installation of off-premises addressability. It is assumed that an off-premises broadband addressable system would eliminate the need for most visits to the home. Once an installation had been performed, future disconnections, reconnections and changes in level of service would be automated.

Universal pay-per-view. One obstacle to the growth of PPV has been the limited number of homes in most systems which have addressable converter/descramblers. It can be argued that, in systems which use set-top addressability, most potential PPV subscribers also subscribe to scrambled pay services, but that hypothesis is untested. Additionally, it is clear that major PPV events, such as boxing matches with their substantial revenue potential, could sell to a wider audience if a delivery mechanism were in place. When compared with a trapped system, off-premises broadband addressability has significant revenue potential in terms of PPV.

There is no consensus in the cable industry about the size of this potential revenue, but it is an important factor to be examined in modeling off-premises addressability.

Consumer-friendly broadband delivery and remote revenue. Systems which employ addressable scrambling, as opposed to trapping, in order to control selective delivery of pay television or PPV product provide a fair degree of frustration to that majority of their subscribers which have cable-ready consumer electronics equipment. If there is any benefit to be gained from improved subscriber satisfaction, off-premises broadband addressability should capture it.

Such a benefit should take two forms. First is an economic advantage, in the form of improved retention and, therefore, penetration. This is a difficult effect to isolate from other factors in subscriber penetration and is a potentially large but difficult factor to use in economic modeling.

The second advantage of improved utility of consumer electronics is strategic. With a variety of alternative video delivery systems on the horizon, cable's strategic ends are not well served by providing a source of subscriber frustration. This applies as well to remote control device revenues "forced" from subscribers who have cable-ready sets with remote control, but who must purchase an additional remote from the cable operator because of scrambling. Thus, while consumer friendliness carries some penalty in lost remote revenues against a scrambled system, those revenues have limited long-term viability, as they are built on subscriber dissatisfaction.

Reduced set-top converter capital investment. When an off-premises broadband addressable system is compared with a set-top addressable descrambling system, the off-premises system has a clear advantage in its ability to benefit from cable-ready consumer equipment in the reduction of the set-top converters needed in the system. Since set-top addressability requires a device in the home regardless of the kind of television set the subscriber owns, and since the number of cable-ready TVs and VCRs is steadily increasing, a system using off-premises addressability should show a decreased need in future years for set-top converters. In addition to gradually reduced set-top capital requirements, elimination of converters from an increasing number of homes decreases the need for service calls, and converter delivery and pick-up. Additionally, this would result in fewer

unretrieved converters.

High capital cost. Currently available off-premises broadband addressable signal delivery systems have an installed capital cost between $75 and $125 per subscriber. This represents a very significant incremental investment, and we can reasonably expect to make that investment only if offset by sufficient benefits.

Powering. Powering from the home involves no incremental additional power cost, but does involve accessing the home for the installation and maintenance of a low voltage power supply and power inserter. This is somewhat at odds with the goal of using off-premises addressability to reduce operating costs and subscriber contact. Such a scheme also increases the capitalized investment necessary to implement an addressable system. Powering from the plant has the potential of requiring many additional power supplies. This item is highly dependent upon power consumption of the addressable devices, and provides a powerful incentive for developers to minimize power requirements.

Maintenance. Even though off-premises broadband addressable taps are conceptually quite simple, the fact that they would be deployed in very large numbers has the potential to have an enormous impact on system maintenance economics. In a sample design of a 3,000 mile plant, 105,000 active addressable taps were found to be required. Thus, there is substantial negative economic impact from anything but exceedingly high device reliability.

SAMPLE CATV SYSTEM
($ X 1000)

280 MILES OF PLANT (TRAPPED FOR SECURITY)
21,550 PASSINGS
16,500 BASIC SUBSCRIBERS
10,500 PAY UNITS

REVENUE	
TOTAL BASIC	$3,183
TOTAL PAY	1,197
MISCELLANEOUS REVENUE	227
TOTAL REVENUE	4,607
COST OF SALES (PROGRAM COST)	-735
OPERATING EXPENSES	-1,615
TOTAL CABLE CASH FLOW	$2,257

Figure 5

Economic modeling—an approach

A practical means of developing a feel for the economic trade-offs involved in installing an off-premises broadband addressable system can be derived from examining the annual incremental cash flow requirements necessary to provide a reasonable internal rate of return (IRR) against the incremental capital required for the installation of the system. In the following example, the assumption was made that the existing system used traps for signal security and was in need of a major plant upgrade, involving splicing in new system taps throughout. Thus, no incremental labor was included for the installation of addressable taps. Figure 5 shows basic statistics regarding the system sampled.

The following assumptions were used for the modeled off-premises addressable system:

- The subscriber unit would be made up of two pieces. The housing and back plane would have the potential to serve four subscribers, and would cost $150. Additionally, one subscriber module would need to be added for each active customer served. These modules would cost $50 each. It was also assumed that the unit could be driven by standard tap input levels, so a system would require the same number as a non-addressable system. It is further assumed that this system would be

powered from the home at an installed cost of $10 per home.

- Increased maintenance costs from the installation of over 7,000 additional, but highly reliable, active devices would be offset by the service call savings resulting from decreased drop handling and the ability to permanently weatherproof drops.
- Over time, with churn, it is assumed that 88 percent of homes would be installed, requiring capital investment in off-premises modules.

Although each tap is capable of serving four homes, it is assumed that the design is 70 percent efficient; that is, 30 percent of the four tap outputs will be unused, on average. This means the 21,550 passings will require 7,395 devices to be installed.

It can be seen in the highly simplified example in Figure 6 that the installation of off-premises broadband addressable taps in this previously trapped system during its normally scheduled upgrade results in a reasonably neutral economic scenario with the capital investment offset primarily by operating economies and by PPV revenues. If such an installation were contrasted with addressable set-top converter/descramblers, subscriber satisfaction and converter capital reduction elements would be introduced, but the PPV benefit would be reduced, since that capability exists with set-top addressables as well.

The example illustrates the difficulty of viewing off-premises broadband addressability as a highly attractive investment in terms of direct payback. However, when viewed in the context of a more competitive environment, the argument for its installation becomes far more compelling. Clearly, reduction in the hardware cost, or a more aggressive view of PPV revenue potential, would have a major favorable impact.

SAMPLE SYSTEM ECONOMICS

CAPITAL INVESTMENT REQUIRED

HOUSINGS & BACK PLANES	
7,395 LOCATIONS X $150	$1,109,000
SUBSCRIBER MODULES	
88% X 21,550 PASSINGS X $50	948,000
POWER SUPPLIES	
88% X 21,550 X $10	190,000
TOTAL	$2,247,000

ANNUAL INCREMENTAL CASH FLOW FOR 10YR IRR OF 10%
$365,000/YR

CASH FLOW GENERATORS

TRUCK ROLLS SAVED FOR DISCON & RECON 30% CHURN X 16,500 SUBS X $20/TK. ROLL X 2 TK. ROLLS (DISCON & RECON)	= $198,000/YR
TRUCK ROLLS SAVED FOR SPIN 10,500 PAY SUBS X 20% SPIN X $20/TK. ROLL	= $42,000/YR
20% PPV REVENUE/MONTH X 12 MO X 16,500 SUBS X $2 NET/TAKE	= $79,200/YR
	$319,200/YR
ACTUAL IRR =	7 %

Figure 6

Summary

We have seen that the quest for an improved cable television signal delivery system leads us to seriously examine off-premises broadband addressable delivery of our services. We have also seen that there are significant technical and economic challenges in our path as we seek to realize hardware which would meet this goal. There is clearly a substantial reward to the cable industry in finding such a solution. It is hoped that in working with potential manufacturers of such hardware, the industry as a whole can realize the goal of reduced operating costs, increased subscriber satisfaction with our service, enhanced pay-per-view revenues, and a network which is better positioned for a more competitive future. ■

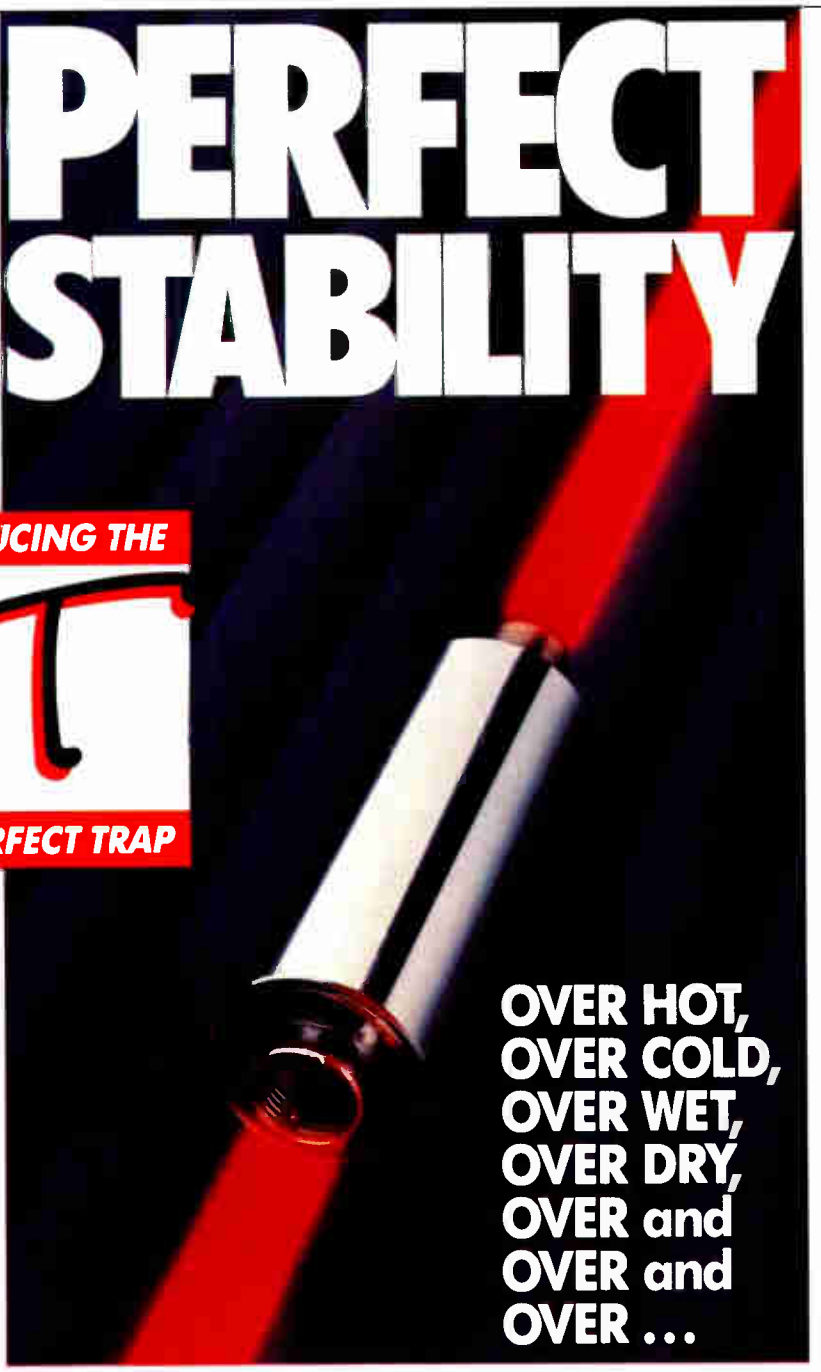
Acknowledgements

Austin Coryell, ATC; Brad Johnston, Warner Cable; Herzel Laor, ATC; Louis Williamson, ATC.

PERFECT STABILITY

INTRODUCING THE PT

PICO PERFECT TRAP



Pico's ***New Mini PT*** leapfrogs all existing trap technology with an exciting discovery! By using circuitry so advanced,* in the industry's only hermetically sealed and welded design, the ***PT*** achieves perfect notch stability time after time, weather or not.

Call for a sample today and test the ***Mini PT*** — the new standard by which all other traps are judged.

***PATENT PENDING**

PICO®

PICO PRODUCTS, INC.
CATV DIVISION
103 Commerce Blvd.
Liverpool, NY 13088
(315) 451-7700
FAX #(315) 451-7904

Inside the U.S.
CALL TOLL FREE
1-800-822-7420

Pico's ***PT*** is the only trap which exceeds the 1990 FCC requirements, established by the Cumulative Leakage Index, by 17dB - 25dB.

A conversation with Yves Faroudja

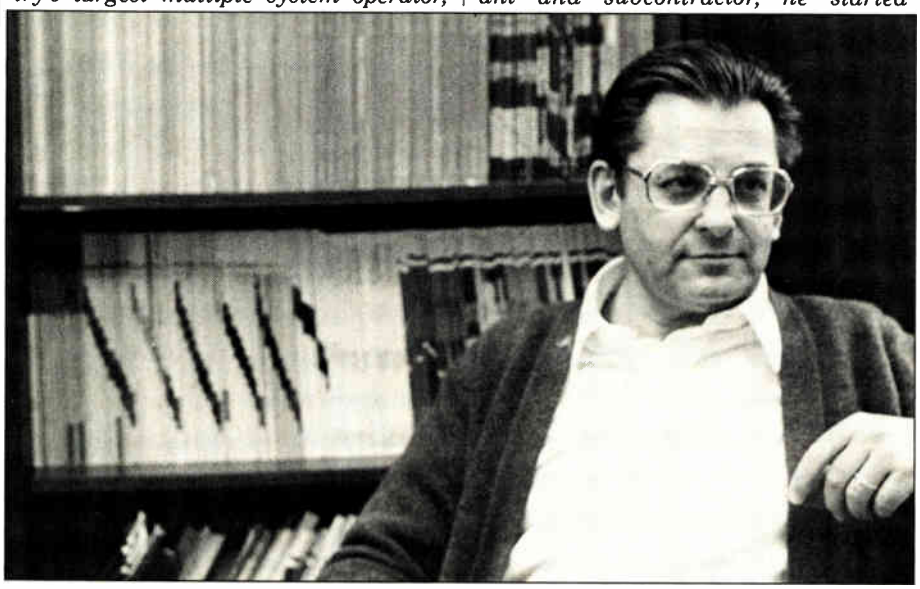
Next summer, the American Television Test Center (ATTC) and CableLabs will have begun testing advanced television systems, and the first to be tested will be the Faroudja SuperNTSC system. While technically not an HDTV system, SuperNTSC offers improved reception by pre-processing, post-processing and scan line doubling.

Supported by broadcasters and backed most heavily in the cable industry by Tele-Communications Inc., the industry's largest multiple system operator, SuperNTSC stands a chance of being approved by the Federal Communications Commission as the first new standard for television since the introduction of color television.

Yves Faroudja, a diminutive and energetic Frenchman who has resided in this country for 23 years, holds a Masters Degree in electrical engineering and over 20 patents, including several dealing with VHS and SuperVHS video recording. He began his research career in France in tide power plant engineering and later in transistorizing Doppler radar. He also participated in the first firing of a laser in Europe. After a frustrating stint in a NATO research laboratory near the Italian Riviera, Faroudja married and moved to the United States in 1966 hoping to do research on video recorders.

After being offered the wrong job at Ampex ("They failed to understand my potential," he says), he was hired at Memorex where he learned his trade. This was followed by design work on color processing on video recorders at International Video Corp.

Following several years as a consultant and subcontractor, he started Faroudja Laboratories, for which Faroudja and his wife are the sole owners. It is a self-supporting corporation, in existence for 10 years, for licensing his technology to other companies. Faroudja Research, which he started a year ago, is funded by a consortium of investors from the television industry for the purpose of bringing SuperNTSC technology through research and development to market.



Yves Faroudja at home in his office.

By George Sell, Contributing Editor

Faroudja, inventor of SuperNTSC, was interviewed by CED *magazine Contributing Editor George Sell, in the offices of Faroudja Research in Sunnyvale, Calif.*

CED: For Faroudja Research, who are your major backers?

Faroudja: We had a grant from ABC and the other investors are mostly from three groups: broadcasters, cablecasters and equipment manufacturers. I picked up investors who can contribute not only with money but also as potential customers or users of what I am doing so they have a motivation in our success which goes beyond stock appreciation.

CED: What do you believe is your role with each of them?

Faroudja: The motivation of these people—Capital Cities, Comcast, Continental, General Instrument, Newhouse, Scientific-Atlanta, TCI, Viacom and Westinghouse—is to maintain the status quo in terms of NTSC, while giving, to those who want to pay, a very high quality picture. In other words, they don't want to redesign the whole facility and they don't want to lose income by losing channels. That's one of their motivations.

Another is, particularly for the two companies with a slightly different motivation, General Instrument and Scientific-Atlanta, who are equipment manufacturers, their interest is to improve their own equipment through a license agreement of some kind.

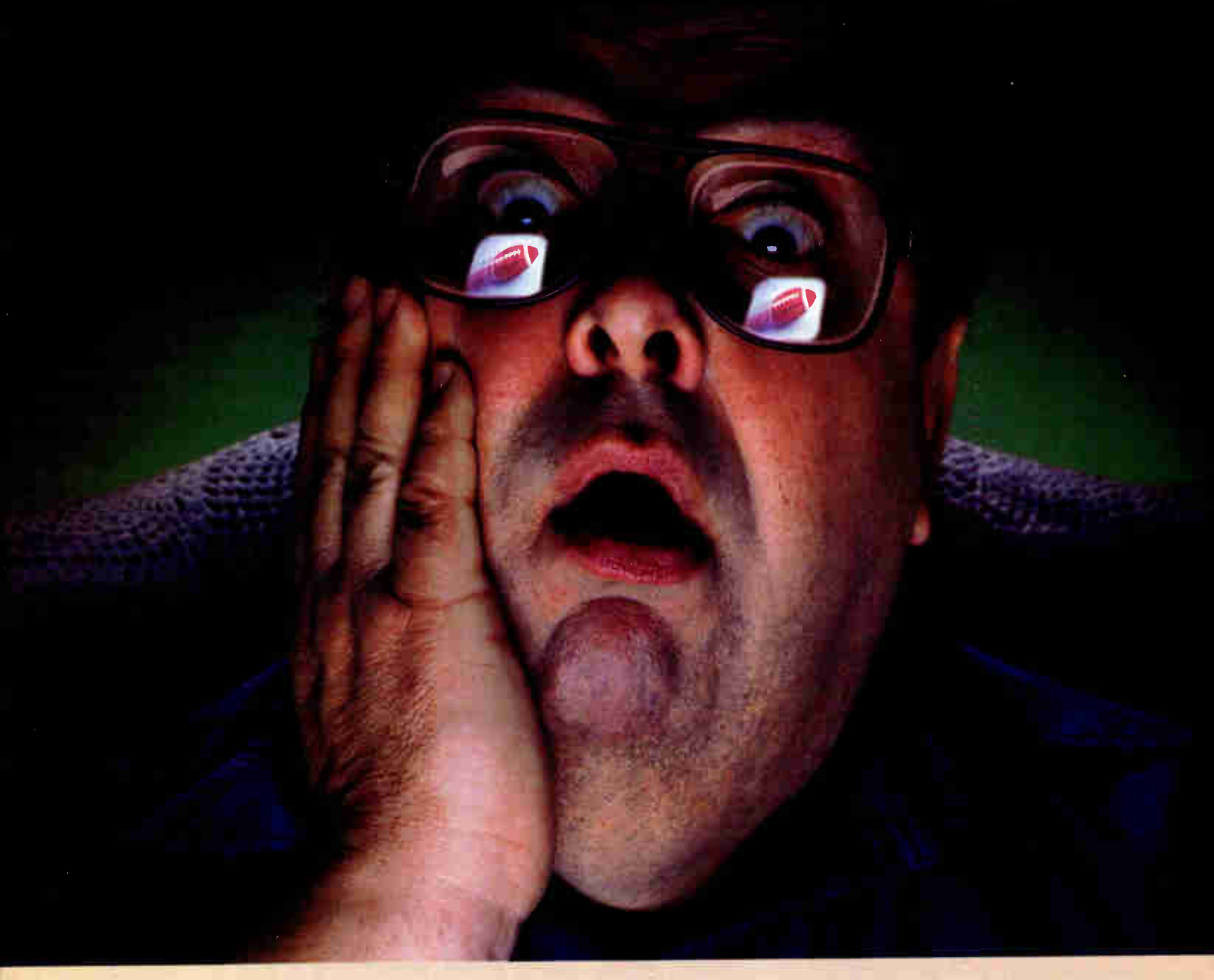
The cable people or the broadcasters don't have such motivation. They don't want to build equipment. They want to sell equipment or use equipment. They want to make sure it is done right, you see. HDTV might not be entirely welcome in this environment.

CED: How does the SuperNTSC system work? What does it do?

Faroudja: Essentially, what it is is NTSC. The key is to keep compatibility with NTSC 100 percent, only on one channel with no extra subcarrier, no extra side panels, no extra nothing. The idea is NTSC-minus, not NTSC-plus. It's NTSC minus artifacts. We do that by a combination of pre-processing at the transmission and post-processing in the receiver.

Essentially, the pre-processing can be summarized in two very simple things. One thing I call "detail processing," which is a strong preemphasis on small details to get those details more vivid. The second is pre-filtering

How Most People Reacted When Told We Could Improve Their Image.



Introducing the new CAT100R, a startling new development from Uniden Satellite Television. The CAT100R features direct entry in 1 MHz steps, so you get pinpoint tuning. Pictures come through with incredible clarity, and the sound, in unbelievably rich stereo.

The CAT100R can also operate on both C and Ku bands. It's MAC-compatible. And since it's from Uniden, you're assured of the highest quality and best features at an astonishing price.

So if you're the least bit image-conscious, the only choice is Uniden's CAT100R. *Putting you face to face with a world of entertainment.*

uniden®

Commercial Satellite Television

For more information write: 4700 Amon Carter Blvd., Ft. Worth, TX 76155 or call (817) 858-3468

Reader Service Number 32

to prevent artifacts in the encoding while mixing chroma and luminance. So, that's the transmission path.

The reception path, we get NTSC first, then we decode it into RGB with a decoder which has very good performance, (is) very adaptive and very efficient. The second step is to double the number of lines using a line doubler. That's the essence.

The philosophy is very simple, 35 mm picture quality but not better. It is useless to be better than 35 mm because 35 mm is the subjective level that people accept and are willing to pay something for. Beyond that, they won't pay.

So we don't believe in the necessity to go any further. First is NTSC, second is single channel, third is ease of insertion in the existing state of things, that is cable systems, broadcast stations, and so forth.

And fourth is no cost at the receiver, very important. People won't pay more than $500 for high quality and that's a fact, not in America. And I'm interested to get the whole TV industry, not just the fringe on the top.

CED: What hardware is required?

Faroudja: At the present time, the thing is a deluxe device, less than $20,000 for the encoder and transmitter and this is located at the source. The bad news is that presently the decoding and the line doubling is quite expensive. We are selling, right now, decoders in the $7,000 range and line doublers for $50,000. They are located at the receiving end. There is nothing at the headend.

The reason I got this financing is to make the decoder and the line doubler so that the increase in parts costs to the TV set would not be more than $100. I am going to reduce $60,000 to less than $100 in one year and three months, which, I think, is very easy. However, to get there we have to design ICs. In one year and three months, I will not have ICs. I will have IC diagrams, models, and prototypes and simulations. In other words, it may still be big after one year and three months and after that I have to spend a bit more time and money to get into the real ICs.

CED: Why is it still referred to as NTSC?

Faroudja: Because it is. It respects the rules. I did broadcasts at the last NAB Show in Las Vegas using SuperNTSC and using the Dolby audio subcarrier of 4.5 MHz, and we did have clearance from the FCC to broadcast because they said they didn't see why that was violating the rules of NTSC. If you measure the signal with an objective test, you don't know that it's SuperNTSC. In other words, we don't put any funny things in the vertical blanking interval. We don't introduce any funny sync. A normal set can receive it. It is displayed as normal NTSC.

CED: SuperNTSC is not high definition television but yet it is being judged along with HDTV systems. What differentiates your system from HDTV systems?

Faroudja: The point is that I don't believe in "definition." I don't like the expression "high definition television." I think nobody cares about definition. Definition costs bandwidth and in terms of picture quality, it's only one of 28 components.

In other words, I don't see the point to broadcast high definition pictures. There's a point in displaying them or

generating them but you want to broadcast in something that is narrowband and which is compatible with the existing system. That's the main difference.

I think that the MUSE system from NHK, which starts with 1125 lines, and the MUSE-E (system), which converts into NTSC and goes back at the TV set into 1125 lines, is doomed to failure because it is too complicated and too expensive. Now this is the first class of high definition schemes.

But the way I can describe it is in terms of picture quality. My opinion is that if you look at it in a living room, a picture that size (he points to a frame about 36 inches) at this distance (about seven feet) is perfectly acceptable. I have an angle of about 45 degrees, you look at our picture and you look at a 1125-line, 30 MHz picture, I don't think there will be a marketable difference in the same condition of propagation. What I'm saying is that our system, in these conditions, shows no deficiencies and therefore I don't see any point to go any further.

CED: What differentiates your system from the Sarnoff E system in its technical aspects?

Faroudja: Sarnoff, as you know, is using our encoders, decoders and line doubler. We sold it to them. So, their system E is essentially our scheme, plus side panels. To get wide aspect ratio, we cut a little bit, the top and the bottom, and we display on NTSC a wide band. To get a wide aspect ratio, Sarnoff hides side panels and adds something on the sides. So, as a result, in our case, the NTSC viewer will see something that is a black band (about one half inch). In their case, the NTSC viewer will miss a part of the picture but will not have a black band. It's a different trade off. The picture is wide screen in both cases.

CED: What did you learn from the tests over the TCI cable systems? What limitations were discovered, if any?

Faroudja: We did two types of experiments. The first one was here in Sunnyvale connected to the Sunnyvale cable system. We are scrambling it so nobody can see the experiment. And then, in Dallas, we had 14 miles of cable connection between the Heritage system and the convention hall. And we were going via coaxial cable interconnected with fiber optics about 10 miles and then back to coaxial cable, so we could try to kill two birds with one stone.

It did very nice. We were displaying on a big screen and the result looked beautiful, wonderful. What we learned was that, number one, a lot of the problems with cable TV are essentially hygenic. If all the amplifiers are working and everything is linear and everything is done according to the rules, you can get an excellent picture.

You know, in cable television, hard work pays in terms of picture quality. It is not a theoretical limit. We discovered that the vestigial sideband filter, which I was afraid could be a cause of trouble, was not such a significant cause of trouble. However, the audio-video multiplexing and demultiplexing was much more a significant cause of trouble and we had to develop something for that.

We discovered that digital audio schemes proposed are not kosher and are not working on cable TV. I'm

we wait for processed digital television to become a reality?

Faroudja: I don't know. Processed digital is something that has met a lot of skepticism because it's based upon extrapolation in the future. It's based on thin air or based upon feeling and intuition and promolgating a curve that doesn't exist. So, it has been met with skepticism.

But I know one thing for sure is that there is going to be NTSC for another 10 years. I can guarantee you that, no matter what standard is going to be taken, in the year 2000, a very significant portion of the American and Japanese population will have NTSC sets still. You can be sure about that. Under any scenario, there is room for an NTSC-compatible scheme.

CED: There are those who say your system does not compete with other ATV systems in terms of subjective viewing quality, whether they are HDTV, SuperVHS, laser discs, or ones that have wide aspect ratios. There are some in the cable and broadcast industry that worry that viewers will perceive diagonal motion artifacts or will want a wide aspect ratio immediately and may have already learned enough about high definition to know that your system will not give them over 1,000 real scan lines. Some in the industry are therefore afraid that if they adopt your system they will be underachieving and not satisfying the consumer.

Faroudja: OK, I challenge any other system to a very simple match. Sixty degree viewing angle, their picture, my picture and let the public decide, that's all. I don't want to even put a price tag on it.

You have to realize that we kind of play tricks. What we want is an illusion of bandwidth, not real bandwidth. Television is an illusion. What I want is subjective testing. That's the only thing that makes sense.

Whoever says their system is better than mine has to prove that it works better in practice. The practice is to be in the living room and if I wanted to be nasty I would say, "OK, we've got exactly the same amount of money to make ICs." Then I would win for sure. But if I wanted to be very generous I would say, "OK, you can spend $10,000, and I will spend $500, let's compare it." My point is that anything beyond this $500 bill is useless. There is no point to carry definition that you cannot see with a viewing angle that's small. I don't see the point.

CED: Let's say the cable industry adopts your system, following TCI's strategy, and the broadcast industry does not. And say, in a few years after the cable industry begins operating with your system, the broadcasters begin operating with a full blown HDTV system. Doesn't the cable industry then lose its competitive edge?

Faroudja: I think this is a totally ficticious, hypothetical scenario which has no resemblence to reality whatsoever. I absolutely don't believe that the broadcast industry's going to adopt some form of HDTV that's not compatible with NTSC. I just don't see it at all.

You can make better pictures on cable than off-air broadcast if you play your cards right. You don't have ghosts for one thing. And microreflections are a much easier problem to solve than ghosts.

Make the best possible pictures in the practical sense independently of what others are doing. Besides, cablecasters and broadcasters should be closely associated. The whole deal is merging. I cannot conceive of a reality of antagonism. It doesn't make sense to me. I see it more as a cooperative thing.

I think all systems of transmission, number one, should be identical. I think it's important to have a single standard. To have one standard for satellite, one standard for broadcast, and one standard for cablecasting is asking for disaster. I am totally opposed to that.

CED: There are those who privately say that you are being used by TCI to hold off HDTV but that you don't care because you will make a lot of money if TCI's strategy works. How do you react to that opinion?

Faroudja: I love being used for something that's rational. I don't mind. I'm using TCI as well. We are both parasites of each other. That's OK. That's called collaboration. They have a very clear need. They don't want to lose income by (giving up) channels or having to redesign the whole stuff. That's rational and I don't care whatever else.

And I have a very clear goal. I want to sell ICs for TV sets. I don't see any contradiction with that. You are better off having a partner who's too smart than too dumb. You are better off having somebody who sees reality properly and he may be tough to deal with, a bit greedy, a bit hard to negotiate with, but fair, than to take a naive, "don't know nothing" type of investor.

I purposely pick up people who are hard to deal with, in a way, so I have a clear assessment of reality. I did not go to venture capitalists. I excluded financing that way because I wanted to be guided. And I want to be guided by those who are successful. It seems to me that success is the key to success.

CED: Being an ATV proponent system before the FCC, and hopefully an ATV winner, is one way to bring your product to market. What other ways are you planning to bring SuperNTSC to market?

Faroudja: We have a plan where we are going to build 12 TV sets and we are going to broadcast from 12 sites in the U.S. The first one is probably going to be Westinghouse in the Bay Area because it's here. And we are going to broadcast two hours a day every week and have TV sets in public places so we can get some marketing feedback and technical feedback that it works before we spend the money making ICs in case something is wrong. We will get to know it earlier. And also I want to hear the reaction of the people.

CED: Are there any FCC rules and regulations that prevent you from simply going to market with your product? Why not go directly to the market, for example, the cable television pay services, and the television set manufacturers could offer SuperNTSC sets on the retail market?

Faroudja: Right, I could do that. But I want to be endorsed by the FCC. I think that's valuable. I could do it. Nothing would prevent me from going to market that way. There is a little problem with the audio, to be honest. We haven't solved the problem with the audio completely.

Number one, I think there is a lot of knowledge to be gained by it (ATTC testing). They may discover a couple of things that I may improve. That's a value. Number two, I may learn the other systems and find something. I think there's a lot to learn from that and a lot to gain. I think it's important. Remember, a lot of the testing is subjective. It's important to have an outside party judging the subjective impact of what we are doing in an objective way. ■

More Power to You.

Lectro®

More Efficiency.

In response to operators' concerns over shyrocketing utility costs, Lectro designed and delivered the first Super Efficient power supplies. Now, a complete line of Super Efficient products is available for you.

More Modularity.

Lectro features plug-in modularity so advanced, so simple that maintenance is a snap! Just ask the man in the bucket.

More Designs

Lectro has the most diversified product line in the business, ranging from 4 amp to 18 amp. You'll find products to meet *every* application.

More Service.

We've been powering cable systems for decades. we back up our service and warranties with field and factory support personnel. *A satisfied customer is our most important asset.*

CALL 1-800-551-3790.

In Georgia, call (404) 543-1904

Lectro®

More power to you

Lectro Products, Inc.
420 Athena Dr.
Athens, GA 30601

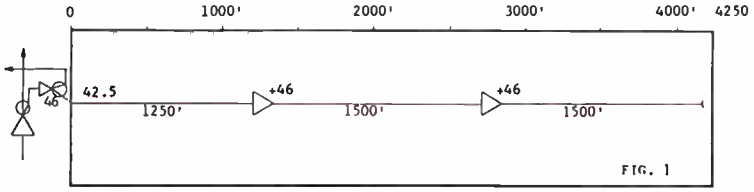
Made in U.S.A.

Reader Service Number 35

Alternative approaches to bandwidth extension

As presented to the Canadian Cable Television Association's Annual National Convention, May, 1989.

There is no doubt that the most pressing problem facing many systems is channel capacity. In many cases, the system can be easily upgraded to accommodate the immediate requirements, but allowances for future expansion carry a much higher price tag. The following paper explores alternatives to the full scale 550 MHz rebuild and its inherent burden of cost and time, through the use of progressive rebuilding and plant reuse.



Amplifier Performance	-59 CTB @ +50 dBmv/35 CHS
System Capacity	35 CHS
Bandwidth	300 MHz
Tap levels (HB)	+10 dBmv MIN
Bridger O/P Level	+42.5 dBmv (After Split)
Line Extender Level	+46 dBmv
Trunk CTB Performance	-67 dB
Distribution CTB Performance	-59.8 dB
Last Amplifier Output CTB Performance	-56.7 dB @+46 dBmv/35 CHS

Figure 1

The problem

Bandwidth and channel capacity extensions are, unlike the first expansion into mid-band, invariably upward in frequency. We are therefore faced with the double edged sword of higher losses requiring higher output levels, and more channels requiring lower output levels. The higher output level problem is compounded by the higher tap level requirement. Add to this the proposed development of HDTV and its probable requirement for improved system performance, and we have what appears to be a problem solveable only by complete system redesign and rebuild. We have however, received some technological benefits, which apply in particular to upgrades from 300 MHz or lower to 550 MHz. In general, the modern Hybrid Integrated circuit will carry 77 channels at approximately the same output capacity and distortion performance as the earlier 300 MHz devices. Additionally, power doubling technology will allow even higher operating levels. We still are faced with the problem that 300 MHz systems, in general, have very little margin having typically been pushed from 220 MHz to 300 MHz.

In these systems, input levels to amplifiers are typically already marginal, while output levels are as high as possible, and tap levels are in the area of +10 DMbv/300 MHz. In general, a bandwidth rebuild must start with the backbone. Trunk systems will be required to push deeper into the distribution network, and spacings will shorten. This problem will be addressed either by improved amplifier technologies such as feed forward, or by replacing the majority of the trunk with AML or fiber backbone. The design objective will be to provide a bridger port performance equivalent or better than the previous 300 MHz system. It is somewhat ironic that those of us who "bit the bullet" and upgraded from the 220 MHz area up to the "4"s, will face a more difficult task in upgrading to 550 MHz. Technological improvement has made the job of upgrading a 220 MHz system simpler, in that often the amplifier spacing will not require alteration. An undesirable by-product of the full scale 550 MHz rebuild is that it renders the system less than fully usable during the rebuild period. What is required is a progressive rebuild which adds capacity as required, with a minimum of bottlenecks. In a bandwidth expansion we normally have no option but to begin with the backbone trunk or feeder. As this portion represents a relatively small proportion of the overall system plant, it is normally undertaken as a full scale, "by the book" upgrade. The distribution system, however, is where the miles, and therefore the costs, begin to make us stop and reassess the situation. The basis of the distribution problem is this: we need 6 or 8 of the new channels now. But while we build each section to add 25 channels, some areas are waiting for their first 6 or 8. What we need is a way to deliver those needed 6 or 8 to all subscribers, while preparing the system to easily carry 25+ extra channels in future.

There is no doubt that the most pressing problem facing many systems is channel capacity.

It may be simpler to approach this concept by taking a piece of reference system as a model for possible alternative rebuild approaches. However, before doing anything, we must immediately implement one basic rule:

Starting now (yesterday if possible), buy everything to handle 550 MHz minimum. This means taps, amplifiers, cable, etc. even if they will not be employed as such today, they will inevitably be.

As shown in Figure 1, this reference section consists of three tapped sections, one of 1,250 feet and two of 1,500 feet for a total reach of 4,250 feet. The challenge is simply to deliver 77 channels, at reasonable CTB, to this 4,250 foot section and hundreds like it throughout the system.

System design approaches

As it is impossible to cover all the possible system designs, we will employ a reference model which probably fits the majority of systems to some

By Karl Poirier, Vice President, Corporate Development, Triple Crown Electronics Inc.

Would you like an easy way to increase cable subscribership? To justify rate increases? To maximize profits? Call the Augat BROADBAND ENGINEERING Upgrade Hotline. Find out how easy it is to add channels at a modest cost with upgrade electronics.

EXPERT ENGINEERING ADVICE OVER THE PHONE.

Sherwood Hawley, BROADBAND ENGINEERING Applications Manager, can advise you over the phone how your current equipment can be upgraded to handle your subscribers' demands for more channels. He'll point out the "do's and don'ts" of upgrading. He'll even provide you with a cost estimate for your system's upgrade. All in about 15 minutes. You end up with nothing to lose and a performance advantage to gain.

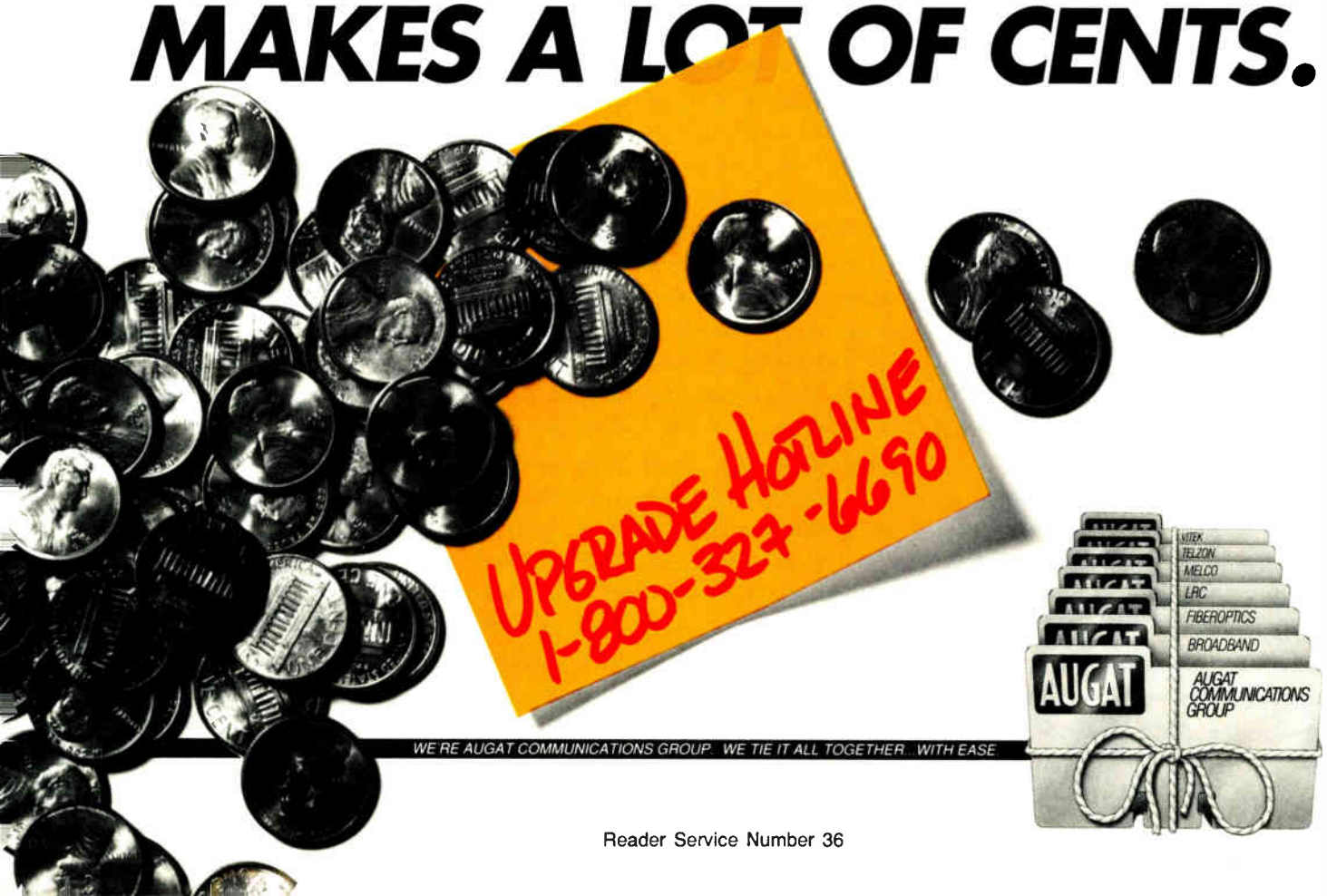
GAIN SUPERIOR ENGINEERING PERFORMANCE WITH BROADBAND ENGINEERING UPGRADE ELECTRONICS.

BROADBAND ENGINEERING originated the concept of upgrade electronics 14 years ago to extend the life of your CATV equipment—without the unnecessary expense and headaches of system rebuilding. You can still be confident of the technical superiority and reliability of our products and advice. And we back up our upgrade electronics products with a one-year warranty.

For a common sense, cost-effective approach to higher profits and longer life for your current system,

ask for Sherwood Hawley at Augat Communications Group, P.O. Box 1110, Seattle, WA 98111. Call (206) 932-8428 or toll free **1-800-327-6690.**

KEEPING UP WITH THE DEMANDS OF CABLE SUBSCRIBERS MAKES A LOT OF CENTS.



degree.

The reference section consists of a two line extender cascade of tapped distribution fed from a final trunk bridger. This system incorporates late 70's and early 80's technology and operates to the following parameters:

The reference section (Figure 1) is shown being upgraded to 550 MHz/77 chs in three traditional approaches.

Approach #1 (shown in Figure 2a): In this method we have employed a cascade of power doubled bridger and four line extenders derated to maintain CTB performance and yet feed 4,250 feet of retapped distribution.

Due to the reduced output capability of five amplifiers in cascade (+43 dBmv), even at a tap level of +10 dBmv, a line extender can only feed 930 feet of the reference cable. The combination of bridger and four line extenders delivers a CTB of −55 and an end CTB of 53.1 dB. This section (Figure 2a) requires that all 33 taps be relocated, and adds two line extenders to this and all similar sections.

Approach #2 (shown in Figure 2b): In this method we have employed a cascade of power doubled bridger and three line extenders. In this approach we have also employed "backfeed" techniques which allow us, at the expense of cable replacement, to reduce the amplifier cascade by one. This section (Figure 2b) requires that at least 12 taps be relocated and 750 feet of distribution cable and one amplifier be added to this and all similar sections.

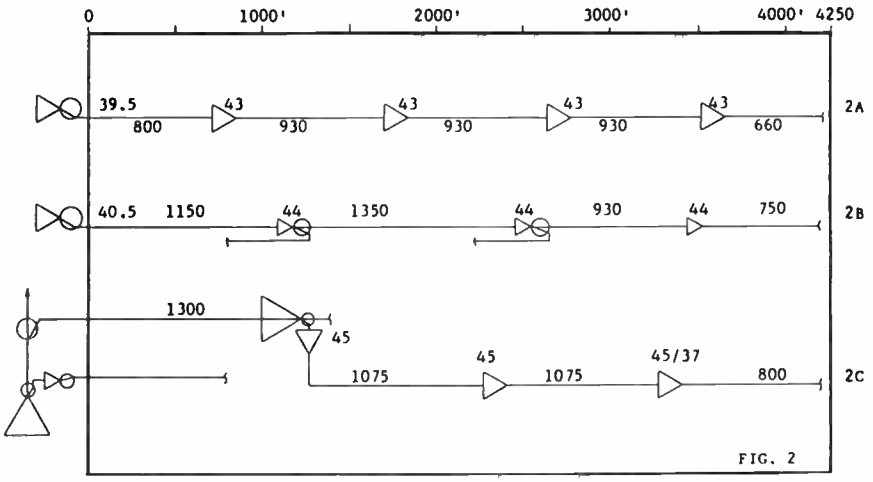


Figure 2

Approach #3 (as shown in Figure 2c): In this method we have reduced the number of line extenders in cascade to two by pushing trunk part of the way down each distribution section. There may be technical advantages to this approach, but the exorbitant cost of this method typically makes it impractical.

In fact all of the foregoing methods

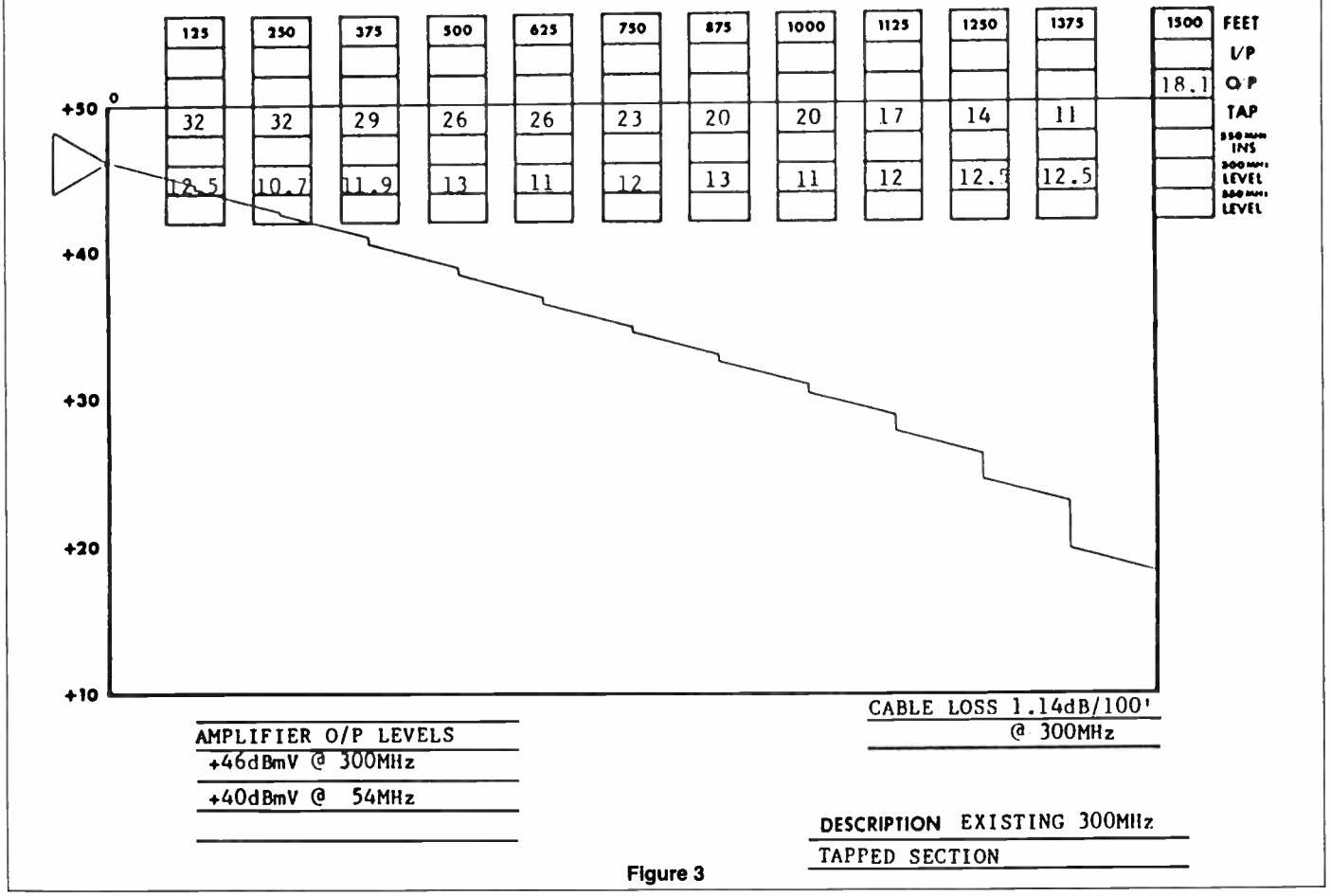
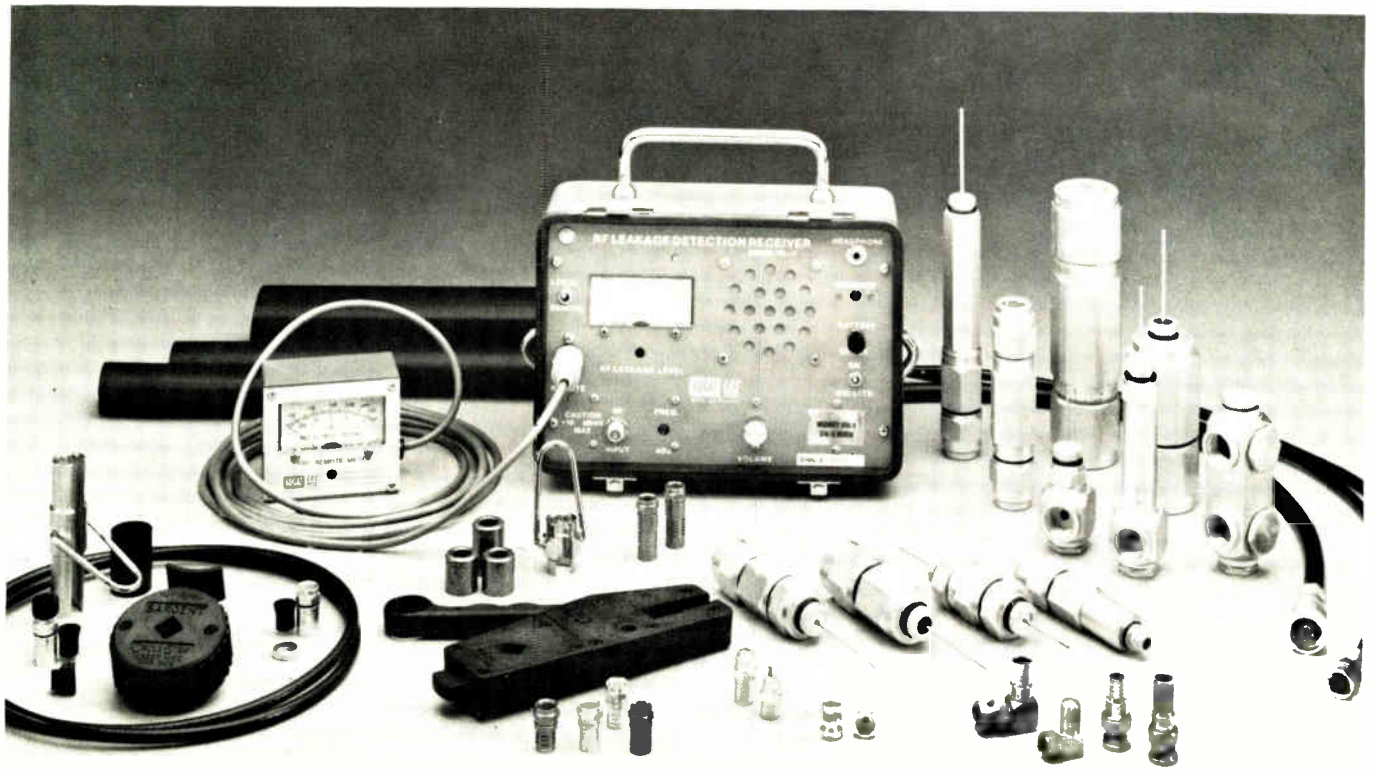


Figure 3

YOU CAN GET IT ALL



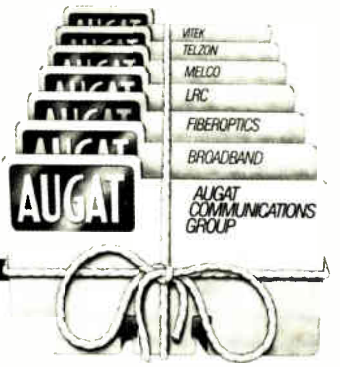
WITH LRC!

EASY INSTALLATION. RELIABLE PERFORMANCE. PROVEN DURABILITY.

Whatever your CATV needs, look to LRC's complete line of quality engineered products — we've got it all!

- Snap-N-Seal™, the exclusive "F" Connector that requires no crimping! The 360 degree compression on the cable jacket ensures a complete radial seal, virtually eliminating RF leakage. Triple seal gives maximum protection against the environment.
- A convenient combination tool to handle both cable prep and installation. Plus weather caps to protect disconnected drops and security shields.
- 3-Piece "W Series" Connector. Offers no-twist center conductor, guess free positive stops, center conductor cutting guide. The 30 dB minimum return loss has been extended to 1 GHZ on pin and splice connectors to accommodate future channel expansion. And, it's Keyless! The keyway has been eliminated.
- 2-Piece "K Series" Connector. Our 2-Piece offers you the same convenience and durability as the 3-Piece, with 2-inch pin, positive stops, and patented auto-seize mechanism.
- TR-1 Tracer Unit. Everything you need to meet revised FCC codes in one package! Our full range of accessories includes probe adaptors, strap, wall mount, charger, dipole antenna with 10 ft. of cable, headphones, 8 and 20 dB pads, tuning tool and more. And now you can order our remote meter. It's easy to use and easy to read. It plugs into the TR-1 and takes equivalent readings of 10 u/Vm or less at 100 feet.

We've only highlighted a few of our products, but at LRC, we have it all! Call us for details on these and other products at 607-739-3844 or 1-800-332-8428 or write Augat/LRC Electronics, P.O. Box 111, Horseheads, NY 14845.



WE'RE AUGAT COMMUNICATIONS GROUP. WE TIE IT ALL TOGETHER...WITH EASE.

Reader Service Number 37

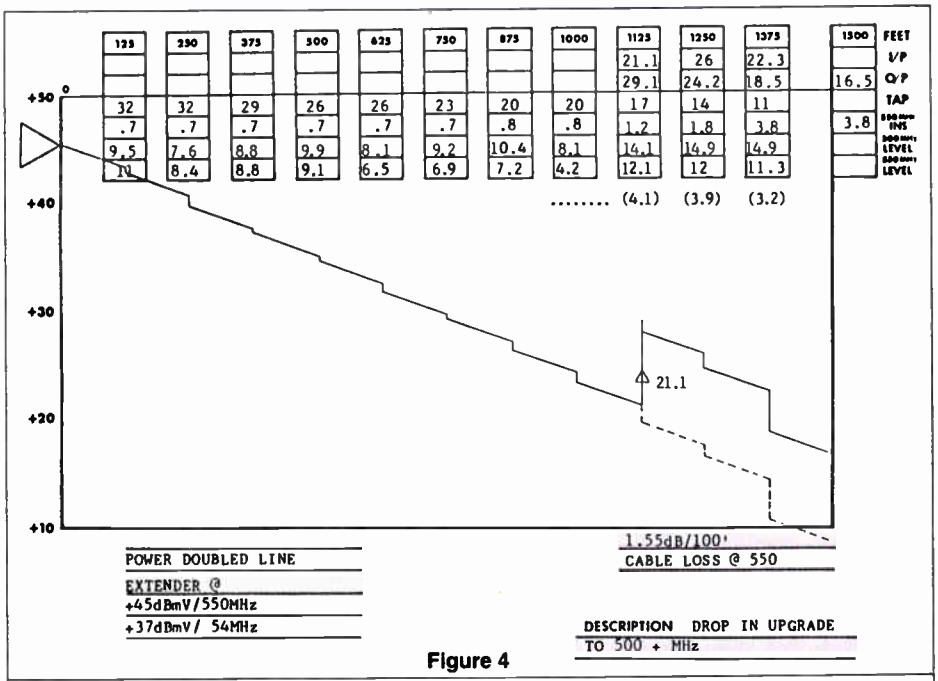


Figure 4

deliver immediate full upgraded channel capacity at an extremely high capital cost. It is this high cost and its associated labor intensive upgrade which makes this approach somewhat fearsome to most operators. If only there was some way to deliver at least some of the required channels now, without compromising our capabilities in future. In order to examine whether such a possibility exists, we must go back and examine our reference.

The reference section (Figure 1) consists of 4,250 feet of cable exhibiting losses of 1.14 dB/100 ft at 300 MHz and 1.55 dB/100 feet at 550. The section consists of one 1,250 foot and two 1,500 foot runs. The line is tapped at regular 125 foot intervals. (The taps are assumed to pass 550 MHz although at somewhat higher losses). The system delivers +10 dBmv at tap ports, and it would be advantageous to maintain levels in this area during conversion. Figure 3 shows the relative tap and system levels at 300 MHz in this section.

Figure 4 shows the same section at 550 MHz bandwidth, employing a power doubled amplifier operating at levels similar to the previous 300 MHz device. (Output levels +45 dBmv at 550 MHz, +37 dBmv at 54 MHz.)

An alternative

While the signal levels are too low to use at the existing 17 dB tap they are only low by 8 dB. It should be possible to employ some form of mini-line extender in this situation. The requirements for an amplifier in this application are quite different from any other.

Condition #1: As this plant location did not previously allow space for an

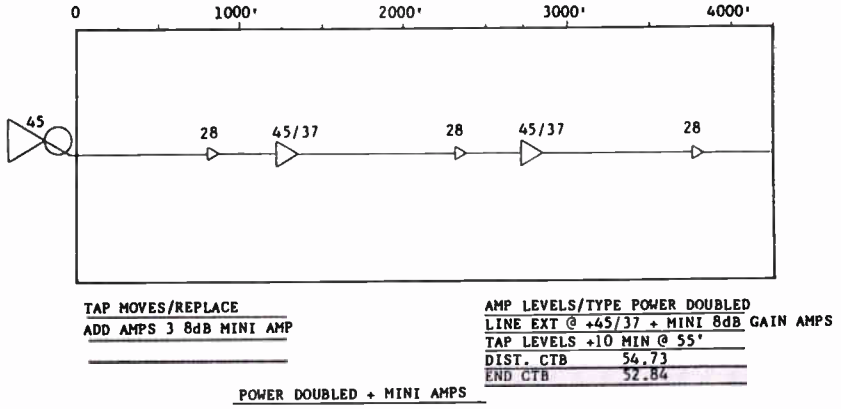


Figure 5

amplifier, small physical size and low power consumption are a must.

Condition #2: A significant reverse slope is expected.

As we can see, the increased losses at these higher frequencies results in the signal level being too low for tapping purposes at least three taps short of the existing amplifier spacing.

Condition #3: The amplifier must be relatively transparent, as very little noise and distortion contribution can be tolerated. The ideal device would consist of an 8 dB to 10 dB equalizer followed by a 9 dB gain amplifier stage. This would not be a simple amplifier to build, and would only currently be possible using discrete technology. The amplifier must have a natural gain of 9 dB. Use of a higher gain device with either input or output attenuation would seriously degrade the overall system performance.

We can envision such a device having the following overall performance:

Gain at 550 MHz	8 dB
Gain at 54 MHz	0 to −2 dB
Noise Figure	9 dB
Output Capability:	+38 dBmv at −57 dB CTB/77 CHS>
Power Requirement:	<80 Ma/60 VAC. (~4 watts)

Application

The device is inserted into the line at a location where the 550 MHz signals are between +16 dBmV and +22 dBmV; (In Figure 4, the device is shown inserted at the +21.1 dBmV level point). The resultant output level of +29 dBmV is sufficient to carry through to the existing next amplifier location.

In fact, we are now delivering usable levels of 550 MHz, and relatively unchanged levels of 300 MHz without having altered cable, taps, or amplifier locations.

> While it is not suggested that this approach be applied to new builds, the potential to greatly simplify rebuilds is significant.

System performance

At first glance it would seem that this approach must have serious negative impact on the system C/N and CTB numbers. This is where the requirement for low natural gain is evident.

Figure 5 shows our reference section being fed by a power doubled bridger, two line extenders, and three of our proposed mini-amps. If we now compare the performance of this line with the approaches in Figures 2a, 2b, and 2c, we find the following results. (See Table 1).

Assuming the amplifier performances and system conditions in Table 1, we can see, these are almost insignificant degradations in overall performances. While it is not suggested that this approach be applied to new builds, the potential to greatly simplify rebuilds is significant. Application of a device is described herein does offer the nearest thing to a "drop-in" upgrade allowed by current technology. ■

TRUNK/AML PERFORMANCE:	C/N 49.2 dB CTB 67 dB	
AMPLIFIER PERFORMANCES:		
BRIDGER/EXTENDER	−57 dB CTB @ +49 dBmv O/P (8 dB slope) 7 dB NOISE FIGURE 30 dB MAX GAIN	
MINI-AMP	−57 dB CTB @ +38 dBmv O/P (8 dB slope) 9 dB NOISE FIGURE 8 dB MAX GAIN @ 550 MHz (−1 @ 54 MHz)	
Figure 2b: 5 AMPS (br/ext) @ +43 dBmv O/P, 16 dBmv I/P =	CTB C/N	−55.0 dB 61.2 dB
ADDED TO TRUNK =	END CTB END C/N	−53.1 dB −48.9 dB
Figure 2c: 4 AMPS (br/ext) @ +44 dBmv O/P, 17 dBmv I/P =	CTB C/N	−54.9 dB 63.2 dB
ADDED TO TRUNK =	END CTB END C/N	−53.0 dB −49.0 dB
Figure 2d: 3 AMPS (br/ext) @ +45 dBmv O/P, 18 dBmv I/P =	CTB C/N	−55.4 dB 64.4 dB
ADDED TO TRUNK =	END CTB END C/N	−53.4 dB −49.1 dB
AND NOW, OUR PROPOSED MINI-AMP SECTION, FIGURE 5:		
3 AMPS (br/ext) @ +45 dBmv O/P, 16.5 dBmv I/P =	CTB C/N	−55.5 dB 65.4 dB
PLUS		
3 MINI-AMPS @ +29 dBmv O/P, +21 dBmv I/P =	CTB C/N	66.6 dB 66.4 dB
ADDED TO TRUNK =	END CTB END C/N	−51.7 dB −49.1 dB

Table 1

The good and bad of syndex

When it comes to syndex, there's good news and bad news. On October 17, 1989, the courts issued an order denying the requested stay on syndicated exclusivity (syndex). Although the decision is still not definite, the denial has given the cable industry a graphic message—everyone had better gear up for a January 1 deadline. If, at that time, a decision is still pending, the syndex rules *will go into effect*. That's the bad news.

Surprised? Actually, not many in the industry are surprised at the denial or the possibility of the impending finalization. What has been the surprisingly good news is that syndex is not turning out to be as bad as most operators originally thought. In many cases, fewer than 50 percent of a MSO's systems are actually affected. And even those systems that are affected have found that syndex is simply one to two switches a day.

"Thanks to the superstations,"says Susan Scott, programming manager for Comcast, "our problem isn't as large as it potentially could have been. We run the gamut from a half an hour (black out) in some systems to systems with much bigger problems."

Del Heller, vice president of engineering for Viacom Cable, also expected a lot of conflict, especially in the San Francisco Bay Area, but was surprised at the low impact. "From the technical end, only about one-third of our cable systems have had any significant impact that's going to trigger a lot of technical switching requirements," says Heller. So really, it's not too bad."

What this means for the industry is varied. For the technical community, it means perhaps a couple of days work on the part of the engineering staff to set up equipment—after the preliminary work of choosing viable equipment is completed. For the administrative staff, it means validating requests and soliciting cooperation from broadcasters, programmers and system managers to determine what programs will ultimately be affected. And for everyone, it means a unified effort to inform the public of what's happening *before* programs are switched.

NCTA helping

In order to educate the public on the causes and effects of syndex, the National Television Cable Association recently sent out a "strategy package" to all general managers. These strategy sheets include information on communicating syndex to different constituencies: subscribers, local officials, news media and broadcasters. How each system uses the information is up to its own discretion; what is important is that it be used.

"We would be doing our subscribers and ourselves a terrible disservice if we went out and just made these changes without any notice or explanation and then, when people got upset, tried to force the blame on the FCC," says John Wolfe, director of public information, at the NCTA. "We still have to work with the FCC in the future."

Yet, a lot of systems do have a program or plan in place. Comcast has a kit that includes spots which can be tagged, bill stuffers, a media plan and question-and-answer sheets for customer service representatives. Times Mirror Cable TV has an actual Syndex Handbook which is in the hands of all its general managers. Sammons Communications has already implemented its program with statement stuffers and letters to broadcasters asking if they're intending on submitting syndex requests. And Rifkin and Associates is incorporating all these aspects into a program which is now in effect.

"Somehow or another, we need a message that tells the consumer what's going on here," says Pete Smith, vice president of engineering at Rifkin. "We don't intend the message to be mean or nasty, we just simply want a message that says the program is being deleted because of FCC rules. We're trying to get some of the blame off of us, but we also fully realize that we're going to get some phone calls.' So we have an internal training job to do, which is going on at this point."

But while this is happening, systems are also focusing on what is considered the largest problem of syndex—what to switch and the alternative programming to use. "We can't really go far enough in our research until probably later in December," says Smith. "That's the problem I think we all have right now. Nobody publishes schedules two months in advance. They publish them a couple of weeks in advance. The old rules held that local stations had to tell me where the offending signal was coming from and which station it was on. Now, all they have to do is tell me what program they have the rights to and then I figure out where the programming is and delete it. I can't tell you where that is right now because it's too early."

Comcast's Scott also sees this as a major difficulty in scheduling movies. "It's tough to know how movies are going to impact until the actual schedules come out," states Scott. "This is all preliminary because we're basing this on TV schedules as they look today and come January 1, I don't know what distant stations plan to air nor do I know what local stations tend to air. But that doesn't really matter, they have the rights to it."

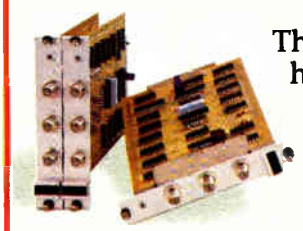
An administrative headache

Even as the schedules are published, the problem of finding the programs and validating requests are turning syndex into an adminstrative nightmare. A valid request means that the broadcaster requesting protection has lived up to all letters of the law; they've provided all the contracts cable systems are legally allowed to request and have fulfilled their obligation. Once the request is validated, the system then needs to work on finding the program.

"The biggest aspect, or impact of syndex, is in the administrative/clerical areas," says Tom Jokerst, assistant vice president and director of engineering for the Illinois-Iowa-Missouri region of Continental Cablevision. "I think we can handle any switching requirement we've got. The real work aspect is going to be involved in inputting the requests and managing the information side of the equation. The issue will also be complicated to the degree that people substitute programming. If all you do is substitute a character generator, that's not a big deal compared to substituting programming from a satellite."

Although equipment to do the actual switching is not seen as a stumbling block to the syndex dilemma, there are those who feel the final equipment decision is impacted by these adminis-

Introducing Syndex peace of mind... it's all in the cards.



The Trilithic 7RS is a modular headend reconfiguration system. With it you gain total control and unmatched programming flexibility– Syndex or no Syndex.

Modular. Flexible. Expandable. Trilithic offers you a broad range of modular, interchangeable switch cards. You have the flexibility to tailor the 7RS functions to suit your needs and expand it whenever necessary. Much like a headend, the variety of configurations is almost endless.

Technology Working For You. The technology used in the 7RS puts total control at your fingertips. It can be operated manually or through any IBM compatible computer under control of scheduling software or by keyboard command for general reconfiguration.

Hardware options and Software functions

Our vast array of cards execute the following switching and other functions:

- Stereo Audio
- Baseband
- RF
- Contact Closures
- Satellite Receiver Frequency Tuning
- And much more

Our switching products interface with "CASEY"* software which offers features such as:

- Scheduling
- Contract information
- Trilithic switch interface
- Management reports
- Program data base interface
- Plus a lot more

* Trilithic is an authorized stocking distributor for "CASEY" software.

"CASEY" is a trade name of Telecommunication Products Corp.

See us at the Western Show, Booth #1509.

Reader Service Number 39

For more information, about the Syndex solution, call or write:
Trilithic/Texscan ■ 9202 East 33rd St. ■ Indianapolis, Indiana 46236 ■ 317-895-3600
800-344-2412 Outside Indiana ■ FAX: (317) 895-3613 ■ TELEX 244-334 (RCA)

TRILITHIC

IBM is a trademark of the International Business Machines Corp.

trative problems. "What really happens," says Bob Saunders, director of engineering for Sammons Communications, "is you end up buying equipment based on the software capabilities to sort out these programs and give you exposed programs that you have to switch out or supplement. And that is what's driving the industry right now," he adds, "the software capability to sort all this mess out, rather than the hardware that actually does the switching."

A worse problem

While they may not be panic-stricken about syndex, there are others in the industry who feel there may be an even greater problem—network non-duplication. Non-duplication simply means a cable system carries a network program as opposed to a syndicated program. Local stations that have either a 35-mile market in major markets, or a 55-mile market in minor markets, can request protection from those programs from distant stations. Under syndex, distant stations are protected from these requests if they can put a grade B contour over any part of a cable system or if they're significantly viewed in that county.

However, with network non-duplication protection, the only protection that a distant station has is significant viewership in the county. Since grade B contours do not give protection, the request must be honored. "If I'm carrying two NBC networks and one of them is within 35 miles," says Rifkin's Smith, "he can ask me to black out the other guy. That could be a big problem for me, especially if I've been carrying the other NBC (network) for 15 years."

"In some cases," says Dave Anderson, vice president of public affairs for Cox Enterprises, "non-duplication can be worse than syndex. What we will probably do, where we have those kind of requests in prime time, is merely black out the imported signal and duplicate the local signal so it's transparent to the customer. It makes it a little more difficult in non-prime time, you may have holes in your lineup, but we will probably just go to blackout."

Do you have equipment?

Whether it's for syndex or network non-duplication, every cable system will still have some switching requirements. The problem now is whether there will be enough equipment to meet the demand come January. Although some operators, like Comcast, want to wait until spring of 1990 to "see what the universe looks like and how subscribers react before making any serious hardware commitment," others have been waiting for the results of the court hearing.

Once it was ruled the cable industry would not be granted a stay, "there seems to be more interest now," says Mike Watson, vice president for Channelmatic, referring to the increase in orders for syndex related equipment. And Telecommunication Product's National Sales Manager Tom Russell agrees. "It's picking up real quick now. Everyone was kind of hanging loose on that last court hearing but now we're getting a lot more activity."

Unfortunately, the timing for the increased interest may be a little late. With less than a month to go before the syndex deadline, the possibilities of having syndex gear up and running

by the first of the year are slim. "We won't be able to meet demand by January 1," says Brian Ives executive vice president for Monroe Electronics. "What we did was readjust our thinking based on the orders we had a couple of months ago. Since it was not at the level we had anticipated, we cut back in our planning. What that really meant was we didn't place orders for parts and so forth and some of these parts have 10- to 12-month lead times. We have a bit of flexibility," continues Ives, "but there are going to be people who will place orders that will not get them until probably the end of the first quarter."

Ken Lawson, manager of cable products for Quanta, also feels its All Channel Messaging System will not be able to meet the demands of all its customers by December 31. "We will have a production run in December which will meet some of the demand," says Lawson. "But it's true that we cannot meet all the demands by the end of the year."

Still, others feel the demand will not be a problem. "We are gearing up and setting up production levels," says CableCom Specialist's President, Art Leisey. "We don't foresee any problems but the more days a cable system waits (to order) that needs 20 or 30 pieces of equipment, they're going to be backed up on the production line. They may get their equipment by December 25, but it doesn't do much good because they have to install it."

And Kevin Mackenzie, president for JD McKay Corp., sees no problems with delivering syndex applicable gear. "We can more easily deliver, in quantity, on a short notice at the end of the year, unlike others, because we're using off-the-shelf equipment that's produced in quantity for other purposes. We accelerated the introduction of the product because we saw the fact that there was a need for syndex gear that wasn't going to be able to be met."

Jerry Salandro, president and CEO of IRIS Technology, does not even plan to fully introduce its Video Commander until the National Cable Show next year. "I really don't think anyone is going to try and solve the problem (right away). They're going to get a 60-day notice to comply and they're going to solve it the simplest way possible. That's going to be an A/B switch which is a short-term (solution). We don't want to be attached to that business, even though we can solve it. Syndex is a simple solution, the cable people just don't realize how simple it is right now."

"I think the real problem is going to come in that many people have not gotten their data together yet," says Russell. They need to get their system specific information in and do some off-line testing prior to doing actual switching. That's where the problem is going to be."

Regardless, it's comforting to realize syndex is not as bad as originally forecast. With January fast approaching, "I expect there will be an awful lot of confusion," says Paul Wedeking, vice president of corporate affairs for Times Mirror Cable TV. "Hopefully, the FCC will recognize that and give the broadcasters—who are legitimately trying to play by the rules, and the cable operators, who are trying to figure out the rules and implement them—a little bit of latitude in trying to administer the rules early on." ■

—Kathy Berlin

ADVERTISEMENT

SYNDEX CALLBOOK

The following companies have paid a fee to have their listing appear in the Syndex Callbook.

Ad Systems . . . . . .(801) 263-1661
6138 S. 380 W
Murray, UT 84107
PERSONNEL: Bob Hall, Vice President
DESCRIPTION: The Ad Lieutenant—Syndex Application (ADL 100C) is a four channel real time PC based switcher with built in VCR control. Substitutes either a recorded program or other source such as a character generator. Can be programmed locally or remotely. By filling with an ad simulated taped segment, Syndex can be profitable.

Monroe . . . . . .(716) 765-2254
Electronics Inc.
100 Housel Ave.
Lydonville, NY 14098
PERSONNEL: B. Ives, Director of Marketing; R. Phillips, Applications Engineer
DESCRIPTION: Manufactures time/tone/remote switching equipment, commercial insertion equipment, cue tone encoders and decoders, emergency override systems, telephone couplers, DTMF encoders and decoders, remote control and status monitoring systems, audio/video switches.

Quanta Corporation .(801) 974-0992
FAX . . . . . .(801) 974-5147
2440 S. Progress Dr.
Salt Lake City, UT 84119
PERSONNEL: David Keller, President; Ken Lawson, Marketing Manager, Cable Products
DESCRIPTION: "Syndex Plus" is the first video and audio ALL CHANNEL MESSAGE SYSTEM with switching. An IBM™ compatible computer schedules both switching and advisory messages. Each 1-3/4 inch rackmount contains four switchers. Each three input switcher contains its own genlock character generator/titler and contact closure output. $550 per channel plus computer.

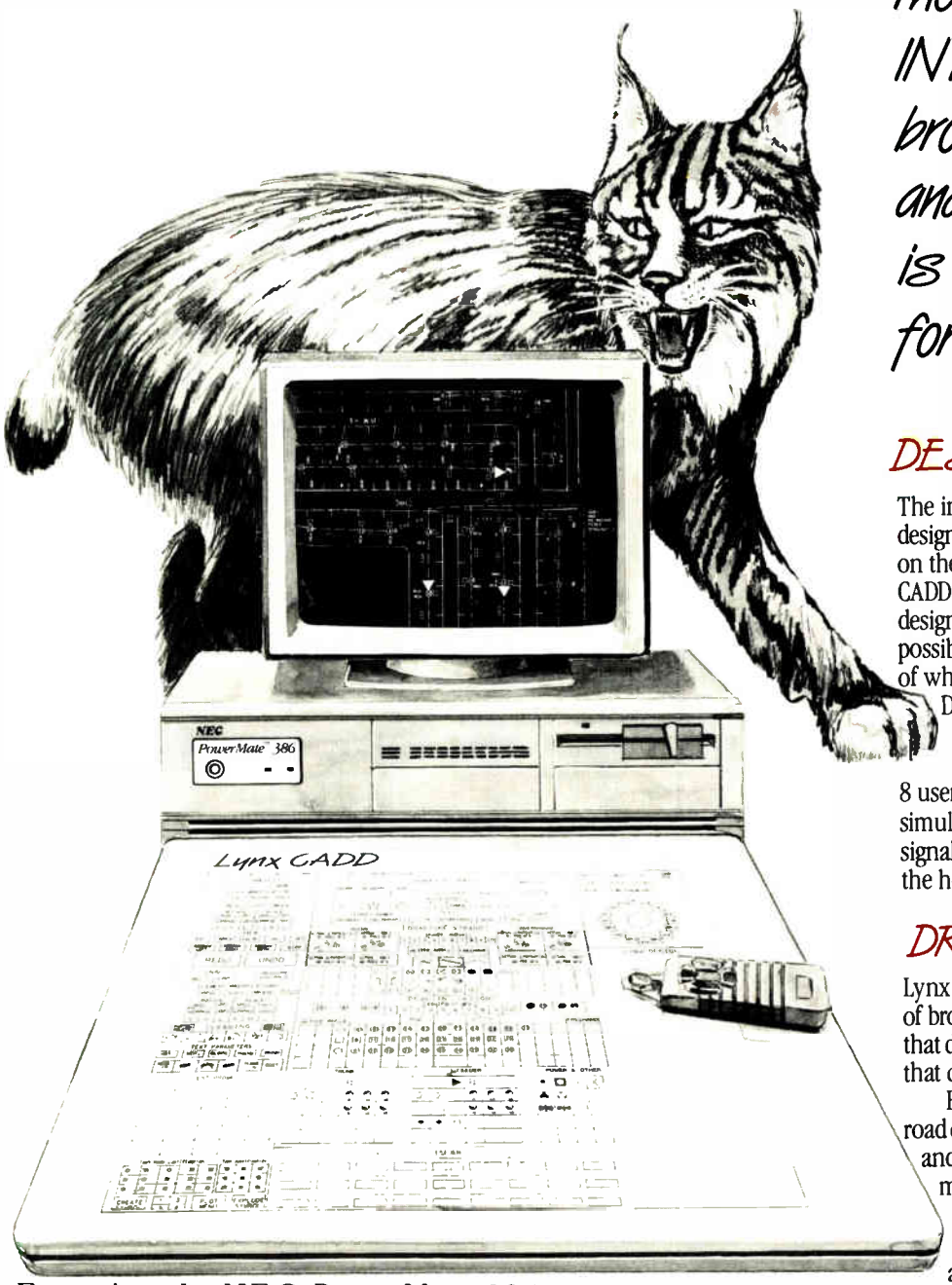
RMT Engineering . . .(800) 228-0633
FAX . . . . . .(408) 773-0937
625 E. Taylor Ave.
Sunnyvale, CA 94086
PERSONNEL: Charles Blanchard; David Jarvis, Sales Rep
DESCRIPTION: Control your headend switching from any touch-tone telephone! Call the GENESIS™ switcher from J.D. McKay and it responds to you with an easy to understand human voice. GENESIS™ offers everything you need to comply with the new regulations: switching equipment, Syndex Manager control software, and much more!

TV HOST . . . . . .(717) 657-1700
FAX . . . . . .(717) 657-2921
3935 Jonestown Rd.
Harrisburg, PA 17109
PERSONNEL: Frank Dillahey, Harrisburg (717) 657-1700; Jeanne Benecke, Portland (503) 241-9099
DESCRIPTION: HOST, Hands Off Syndex Transmission, is a Database Package utilized to determine SYNDEX conflicts. All valid exclusivity requests will be computerized and merged weekly with programming of monitored stations in our extensive programming database. A conflict report can be delivered via mail, PC disk or phone line.

Telecommunication .(717) 267-3939
Products Corporation (TPC)
FAX . . . . . .(717) 261-1162
1331 South Seventh St.
Chambersburg, PA 17201
PERSONNEL: Tom Russell
DESCRIPTION: CASEY is a menu-driven software package that runs on any standard IBM PC or compatible. It is designed to: perform notification validation; receive switch schedules automatically (HOST database service); control hardware switches (Monroe, Trilithic); provide switch verification. CASEY is friendly, easy to use, and provides a solid paper trail for FCC syndex compliance.

Trilithic, Inc. . . . . .(317) 895-3600
WATS . . . . . .(800) 344-2412
FAX . . . . . .(317) 895-3613
9202 E. 33rd St.
Indianapolis, IN 46236
PERSONNEL: Terry Bush, Greg Marx
DESCRIPTION: Trilithic offers a modular headend reconfiguration/syndex switching system. Interchangeable switchcards available include A/B switching formats for RF, IF and baseband video and audio with stereo. Other utility cards available include contact closure and satellite receiver tuning. Trilithic switching products interface with "Casey" software from Telecommunications Products Corporation.

Run with the Lynx!



Featuring the NEC PowerMate 386.

The most powerful INTEGRATED broadband design and drafting package is now available for your PC . . .

DESIGN. . .

The intelligence of Lynx CADD gives the designer the power to calculate design right on the map. Simply specify the area and Lynx CADD automatically calculates the optimum design for you. Or, explore alternate design possibilities simply and quickly for any type of what-if situation.

Detailed Bill of Materials are produced automatically.

With Lynx CADD, up to 8 user-specified frequencies are tracked simultaneously. And it is possible to monitor signal from a subscriber's house back to the headend.

DRAFTING. . .

Lynx CADD has taken the basic functions of broadband drafting and created features that dramatically increase the number of miles that can be mapped in a day.

For **base** mapping, Lynx CADD has a road command with easy intersection cleaning and a MAP/CUT command which will automatically divide a topo, utility or tax map into the individually desired maps.

For posting **strand**, commands are available for automatic placement of text for footages, house counts, addresses and pole numbers.

If **design** is posted manually, the SCTE standard symbols are included for your use.

Call (404) 448-0977 or (800) 333-LCAD today for more information on this powerful PC-based system for broadband design and drafting.

A.D.S.
Automated Drawing Systems, Inc.

3150 Gateway Drive, Suite 700
Norcross, GA 30071

Reader Service Number 44

Performance Building Blocks

ISS STACKS UP

Our exceptional lineup of frequency agile performers is engineered to work together to give you outstanding performance and the quality and innovative feature design you need now. In fact, you may be surprised to find that the performance attained with our agile equipment is not only comparable to conventional fixed channel equipment, but often superior. And it's all backed by the ISS full three-year parts and labor warranty.

Series III Agile Modulator

The introduction of the ISS Series III Agile Modulator makes it no longer necessary to use a fixed channel modulator to obtain the performance you require. That's because our in-band and out-of-band carrier-to-noise ratios and phase noise measurements are better than what you can measure with most spectrum analyzers!

- **Now more than 60-channel operation without the need for external bandpass filters!**
- 80dB out-of-band carrier-to-noise ratio
- Greater than 74dB in-band carrier-to-noise ratio
- Phase noise measurement surpasses the 1988 NCTA Pidgeon and Pike recommended specification
- Pre-emphasis on/off switch allows for BTSC for normal audio inputs
- Agile from 2 thru WW with optional agility from Channel T7 thru 550 MHz
- Offsets plus or minus selectable
- Audio subcarrier phaselocked to a crystal ensures FCC-required intercarrier stability
- RS-232 remote control available

GL-5020 Satellite Receiver

Our U.S. made GL-5020 Satellite Receiver comes equipped with a plug-in VideoCipher® II Descrambler module installed up front- - where it belongs. This gives you fast, easy access to the address number through a translucent front panel window. And the back of the GL-5020 receiver features the cleanest rear panel design in the industry, making it simple to connect and easy to read.

- Front panel VideoCipher®II Descrambler
- Easy-to-read address number
- C-, KU-, L-band tuning by channel or frequency
- Generous ventilation ensures cool operation
- Meets RS-250B standards
- Remote control via built-in RS-232 port

GL-1000A Series Demodulator

The backbone of the ISS MSII Processing System, the GL-1000A Demodulator provides the cleanest, clearest video performance available for local off-air channels when combined with the Series III Modulator. Its simplicity of set-up, ease of operation and agility, coupled with a wide variety of options make it truly flexible.

Features

- Nonvolatile user-programmable memory
- Broadcast version available
- Tunes all VHF, UHF, and cable channels (STD or HRC)

Options

- -01 4.5 MHz Audio on Video
- -02 T Channel (Subchannels)
- -03 Separate Audio/Video IF

For more information, please call or write:
ISS Engineering, Inc.
1047 Elwell Court, Palo Alto, CA 94303

ISS West Toll-free (800) 227-6288
(415) 967-0833 FAX (415) 967-0772

ISS East Toll-free (800) 351-4477
(205) 853-6919 FAX (205) 854-4581

ISS
ENGINEERING, INC.

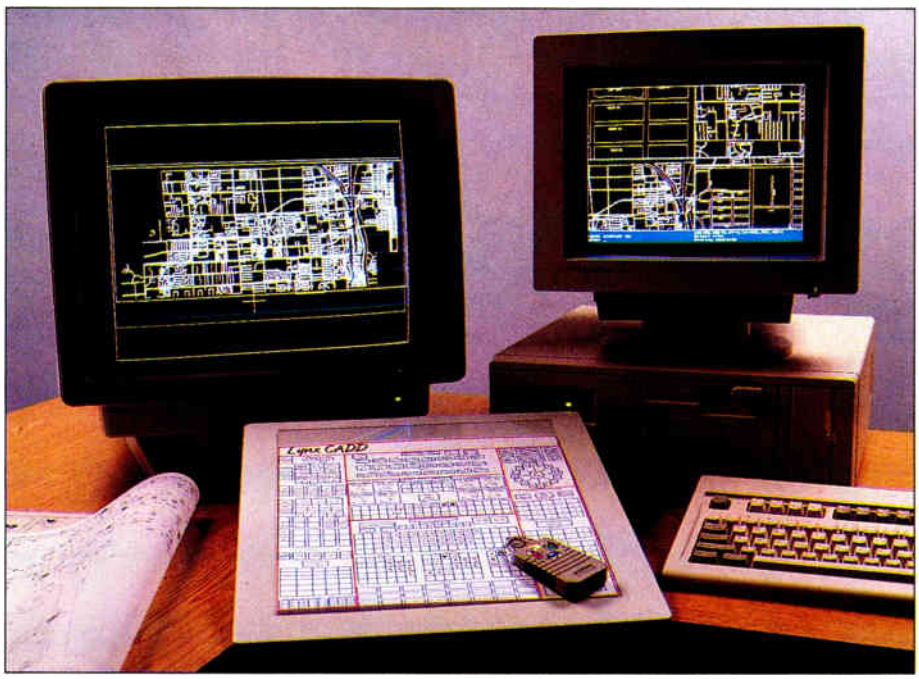
We Simply Bring Communications Down to Earth.

Using CADD to rebuild

With the concentration in the CATV industry now centering so heavily on rebuilding weak, damaged or outdated systems that were installed years ago, more and more companies are considering CADD—computer-aided-drafting-and-design—to handle the increasing workloads.

Years ago, the average MSO could get by quite well with the general CAD system. However, in today's competitive market, it isn't enough for a computer system to be able to draw a line or to place text at an angle. The progressive MSO's need a CADD package that will address their specific CATV needs immediately...not an "off-the-shelf" package that they must spend weeks and months attempting to conform to their desired standards.

CADD is also being used as a way to reduce the costly design and drafting time that is normally required in traditional mechanical drafting procedures necessary for rebuild and newbuild.



A dual monitor configuration allows monitoring of eight different views simultaneously.

This rapidly growing method of CATV mapping and design is still relatively new to the cable industry. Although a variety of general drafting-only or design-only software packages have existed for several years, there have been new affordable, customized, PC-based systems that actually integrate the drafting *and* design for cable television mapping.

A database advantage

The primary advantage of an integrated system is that an intelligent, working database is generally created from information provided during the drafting phase of a map. Later, that information can be used to calculate the optimal system design and post it directly on the map.

Information on house counts, pole type, pole number, strand footage and pole connections can be fed directly to database files that will generate reports such as bill of materials, parts lists, pole counts, strand footage and pole connection checks.

If a system boasts automated procedures such as running strand and cutting maps, the operator can save a tremendous amount of time performing the base and strand drafting. Efficiency and productivity will naturally increase as the user becomes more and more familiar with the operation of the system.

By computerizing the drafting and design process, less time is wasted on continually drafting maps by hand. Paper maps can be bulky, difficult to store for long periods of time and often sadly out of data. A CADD system allows for constant updates and changes concerning data found in the field.

For instance, new field maps with the latest information can be plotted in moments, showing various levels of the same drawing, while a drafter might need hours to produce the same maps by hand. Instead of working with outdated and awkward 24 inch by 36 inch drawings, a field technician is able to have manageable 11 inch by 17 inch drawings that can be continually updated with new information as needed. And finished CADD maps can be stored on floppy disks rather than paper.

When the time arrives to shop for a CADD system, there are a number of features and capabilities that should be taken into consideration.

- A CADD package should be able to take a large tax or topographic map and cut it into several smaller base maps.

This feature can literally save hours of a drafter's time, since it allows an operator to take a new or existing topographic map and have it automatically cut it into a user-specified number of accurately dimensioned base maps, with map to map integrity of major roads and highways.

- Smaller maps should be able to be re-joined into one large map. After running strand on the base maps, the user should be able to add them together to form a large system map.

- Smaller maps should be able to be re-joined into one large map. After running strand on the base maps, the user should be able to add them together to form a large system map.

- Automatic intersection cleaning. Intersecting, overlapping roads can be cleaned as simply as drawing a "window" around the intersection.
- Double screen viewing. By adding an optional monitor and graphics card, two separate views can be displayed simultaneously. One screen can show the entire map while the other shows a zoomed view of the area being posted.
- Symbol creation. Customized symbols can be created in the software for special applications or uses.
- SCTE symbols should be avail-

By Automated Drawing Systems Inc.

MAKE THE CLEAR CONNECTION

U S WEST Communications Fiber Optics Technology for the Cable TV Industry

U S WEST Communications is ready to become a player on your team! With our winning combination, you'll keep ahead of the game.

Our experience in fiber optic technology has prepared us to meet the needs of the cable television industry today. Our 14-state region covers one third of the nation, from Canada to Mexico, and includes Arizona, Colorado, Idaho, Iowa, Minnesota, Montana, New Mexico, North Dakota, South Dakota, Nebraska, Oregon, Utah, Washington and Wyoming.

U S WEST's Cable TV Industry Marketing Group welcomes the opportunity to work with your system engineers for possible video transport alternatives.

Teaming up with U S WEST Communications offers you:

- A cost-effective solution for your video transport needs.
- Replacement of AML microwave links with multi-channel video services.
- Increased channel capacity.
- Superior signal quality.
- A streamlined ad insertion network.
- Field proven ANI/PPV Order Entry Service.

Come talk to us at booth **#1262** at the Western Cable Show in Anaheim, California! Representatives will also be available to review our ANI Order Entry product. If you are not planning to attend the show, please call us at **(303) 896-4691** or **(303) 896-2942.**

USWEST COMMUNICATIONS

Making the most of your time.™

Reader Service Number 42

able. All of the nationally recognized SCTE standard symbols should be available in the software.

- Intelligent database. This is perhaps one of the most important aspects of a combination drafting/design CATV software package.

As the drafting is performed, it is necessary to have an intelligent database to assimilate the information regarding house counts, pole types and pole numbers, strand information, etc., so that the design portion of the system may utilize the most accurate data possible to provide the optimum design structure on a drawing.

- Automatic aerial and underground strand. Look for a system with automatic aerial and underground strand functions. As strand is posted, the screen should keep panning to keep the last pole centered in the screen.
- Provides the optimum design based on the information acquired. One of the most important features of a CADD system is the ability to design the area being mapped. Look for a system created to eliminate the wasted time of "second-guessing" or "what-if" situations, while still allowing the operator to override.
- Relatively easy to learn. The CADD system that is chosen should be written for the novice user, with training and documentation to support the learning process. Regardless of how powerful a system is, if it is difficult to learn and master, or if the documentation is poorly written, efficient production will be hard to obtain.

A cordless puck input device and overlay template.

- Support and training package. There will generally always be questions regarding usage and application of the system. If a support package is offered, it is wise to take advantage of it. Likewise with training—a few days invested on training will help maximize the performance of the drafter and designer.
- Consistent output and a professional, clean final product. The output of a CADD system is seen usually via a plotter. The plots should be consistent, easy to read, and always present a professional appearance. Examine a sample of a drawing that has been created on the software you are considering.
- Adapts easily to customized needs. Since all CATV systems will vary somewhat, the CADD package purchased should be readily adaptable to a variety of things such as creating user commands and symbols.
- The package should be CATV customized for maximum performance with minimum input by the user. Since the CATV industry is fairly standard, it makes sense to buy a CADD package that has already customized the majority of functions and symbols for the user, and accounts for information such

as potential and actual house counts, aerial and underground strand, risers, utility companies, drafting strand and base, etc.

- Report generation. It is helpful to purchase a CADD package that can generate several reports with the database information, such as pole information, house counts, bill of materials, parts lists, etc.

Components

The following are among the basic components that you will need to consider when purchasing a total CADD system.

1. **Plotter.** Plotters range from A (9 inch x 12 inch) to E (36 inch x 48 inch) size drawings and vary in price as well as speed. The faster the plotter, the quicker drawings can be generated. Plotted drawings should be clean and consistent.

2. **Computer.** The most popular computer seems to be the 80386 DOS system running at 20 or 25 megahertz. Although this is adequate for most drafting needs, there are some applications that may require more speed and power.

3. **Digitizer.** Although there are several methods of inputting an existing map into CADD software, the most practical way for the CATV industry appears to be digitizing.

This illustrates the detail of the design.

Digitizing is simply tracing over an existing map or drawing and by specifying lines, arcs or circles, recreating that drawing in the software. The new drawing will then be treated the same as a brand new drawing by the software.

Equipment can be purchased to perform in-house digitizing or the work may be contracted through a digitizing services.

4. **Monitor/Graphics.** An oversize monitor and a high resolution graphics card are a tremendous help to a drafter or designer who spends the day in front of the screen. A dual monitor configuration is also useful for splitting the screen views.

5. **Template/Digitizer.** Digitizing tablets with customized overlays used in conjunction with a stylus or a puck are very common input devices.

Although you may very well save money by price shopping each and every component of your CADD package, there are important advantages to purchasing a bundled system. Generally, the business selling you the hardware and software will offer support or assistance on all the component pieces. Whereas, if each item is purchased separately, it may be difficult to obtain quality support quickly.

With the magnitude of cable miles to be built as new or as rebuild, the right CADD package can produce rapid results while saving time and money over conventional drafting and design methods. ■

PEOPLE

Pioneer names new director

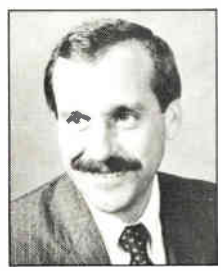
Pioneer Communications of America, Inc. announced the appointment of **Thomas W. Holder** as director of the cable television division. Holder will report directly to Pete Imamura, president of Pioneer, and will oversee all cable division operations, including sales, engineering and marketing. Holder was previously corporate vice president of sales for Texscan Corp. for four years and director of Western sales for Oak Communications for 12 years.

Thomas W. Holder

Abe Jacob has joined **Jerrold Distribution Systems Division** of General Instrument as vice president of engineering. Jacob, who has been with General Instrument for 20 years, has served as vice president of engineering for the Transportation Electronics division and vice president of networking for the Computer Products division. Jacob also served as Jerrold's manager of RF design in the area of converter development.

Abe Jacob

C-COR Electronics has appointed **James E. Bedison** as the new plant manager for C-COR's Altoona manufacturing facility. Bedison was most recently plant manager for GTE Products Corp. Prior to his employment at GTE, Bedison held the position of Chief of Operations for APC Skills Managment Consulting Company.



James E. Bedison

In other news from C-COR Electronics, **Tom Gingrich** has been named regional account executive for the Cable TV group. Gingrich is responsible for sales of C-COR's line of distribution electronics, power supplies and system design services for cable television systems.

PEOPLE

Steve Fox

Steve Fox, formerly Cable Marketing Manager with Wegener Communications, has joined **Mega Hertz** as Eastern regional manager. Fox will be responsible for expanding distribution product sales to cable operators throughout the U.S. as well as new business expansion into broadcast markets.

ISS Engineering, Inc. has announced the appointment of **Karl Witbeck** to the position of vice president of engineering. Witbeck is a graduate of California Polytechnic State University and was formerly a systems engineer at RFI Electronics.

Michael T. Dowling

Lindsay Specialty Products has named **Michael T. Dowling** as national sales manager for the company's CATV product line. In the position, Dowling is responsible for sales and marketing operations in the United States. Dowling was formerly Lindsay's Eastern U.S. regional sales manger.

Scientific-Atlanta, Inc. announced the appointment of **Raymond D. Lucas** to the new position of senior vice president, strategic operations and chief strategic officer. Lucas will be responsible for directing and coordinating business planning and new business development activities. Lucas was previously vice president for planning and business development of GTE.

Diamond Communication Products, Inc. has announced changes in its executive ranks. **Frank W. Pepe** has been appointed president. Pepe has been affiliated with Diamond since 1980. **Robert W. Muir, Jr.** formerly president and CEO, will remain as Diamond's Chief Executive Officer.

Tom Walsh has been named to the position of vice president of business development for **Channelmatic**. Walsh was Channelmatic's executive vice president for the last seven years. As Vice President, Walsh will oversee product, systems, and customer support management, including new product development and technical documentation.

Cable Link, Inc. has announced several new positions. **Tina Belz** has been named senior account executive managing sales in the north and west states including California and Canada. **Jack Ebright**, account representative, shares a sales territory of Pennsylvania, Colorado, Washington, Oregon and the Southwest states. **Marci Smith**, account representative, will be sharing territories including Florida, Alabama, Tennessee, Mississippi, Louisiana and part of the Western states. **Byron Johnson**, account executive, shares a territory including Ohio, Georgia, North Carolina, South Carolina, North Dakota, South Dakota, Wisconsin, New York and the New England states.

PCO Inc. announced the appointment of **Robert C. King** as vice president, market and business development. King will be responsible for managing the company's marketing, sales and new business development activities.

Steven R. Brazil

Midwest CATV, a division of Midwest Corp., has appointed **Stephen R. Brazil** as vice president of marketing. Brazil comes to Midwest from Hudson Supply where he was vice president of sales. Prior to Hudson, Brazil was with Cable TV Supply Company as director of sales.

John A. Johnson

Also announced by Midwest is the promotion of **John A. Johnson** to vice president of materials. Johnson was previously purchasing manager for Midwest. Prior to that, Johnson was corporate manager of purchasing for Cox Cable.

Drop Shop Ltd. has named **Jim Ruh** as president. Ruh will be responsible for directing and monitoring all aspects of the company's operations, including sales, marketing and purchasing. Ruh joined Drop Shop in April, 1989, as senior vice president. Ruh was previously with Anixter and Tele-Wire Supply.

Chuck Evans has been appointed Midwest regional sales manager at **JVC Professional Products Company.** ■

—Kathy Berlin

Connecting with interconnects: A primer

It's common knowledge that the primary marketing appeal of cable advertising lies in its ability to offer the advertiser a better investment through demographics. The wide range of specialized network programming, such as sports, family entertainment, playhouse dramas, business news, etc., offered to the cable subscriber allows an advertiser to purchase time on the program best suited to its product.

On the other hand, broadcast television's programming is designed to reach the largest common denominator. If the advertiser wants to sell soap, he should go to broadcast, but if he wants to sell Mercede Benz's to Culver City, Beverly Hills and Irvine, he should come to cable, or better still, find a cable interconnect.

What is an interconnect?

An advertising interconnect can be defined as a business agreement in which one or more cable operators combine one or more regional markets, thereby increasing the number of viewers an advertiser can reach without having to individually contact and place orders with each cable operator in each market.

The following is a brief explanation of the three types of cable advertising interconnects: hard, soft, and hard distribution/soft playback, and the advantages/disadvantages, if any, of each.

The hard interconnect

Terming an interconnect as "hard" refers to the use of a central point of origination for all advertising playback. Commercials are distributed via a hard path to each cable system participating in the interconnect. This path can be microwave, satellite or cable plant, to each system. The same commercials are run and distributed to all systems at the same time (see Figure 1).

The advantages of a such a system include:

- Lowest playback equipment cost.
- Lowest equipment maintenance cost.
- Simple management of trafficking schedules.
- Interconnect management of insertions.

On the other hand, there are also several disadvantages, including these facts:

- Serves only the largest regional advertiser.
- Denies the local cable operator local promotions.
- Cannot serve the smaller local advertiser.

The soft interconnect

Method 1. A "soft 1" interconnect requires the use of insertion hardware at the site of each participating system. This equipment may be from various manufacturers.

The interconnect manages the sales and acquisition of the commercial material and sends a copy of each ad to each system. Each cable system then edits the commercial into the spot reel of other commercials they have sold on a local level. An affidavit of performance is submitted to the interconnect management group, and the interconnect bills its client and distributes the appropriate commissions.

The advantages of this scenario include:

- Allows local ad sales activity by the cable operators.
- By using existing hardware, virtually no up-front equipment costs are incurred.

Meanwhile, the disadvantages are:

- Distribution of individual client tapes lengthens commercial airing lead time.
- No control of insertion hardware.
- Relies on cable operator to correctly air the spots and submit the affidavit to ensure timely billing.

Method 2. This type is similar to the first soft interconnect method, however, the "soft 2" interconnect group installs all the necessary hardware and performs all local and interconnect cable ad sale functions. The interconnect then delivers a complete spot reel to each location, including all commercials required to air. The interconnect transmits the appropriate schedule to the hardware and retrieves the logs that the commercials run. The interconnect now has full control of the business.

The advantages of this method are:

- Supports local, regional and national advertisers.
- Control of all insertion business activities, from sales to tape preparation to insertion to billing from a central location.

And the disadvantages include:

- Higher upfront hardware costs.
- Requires duplication and dissemination of a large volume of spot reels.
- Commercial air lead time is not improved.

Hard distribution/soft playback

An HDSP interconnect brings together the immediate delivery process of a hard interconnect with the selectable demographics by market of a fully developed soft 2 interconnect.

The primary uniqueness in this type

By Michael Watson, Vice President Sales & Marketing, Channelmatic Inc.

We carry your size.

CSR-191
controls one VCR for random sequential spot selection.

CSR-192
controls two VCR's for random or semi-random access selection.

CSR-294
controls four VCRs for random access selection during two minute breaks. It can insert spots on two satellite channels at mutually exclusive break times.

Advertising and engineering managers across the country demand the wide range of capabilities offered by ComSerter. Key benefits are random access spots, full stereo audio, direct spot search, automatic fail-safe modes, broadcast style switching, selectable end-of-break modes, video verification, advanced tape marking, simplified installation, automatic VCR timing adjustments, auxillary inputs, external processor loop, preview outputs, multi-tasking operating system and modular design as well as thorough training and support.
Our standards of quality and reliability have resulted in the selection of ComSerter being the commercial insertion equipment choice of 18 of the top 20 MSO's.

We're focusing on your future.

Texscan MSI

124 North Charles Lindbergh Drive, Salt Lake City, Utah 84116 / 800-367-6011 or 801-359-3077

Reader Service Number 50

of interconnect is that it manages and concentrates its efforts on the larger regional and national advertisers, affording the local cable operator control of its individual local ad sales activities. By co-locating an interconnect insertion system at each participating system, the two systems share the available advertising inventory.

Commercial spot reels for interconnect advertisers are uplinked and distributed to participants for automatic recording and playback (Figure 2). This process is similar to a hard interconnect's approach, however, unique demographics can be achieved by recording only those spot reels that pertain to given markets. The first of this type was recently installed in an interconnect in the Los Angeles area. The LA Interconnect's commercial spot reels are delivered via satellite for automatic record and insertion.

The advantages of this arrangement are many, including:

- Interconnect maximizing advertisers potential and matches advertisers demographics.
- Human error is removed from local cable systems.
- Shared avails allow for economical random access insertion.

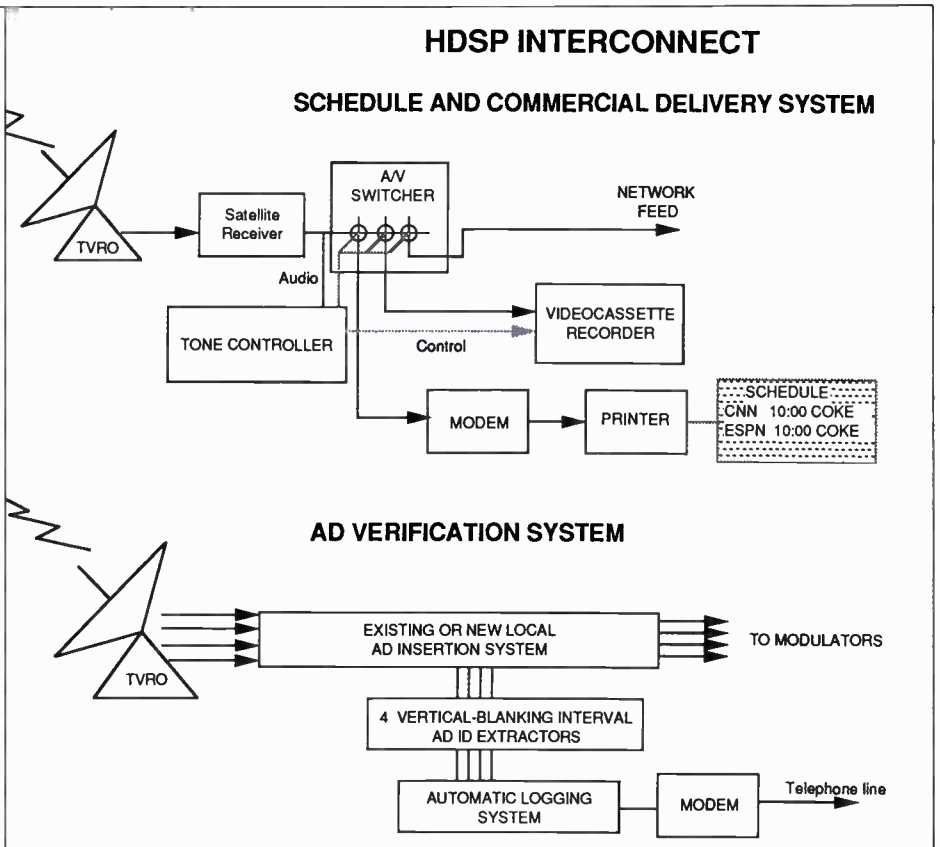


Figure 2

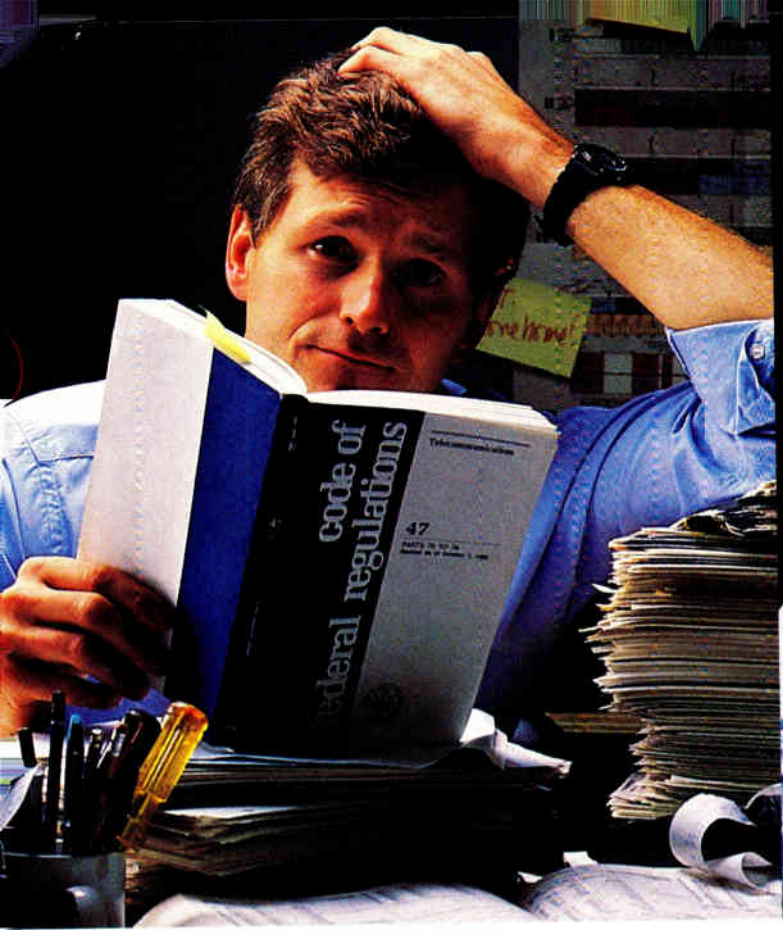
- Modest overall and per location equipment costs (especially in consideration of the labor burden of other interconnects).
- Interconnect management retains complete control.

In comparison with other current methods, there appear to be no disadvantages to this approach.

Interconnect configuration criteria

So how is the proper type of interconnect selected? First, some criteria has to be established, based on expectations of the interconnect's capabilities:

- Number of headend locations and the projected expansion capability.
- Number of channels of spot random access per location and number of field expandable channels.
- Any integration with existing local insertion hardware? What will be the manner of distribution (i.e., local-avail cuetones or A/V switching on-air)?
- What kind of interconnect trafficking and management system will be needed/wanted (i.e., centralized multi-user with full-scheduling and log-retrieval software interface)?
- What kind of installation and systems integration provisions? (Ide-



Don't worry. Be happy.

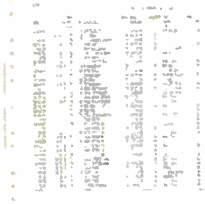
With the FCC's Compliance Regulations, the way you seek, find and document cable leakage is under careful scrutiny.

But compliance is simply a function of loading, documenting and repairing leaks. And locating and documenting leaks is simply a function of the right equipment.

CLM-1000 with CLIDE* is just what you've been waiting for.

The CLM-1000: Amazing.
If you had one instrument to buy to solve your leakage problems, this would be it. It measures field strength at any frequency from 50 to 550 MHz. At any range from 9 to 200 feet. And what it finds, it remembers, so you've got foolproof recall to simplify your documentation.

The end of calculated risks.
With just the push of a button, the CLM-1000 takes precise measurements. The dipole antenna receives signals as far as 200 feet and as weak as 20 μV/m. All you do is approximate and input the distance between the antenna and the leak. The system automatically converts the measurement to a 3-meter distance. No number crunching with conversion tables or formulas. No question about accuracy. All the information you need is displayed in an easy to read two-line LCD display, including analog level bar.



The CLM-1000 provides a detailed log—just for the record.

CLM-1000 digital readout takes guesswork and interpretation out of settings and readings.

As easy as rolling off a log.
The CLM-1000 contains a complete logging system. At the touch of a button you can store all the measurement data, leak location, date and time of measurement. Then you can print it out on site.

The CLIDE software can instantly transfer the CLM-1000's data and compute a system's Cumulative Leak Index. This and subsequent repair data is stored and printed to form an FCC leakage report log. It virtually puts an end to complicated paperwork and recording errors.

Just for the record, the CLM-1000 with CLIDE is the most precise, versatile and thorough field strength meter you can buy.

Compliance made easy.
CLI compliance doesn't have to be difficult. It's really just a matter of applying the right equipment. With Wavetek's CLM-1000 with CLIDE, you've got the right equipment.

Make it easy on yourself. Call Wavetek at 1-800-622-5515 for more information and the name of your nearest rep. In Indiana call 317-788-5965. Then, don't worry. Be happy.

*CLIDE is a product of Telecommunications Products Corporation.

WAVETEK®

Stop by the Western Show Booth 116 for your CLI testing notes.

Reader Service Number 51

ally, the labor assistance arranged by the interconnect should be a systems engineer or a technician familiar with cable headends. This labor assistant could be required to execute headend preparations and make-ready cabling.)

- Should each interconnect insertion system be pre-wired? Number of channels at each? Supplied as a turnkey package?
- A/C back-up, line-conditioning power supplies, or error-correcting modems with the headend components should also be considered. A headend-by-headend investigation should be conducted by an engineer to determine which headends, if any, require uninterruptible power supplies, power conditioning or error-correcting modems.

The process of interconnecting

So how exactly does an interconnect work? For simplification sake, we'll look at the techniques behind the last method of interconnecting discussed, the HDSP.

Spot-reel delivery via satellite. The technological capability of the cable interconnect discussed here extends to automatic recording of commercial spot-reels, transmitted via satellite (Figure 3).

The interconnect would either provide or use the existing applicable TVRO receiver with demodulated composite TV signal outputs at each headend, to include appropriate audio subcarrier demodulator modules and other audio processing equipment for commercial cue signal reception.

Management, maintenance and acquisition of satellite transponder time are usually the responsibility of the interconnect and its affiliates.

Headend signal distribution. The satellite receiver's audio/video output signal used for the spotreel feed will input a stereo A/V distribution amplifier. The outputs will feed the record inputs of the videocassette recorders. Any unused outputs will support system expansion of additional VCRs.

Cuetone distribution and cue-signal buffering for each network is distributed to both of the co-located insertion systems (interconnect/existing local). Audio distribution amplifiers and cue-signal buffer modules, installed in a rack-mount frame (which can be prewired for field expansion), perform the necessary cue-signal distribution.

With reliable distribution amplifiers with broadcast-quality specifications,the transmission of the interconnect avail cue signals will never be disrupted because of the parallel hook-up in the system design; the existing local insertion system or interconnect system failures would not affect each system's operation.

The record function. Time-dependent schedules, downloaded to each headend's channel control unit, will rewind the system's VCRs upon execution and place them in rewind. Allowing for a "worst-case" VCR-rewind period of five minutes or more (should the end of the tape be reached in the VCR), a second time-dependent event executes the record function of the VCRs. The system's stereo A/V distribution amplifier, which is hard wired, supplies the satellite feed to the record input of the VCRs.

Synchronization with the uplink transmission and each VCR in the system is extremely simple. One or more minutes ahead of uplink transmission, a control unit record function is executed, allowing for a leader. The uplinked commercial audio and video is preceded by a new beginning-of-tape marker, and then a new spot-reel directory. The directory contains the beginning and ending frame numbers for each spot on the reel, a three-digit spot position number, a five-digit advertiser ID number, a 20-character advertiser name and a 20-character commercial name. An optional tape volume index designation can be entered as well. If the volume index is encoded on the tape, it could be compared with the volume index specified in its active schedule. The volume indices recorded from the tape and entered into the schedule from the traffic system must match identically for insertion to begin. This ensures that the correct spot reel is in use.

The record function can support a global (interconnect-wide) recording of the same spot reel to all VCRs at all headends, or to headend/VCR specific spot reels. Once the record function is completed, the VCRs are automatically rewound, the active insertion schedule is mounted and the VCRs are cued to the correct spot position, ready for playback.

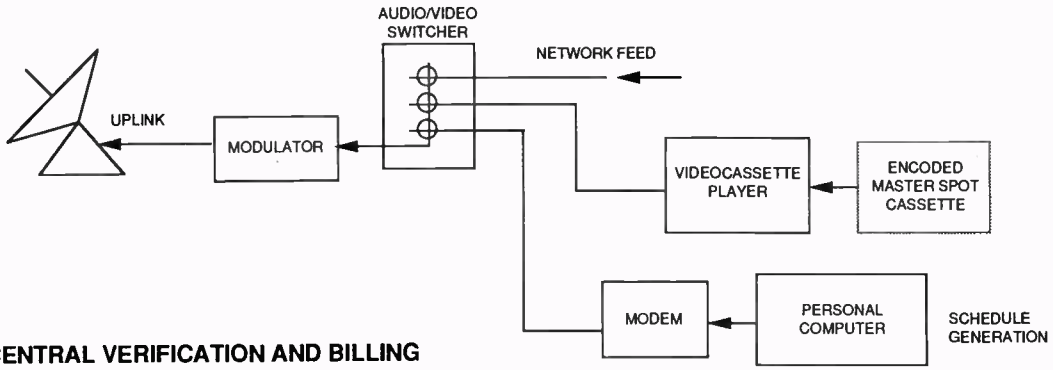
Playback insertion hardware. A typical insertion system for such an interconnect is made up primarily of these components (Figure 4):

1) A random-access inserter capable of controlling four VCRs on one or more channels simultaneously.

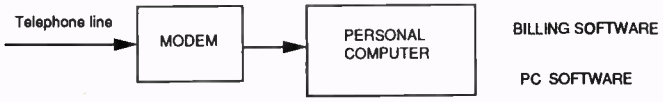
2) A channel control unit, designed to be a universal control device, which

HDSP INTERCONNECT

SCHEDULE AND COMMERCIAL DELIVERY SYSTEM UPLINK



CENTRAL VERIFICATION AND BILLING



TAPE ID ENCODING CENTER

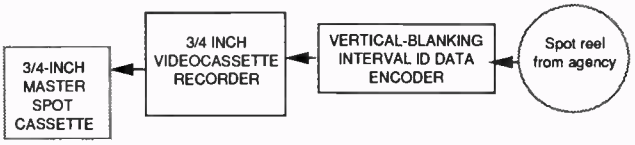


Figure 3

can control VCRs in a spot random-access fashion, and includes an external general-purpose interface to numerous switching configurations.

3) A network share switcher to perform cuetone decoding, VCR sync-lock and vertical-interval switching for up to four channels with one videocassette player as a source. Two switchers may be interfaced to one control unit.

Insertion hardware utility for a sample configuration

Insertion on: TNT, VH-1, USA, MTV, Nickelodeon, Lifetime, CNN. These seven networks, used here as an interconnect sample, provide minimally conflicting local availabilities. Four of these networks would occupy a network share switcher, with the remaining three on the second. The channel control unit would control two VCRs and could be scheduled to disable any individual channel from inserting by priority. This feature allows, within live premium programs (which fall outside of the normally scheduled timed-event window), fixed-spot positioning.

Insertion on ESPN. Dedicating a VCR and control equipment to ESPN to accommodate heavy use is recommended. Maximal spot inventory and fixed-position scheduling would be supported by a channel control unit and one VCR.

Spot-reel tape encoding. The insertion system's tape preparation and encoding process for the commercial reels is performed at a central location. The encoding components in this interconnect example include a terminal, a tape encoding unit, a frame-code generator and a VCR.

Encoding begins with a master encoded tape reel. This master tape incorporates the information described under "The record function." Generic descriptions are filled in all the data fields, such as "Spot Position 1 On Tape," etc. The tape encoder is a computerized device with menu-driven, self-prompting, control, test, status and diagnostic terminal display screens. Cables integrate these components, and the end result is a frame-accurate commercial spot-reel, ready for transmission.

Central control and trafficking

The central control system consists of three main subsystems and their respective software.

- Traffic software.
- 386 CPU file server with 386 workstations.
- Interconnect communications workstation.

Traffic software. Among an interconnect's trafficking software options include several software vendors capable of accomplishing this function. The uniqueness of the trafficking systems and vendor capabilities requires a direct line of communication to be established between the interconnect and the prospective software vendors for a proper evaluation.

The software vendor in an interconnect is usually responsible for the installation, training, support and maintenance of its respective product. Formal maintenance agreements can be arranged.

Interconnect communications workstation (386 CPU). The workstation, networked to the file server and traffic software, provides the communication functions necessary in sending schedules and receiving logs in all of the interconnect's insertion systems. PC software can be used for auto-dialing and transmitting insertion schedules and verification logs. These insertion schedules and verification logs are file-transferred to the file server's traffic software for processing.

Terminal. An on-duty terminal can provide the interconnect (when necessary) with headend insertion system status monitoring. Status can also be monitored with the software installed on the workstation. This terminal is supplied to prevent any conflict arising from all workstations simultaneously being in use.

Planning a key part

The key to a successful installation of an interconnect is planning and preparation. Much time and cost can be saved by ensuring that all sites are ready for the new ad insertion equipment upon its arrival. The importance of proper site preparation cannot be emphasized enough.

An interconnect is an ambitious undertaking, requiring months of planning and structuring on the part of the interconnect management, interconnect headends, equipment manufacturer and software vendor. But like any new business venture, the prospect of limitless possibilities makes it all worthwhile. Interconnects deliver results and with satellite delivered spot-reels, the sky's the limit. ■

NaCom

A Full Service Communications Contractor
Specialists in: Installation, Construction, LAN

BUILDING COMMUNICATION SYSTEMS THROUGHOUT AMERICA

- **Installations (Including fiber optics)**
- **Converter Exchanges, PPV, Audits, Special Projects**
- **MDU, SMATV, & LAN Pre/Postwiring**
- **CLI Detection, Correction, & Documentation**
- **Strand Mapping (AutoCAD)**
- **RF Design**
- **Aerial/Underground Construction**

NaCom

1900 E. Dublin-Granville Rd.
Columbus, Ohio 43229

614/895-1313 • 800/669-8765 • FAX 614/895-8942

ISDN to the home: Part II

This is Part II of a paper describing a fully Integrated Services Digital Network. Part I appeared in the November issue of CED, p. 54.

The network equipment used in the installation of the headend will consist of video encoder terminals and optical fiber trunking equipment. The "codec" or video encoding method in this network is performed using Differential Pulse Coded Modulation. This technique provides cost effective, high reliability in the TVT140A. The TVT140A encodes three baseband video, and six baseband audio signals into a multiplexed 140 Mb/s data formatted signal (DS4E).

The 140 Mb/s data signal has additional capacity for a 1.544 Mb/s data signal which is intended for later use in the system as a carrier of a DS1 to each subscriber premise. The DS1 can also be used for intertrunking between the headend and the central office.

The TVT140A encoder terminals are synchronized at the 140 Mb/s level, where each terminal can be a master or a slave.

A functional block diagram of the TVT4140A encoder terminal is shown in Figure 9. The three video and associated audio channels are digitized and multiplexed into three 45 Mb/s data streams. The 45 Mb/s data signals are then multiplexed with the DS1 signal into 140 Mb/s frame structure. The 140 Mb/s data stream is either CMI encoded for interface to a high data rate trunking system or an optical interface for 140 Mb/s trunking.

At the central office, standard telephone and data switch equipment is installed. The broadband switch master controller, used to control and record usage in the system, is recommended for installation here due to the integration of the billing of CATV, telephone and data services.

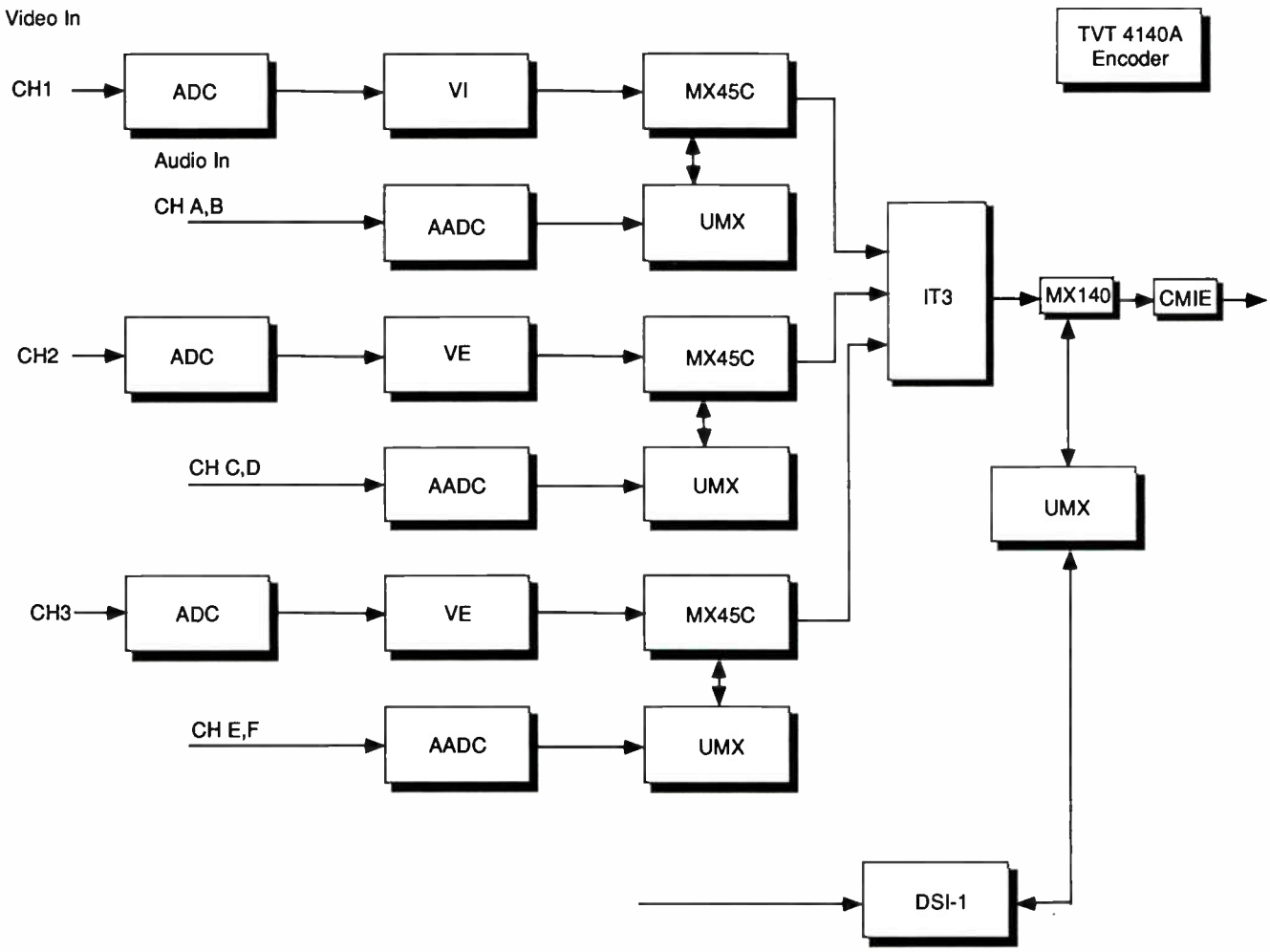


Figure 9

Local switch sites

The equipment at the local switch centers are local digital loop carrier units and broadband switch units as shown in Figure 2. The local digital

By Steffen Rasmussen, President, ABL Engineering Inc.

HIGH QUALITY FIBER OPTIC VIDEO

No Company Offers More Lightwave Video Solutions than American Lightwave Systems

LiteAMp™ AM OVER FIBER SYSTEM

Application:
CATV Interconnects
Broadband LAN Interconnects
- 40 Channels, 500 MHz
- 52 dB CNR, -65 dB CTB
- Strand, Pole, Rack Versions

FN6000 & FT1300 MULTICHANNEL FM SYSTEMS

Application:
Two Way Interactive Education
CATV Headend to Hub Nets
Videoconference Systems
Military, Campus Networks
- Exceeds RS-250B M.H.
- 16 Chan. per fiber
- 60-67 dB SNR

LC SERIES SINGLE CHANNEL SYSTEM

Application:
Studio to Transmitter Links
Local Broadcaster to CATV H.E.
- 67 dB SNR, RS-250B S.H.
- Portable & Rack Mount versions
- Multimode, singlemode
- Up to 25 km distance

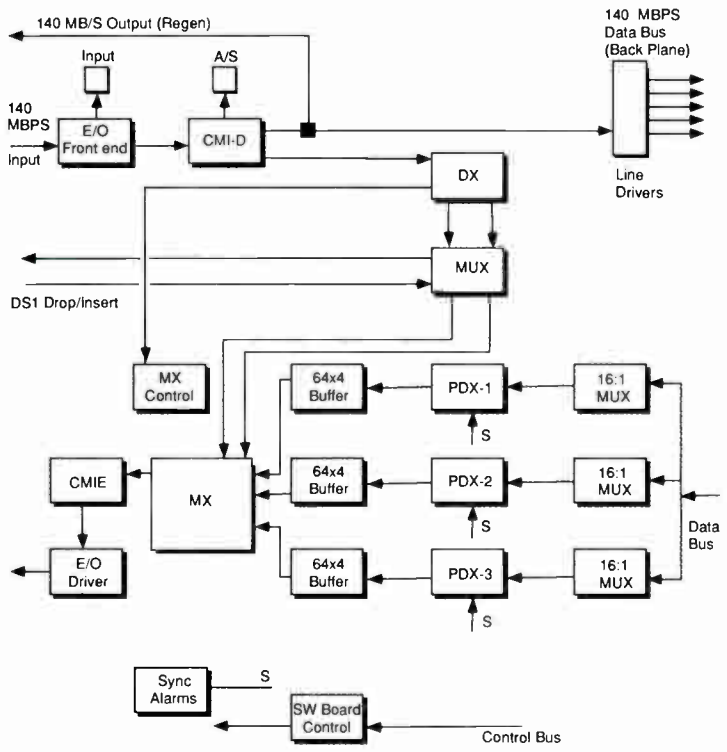
ALS offers proven solutions and twelve years of fiber video experience, - more than any other lightwave supplier. Contact ALS with your application requirements.

ALS

AMERICAN LIGHTWAVE SYSTEMS, INC.

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

Reader Service Number 56



The SB1648 Switch Module

Figure 10

loop carrier unit (DLC) interfaces the subscriber and the central office data and voice switch. The DLC unit functions as a concentrator of DSO time slots coming from the subscriber's upstream data. The difference between standard DLC units and the ones used in the network is that the line extensions are optically interfaced. The option to use electrical interfaces is available for configuration to an electrical network solution.

Figure 2 shows that the DLC units are connected to the SW1648 DAX's DS1 insert ports. The SW1648 is multiplexing the DS1 carrier into the 140 Mb/s data stream that carries the CATV channels to the subscriber. The upstream signal from the subscriber is either a DS1 or a DS4E depending on whether multiple video upstream services are offered. The SW1648 is coupled as a distribution switch. Each subscriber connected to the SW1648 can select non-blocking three out of 48 TV channels. The three channels can be selected totally independently.

The SW1648 DAX is a fully computer controlled time-space-time (TST) switch working in a DS4E/DS3/DS4E mode. As all DS4E and DS3 data streams are synchronized by the

headend equipment a 4/3/4 switch mode operation now becoming cost effective. The SW1648 DAX is equivalent to a SW1616 Matrix switch except from the switch module plug-ins. Switch operations are outlined in the following SW1616 MS description section. A functional block diagram of the SB1648 switch module is shown in Figure 10.

Switch operations

The incoming 140 Mb/s data signal is regenerated for feed through distribution on the switch back plane and CMI is decoded for demultiplexing to provide a DS1 drop capability. The switch backplane distributes the 140 Mb/s to all switch cards in the frame.

Each switch card in the frame selects three 140 Mb/s data streams out of sixteen available by the 16:1 multiplexers. Each multiplexer output is connected to a programmable demultiplexer, which selects one out of three 45 Mb/s channels, which carries the video and audio information. Each demultiplexed 45 Mb/s signal is then stored in a buffer for an internal frame alignment before multiplexing into a 140 Mb/s data stream. A DS1 signal is also multiplexed into the 140 Mb/s

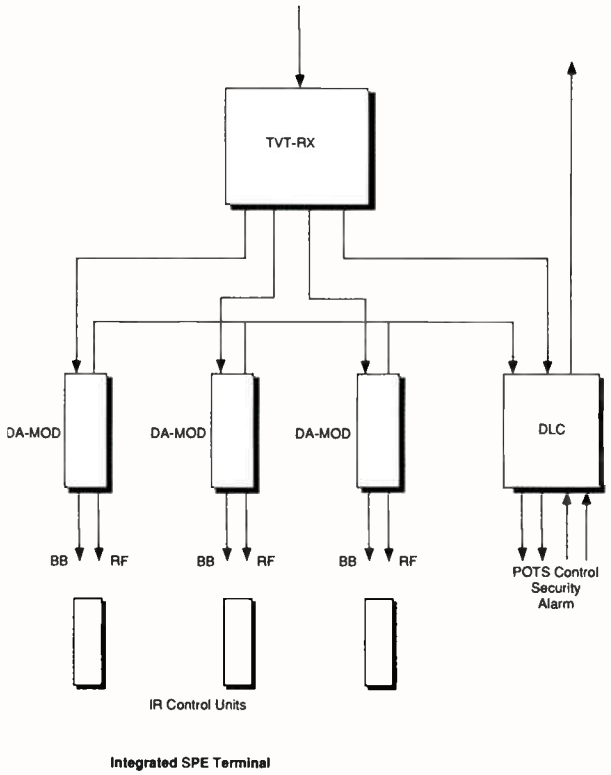


Figure 11

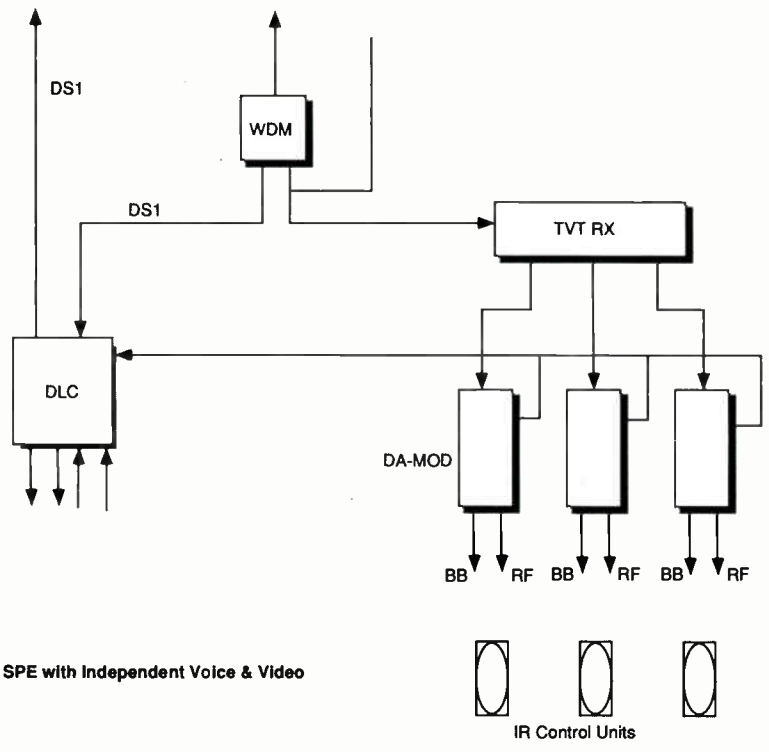


Figure 12

frame structure. The DS1 can either be locally inserted or fed through from the input section of the module.

The 140 Mb/s data signal is then interfaced to the optical wave guides via an onboard electrical optical converter. The E/O converter is either an LED or laser, depending upon the application distance.

Each switch module is controlled by the local switch computer. Each switch is connected via an internal bus back to the computer. Status and alarm information is also communicated to the local computer for further distribution. The local switch computer is communicating with master switch control computer via RS232-C links.

Subscriber premise equipment

Figures 11, 12 and 13 show three configurations of SPE terminals available. Figure 11 shows a terminal configuration for integrated transmission of CATV and voice/data. Figure 12 shows a configuration for separate voice and video systems. Figure 13 shows a configuration for an integrated video and voice system with bidirectional video capabilities. The voice and data services are interfaced via the

SPE section of the DLC unit. The video and audio signals are recovered by the TVT4140A decoder terminal. The TVT4140A decoder terminal is shown in Figure 14. The incoming optical 140 Mb/s data stream is connected to an electrical data signal by the optical front-end and demultiplexed into three 45 Mb/s data signals and a 1.544 Mb/s data signal. The DS1 signal is applied to the DLC unit.

The 45 Mb/s data signals are further demultiplexed into digital audio and video information, from which the analog audio and video signals are reconstructed. The analog video and audio signals are available at baseband level for high quality video and audio equipment. The baseband signal can also be modulated on an RF carrier system for standard television sets as shown in Figure 15.

The TV channel selection information is routed from the SPE terminal for further transmission to the master switch controller. The physical layout of the SPE terminal is shown in Figure 16. The dimensions are 16 inches x 10 inches x 4 inches and the unit is intended for installation as in an electrical circuit breaker box, but with access from the outside. The telephone

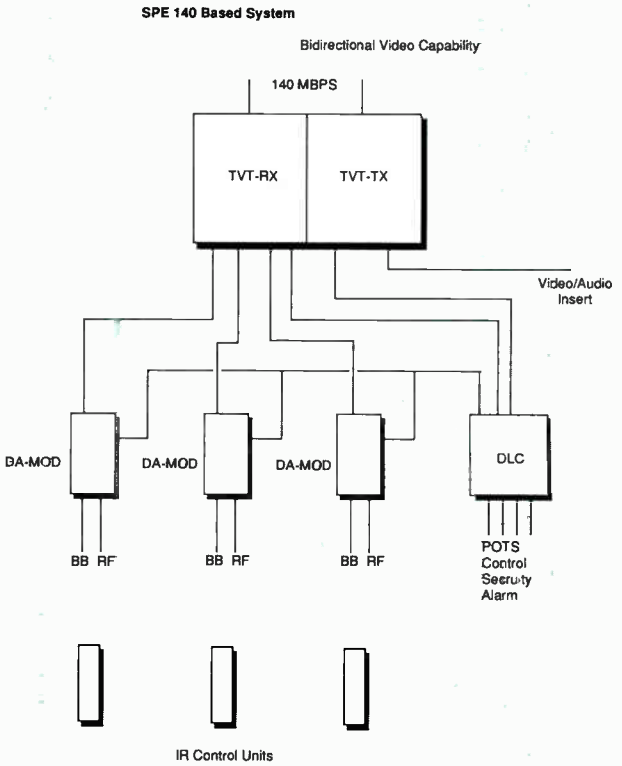


Figure 13

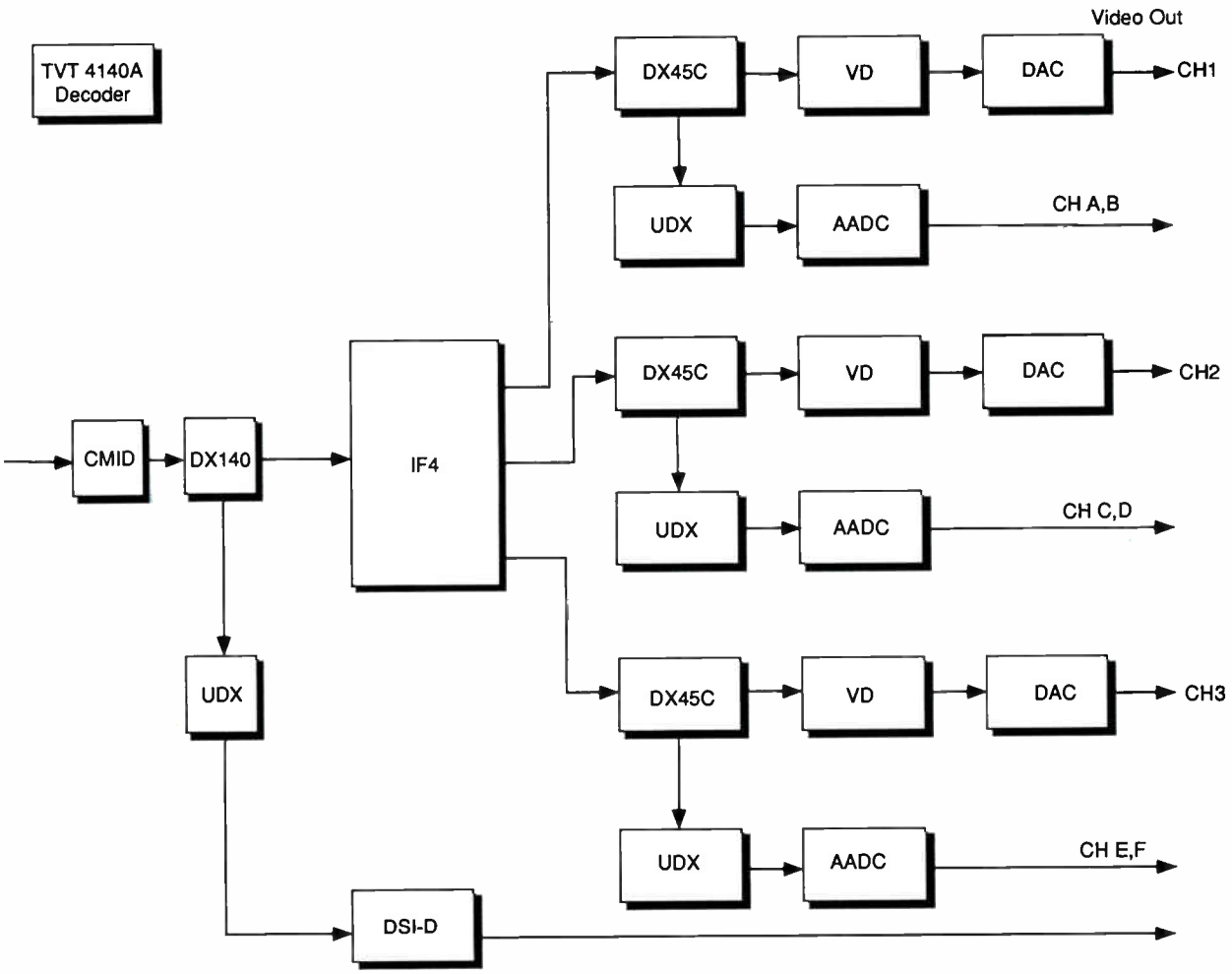


Figure 14

circuits are back-up powered from a battery supply in case of a power failure. However, the video/audio circuits are not back-up powered.

System performance monitoring

All components in the network are digital, with onboard monitoring intelligence that can report status or alarms via the upstream data channels, which will ensure that all alarms within the network will be remotely monitored and sent to a central reporting point. The performance monitoring system allows bit-error-rate (BER) measurement, loss of signal and/or framing of all 1.544 Mb/s, 45 Mb/s, 140 Mb/s, 565 Mb/s data signals in the network.

All analog video signals in the system are monitored for loss of signal. The network will show network problems before, or at the latest, when the user observes a problem. By use of the monitoring system, the problem can be identified and solved expediently providing limited subscriber down time.

Network cost performance

The network solution is intended for installation in new developments or where existing plant needs to be totally renovated.

Cost studies show that the increased cost of installing a fiber cable to a home is only an additional premium of 15 percent in cost comparisons for installations of four-wire twisted pairs. Each fiber has a bandwidth of approximately 1.56 GHz. This allows for CATV on the same cable as the telephone. This in turn saves the cost of a copper CATV coaxial system. Further cost savings are possible with planned joint installation of utilities as with power cable (new development) drops.

Another major cost savings issue that is overlooked in the design of the network is that the CO and CME can be far from the subscriber premises. This will save in the construction costs by eliminating capital expenditure for land and buildings, when comparisons of a traditional telephone loop must be within 15,000 feet from a CO or concentrator device and CATV is limited to 5 to 6 miles from a CME. In both cases inherent severe noise problems will degrade services and make data services unreliable. The fiber optical network maintains signal integrity at any distance from the source and allows signal regeneration anywhere without loss of signal quality.

This means that *no* new CO and CME facilities have to be built when adding on new sectors of a city of suburbs, which can accumulate to significant savings over time.

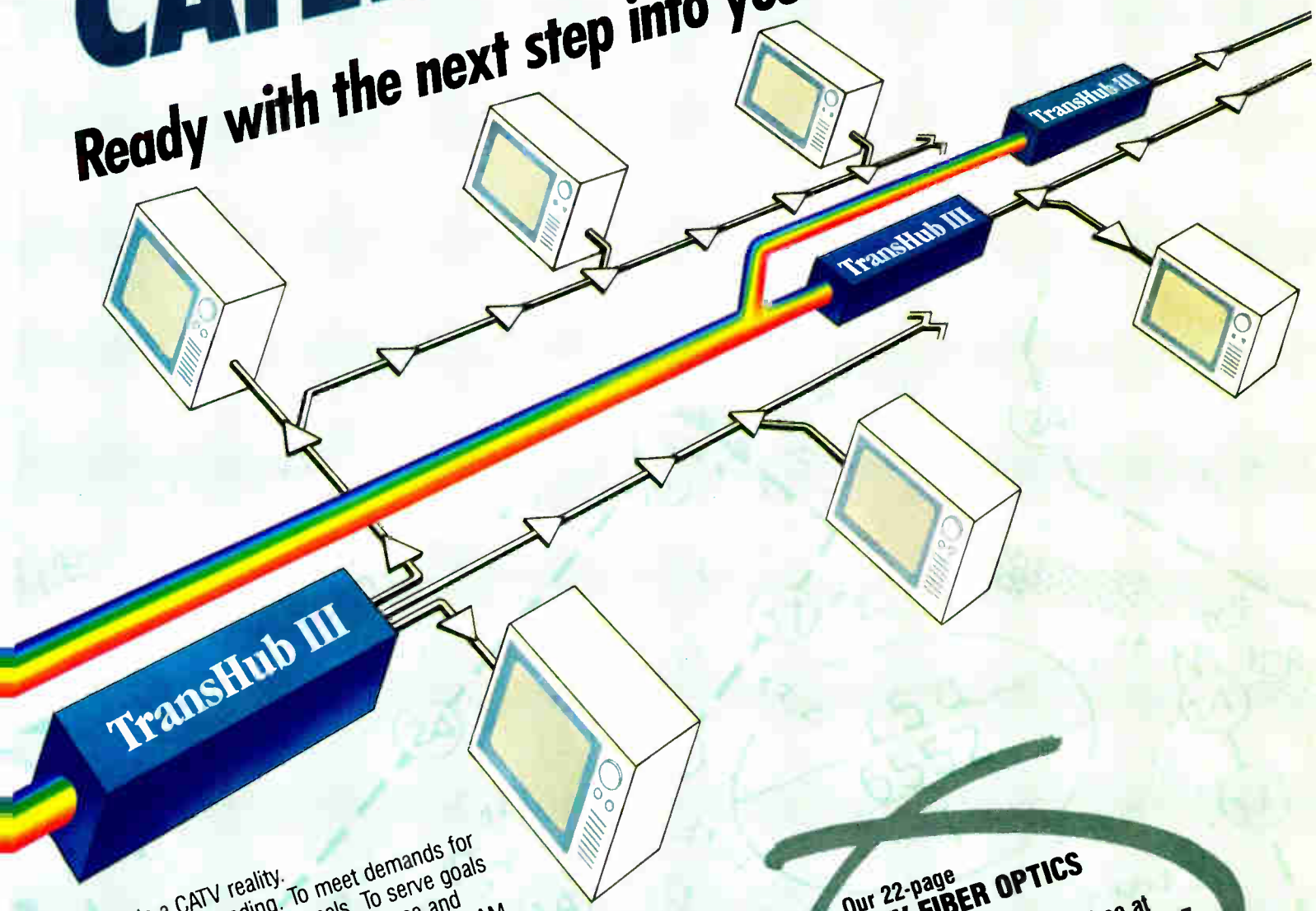
The total remote monitoring system combined with highly stable "non-drifting" digital equipment can save appreciably on the maintenance budget.

Adaptability to future needs

As the network provides a 140 Mb/s

CATEL

Ready with the next step into your fiber optics future.



It's a CATV reality.
Rebuilding. Upgrading. To meet demands for better signals, more channels. To serve goals of lower costs, reduced maintenance and higher revenues. Catel's family of FM and AM fiber optics equipment lets you do all that, while ensuring smooth response to future needs.

Take our TransHub™ III. Stand-mounted and driven by your headend equipment or a TransHub I, it converts AM-on-fiber to VSB-AM for coax. So you can take quality signals "deeper." With a fiber loss budget under 7.5 dB. SNR of at least 52 dB. Second-order products under 70 dBc and composite thirds less than 65 dBc.

You also gain bandwidth needed for migration to new standards —HDTV, for example—and for higher revenue potential. And you do it at the cost of traditional coax. With no repeaters and none of the accompanying noise and maintenance.

Like our entire fiber optics product family, TransHub III, exemplifies decades of CATV technology leadership.

Our 22-page CATV FIBER OPTICS DESIGN KIT is yours—free. Call toll-free at 800-827-2722 or FAX 415-651-8437 and request your copy.

See us at the Western Show booth #1007.

CATEL
THE CLEAR CHOICE IN FIBER

Reader Service Number 58

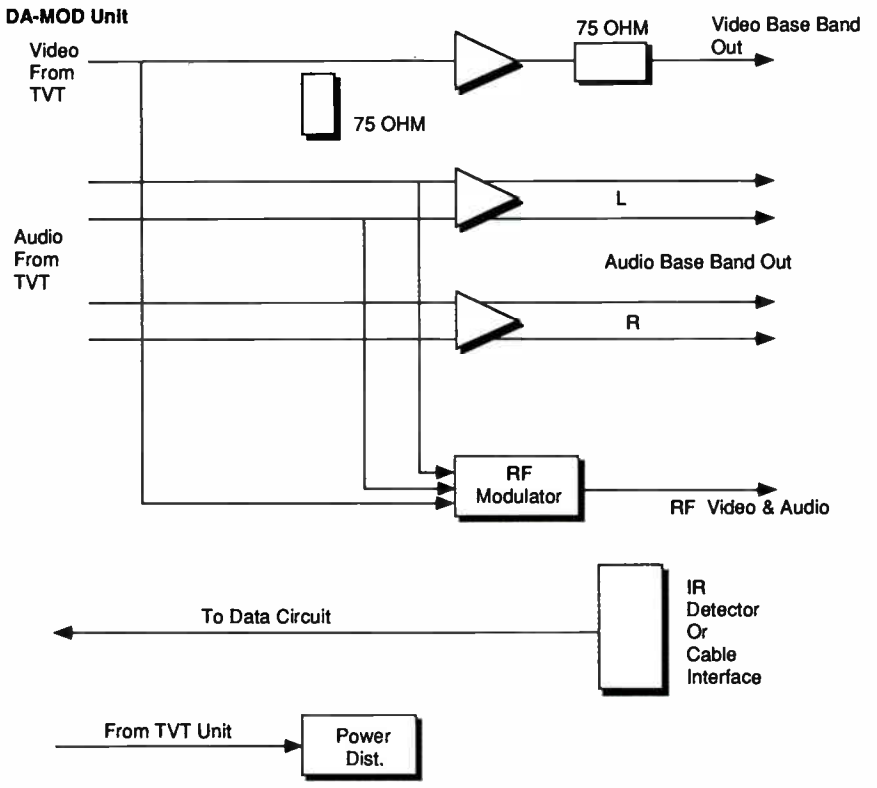


Figure 15

data capacity to each subscriber, the system will be capable of adapting to future needs such as HDTV or in mass data transfer.

Each subscriber can increase the number of simultaneously available CATV channels by requesting addi-

Continued on page 148

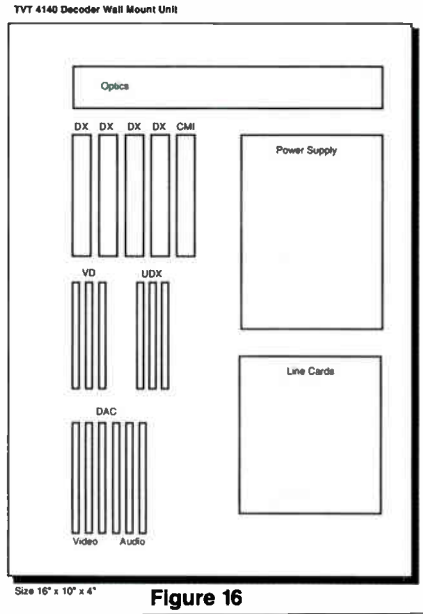
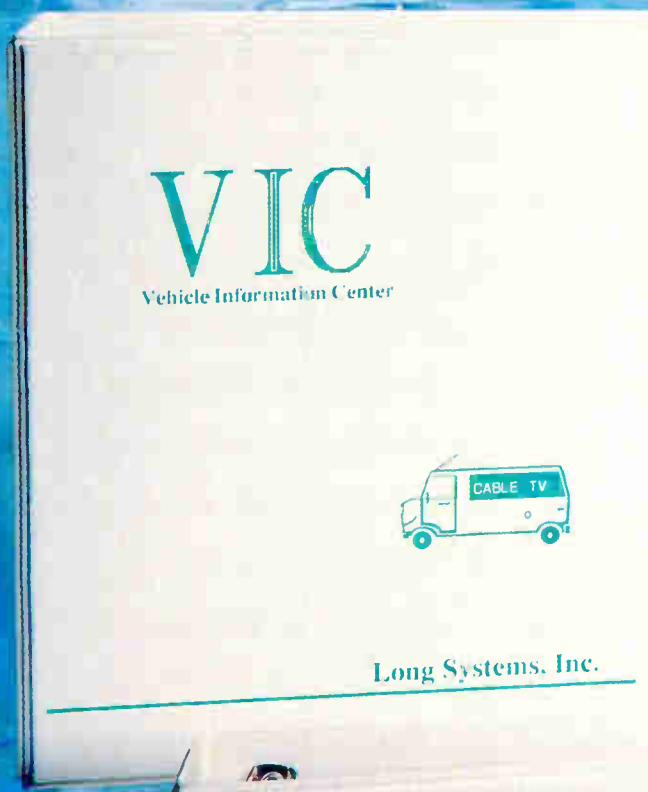
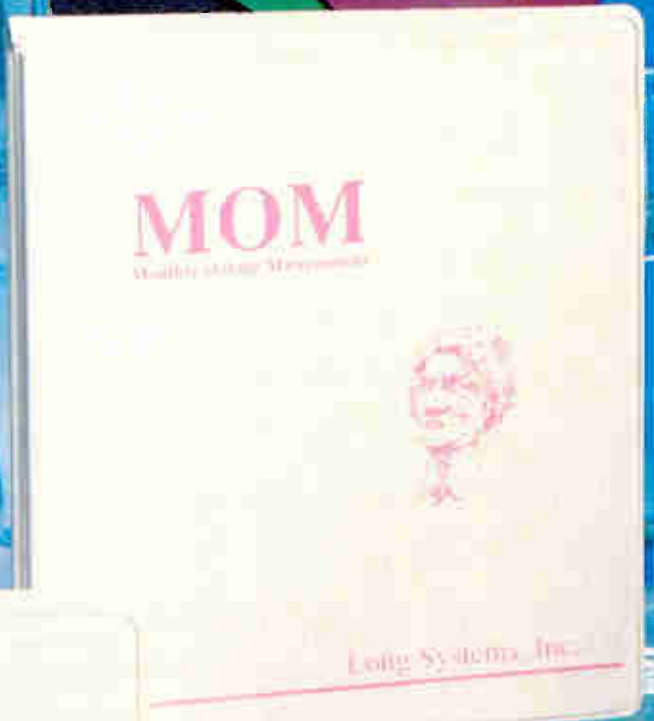


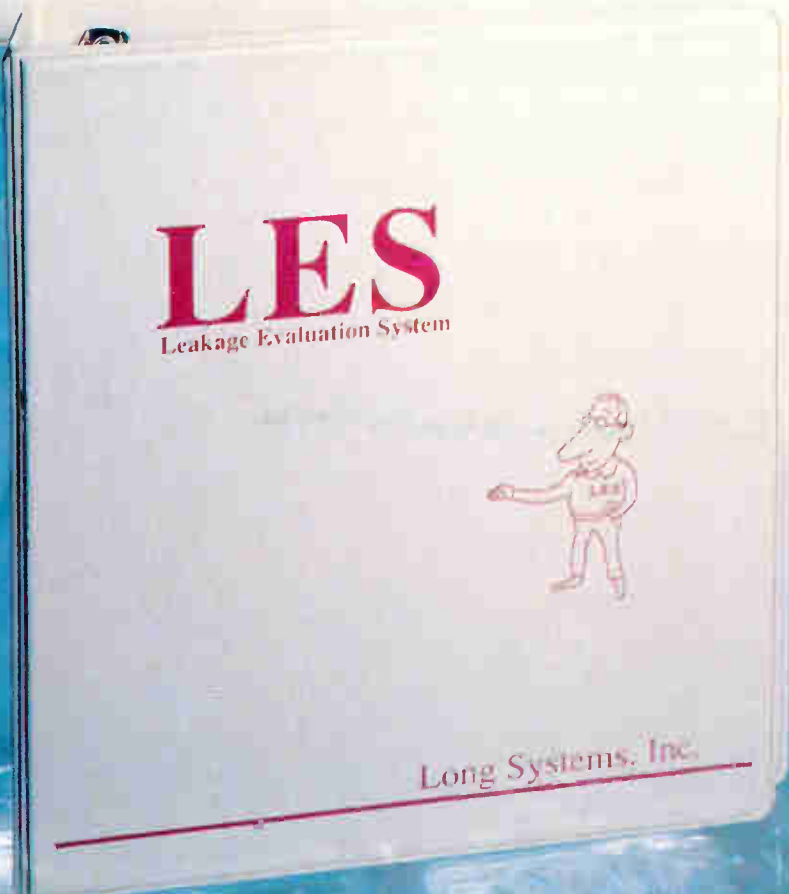
Figure 16

WE'RE HOT!

A New Tradition In Cable Software







VIC **Vehicle Information Center**

Now you can take complete control of the fleet. Tracks vehicles, drivers, maintenance costs, and accidents. The ultimate tool for the vehicle manager.

MOM **Monthly Outage Management**

Finally, an ideal way to compile monthly outage statistics. Results for each system are graded in a report card style. Almost makes outages fun.

LES **Leakage Evaluation System**

The industry standard. Most flexible and powerful signal leakage software available, anywhere! As with all our products, quick to learn and easy to use.

For More Information:

Long Systems, Inc.

3131 Camino Del Rio North
Suite 1010
San Diego, California 92108-5711

800-669-LONG 800-669-5664 619-584-2400 FAX 619-584-2667

Optical-fiber system gives Rogers 'The Big Picture'

Some companies just like to think big.

Faced with growing demand for better picture quality and more reliable service, Rogers Cablesystems Inc. of Canada opted to upgrade its cable plant to optical fiber. Although this would be the company's first major fiber construction, Rogers decided to plan an entire fiber-optic supertrunking system rather than attempt patchwork upgrades justified one-by-one.

The result will be approximately 400 kilometers of fiber-optic cable servicing 600,000 subscribers. That makes it the largest cable television system using optical fiber for a significant part of its infrastructure in North America.

The prime motivating factor behind this effort—the Canadian cable TV subscriber and his growing appetite for top-notch cable service.

Customers know what they want

Canadian consumers now are buying more television sets with much larger screens than they were two or three years ago, according to George M. Hart, manager of advanced engineering for Rogers Cablesystems Inc., the largest MSO in Canada.

"With today's large TV sets, subscribers already perceive that the quality of cable is not up to what they anticipate," Hart said. "People aren't going to pay $20 to $30 a month if they don't get better quality on large screens, as well as uninterrupted service."

To reach its goal of providing reliable, high-quality transmission, Rogers decided to upgrade its systems throughout Canada. After studying its transmission options—optical fiber, coaxial cable and microwave—Rogers opted to develop a hybrid coaxial/fiber optic system architecture that would provide the level of quality and reliability consumers will expect in the coming era of advanced and high definition television (HDTV).

A key determinant of the fiber optic choice was fiber's reliability. The high quality and reliability Rogers believes is necessary to maintain an effective position in video entertainment would be severely compromised by rainfade, other weather-induced outages and by long amplifier cascades typical of microwave hubbing systems.

Providing an optimum network layout was the company's greatest challenge in the entire fiber system design, Hart said. The spacing of secondary hubs 1.9 miles (3 km) apart was a key element in meeting the topology challenge; the 3 km distance was ideal for the cable television quality required.

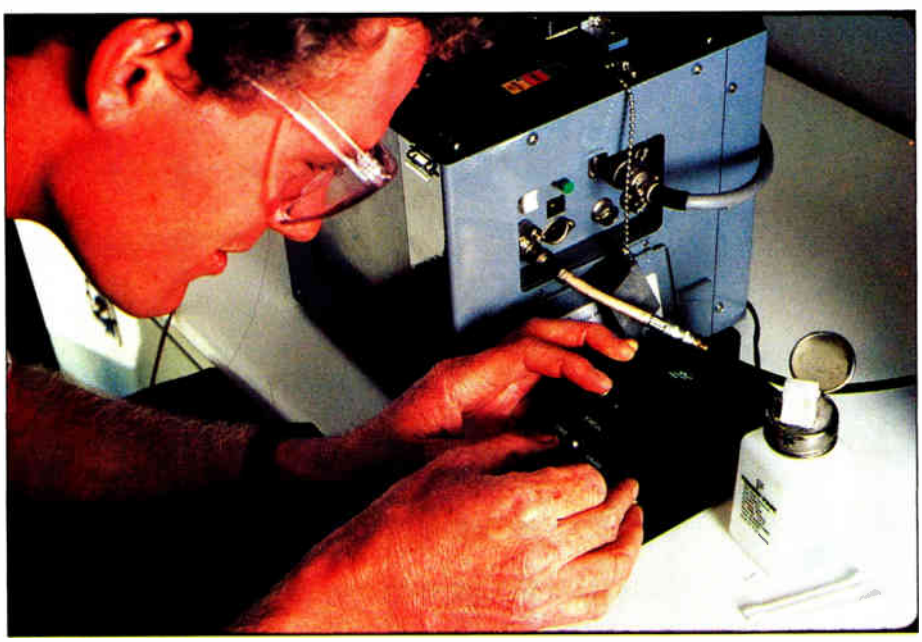
'Stand and deliver'

To ensure that the fiber would stand up to environmental demands and still deliver high-quality

Implementation of Rogers Hybrid Coaxial/Fiber Architecture

	Phase I	Phase II
CNR at the home	46 dB	49 dB
Channels available to every home in system	58	77
Opto-electronics	FM primary hubs	AM/VSB secondary hubs
Maximum homes affected by electronics failure	60,000	8,000
Bandwidth	550 MHz	550 MHz
Completion date	Late 1990	1993

Table 1



A Roger's technician completes preparation of an optical-fiber splice closure.

pictures, Rogers Engineering, the corporate engineering group for Rogers Communications, developed well-defined specifications for fiber performance parameters. As a key determinant of system performance, Rogers knew the fiber it selected would drive the design of its entire system.

The specification document was reviewed with a number of fiber suppliers. It was made clear that these specifications were hard and fast; consequently, several suppliers elected not to respond to Rogers' needs.

Rogers' formal specifications for fiber fell into two basic categories: dimensional and attenuation. For example, attenuation requirements were specified for the range of change across each window of operation. Over the temperature range -30 degrees C to +65 degrees C, attenuation change was not to exceed 0.05 decibels per kilometer (db/km) between 1305 nanometers and 1315 nm, nor to exceed 0.05 db/km between 1545 nm and 1555 nm.

A technician prepares fiber for splicing.

The group's evaluation revealed that Corning fiber showed consistency of dimensional control on key performance parameters, such as mode-field diameter, clad diameter and core/clad concentricity. These are all critical parameters for low splice loss.

In addition to performance, the characteristics of the cabled fiber were clearly defined to complement the fiber specs.

Among the six optical-cable manufacturers that Rogers Engineering formally evaluated, five could use Corning fiber, but only three of them met Rogers' cable specs. Key cable specs were the ability to withstand temperatures down to -40 degrees C and to resist water penetration, measured in a standard optical-cable water migration pass test more stringent than the industry standard.

Construction posed few problems

The topology of the locations of Rogers' systems favored fiber for several reasons. First, the company's systems are located largely in urban areas, where roof rights for microwave antennas are costly and where building construction next year may block a path available this year. Microwave path coordination to avoid signal interference in such dense areas also is difficult.

Fiber avoided these problems. Rogers used a combination of aerial and underground installation techniques

in laying in the fiber cable, as dictated by the terrain.

Construction did not present any great challenge, although it was Rogers' first fiber job. Rogers Engineering contracted out the first part of the Toronto construction as a turnkey system. "We watched that pretty closely and at the same time trained our inhouse crews for splicing," said Hart.

Construction of the remainder of the system continues to be subcontracted to a local company, although Rogers now handles all the splicing. It was necessary to bring this capability inhouse for the sake of timely restorations in future emergency situations.

Two three-person Toronto area crews will be expanded as the company deploys secondary hubs, Hart said. A "fall-back" team is available to keep splicing operations continuously available during vacations and illnesses.

Each optical cable connecting primary to secondary hubs carries from 28 to 144 fibers, with the average a 72-fiber count. Each cable requires:

- Four fibers to deliver 77 channels to each of a maximum of 15 secondary hubs, plus one fiber for two-way network management,
- Sixteen fibers for business services, including cellular telephone and data services,
- Four backup fibers dedicated to carrying cable television signals on a secondary path, in case the primary path fails.

Active fibers are color-coded for easy identification.

Toronto system showcase

A $5 million investment combines the Toronto metropolitan cable TV system with smaller ones in adjacent Mississauga and Brampton to form a new 600,000 subscriber system. One headend serves six primary hubs interconnected in a counter rotating ring in the first phase of implementation.

The fiber supertrunk installed in Phase II replaces a microwave system in serving 435 miles (700 km) of coax trunk and 2,600 inline trunk amplifiers in the Toronto-proper section of the system, nearly 200 miles (320 km) of coax trunk in Mississauga and almost 80 miles (127 km) in Brampton. Trunk amplifier cascades will be limited to 10 or fewer when secondary hubs are deployed.

The same architecture will serve Rogers' subscribers in a dozen systems throughout Canada. The 600,000 subscriber system in the Toronto area was begun first, in the spring of 1988. A system serving 250,000 subscribers in Vancouver, B.C., is being constructed almost simultaneously.

Another 10 systems, ranging in size from 20,000 to more than 130,000 subscribers, are in Phase I construction. Because of Rogers' high-density subscriber penetration, the first two phases of the fiber upgrade is expected to cost about $60 per subscriber.

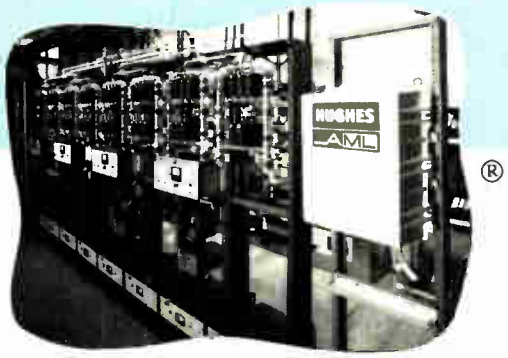
Hart believes fiber is essential to the future of Rogers' cable TV business. "As video stores and home satellite dishes loom as stronger competitors, our new fiber network will ensure the quality and reliability we need to bring choice entertainment to our customers," he said. "And in the process, we'll have the capability of offering HDTV as it's introduced. ■

This article was provided by Scott A. Esty, Market Development Supervisor, Telecommunications Products Division, Corning Incorporated.

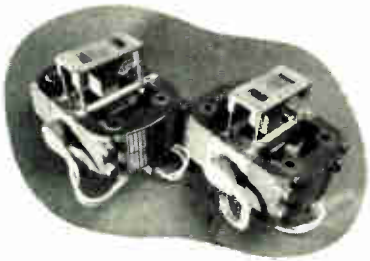
WESTEC Microwave

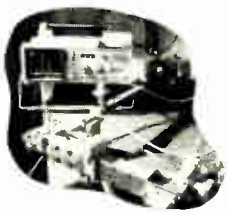
Manufacturing

Modification Repair



®





We have enlarged our AML Service operation to include all major AML system requirements at a reasonable cost. Since starting to refurbish solid state sources six years ago, we now provide the services shown below, and then some! Currently we are supplying all the modifications to convert AML systems to 450 MHz Bandwidth. Call Westec for responsive answers to your service problems.

Bob O'Hara, President
Westec Communications, Inc.

- SOLID STATE SOURCES
- UPCONVERTERS
- TRANSMITTERS
- RECEIVERS
- REBUILT KLYSTRONS
- KLYSTRON & OTHER POWER SUPPLIES

Stop by Booth #53 at the Western Show to discuss field service or other AML needs.

NEW

PHASE LOCK MODS FOR INDOOR & OUTDOOR RECEIVERS

® Registered Trademark of Hughes Aircraft Co.

WESTEC COMMUNICATIONS, INC.
14405 N. Scottsdale Road, Scottsdale, Arizona 85254
(602) 948-4484 FAX: (602) 998-8701
Microwave Service (800) 666-4441

Storer bounces back from Hugo's destruction

When The Weather Channel did a slow fade to black late the night of September 21, Storer Cable of Charleston's Charlie Jones, chief of electronic technology, suspected that Hurricane Hugo had begun its all-out assault on the Charleston, S.C. area. A few minutes later, when the entire cable system went out, his suspicions were confirmed.

By now, the story of Hugo and the destruction it brought to the residents of the Carolinas and other Eastern states is well-known. But what's been less of a focus is the intense clean-up efforts the area has undertaken to bring itself back to a normal way of life. While it will be years before the area—especially the islands south and east of downtown Charleston—fully recovers, good progress toward that goal has been made.

For example, within three weeks of the storm, more than 80 percent of the residents had electric power restored to their homes. Most of the downed trees had been moved, cut up and piled along the street for eventual pickup by hauling companies. Most businesses had restocked and reopened.

At Storer Cable, the cleanup and rebuild task loomed large. "This place looked like a war zone," said Michael D'Amico, staff engineer for Comcast's Atlantic Region, who was brought in to help oversee the system's restoration.

The first thing Plant Manager Rick Barnett did was organize his 30-person technical staff into teams, break out the system's maps and begin the task of assessing the plant damage via drive-outs. Out of 1,100 total aerial plant miles, it was estimated that 300 miles of cable was laying on the ground, useless.

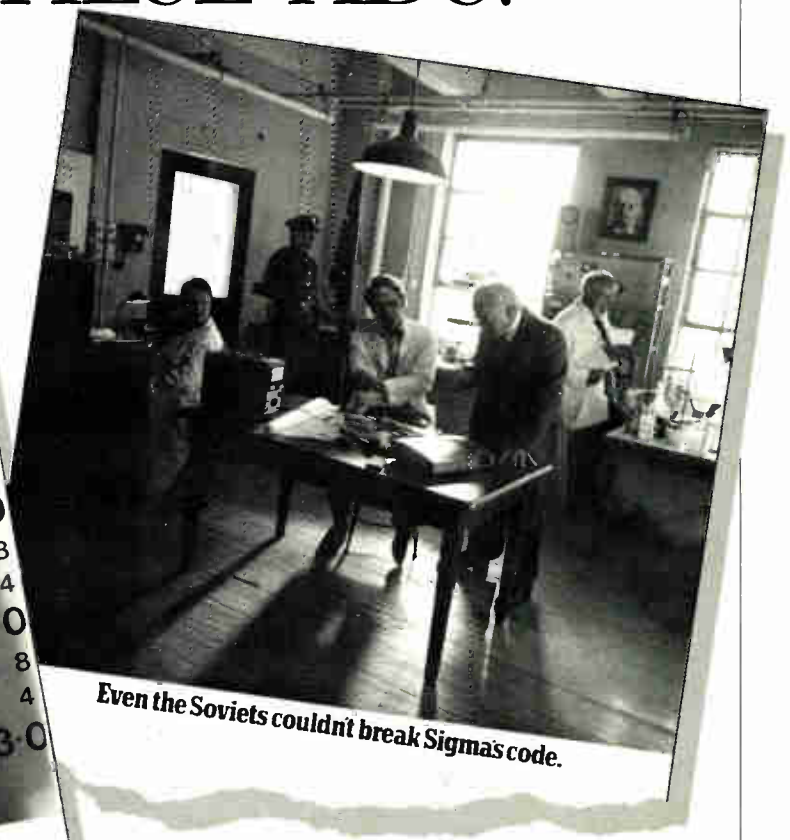
Hurry up and wait

But immediate restoration of service was simply out of the question. First priority was reestablishing power to the area, so the cable system's crews were forced to do little more than concentrate on assessing damage and staying out of the way of the power company's work crews. "The first week to 10 days, we could do little to restore the plant because of safety concerns," said D'Amico. In order to give the power crews room to work, Charleston imposed a sundown to sunup curfew.

As if to illustrate D'Amico's point about safety, just three days into the cleanup effort, the endeavor was struck a huge blow when Barnett was seriously injured in an automobile accident while trying to negotiate an intersection where the traffic light was not operating. That's when D'Amico began

REMEMBER THESE ADS?

THEY FIRST RAN IN 1985. We brought them out again to remind you we've been talking about signal security for nearly five years.



No other addressable system can protect your revenues like Oak Sigma. With over half a million units shipped, Sigma's encryption-based encoding has never been cracked. Never.

No other manufacturer of home cable (or satellite) security products can make that statement — not even for some of their "brand new" models.

Getting serious about signal security is just good business. Especially now that cable's most secure addressables cost no more than some virtually defenseless systems. If you're making a multi-year security system investment, can you risk having anything less?

If you're ready to get serious about security, call us to arrange for a no-obligation demonstration of the toughest signal protection available — Oak Sigma.

OAK Communications Inc.

16516 Via Esprillo • Rancho Bernardo, CA • 92127 • (619)451-1500

his weekly commutes from Virginia to South Carolina to supervise the project.

Surprisingly, the main headend suffered no damage from the storm, other than some minor damage to the roof of the building. In fact, between the headend and five hub sites, damage was confined to just one tower (a 260-footer which was blown over) and a microwave receive site, which lost some waveguide. Beyond that, the winds did little damage: some receive sites and a tower or two had to be simply realigned.

Lost just one tower

Of all the towers in the system, only the one on James Island, located across the Ashley River from downtown Charleston, which had a bolt-down base, was affected. The others, which are equipped with pivot bases, survived unscathed. For example, the tower at the headend site didn't have to be retensioned or even replumbed, said D'Amico.

Surprisingly, most of the damage to the plant was not a result of the 140 mph to 200 mph winds which swept through the area; it was trees that did the damage. The strong winds snapped limbs like toothpicks, broke mature trees about 40 feet from the ground and entirely uprooted others. In places where trunk and feeder cables existed, they came down with the trees or the poles they were attached to.

While the damage to the homes on the barrier islands (Sullivans Island, James Island and Isle of Palms) was severe, the cable plant actually suffered less damage because there are fewer trees on the islands. And while the 20-foot storm surge ripped up docks, moved homes from their foundations and even lifted moored boats to new, high and dry locations, water didn't seem to affect the Storer system.

Once the cleanup effort began in earnest, it didn't take long to make some real progress. Numerous hardware vendors rushed truckloads

Charlie Jones examines 'misplaced' plant

of equipment to the area, Kennedy Cable Construction was hired and came armed with about 20 crews and Comcast brought in a handful of technical and construction supervisors to organize the efforts.

"Everyone has been very supportive," said Roddy Edge, system general manager. Equipment deliveries have been "timely and in the quantities we need," he added.

To some, it might have seemed like the perfect time to completely rebuild or at least upgrade the 9-year-old, 270-MHz system to add channel capacity. But in reality, the system's electronics weren't heavily damaged and the pattern of destruction was unpredictable—pulling cable down in one area while leaving another area untouched.

Trunk restored

Despite the haphazard pattern of devastation, by the first of November, all 50 miles of the system's trunk lines that were down had been replaced and crews were working feverishly to meet a self-imposed 100 percent reactivation deadline of Dec. 1, said Edge. As of that time, more than 35,000 of the 67,000 subscribers affected by Hurricane Hugo (about 4,000 subscribers were unaffected by the storm) had service restored and more were being brought back on daily.

But the system's subscriber count won't match the pre-storm levels, simply because so many homes were destroyed by the hurricane. Edge said they'd be "lucky" to have 60,000 subs when the restoration is complete.

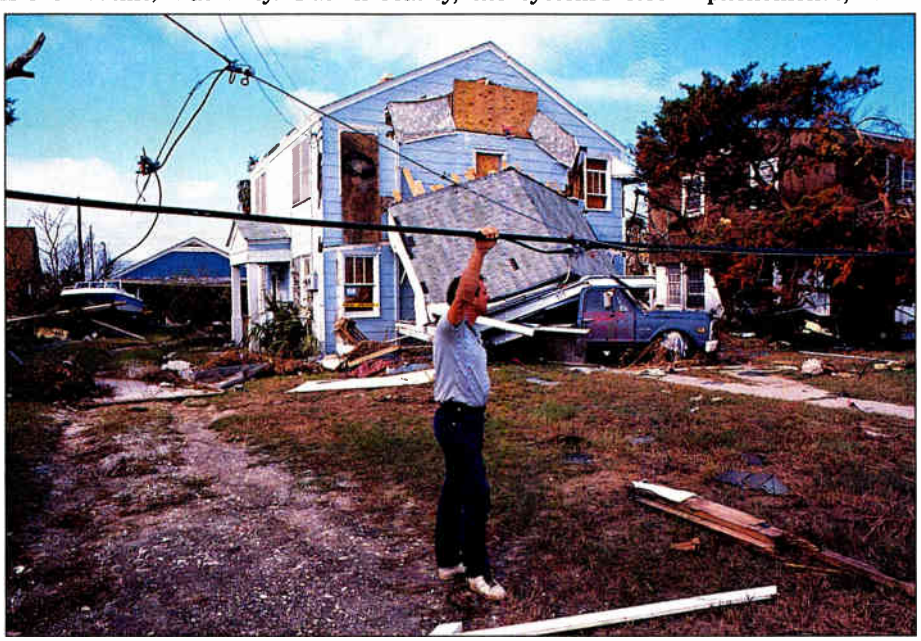
Predictably, the subscriber base has been patient through the rebuilding process, which system management predicts will cost between $6 million and $9 million. "Largely, they've been understanding," said D'Amico, "mostly because they've had bigger fish to fry."

Champions

Through all the destruction, both personal and system-related, the Storer personnel have been nothing short of phenomenal, said D'Amico. "The employees here deserve tremendous credit. They bounced back (from the storm) with a superhuman effort, working seven days a week, 12 hours a day."

By the time you read this, most if not all of Storer Cable will be up and running. It'll be years before life in Charleston returns to normal, but if the rest of the area bounces back as fast as Storer, there's nothing but blue sky in the forecast. ■

—Roger Brown



Charlie Jones, of Storer, evaluates damage caused by fallen trees

Easier testing with a CATV analyzer: Part III

This article is adapted from a presentation made to several SCTE Chapters in different locations.

In earlier articles in this series, we described a portable CATV analyzer based on a modern RF spectrum analyzer. This analyzer is easy to use for fast, accurate testing of CATV systems. Basic operation of the analyzer was shown to require three basic functions: Frequency, amplitude and span. Control of other functions provides measurement flexibility, such as adjusting the IF bandwidth for the desired signal resolution. Knowledge about analyzer controls allowed us to begin making measurements that are important in CATV testing. Now we turn to a brief look at the usefulness of the microwave spectrum analyzer in cable applications, and then we discuss at length how amplitude range affects measurements made in the CATV environment.

The microwave spectrum analyzer

The block diagram in Figure 1 shows that a microwave spectrum analyzer is similar to an RF spectrum analyzer. However, a second input-signal path has been added. If an incoming signal is switched to the microwave path, it encounters a preselector—that is, a tunable-bandpass filter that tracks the input signal. This preselector improves dynamic range and eliminates out-of-band responses resulting from the harmonic mixing process used to produce the desired IF. This harmonic mixing process uses a modification of the fundamental tuning equation that was applied in the RF spectrum analyzer:

$$f_{Input\ Signal} = f_{LO} - f_{IF}$$

becomes

$$f_{Input\ Signal} = Nf_{LO} - f_{IF}$$

where N equals the harmonic number of the local oscillator.

Because the LO frequency doesn't tune high enough, the microwave analyzer uses LO harmonics to receive microwave signals. For example, solving the tuning equation for a 4 GHz input signal results in a 6 GHz LO frequency. When the LO is tuned to 3 GHz, the second harmonic, 6 GHz, is generated in the mixer.

In CATV testing, the wide frequency range of the microwave spectrum analyzer, typically 9 kHz to 22 GHz, makes this analyzer useful in a number of situations from trunk testing to maintenance of point-to-point microwave links. The same functions that were found in the RF spectrum analyzer—frequency, span, amplitude, resolution

By John Cecil and Mary Jane Pahls, Hewlett-Packard Co., Signal Analysis Division

MICROWAVE SPECTRUM ANALYZER BLOCK DIAGRAM

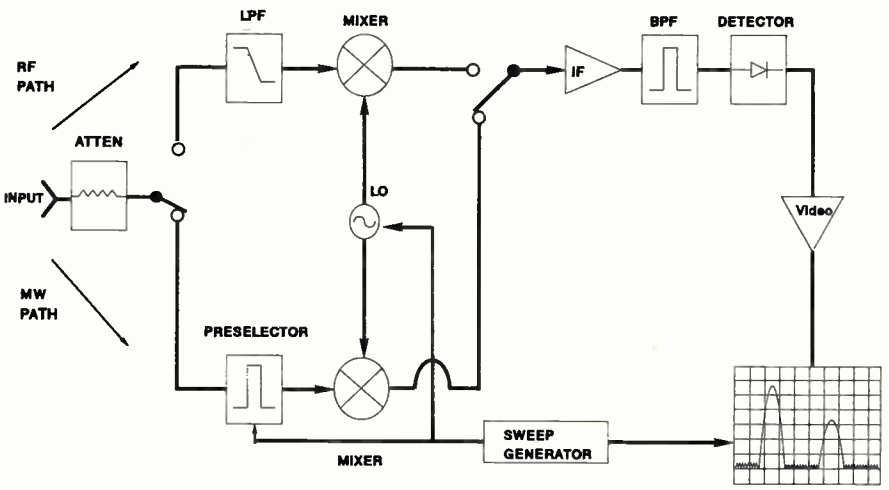


Figure 1

TOTAL POWER FOR CATV SYSTEM AFFECTS SPECTRUM ANALYZER ATTENUATION

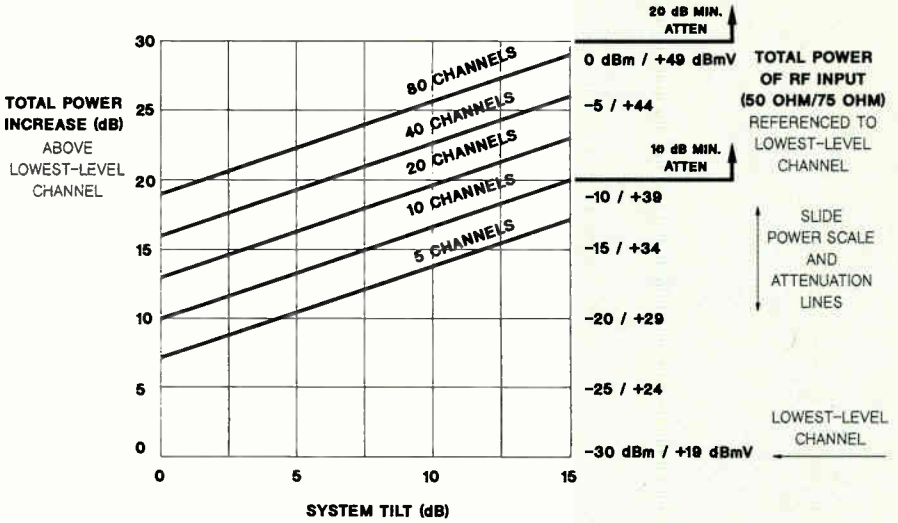


Figure 2

bandwidth and video bandwidth—also give the microwave analyzer the same measurement capabilities for both RF and microwave signals. Troubleshooting and maintenance can be done at microwave frequencies, taking advantage of the various microwave points in the system. Measurements such as carrier-to-noise ratio can be performed in both the CARS and CATV bands. The special functions and tests for which the CATV analyzer has been customized are found in microwave and RF analyzers.

Amplitude measurements in the cable environment: A spectrum analyzer resolves a frequency spectrum into individual signals whose amplitudes can then be measured. The amplitude measurement range is affected, however, by the internal distortion and noise of the analyzer. We'll now investigate the effects of each.

Distortion effects

When a signal is viewed on the CRT, it is important to know whether the signal is real or a distortion product generated by the input mixer within the analyzer. The source of distortion, input signal or analyzer, can be identified by changing the signal level at the mixer and looking for changes in the displayed signals. Mixer distortion increases proportionally to increased signal level. An easy way to change the signal level at the mixer is to vary the input attenuation.

The type of distortion determines how a displayed signal will react to adjustments in power level at the mixer. If input attenuation is changed, possible reactions by the distortion signal are the following:

1. The signal changes by the same amount. This is second-order distortion coming from second harmonics.
2. The signal changes by twice the amount. This is third-order distortion coming from third harmonics, or two-tone intermodulation (composite triple beat [CTB]).
3. The signal does not change. Distortion is caused outside the spectrum analyzer.

Adjusting the input-signal level is another way to determine the distortion type. For a change in signal level, the possible changes in the distortion are:

1. The signal changes by twice the amount. This is second-order distortion.
2. The signal changes by three times the amount. This is third-order distortion.
3. The signal changes by the same amount. Distortion comes from the input signal.

A mixer causes distortion relative to the total input power, not just the highest signal level. Thus, mixer distortion may occur when the signals from the broadband CATV spectrum add together in the mixer. In such cases, more attenuation must be added before reliable amplitude measurements can be made on the channels.

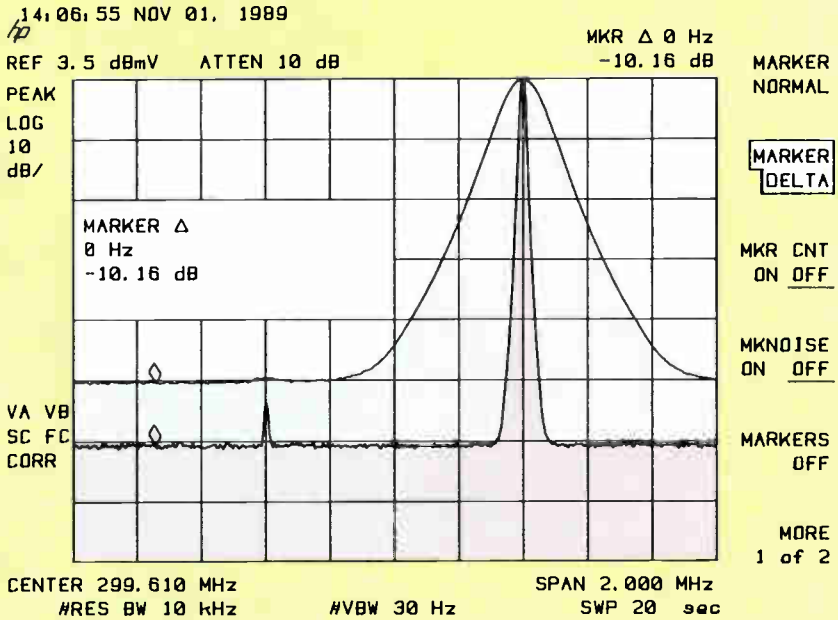
If all visual carriers are equal in amplitude, the total power for a CATV system can be calculated from this equation:

$$P_{total} = P_{carrier} + 10 \log N$$

where N = number of visual carriers. However, the carriers generally are not the same amplitude because of "system tilt," that is, carrier level increases with frequency to compensate for cable attenuation. A nomograph such as the one in Figure 2 can be used to determine the total system power for different tilts and numbers of carriers. This allows you to determine the amount of attenuation necessary to prevent mixer compression.

REDUCING IF-FILTER BW LOWERS NOISE AND IMPROVES SIGNAL RESOLUTION:

NOISE CHANGES 5 dB FOR EACH BW STEP



NOISE CHANGE = 10 LOG BW_2/BW_1

Figure 3

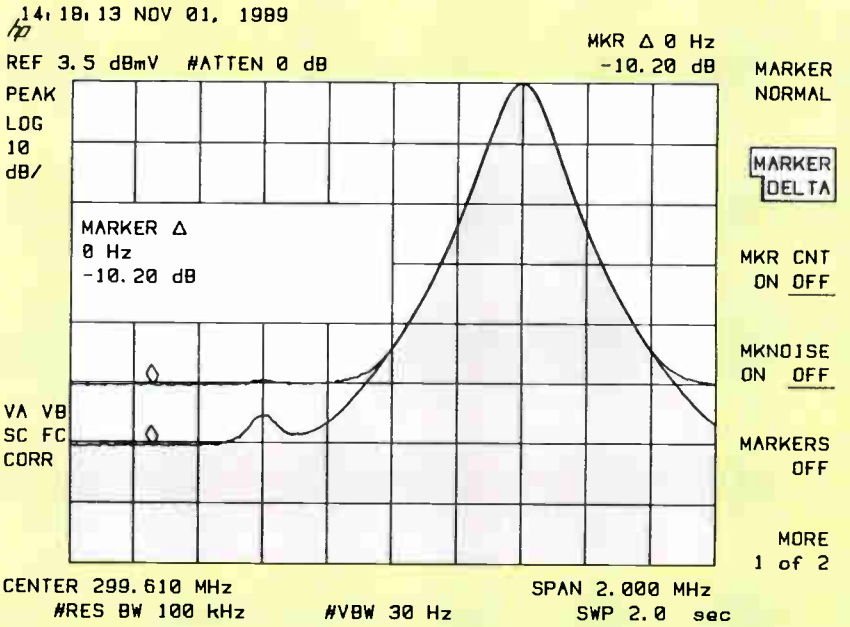
Some examples will illustrate the use of this graph. For a system with 10 channels and no tilt, the total power increase above the lowest-level channel is 10 dB. Because the lowest level is +19 dBmV in the example, the total power at the mixer for 0 dB attenuation is +29 dBmV, which is below the mixer-compression level of +39 dBmV. If 10 dB system tilt is added, the total power increases to +36 dBmV, still below mixer compression. But, when the number of channels is increased to 40, the total power becomes +42 dBmV which requires 10 dB input attenuation to prevent mixer compression.

The effect of additive power of multiple signals can be reduced by using a preselector filter in front of the spectrum-analyzer input. This bandpass filter lets one signal reach the analyzer and attenuates all others outside the filter bandwidth. Filters come in a large range of frequencies and bandwidths appropriate for CATV testing.

Noise effects

All electrical equipment generates noise. On the CRT of the spectrum analyzer, the noise floor comes either from internal electronic circuits or

REDUCING INPUT ATTENUATION LOWERS SPECTRUM-ANALYZER NOISE FOR IMPROVED SIGNAL-TO-NOISE RANGE



NOISE CHANGES 10 dB FOR EACH ATTENUATOR STEP WHEN ANALYZER NOISE EXCEEDS INPUT NOISE

Figure 4

CARRIER-TO-NOISE RATIO CORRECTION FOR 4 MHz BANDWIDTH

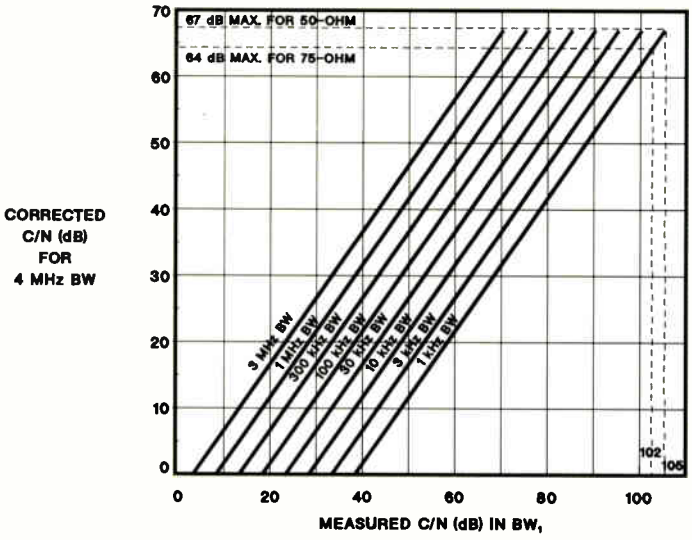


Figure 5

from the input signal. To determine the noise source, the input cable can be removed from the analyzer. If the noise level remains the same, it is coming from the analyzer; if it drops, it is coming from the input signal. Knowing the noise source is important before making C/N measurements on a CATV system. If the analyzer noise exceeds that of the system, the input signal should be amplified until the system noise is greater.

The IF filter also affects the displayed noise level. The filter acts as a window that allows us to view the noise. Larger windows—wider bandwidth filters—let through more noise. More noise also comes through the filter when the noise source is large to begin with. If this source increases by 10 dB, for example, the displayed noise will increase by 10 dB for any bandwidth setting.

We saw in Part II that the noise floor is lowered if the IF-filter bandwidth is reduced, allowing low-level signals previously buried in the noise to be uncovered. The change in displayed noise resulting from a change in resolution bandwidth is described by the equation:

$$\Delta N = 10 \log BW_2 / BW_1$$

where ΔN = noise change in dB, BW_1 = initial bandwidth in kHz, and BW_2 = new bandwidth in kHz. That is, for a decade change in bandwidth, the displayed noise changes by 10 dB. In Figure 3, the low-level signal is revealed when the bandwidth is reduced from 100 kHz to 10 kHz.

Reducing input attenuation is another way to lower the analyzer noise floor, but not external noise. When attenuation is decreased, the input-signal level increases at the mixer, resulting in a larger IF signal. To prevent this signal from moving up on the CRT, the IF amplifier reduces its gain. The reduced IF gain in turn decreases the internal noise of the instrument, the displayed noise drops, and the signal-to-noise (S/N) range increases. This is shown in Figure 4. C/N measurements in CATV are therefore usually made with the smallest amount of attenuation that still prevents mixer compression.

The measured noise in one bandwidth can be used to predict the noise in another. This is useful for C/N measurements, which are generally referred to a 4 MHz bandwidth of rectangular shape that is not available in the spectrum analyzer. An equation is used to calculate the noise of the 4 MHz bandwidth, based on the measured C/N, the spectrum analyzer bandwidth used, and a correction factor that accounts for bandwidth shape and other characteristics affecting the displayed signal. Easier methods include simply applying a correction factor to the C/N measurement in any bandwidth, or using a nomograph such as the one in Figure 5, which eliminates the need for any calculations. For an example using the graph, a 60 dB S/N ratio measured in 30 kHz bandwidth translates to a 37 dB C/N ratio in 4 MHz bandwidth.

Amplifying a signal up to the mixer-compression level gives the best amplitude range for measuring carrier-to-noise ratio. Preamplifiers often are used to boost low-level signals while increasing external noise above analyzer noise. Amplifiers with high gain (greater than 20 dB) and low noise figure (less than 8 dB) give the best results. (Noise figure is a rating in dB of the contribution of electronic equipment to noise.)

The nomograph of Figure 6 compares the C/N range of the spectrum analyzer (in terms of 4 MHz bandwidth) with the improved range obtained using a preamplifier. For just about any preamplifier, the graph shows a significant improvement in C/N ratio that averages about 25 dB. Greatest improve-

CARRIER-TO-NOISE RANGE FOR 4 MHz NOISE BANDWIDTH

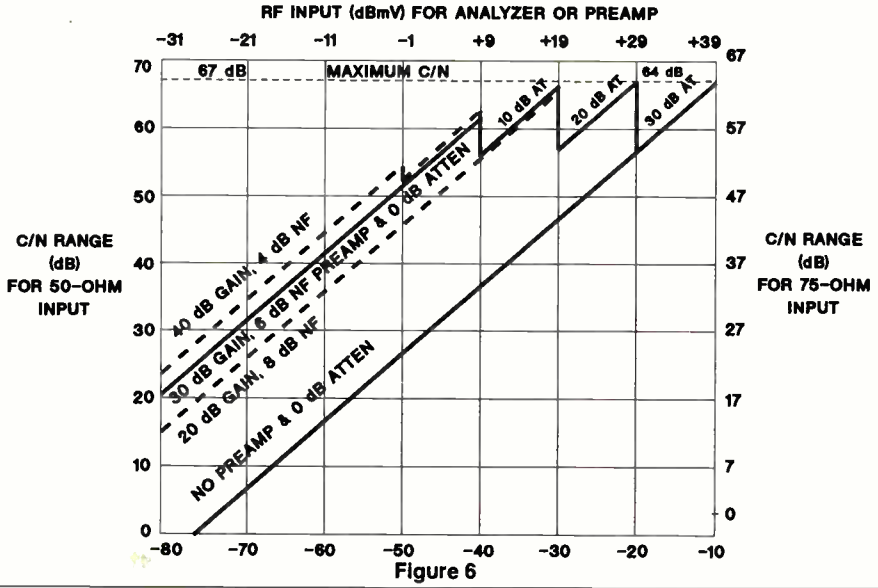


Figure 6

ment occurs for low-level signals that would show less than 40 dB C/N without a preamplifier. At higher signal levels, the improvement is less because the input attenuation must be increased to prevent mixer compression—that is, the signal is being amplified and attenuated at the same time.

Dynamic range

We've seen that increasing attenuation reduces mixer distortion caused by high-level signals, while decreasing attenuation and bandwidth reduce the noise floor, improving the sensitivity of the analyzer to low-level signals. Somewhere in between the largest and smallest measurable signals is a maximum range over which large and small signals can be measured together without interference from distortion or noise. This is the dynamic range.

Figure 7 illustrates the measurement capability of the spectrum analyzer for different testing conditions over the amplitude-measurement range. This range includes input signals from the lowest noise floor with minimum attenuation and resolution bandwidth to the maximum input level possible without damaging input circuits. Am-

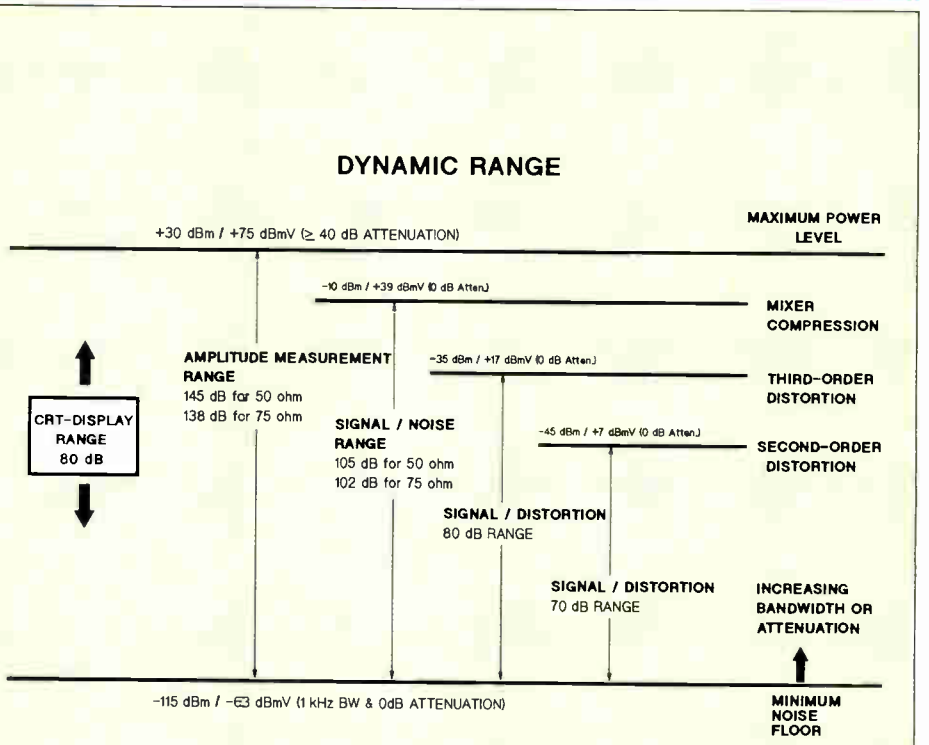


Figure 7

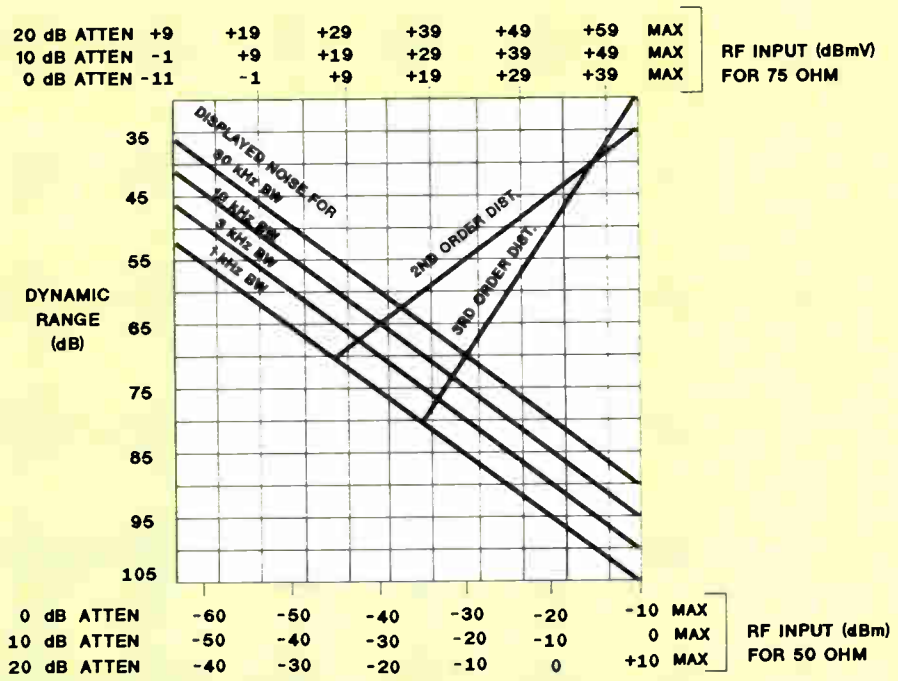


Figure 8

plitude measurements at the range extremes are done in two steps to prevent large signals from compressing the mixer when smaller ones are measured. The large signal is measured first and then disconnected from the input; after reducing attenuation, the smaller signal is measured.

The CRT can be thought of as an 80 dB window that moves up and down over the amplitude range. This window is positioned with reference-level settings that automatically adjust IF gain and input attenuation. The S/N range is the maximum separation between the noise floor and an RF-input signal that is just barely below the mixer-compression level. Like the CRT window, the S/N range can be moved up and down over the amplitude range with the reference-level settings.

In the presence of a large signal, a small signal near the noise floor can be measured if the test is not affected by harmonics from the large signal. (In this case, third-order beats between the two signals are below the noise floor.) By using a technique described in Part II, the large signal is measured and then raised above the reference level, allowing measurement of a smaller signal or noise.

When considering the effects of dynamic range on a test, we must determine the importance of the type of distortion encountered. For example, in CTB testing, third-order distortion range is significant; in searching for second-order interference within a channel, the second-order range will be used. For C/N measurements, distortion is not critical, so we will be more concerned with the S/N range described above.

The signal-to-distortion ranges (80 dB for third order and 70 dB for second order) are moved up and down over the amplitude range by adjusting the input attenuator and the reference level together. Having control of input attenuation is important to get the best performance from the spectrum analyzer, especially in a broadband-signal environment such as CATV. By using the total-power nomograph of Figure 2, we can optimize the attenuation for second- and third-order distortion measurements.

Having control of input attenuation is important to get the best performance...

Using the nomograph of Figure 8, which combines the concepts in Figure 7, we can determine the S/N and signal-to-distortion ranges for different input signals. The horizontal axis has several scales for input-signal level (50-ohm input on the bottom; 75-ohm on top) corresponding to attenuator setting, and the mixer-compression levels are marked as maximums to the right. Noise-floor lines for different resolution bandwidths as well as lines for second- and third-order distortion cut across the graph.

We can use this graph as a tool in CATV measurement. For example, assume that we have a +29 dBmV carrier, and we want to measure low-level signals relative to the carrier level as well as measure C/N ratio. Because the carrier level is below mixer compression, we can select 0-dB attenuation for the best signal sensitivity. To find the maximum amplitude range in searching for low-level signals, we follow the +29 dBmV vertical

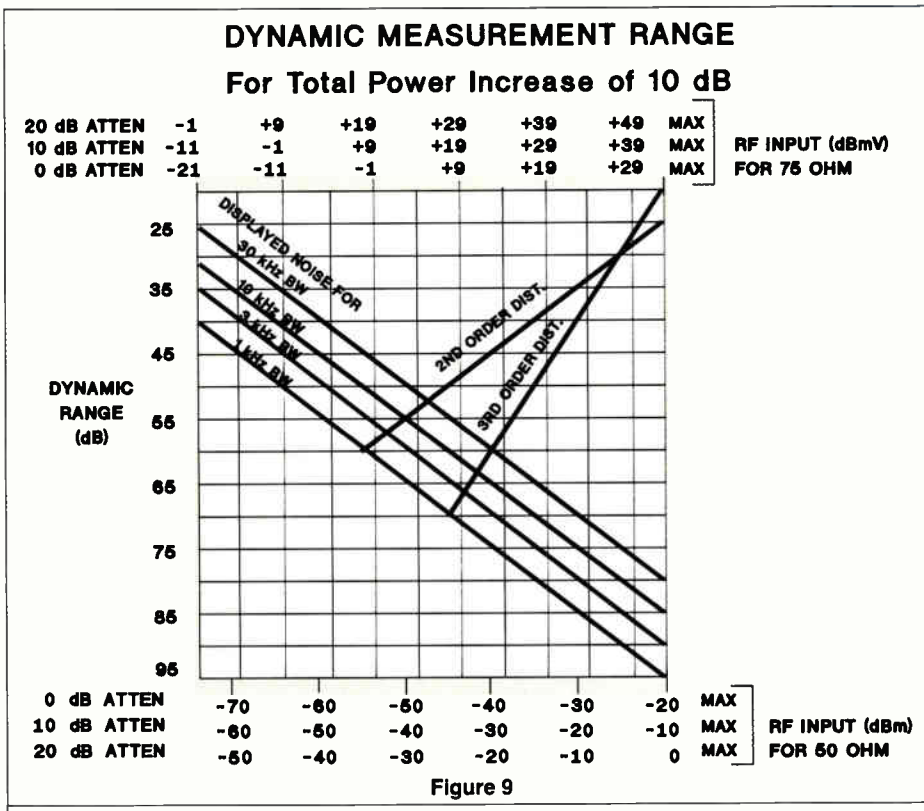


Figure 9

line down the graph to its intersection with the noise line for 1 kHz bandwidth. Then we locate an adjacent point on the dynamic-range scale and find that the S/N range is 92 dB. Using the previous graph that normalizes S/N ratio for a 4-MHz bandwidth, we find that the C/N range is 54 dB.

To find the best dynamic range, we follow the same +29 dBmV line down to intersections with the distortion lines and read the corresponding ranges from the vertical scale: 48 dB to second-order distortion and 58 dB to third-order distortion. We can improve dynamic range by increasing attenuation 10 dB. Then, we use the next higher scale for the input signal and a new +29 dBmV vertical line. The new distortion levels are 58 dB and 78 dB for second- and third-order distortions, respectively. More attenuation improves dynamic range for second-order distortion only; the third-order distortion signals are lower than the noise floor.

The dynamic-range graph must be modified if the total CATV-system power is higher than that of the carrier under test. In this case, the graph scales are adjusted by an amount equal to the power increase: input level shifts to the right and dynamic range shifts downward. Figure 9 illustrates how the graph changes for a 10-dB increase in power. These modifications are not necessary if a preselector filter is used to reduce the total power. Using both a filter and preamplifier (Figure 10) improves the analyzer dynamic range for CATV measurements.

Summary

Signals displayed by the spectrum analyzer may actually be harmonics or intermodulation products. This distortion can result from signals, even those that do not appear on the CRT, or from a broadband spectrum of signals. Before testing, we must know whether the distortion comes from the CATV system or the analyzer. Increasing the input attenuation tests the distortion source: if distortion decreases, the mixer is the source. Mixer distortion can be reduced with increased attenuation or by the addition of a preselector filter which limits the spectrum size.

Displayed noise can be lowered by narrowing the resolution bandwidth. Removing the input signal tests for the noise source: if the noise drops, then it comes from the input. The video bandwidth lowers noise peaks by averaging the noise. Both the IF and video filters improve the resolution of signals close to the noise floor. Reducing input attenuation also lowers the displayed noise caused by the spectrum analyzer. By lowering the noise floor with filter or attenuation adjustments, we get a better S/N range.

A preamplifier boosts low-level signals for improved S/N and C/N measurements. Combining a preamplifier with a preselector filter that reduces the total signal power at the input of the spectrum analyzer results in improved overall dynamic range. Knowing how to improve and apply dynamic range will ensure that signals measured under different test conditions are actually from your CATV system. ■

In the next and final installment to this series, we will cover the special CATV functions and tests that have been programmed into the CATV analyzer to enhance the instrument and simplify testing even further.

PRESELECTOR FILTER AND PREAMPLIFIER INCREASE DYNAMIC RANGE

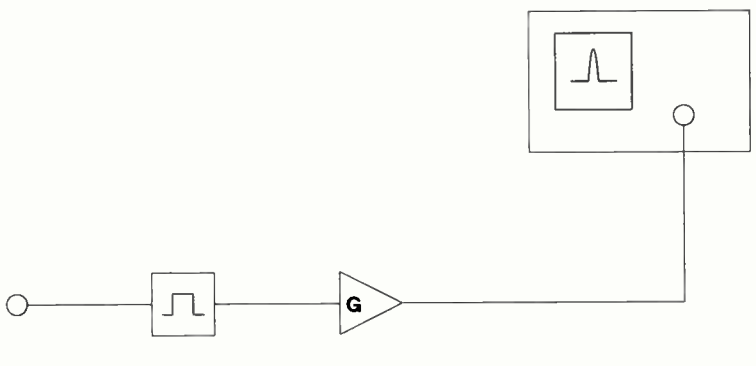


Figure 10

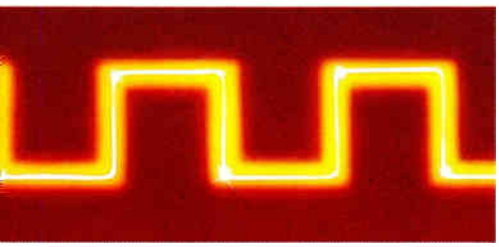
Turn Truck Rolls Into Bank Rolls With Power Guard And Cable Security Systems

If You Want To Mak
Explanations, You Need Po

Your power supply gives you a choice: you can keep trucks in the field servicing equipment or you can roll them out to make new installations. Power Guard is designed to eliminate costly repair hours, so your technicians can be producing revenues.

Power Guard's Modularity Means Lightning Fast Repairs

From the wiring harness to the circuit boards, Power Guard is completely modular. Every component is designed for fast plug-in replacement in the field, so there's no need to remove and reinstall housings with Power Guard. Getting back on the air



even if lightning damages your wiring will take only a matter of minutes.

The normal power supply weighs only 40 pounds, the standby power module only 30 pounds, so the man in the field can pull a damaged module quickly, safely and restore power in a few seconds. That is what Power Guard is all about, keeping you on the air.

The Efficiency Expert

Since Power Guard pioneered the long life 90% efficient power supply in 1985, we continue to set the industry standard in reducing power costs while remaining trouble-free. Because our units are rated at actual output, your bottom-line costs will also be less. For maximum efficiency, your power supply should be operated at or near full load. That's why we designed our ferroresonant supplies with different load ratings, so you can closely match the supply's current rating to the load requirement at each power supply location and save.

Power Guard lets you choose 5, 8, 10, 15 or 18 amp modules. So, when you need 8 amps, use the 8 amp module to get the lowest operating costs with consistent output and high efficiency.

That Makes You A Cool Operator

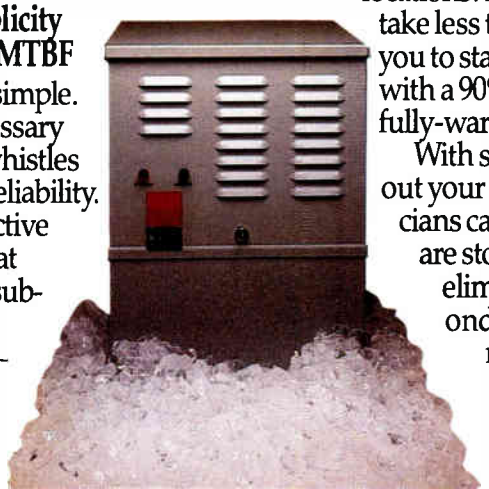
Maximum efficiency means that less energy is lost in heat build-up which causes costly burnout and equipment failure. True efficiency is achieved with Power Guard's cool operation, adding years to the life of your power supply (and your field technician's). And the cool operation allows for a smaller enclosure and less pole space.

Flexibility To Grow On

As your system grows, you can increase your load capacity by swapping out the existing module for one with a higher capacity and plugging in more power in the field.

Simplicity Spells MTBF

We kept it simple. No unnecessary bells and whistles to reduce reliability. Just productive features that keep your subscribers in the picture–



features to give you the maximum mean time between failures and the minimum down time in case of a failure.

We build a quality product with a powder-coated, all-aluminum housing that will withstand the most severe weather conditions for years of trouble free service. That's why we can give you the longest warranty in the CATV industry today.

Retro-Fit To Standardize

Our small, highly efficient modular design allows us to Retro-Fit virtually all of our competitors' power supplies, standby and non-standby, while using your existing housings in their current locations. Retro-Fits cost less and take less time to install. They allow you to standardize your entire system with a 90% efficient, totally modular, fully-warranted supply.

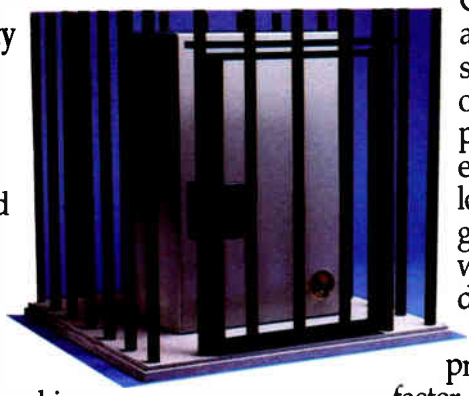
With standard equipment throughout your system, your service technicians can make sure their trucks are stocked for in-field repairs eliminating unnecessary second trips. And eliminating the need for cross-training.

e Installations, Not wer Guard And The Beast.™

The Beast Guards Your Connections

The beauty of this apartment box is that it ends theft of service and signal leakage due to tampering...and reduces truck rolls so your technicians can make more hookups, less unproductive audits and repairs.

The Beast Is Under Maximum Security



We caged the Beast in a box-in-a-box. Stainless steel arc welds eliminate rust and prevent prying. Our 16-gauge aluminized steel remains corrosion-free and outlasts galvanized steel five to one. Coatings withstand high impact for years of use without chipping or cracking.

SuperLocked To Stay Locked

Developed exclusively for CATV, we built the lock you can't defeat.

Since we introduced SuperLock in 1983, it has remained the benchmark for apartment box security, meeting all internal and external security requirements for the CATV industry.

The brass tumbler is enclosed in a 16-ounce solid brass housing. All moving parts are brass or stainless steel to remain rust-proof and free-moving. SuperLock is recessed and encapsulated in a deep drawn steel shroud for double protection, in all weather.

The Key To The Beast's Success

The key to the Beast cannot be reproduced. You control the access to all Beast apartment boxes, simply by logging in and out all keys you distribute to your service technicians.

The key must be in the locked position in order to be removed, so it is impossible to leave the Beast unlocked without detection.

Installing Without Stalling

Six leads or sixty, we've got your box. Custom features and options such as knockouts, mounting plates, organizers, matching locks and ground lugs won't slow us down. Installations of our products are faster, more efficient.

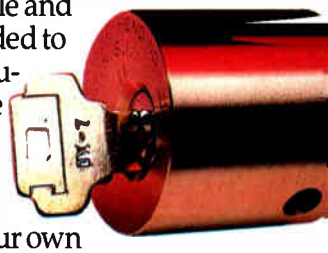
A Pack Of Protection

Swinging Beast, Beast, Lock Box and Beast II–choose the Beast that's best for you. Cable Security Systems offers a choice of four models to meet your cost and security requirements.

The new Swinging Beast has a non-removable, hinged lid that makes servicing quicker, safer and more convenient. No more lost lids.

Our original model, the Beast, is the industry standard for durability and security in all conditions.

The Lock Box™ is adaptable to almost any locking system. It offers durability and serviceability that's affordable and may be upgraded to maximum security at any time without rewiring. It can be keyed to the Beast™ with our own 2" solid brass padlock.



The Beast II has a sliding, retained lid with a self-locking, solid brass lock that can also be keyed to the Beast. The Beast II is a durable system for areas where high security is required.

Reliance Makes Compliance Easy

Meeting new government regulations to prevent signal leakage is critical to keeping your license–and your customers. Many operators have been spending a lot on costly truck rolls to audit their apartment boxes to detect tampering and theft, which is also a major cause of signal leakage.

Cable Security Systems products give you the security you need to prevent tampering. And knowing that tampering is limited by one of the Beasts, you can eliminate those expensive audits.

So, when you send a truck out, your service technicians can spend their time on new installations not inspections.

Let Power Guard and the Beast truck you to the bank.

A Powerhouse Of New Ideas In The Cable Industry

Power Guard and Cable Security Systems are innovators in techniques to control CATV operator costs and generate improved revenues. We have brought some of the finest creative minds in the field together to concentrate on products that serve the cable industry. Because we are serious about quality, we have consistently set industry-wide standards of performance including 100% testing for quality control.

So What Have We Done For You Lately?

In 1974, Jerry Schultz pioneered the first reliable standby power supply for CATV. Today, these very same power supplies are still in use. The Beast was introduced in 1982 as this industry's first true high security apartment box. It is now the industry standard coast to coast.

So What Will You Be Doing For Me Tomorrow?

Today, we continue our pioneering manufacturing with our state-of-the-art facilities. The brand new 40,000 square foot plant is completely automated, using CAD/CAM to insure precision and consistent quality in every component, from complex circuitry to sheet metal fabrication. We also maintain our own in-house powder paint facility to ensure that all housings are coated for years of durability and weather resistance.

But this is only the beginning: Our engineering staff is busy with exciting new products for the future, and our entire company is dedicated to our goal of remaining the most innovative company, totally dedicated to serving the cable industry day to day.

Now you have one source of all your power supply and apartment box needs, with the combined resources of Power Guard and Cable Security Systems.

For pricing and information on Power Guard Power Supplies, write: **Power Guard, Inc.,** 506 Walker Street, P.O. Box 2796, Opelika, Alabama 36801. Or telephone toll-free 1-800/288-1507 or for local calls telephone 205/742-0055.

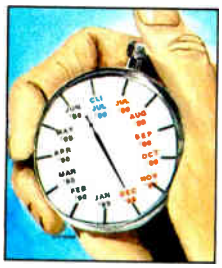
For pricing and information on the Beast, write: **Cable Security Systems, Inc.,** 801 Fox Trail, P.O. Box 2796, Opelika, Alabama 36801. Or telephone toll-free 1-800/288-1506 or for local calls telephone 205/742-0050.

POWER GUARD
800/288-1507

Cable Security Systems, Inc.
800/288-1506

System tap audits

COMPLIANCE



There are several benefits to the operator by performing system tap audits. Some that come to mind are: increase revenues by converting illegal subscribers, thus stopping lost revenues, fixing signal leakage problems created by illegal connections, updating homes passed counts, and cleaning up any problems related to the physical plant. If you feel that one or all of these items should be addressed in your system, then you may want to plan for a tap audit in your system's future business plans.

If this is the case, the next step should be pre-planning for a budget proposal. A question often asked is, "How often should the system be audited?" The answer may be varied from operator to operator, but a general rule would be every three to five years, or sooner, depending on the system's illegal activity. You can perform a sample audit in order to justify the need for a full system audit. This sample can be accomplished by analyzing random areas of the system. Another opportune time for an audit would be after a system rebuild or upgrade.

Getting back to budget planning, this is the time when the system management team should meet to discuss what the goals of the audit are going to be. It is important to remember that this type of project requires the combined efforts of all system staff, especially the management staff. Everyone in the system will need to be aware that an audit is going to happen. A timeline can be developed that shows when the project will happen, how long it will take, and what everyone's role is.

Preparing a proposal

In order to prepare a budget proposal for a tap audit, labor, marketing, and material costs must be researched and confirmed. Labor charges may vary depending on the scope of the work involved. Send out bid proposals in order to achieve competitive pricing. Marketing costs are something that tend to get overlooked. A lot of time and money need to be allocated to this department for such things as: door hangers telling people that the system is working in the area; advertising to create an amnesty program for illegal subscribers; and labor costs for sales personnel who need to follow audit crews in an attempt to convert illegals into paying subscribers.

Be very careful what you print on door hangers. You do not want to accuse anybody of stealing the service when it could have been a "coffee shop disconnect" and was on when the homeowner or renter moved in. This doorhanger could say something like, "During the next few weeks our crews will be working in the area. We are currently offering special discounted installation and service rates. If you would like more information please call us at 978-9770, or wait for one of our representatives to contact you within the next few days."

The wrong wording could create legal problems for the system if someone decided to pursue the issue. Marketing dollars should be allocated to create an amnesty program as part of the audit or as a permanent fixture. Amnesty programs have been somewhat successful in certain systems, but it does take money to create and keep such a program going.

Another option as it relates to marketing may be to investigate the possibility of setting up a sales person as an instant installer/MDU auditor. This person would be required to be qualified in all areas of installation to ensure high quality work is performed. This person would also need to regularly monitor and audit multi-dwelling units and/or heavy move-in/move-out areas of the system. This person would then submit reports of findings to the sales manager on a regular basis and act on those findings. This position may be justified by identifying how much lost revenue he/she could potentially prevent.

Depending on the scope of the work, material costs can also vary. In most cases drop I.D. tags, locking terminators, security shields (for traps), illegal stickers and locks for pedestals are generally required.

AUDIT WORKSHEETS Date _____

Street _____ Audit Team _____

Address	Active	Disc	U/A	Date Contacted	Delete	Notes

AUDIT ACTIVITY

Homes _____ Active _____ Disc _____ U/A _____

SALES ACTIVITY

Basic Units _____ Movie Units _____ Converters _____ Remote _____

Add Outlets _____ Adult Tier _____ Basic Tier _____ Commercial Tier _____

Cash Collected _____

Figure 1

What to do

Another decision, made jointly by the management team, is how to deal with illegals once you find them. Should

By Dave Barrett, Chief Engineer, Jones Intercable

you disconnect the illegal at the time they are found, send a sales person out to convert them to a paying subscriber, have them scheduled for an install, and then roll a truck to hook them up properly? Or, should you leave the illegal active and try to make contact with them to try and get them to convert?

We have found the most successful and cost effective method is to disconnect initially, then send a salesperson out to convert them. When we left the illegal active and then tried to convert them, our conversion rate was only 16 percent. Whichever way you choose to do it, it is important to contact the illegal in a timely manner. The success of the sales effort depends on the timing and monitoring of the sales force.

It is imperative that the sales person and disconnect crews work closely together. Some systems send them out together and the sales person is held responsible for returning from each home with either a sale or a disconnect. At the least, the salesperson should follow the audit crew within one week. With careful monitoring and timely responsiveness to sales needs and obstacles, you should be able to achieve a 50 percent or better conversion rate on illegals.

Figure 1 is a copy of a tracking sheet that could be modified and used for your audit. This sheet will assure you of the effectiveness of your front office and sales coordination, and help you to determine and correct problems quickly. Additionally, it can be used as a reporting vehicle, and will give you reasons why your conversion rate may be lower than expected.

WORK IN PROGRESS AUDIT REPORT

Dates	Total Homes	Total Actives		Illegals		Illegals to Total Active %	Illegal pay Subs to Paying Actives
		Paying Actives	Non-Actives	Illegal Connects	Illegal Pay Subs		

Total Homes = Paying Actives + Non-actives + Illegal Connects
Total Actives = Paying Actives + Illegal Connects

Figure 2

Getting started

After a budget is approved and you are ready to begin your audit, an "Action Plan" memo to all the system staff should be sent out. It should explain exactly how you are going to deal with the illegal subscribers. It may look something like this:

Purpose: to convert as many illegal hookups as possible without embarassment to the resident and with the least amount of confusion for the system staff. Additionally, to accurately update our homes passed count for our data base.

1) All unauthorized viewers will receive a door hanger letting them know that we are offering specials on installations, but not accusing them of stealing the service.

2) All U/A viewers will be disconnected immediately, and a list turned in daily from the audit which gives the status of "unauthorized viewer" on the computer. Addresses not currently on the database will also be turned in daily and added to the system. Customer comments will identify U/A pay services found for customers currently in database.

3) Any illegal subscriber who calls into the office that day or night, wanting to convert to a paying subscriber will be given that opportunity, and if so, will be changed in the computer data to a "converted" status by the CSR taking the call.

4) The following day, all "unauthorized viewers" will be pulled for the direct sales team and will be contacted that night. The sales reps will follow two days behind the audit crews. Each day the sales staff will return and report all people who wish to convert to paying subscribers.

All non-pay disconnects will show delinquent amounts. Sales reps need to collect before they can be converted.

All addresses that were previously added into the database will not be pulled but will be manually added to the sales list by office manager. This is also the case for all "nevers."

5) Any illegals wishing to convert who call in after the sales list has been generated will be removed from that list manually by the CSR taking the call.

6) The sales staff will have three days to reach the illegals on each list and then that list must be returned to the office. The office will hold the list for an additional two days in hopes of receiving a call from the illegal subscriber.

7) Pull sample of all audits and establish quality control procedures to verify contract labor work performed. This function to be conducted by chief

CLI FLYING SUCCESS

INTRODUCING FLYOVER PROTECTION FROM THE PEOPLE WHO INVENTED LEAKAGE DETECTION...

Avoid fines and loss of channels with
ComSonics' exclusive SNIFFER FLYOVER PROGRAM

- Overall Area Detection
- Accurate Leak Accumulation Indexing
- Leak Location Coordinates
- Complies with FCC Specifications

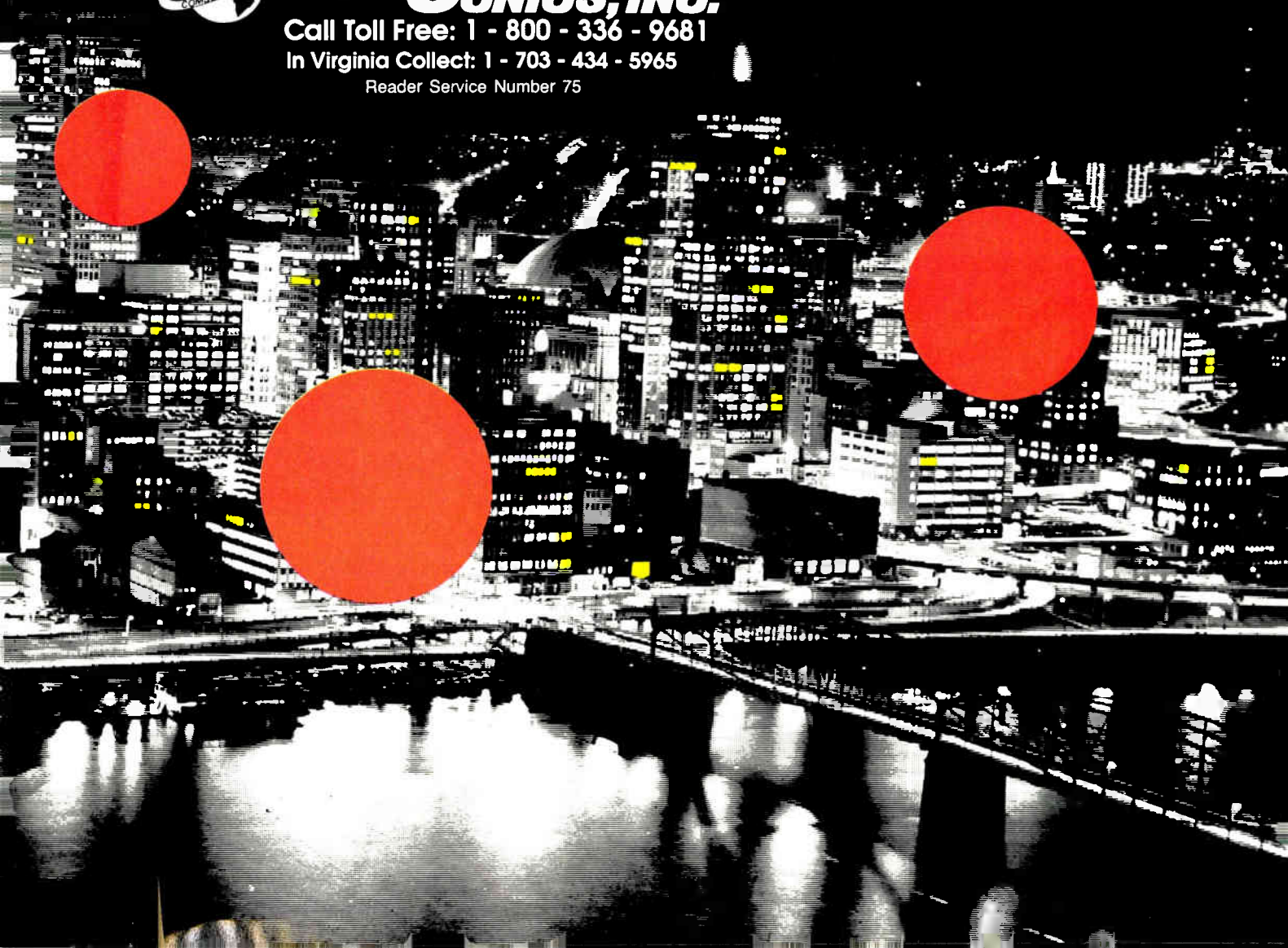
COMSONICS LEAKAGE LEAK BUSTERS

This is the most cost effective technology and service available to the industry today!

Contact ComSonics today and go for SUCCESS NOW for 1990!

ComSonics, Inc.

Call Toll Free: 1 - 800 - 336 - 9681
In Virginia Collect: 1 - 703 - 434 - 5965
Reader Service Number 75



COMPLIANCE

technician.

Some important issues that should be noted as they relate to the contract firm that is hired to do the job may be:

1) Have a meeting up front to clarify the scope of the work they must perform in the field. Clear up any confusion before they start the job! Then once they start the job, follow up with regular communications. Have daily and/or weekly meetings with the supervisor in charge.

2) Have them turn in a report along with their invoicing that explains what they have found to date, eg; number of illegals found, number of illegal basics, number of illegal pays, number of added homes passed, etc. Figure 2 is an example of an audit summary report that may be modified and used by the contractor to report regularly on work done in the field

3) Note any rework needing to be done to the drop on a "Drop Discrepancy Report." This report should be turned in to the chief engineer.

To summarize, develop good communications and tracking procedures, and quality check the work done in the field.

Now we come to the end of this project and its time to analyze all the data and report it to the system manager. Information can be broken down as follows in this example.

***218 illegal addresses found**
30 never homes with active tap = 14%
31 illegal pays on these homes = 103%

56 disconnected homes with active tap = 26%
94 illegal pays on these homes = 168%

132 active homes with illegal pay = 61%
232 illegal pays = 176%

***Converted Units**
Disconnected addresses
58 basics = (9% of disconnected addresses)
6 pays = (6% of illegal pays on these homes)

Never addresses
3 basics = (10% of never addresses)
3 pays = (10% of illegal pays on these homes)

Active addresses
25 pays gained = (11% of illegal pays on active account)
28 sold 3 dropped a pay unit

Overall Summary
218 illegal addresses found
86 illegal basics (9% converted to legal status)
357 illegal pay units (10% converted to legal status)

(*Note the low conversion rate on this example. Perhaps something went wrong along the way!)

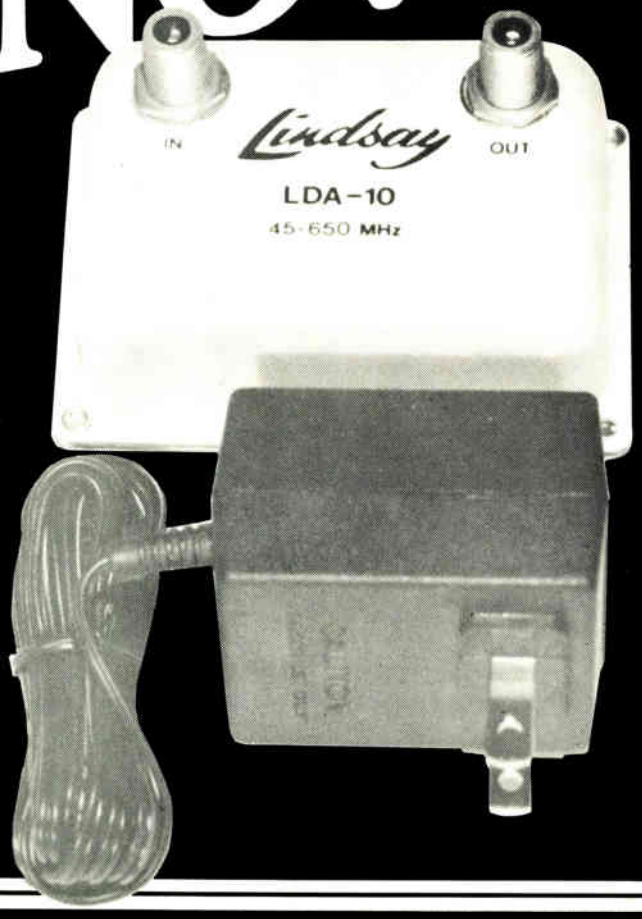
A tap audit as it relates to signal leakage is of prime concern. Not only will you be losing revenues due to the illegal connection, it will probably be causing signal leakage problems to the system. The majority of the illegals that we find in our systems have some detected level of leakage. They have ranged from less than 20 μV/m to over 500 μV/m. The fact that there is a good chance that a particular illegal connect is leaking is justification to disconnect that line immediately.

In conclusion, pre-planning, training, constant communication with all personnel, and thorough reporting will help the overall success of your tap audit. ■

Over Thirty Years of
SERVICE, RELIABILITY and INNOVATION...

- ***the First*** **550MHz Apartment House Amplifier**
- ***the First*** **700MHz Line Passives**

NOW.. *the* FIRST 650MHz DROP AMPLIFIER



Frequency	**45-650MHz**
Gain	**10dB**
Noise Figure	**4.5dB**
CTB	**-65dB**

(SA) and (UL) Approved

Lindsay...Your Full Line CATV Manufacturer ... Actives at 550MHz, Passives at 700MHz, Apartment House Amplifiers and Ganged Apartment Taps, with a full line of CATV Communication Antennas.

Lindsay

PA: TONER CABLE EQUIPMENT	215-675-2053	MN: GRUNWALD, BURNS & ASSOCIATES	218-739-3961
FL: INTERSTATE CABLE ENTERPRISES	800-245-4423	CO: MEGA HERTZ	303-779-1717
PA: JIM MORTON & ASSOCIATES	717-243-4653	CA: WESTERN CATV DISTRIBUTORS INC.	213-539-8030

LINDSAY SPECIALTY PRODUCTS 1248 Clairmont Rd, Suite 3D-231, Decatur, Georgia, U.S.A. 30030
Telephone: 404-633-2867 Fax: 404-634-1515 Head Office: 705-324-2196

Reader Service Number 77

WHAT'S AHEAD

SCTE

Following is a list of SCTE technical seminars with contact name. If known, location and seminar topic are listed.

December 9 *Rocky Mountain Chapter* "System Powering" with Pam Nobles and Margaret Gaillard of Jones Intercable. Contact Rikki Lee, (303) 792-0023.

December 14 *Central Indiania Chapter* "BCT/E Category V - Data Networking and Architecture" with a presentation on the category's theory by Doyle Haywood of Applied Instruments, as well as a presentation on the category's real world application by Joe Bush. Contact Lou Zimmerman, (317) 632-2288.

December 14 *Chesapeake Chapter* (Tentative) BCT/E examinations to be administered at the Holiday Inn, Columbia, Md. Contact Doug Worley, (301) 499-2930.

December 15 *Miss-Lou Chapter* Baton Rouge, La., Contact Charles Thibodeaux, (504) 641-9251.

December 26 *Satellite Tele-Seminar Program* "AM Fiber Optic Transmission (Part II)" featuring J.R. Anderson of Anixter Cable TV and Clive Holborow of AT&T Bell Labs. Recorded at the Cable-Tec '89 in Orlando, Fla. Plus "The SCTE Music Video" featuring the SCTE band. The program will air from noon to 1 p.m. Eastern time on Galaxy III, transponder 2.

SCTE technical seminars, 1990

January 11 *Big Country Meeting Group* Sweetwater, Texas. Contact Albert Scarborough, (915) 698-3585.

January 17 *Greater Chicago Chapter* "BCT/E Category I, Signal Processing Centers." Contact Joe Thomas, (312) 362-6110.

January 17 *Ohio Valley Chapter* Contact Bill Ricker, (614) 236-1292.

January 17 *Mount Rainier Chapter* "Installers." Contact Sally Kinsman, (206) 821-7233.

January 17 *Dairyland Meeting Group* Contact Bruce Wasleske, (715) 842-3910.

January 20 *Cactus Chapter* "System Design." Contact Harold Mackey Jr., (602) 866-0072, ext. 282.

February 13 *Greater Chicago Chapter* (Tentative) BCT/E testing to be administered. Contact Joe Thomas, (312) 362-6110.

February 16 *Miss-Lou Chapter* Biloxi, Miss. Contact Charles Thibodeaux, (504) 641-9251.

March 8 *Big Country Meeting Group* Abilene, Texas. Contact Albert Scarborough, (915) 698-3585.

March 21 *Greater Chicago Chapter* "Safety." Contact Joe Thomas, (312) 362-6110.

April 20 *Miss-Lou Chapter* Baton Rouge, La. Contact Charles Thibodeaux, (504) 641-9251.

C-COR ELECTRONICS INC

C-COR Electronics "state of the art" seminars are three-day events designed to instruct relatively new technicians in basic theory, installation and maintenance of cable TV systems. Attendance is limited to a maximum of three persons from one system. The fee is $195. Call Teresa Harshbarger, (800) 233-2267, ext. 326 to register or for info on any of the following 1990 seminars.

January 16-18
San Diego, Calif.
February 13-15
Charlottesville, Va.
March 20-22
Atlanta, Ga.
April 24-26 Albany, N.Y.
May 22-24
Allentown, Pa.
June 19-21
Indianapolis, Ind.

FC²

Fiberoptic Communications Corp. offers 5-day fiberoptic splicing and termination workshops. The workshops are held at its training facility in Sturbridge, Mass. The fee is $1,495 for 1-3 students and $1,195 for more than four students. For details call, (508) 347-7133.

December 11-15, 1989
January 22-26, 1990
February 26-
March 2, 1990
March 19-23, 1990
April 23-27, 1990
May 21-25, 1990
June 25-29, 1990

Etcetera

February 12-14, 1990 *Second Annual HDTV Conference and Exhibition* will take place at the Hyatt Regency Crystal City at the Washington National Airport. The conference is jointly sponsored by *HDTV World Review* and *HDTV Newsletter*. For registration or additional info call, (800) 635-5537 or (203) 226-6967.

March 26-29, 1990 The *North Central Cable Television Association* annual trade show and convention will be held at the Hyatt Regency, Minneapolis, Minn. For information call Mike Martin, (612) 641-0268.

When your customers are relying on you to get the job done, you need reliable and accurate test results . . . without having to worry about calculations that can add errors and time to your system tests.

The FS74 CHANNELIZER SR. eliminates errors and saves you time with 100% automatic and exclusive tests you can trust.

- All Channel DIGITAL tuner (5-890 MHz) covers Sub-band, VHF, UHF, FM and Cable Channels.
- Exclusive Frequency offset readout alerts you to carrier frequency drift.
- Integrated Wide-band monitor lets you analyze system problems other testers miss and regular TVs can't show.
- 5uV sensitivity (-46dB) and autoranged attenuators allow CLI testing.
- Automatic S/N and Hum tests on any IN-USE channel.
- Built-in DVM tests AC/DC Voltage and resistance.

The FS74 CHANNELIZER SR. gives you one integrated CATV and MATV troubleshooting and performance testing system that gets the job done right and fast.

SENCORE
3200 Sencore Drive, Sioux Falls, South Dakota 57107

Call 1-800-SENCORE
(736-2673)

Ask About A 10 Day Video Preview

tech tape

Reader Service Number 78

The CABLE POLL

™Midwest CATV • CED • CableVision

Three out of four systems believe they would pass CLI tests if inspected today

In what observers said was a clear case of system managers responding with their hearts rather than their heads, three out of four GMs told Cable Poll™ interviewers that, if their system were inspected today, it would pass the Federal Communications Commission's cumulative leakage index test.

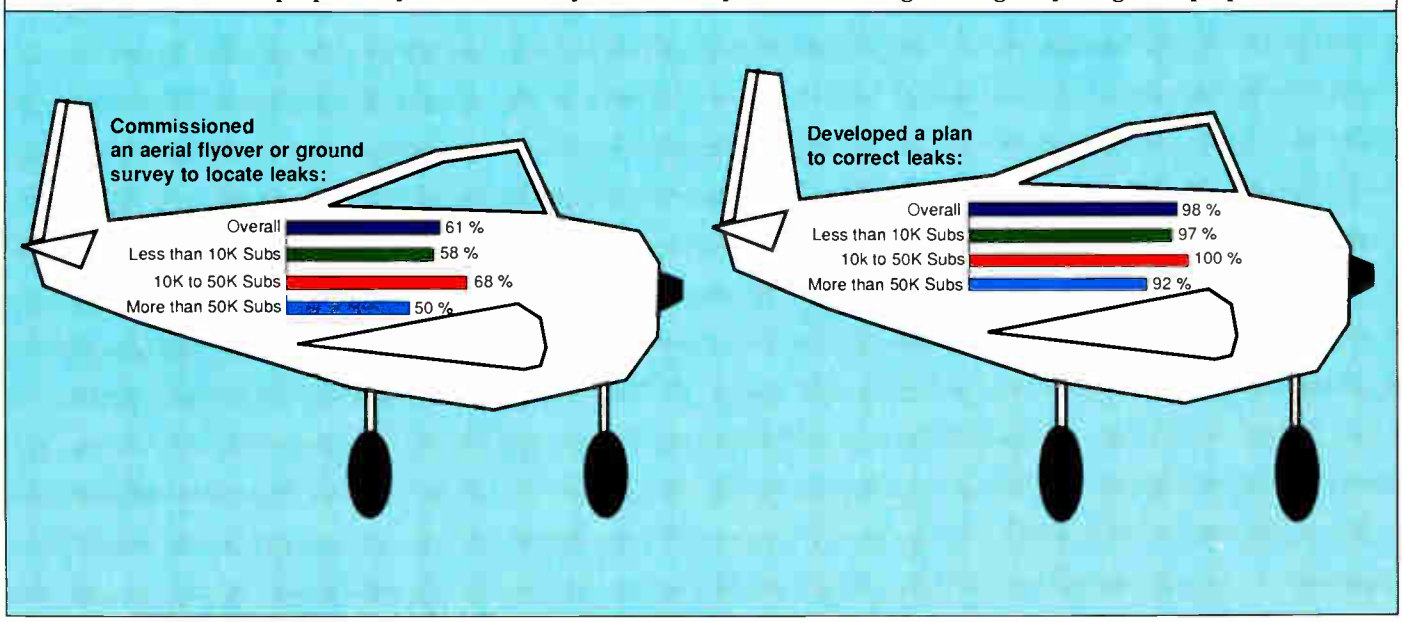
"That seems to be badly at odds with the FCC's own inspection data, which shows that 67 percent of all systems they inspect are in violation today," Wendell Bailey, vice president of science and technology at the National Cable Television Association, said in reacting in disbelief to the data. Bob Dickinson, president of Dovetail Systems in Bethlehem, Pa., a company specializing in helping systems comply with CLI rules, said the level of confidence expressed by system managers perhaps is a reflection not of engineering standards but of simple mathematics: "Some people may be just playing the odds, because they know the number of inspections the FCC can do in a year may be low enough to make it worth the gamble" that they won't get caught.

But that is a gamble that Bailey and others said is a sucker's bet. "The FCC will step up the number of inspections, and the question is not whether there will be any (caught) but how many and (just how hard the FCC will) sting the hell out of them. Everyone out there potentially is the candidate to... find their name up in lights," Bailey said.

Nevertheless, out of nearly 400 system management personnel interviewed on the subject of CLI, most said their systems right now are tight enough to pass muster. Managers at 75 percent of systems with fewer than 10,000 subs, 76 percent of systems with between 10,000 and 50,000 subs and 91 percent of systems with more than 50,000 subs said they believed they are not leaking in excess of the allowable 20 microvolts per meter measured at three meters.

The managers also were asked what steps they have taken to come into compliance with the CLI rules, which take effect July 1 after a five-year notification period. Sixty-one percent of all respondents said they had commissioned an aerial flyover or ground survey to determine what parts of the plant need attention; 98 percent said they had developed a plan to correct leaks identified in the flyover or ground survey; the same 98 percent said they had put that maintenance plan into effect; and 81 percent said that, based on that maintenance plan, they had completed work on correcting identified leaks.

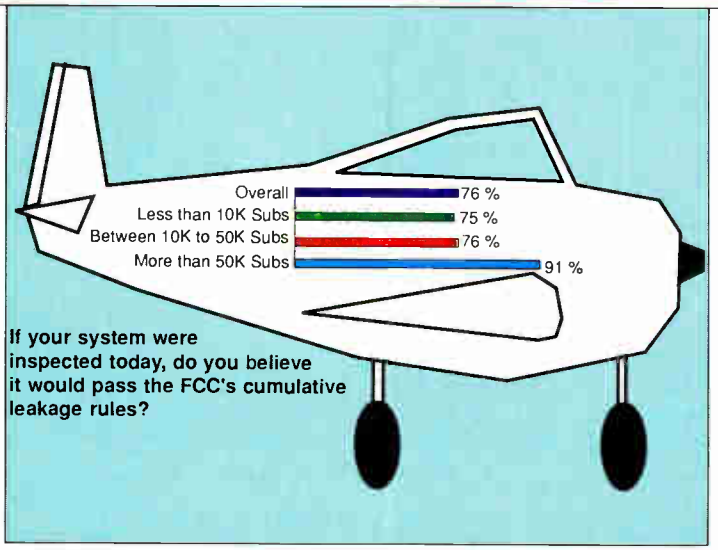
Dickinson said some of that data made sense to him, but he found other responses hard to believe. "It wasn't too long ago that virtually nobody was doing anything (to prepare for im-



plementation of the CLI rules). But today I would say that the major MSOs have taken the situation seriously. I do believe that 98 percent have a plan, but whether it's been tested, that's different." Dickinson based his conclusions on experience from well over 100 flyovers his company has done for cable systems. He said Dovetail is booked solid through next March.

Bailey also cautioned that, even accepting that most operators believe they are in compliance with the rules now, staying in compliance is another matter. "If they have fixed all their leaks today, by the time you get to July 1, 1990, they will have 200 new leaks" due to normal aging of the plant, he said. "I believe the only way to correctly pass this and continue to pass this is to put a plan in place forever. This is not a project with a short time frame on it. Once you commit to it, you must recognize you're committing to it forever."

As the industry gains a better understanding of the engineering work required to comply with CLI, the condition of older systems is beginning to come into critical focus. Observers said that it will be very difficult, perhaps even impossible, for many systems more than 20 years old—certainly those that have not benefited from a large-scale modernization of the plant—to come into compliance short of a complete rebuild.



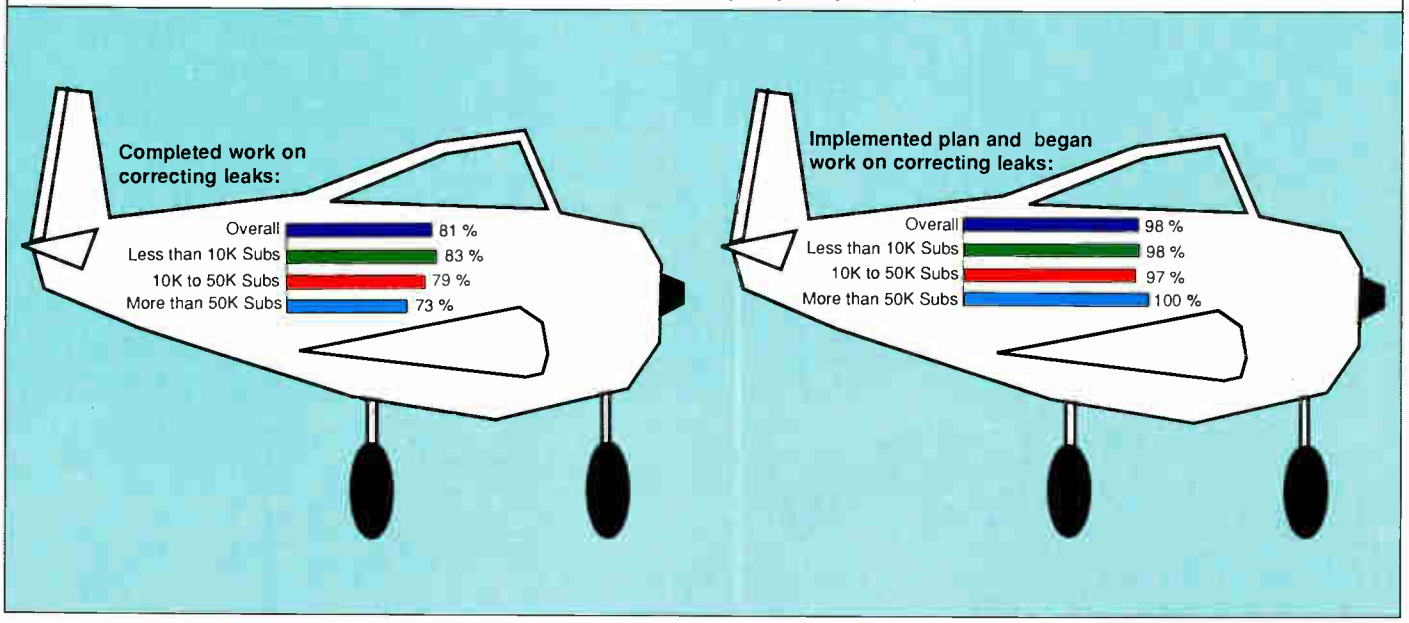
"There's going to have to be some hard choices," said one MSO chief engineer who asked not to be named. "For us and some other companies I know of, we have some smaller properties that were built in the 1960s that there's no way we could tighten up short of just tearing it down and starting from scratch. You just can't put a Band-Aid on gaping wounds like that. Maybe the best thing for us is to bite the bullet and come July 1 just shut down the aeronautical band. At least that way we stay in business."

Dickinson echoed that thought. "I think everybody or most people have some systems that will be hard to fix. You can tighten up any system, but with old systems it's very expensive, especially if they weren't built with good fittings to begin with."

But for the vast majority of systems, complying with the CLI rules certainly is not an insurmountable or extremely expensive undertaking, observers noted. As Dickinson said, "the tests are not unreasonable, and people who have things fairly well under control should pass. And once you get a system in pretty good shape, constant maintenance will keep it that way. I also believe that with either the ground-based or the flyover, there is enough leeway in the formulas and procedures... that a system in reasonable shape can pass and still be far from perfect." To which Bailey added: "Be sure to keep records and paperwork in good order."

The NCTA has conducted six seminars on CLI attended by a total of about 2,000 people, Bailey said. But while the industry's familiarity with the CLI requirements is progressing, Dickinson, who often speaks at trade shows on the subject, said he's shocked by how often someone in the audience will say they haven't heard about the new rules.

"They've (systems) had five years to get ready for this, so the FCC isn't going to be lenient. The commission has put too much into this, so that if they find some people out, they will really nail them." Bailey seconded that thought: "You can fool people with the paperwork up the line (at MSO headquarters) but you can't fool that guy in the truck who comes out from the FCC." ■



New consortium gathers talent

Who says former vice presidents of engineering have to fade away?

Not Ron Cotten, ex-veep at Daniels and Associates and United Artists, who has traded in the VP moniker for a CEO at Engineering Technologies Group, a Denver-based consortium of engineering talent that touts itself as a full-service engineering and consulting firm specializing in cable television, microwave, satellite and fiber optics networks.

Joining Cotten in the new venture are James Holland, who brings international market and production company expertise; Ronald Livesay, a former Jerrold field engineer who is well versed in CATV construction; and Trygve Lode, principal of Lode Data Systems, a computer hardware and software firm.

In fact, Cotten believes cable operators should and will be integrating computers further into their systems and relying on them to perform more functions in the future. "We feel we need to be in the computer business," he says.

Domestically, ETG's focus will be on the current boom in CATV system rebuilds and upgrades. The group's intent is to bring a project management approach, built on quality, to the system rebuild to make the process of installing new hardware in an existing system run smoother. "We want to bring a coherent approach to major projects, which accommodates the smaller technical staffs of today," says Cotten.

Overseas, the approach will be more consulting-oriented, designed to bring U.S. cable experience and expertise to areas just getting their video feet wet. "We think we can help (them) make CATV a profitable business," says Cotten.

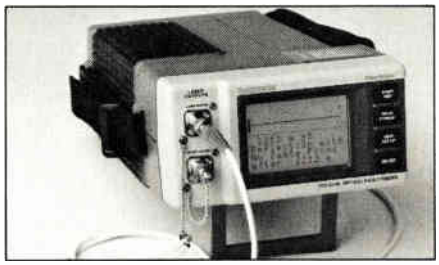
Through ETG a diversity of professional, engineering, construction and support services are available. Professional services include business planning, project management, training and engineering and construction of coax, fiber and microwave systems. Engineering services include development of system architecture, mapping, system design and rebuild/upgrade analysis and planning. Aerial and underground construction of fiber and coax systems, construction supervision and project management are also being offered.

Support services such as custom-designed technical training seminars related to system design, construction, operation, maintenance and regulatory compliance will also be made available at any desired location.

For information, call (303) 695-0608.

Handheld fiber fault finder

The Redmond Division of the **Tektronix Telecommunications Group** has announced a handheld fiber optic fault finder designed as a restoration tool to locate cable faults and identify major events in fiber optic links. The Tektronic TFS2020 FiberScout™ features a symbolic display of the Super-Twist LCD. The front panel has four buttons, two of which are needed to make a measurement. FiberScout is available in combinations of long-range and/or short-range options for fault finding on a wide range of fiber optic communication cables. For more info call, (503) 923-4418.

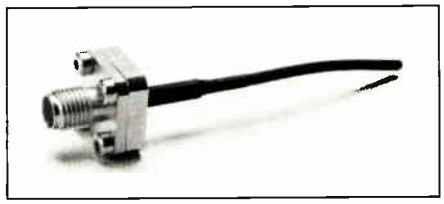


Tektronix's handheld fiber optic fault finder

A fiber optics design kit is available from **Catel Telecommunications** which provides 22 pages of information pertaining to the various ways fiber optics and Catel's fiber optic equipment can be used in CATV systems. The booklet discusses typcial CATV system problems that can be solved using fiber optics, answers basic questions and includes a glossary of terms commonly used in fiber. For a free design kit call, (415) 659-8988 or (800) 827-2722 outside Calif.

Siecor Corp. has introduced three dual wavelength transmitter options for the CME 1000 Attenuation Test Set, a 850/1300 nm LED module, a 1300/1500 nm LED module and a 1300/1550 Laser module. Each transmitter module performs attenuation testing at two wavelengths without changing modules and return loss testing can be performed with the Laser module. The CME 1000 has a measurement range of + 3 dBm to -60 dBm and a resolution of ±0.10 dB. For additional info call, (704) 327-5998.

BT&D Technologies has announced a family of very high speed, planar junction photodiodes produced by the metal organic vapor phase epitaxy (MOVPE) process. The PDC4300 and PDC4304 diodes have a 3 dB bandwidth of 25 GHz, a responsivity of 0.9 amperes per watt and are useful throughout the 1000 to 1650 nanometer optical spectrum. With an active area of 25 um, the photodiode chip has a chip capacitance of 100 *f*F and a dark current of 2 nA. For details call, (302) 479-0300 or (800) 545-4306.



BT&D's PDC 4300 and PCD 4304

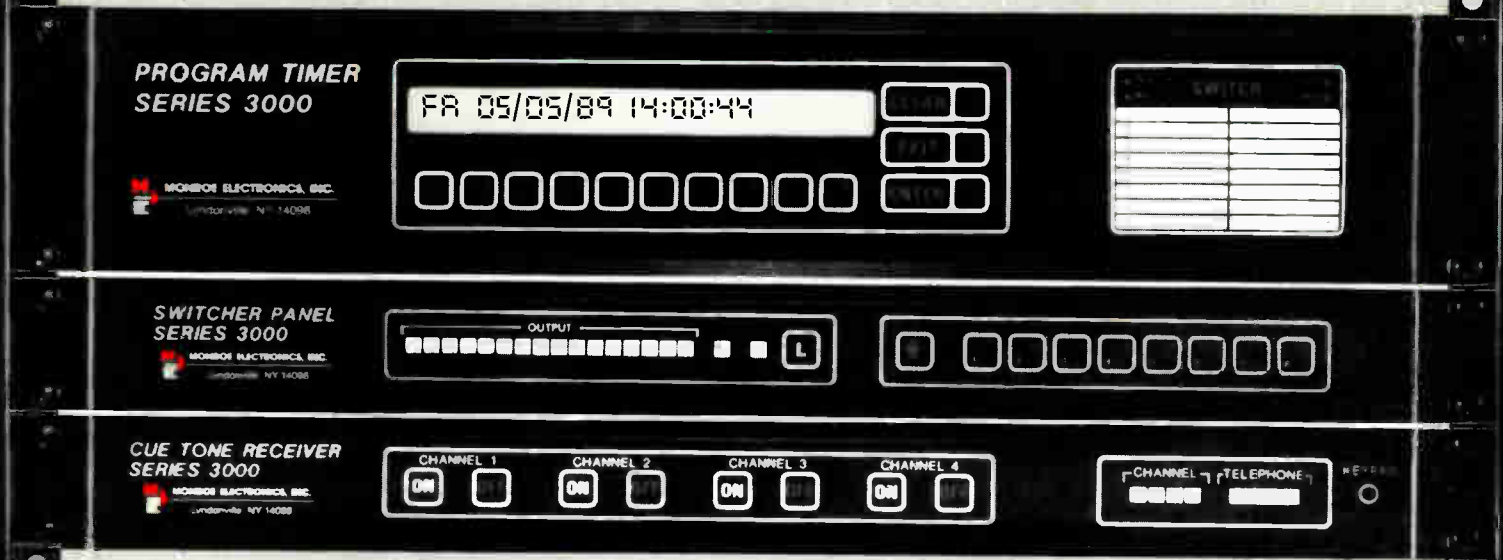
Oak Communications will focus its Western Show activity around the production start of the Sigma 2000 addressable converter. Aesthetically redesigned and 45 percent smaller, the unit is 100 percent compatible with all previous Sigma products. Five of the eight compatibility options are available with the Sigma line (Zenith Z-Tac, Scientific-Atlanta, Jerrold Tri-Mode, TotalControl and Hamlin). Also introduced will be Sigma's new "ACS" control system. The multiprocessor PC-based system is capable of scheduling an unlimited number of PPV events, and accepting monthly master scheduler information directly from a billing system or PPV programmer. For more info call, (619) 451-1500.

Available from **Times Fiber Communications Inc.** are new products for both drop and semiflex coaxial cable markets. The T10 line of drop cable will be swept tested to 20 dB SRL to 1 GHz on RG-6 and RG-59 type cables. The T10 semiflex cable will be swept tested to 30 dB SRL to 1 GHz for virtually all types of semiflex cable including the TFC TX series. For details call, (203) 265-8500.

A computer-based system designed to detect and help prevent overload conditions on aerial lifts has been introduced by **General Cable Company**. Known as the Epic System, it is

MONROE ELECTRONICS
SERIES 3000

The Syndex Switching Solution



Monroe Electronics, recognized as the pioneer of Cue Tone Signaling, continues to set the standard in the changing world of cable programming.

The Series 3000 puts complete program switching control at your fingertips. You get automatic and unattended headend switching through the use of timed signals, network cue tones, and Touch Tones® at your remote location.

PROGRAM TIMER SERIES 3000

- 999 event capability
- 16 open collector outputs
- Expandable to control 20 dual 2X1 A/V switches
- RS232 port for up/downloading program data
- On-site logging of events for verification

SWITCHER PANEL SERIES 3000

- Vertical interval switching capabiliities - 2 slots available for either one or both of the following:
  - Dual Form C 2X1 A/V Module
  - 4X1 Matrix A/V Module
- Front panel control
- Front panel module status indicators

CUE TONE RECEIVER SERIES 3000

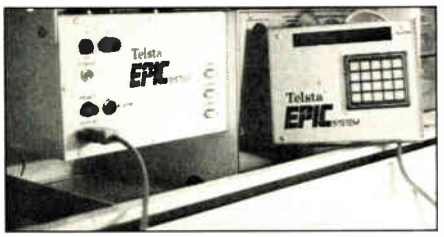
- Four receiver inputs
- Telephone override of cue tones
- On-site cue tone programming by rotary switches
- Front panel control
- Front panel decoder status indicators

Solutions for Program Switching and Syndicated Exclusivity

Reader Service Number 79

MONROE ELECTRONICS, INC.
100 Housel Avenue, Lyndonville, NY 14098
Phone: 716-765-2254 • FAX: 716-765-9330 • Telex: 75-6662

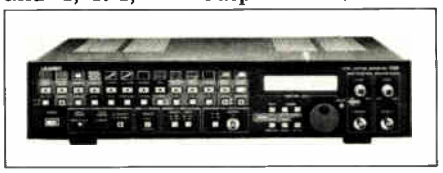
Authorized distributor for Telecommunications Products Corp. new Syndex control software.



General Cable's EPIC System

a diagnostic tool designed to reduce maintenance and parts replacement expenses by alerting maintenance personnel to potential overload problems. The system consists of onboard transducers and sensors inputted to a dedicated microcomputer and is capable of monitoring a variety of parameters at the basket as well as the boom and truck, or can track parameters not traditionally measured but capable of causing overload problems. For more info call, (800) 521-5351.

Leader Instruments Corp. has introduced the Model 408, a gen-lockable NTSC Video Test Signal Generator. The Model 408 provides over 80 test patterns in composite, S-VHS, RGB and Y, R-Y, B-Y output formats with



Leader Instrument's Model 408

RF channel coverage of all broadcast and cable channels. Channel frequencies and video signal-level specifications are set up using a menu driven, multi-purpose data control panel with liquid crystal readout. Up to 100 sets of video level specifications and channel frequencies can be stored in memory for instant recall. The Model 408 also offers on-screen programming. Call, (516) 231-6900 in N.Y. or (800) 645-5104 for additional info.

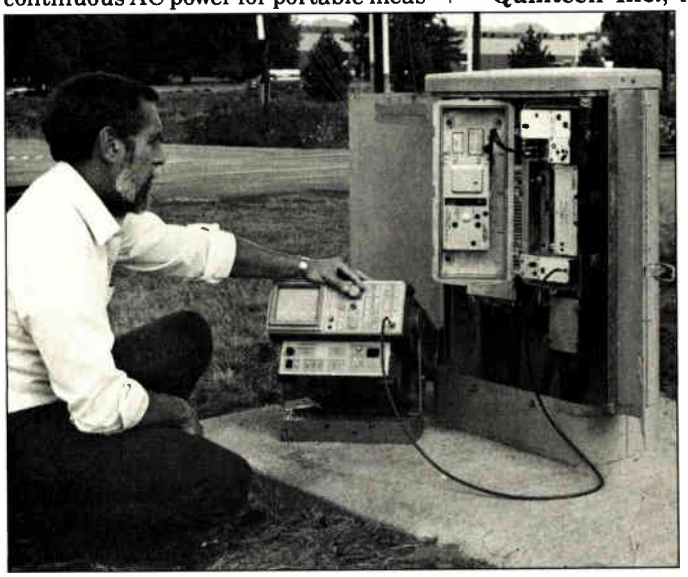
New digital signal level meter

Trilithic Inc. has announced the SP 1700 Digital Signal Level Meter which features 5 MHz to 600 MHz frequency range, keyboard or spinknob digital tuning, by channel or frequency, and electro-mechanical attenuators. Testing features include C/N and 60 Hz and 120 Hz active carrier hum testing. Other features include multiple channel plans, user definable front panel presets, water resistant construction and a two year warranty. For more info call, (800) 344-2412 or (317) 895-3600.

Ripley Company Inc. has announced the introduction of a kit containing tools for preparing Comm/Scope Quantum Reach (QR) trunk and distribution cables. The kits, designated with the prefix QRT, will contain a CST-QR2 combination core and strip tool (with ratchet handle and drill adaptor) and a JST-QR jacket stripping tool. The QRT kit contains all the tools necessary for the removal of specified amounts of dielectric, aluminum sheath and polyethylene jackets from QR cables. For info call, (203) 635-2200.

California Amplifier, Inc. has introduced the establishment of a separate production line for the manufacture of non-standard frequency LNBs including the 430 MHz to 930 MHz, 900 MHz to 1400 MHz and 930 MHz to 1430 MHz range. The change is a reflection of California Amplifier's commitment to the TVRO replacement market and dealers serving the market says Dennis Schwab, vice president of marketing. For additional info call, (805) 987-9000.

Introduced by **Tektronix Inc.** is a new option for the 2710 portable spectrum analyzer that allows operation where AC power is not available. The 2710 inverter battery pack combination forms a single unit which can be carried with one hand and provides a minimum of one hour operating time. When used as a stand-along unit, the 2704 and 2705 provide 125 watts of continuous AC power for portable measurements in the field.



Tektronics 2710 inverter and 2705 battery pack

Tektronix has also announced the 751 BTSC Aural Modulation Monitor/Decoder, with the Option 01 4.5 MHz demodulator board installed, accepts a 4.5 MHz aural carrier, with or without video present. This allows outputs from a number of demodulators, modulators and BTSC encoders to feed audio modulation monitoring devices. For info on both products call, (800) TEK-WIDE.

Available from **Viewsonics Inc.** are low-, mid- and high-split Diplex Filters which provide for single cable, bi-directional or full diplex RF pathways. In rack mount configuration, the sealed units can be affixed to Viewsonics panels with special brackets, eliminating screw holes and insuring RFI/EMI integrity (-100 dB). The Diplex Filters are priced at $35 each. Call, (800) 645-7600 or in N.Y. (516) 921-7080 for info.

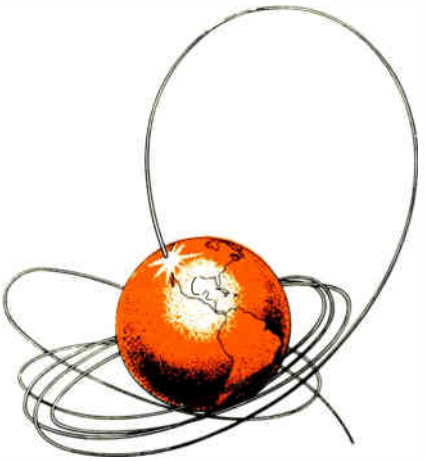
Syndex applicable products

Applied Instruments has introduced a programmable switch configured for syndex requirements. The model RPS 4+4 features four RF A/B switches plus four DPDT audio switches and interfaces to any programmable timer which provides parallel outputs. The RPS 4+4 comes ready to install and is mounted in a standard 1¾ inch high, 19 inch rackmount chassis. Specifications include low insertion loss (0.4 dB at 450 MHz), wideband (DC-100 MHz) RF switches, 600 ohm balanced audio switches and front panel manual switching capability. For more details call, (317) 782-4331.

Quintech Inc., in association with **IRIS Technologies** has announced the release of its Video Commander, a smart switch for signal routing and switching. Manual switching can be either eliminated or augmented by the Video Commander providing automated control. The Video Commander is operated through a touch screen or mouse and can control 32 video inputs and 64 audio inputs to 32 audio video or audio outputs. Optional power supply backup and the ability to change automated switching/routing are available via modem. For more info call, (412) 349-1411.

CableSoft has announced the avail-

Continued on page 144



Moscone Convention Center
San Francisco, CA

Fiber optics—the future of communications is here!

OFC® '90

ISDN • LAN • LOCAL LOOP • LONG HAUL • SENSORS • SPECIALTY FIBERS & DEVICES

OPTICAL FIBER COMMUNICATION CONFERENCE

January 22–25, 1990

Come to San Francisco in January and see why OFC® is considered the "premiere fiber optic gathering."

Co-located with Lightwave's **Fiber in the Subscriber Loop**.

TECHNICAL PROGRAM

OFC® is the major North American conference on optical fiber communications technologies. It offers the most up-to-date information and training, from the basics to the very latest in research, development, and applications.

The technical program will consist of the highest quality contributed and invited presentations reporting leading edge research and development in fiber, component, and system technologies for optical communications. In addition, OFC® '90 will feature a series of one hour tutorials and three hour short courses for in-depth instruction in a variety of optical fiber communication disciplines.

In 1990, OFC® will also feature two special technical symposia consisting of invited papers on *Integrated Circuits for Lightwave Systems*, and *Networks and Switching*. These symposia will provide an overview of developments in two important areas which affect the application of fiber optic technology.

OFC® Session Topics:

- Fibers, Cables and Glass Components
- Optoelectronic and Integrated Optics Devices and Components
- Photonic Switching Techniques
- Direct Detection, Coherent Detection, Analog and Multichannel Transmission Techniques
- Systems and Subsystems for Optical Communications
- Fiber Optic Systems for Trunk, Feeder, and Subscriber Distribution
- Metropolitan Area, Local Area and Data Communications Networks
- New Applications of Fiber Optic Technology

Special Symposia on Networks & Switching:
(organized in cooperation with the IEEE Communications Society)

- Protocols and Software for High Speed Networks
- Problems and Progress in Switching Architectures for Tbit/s Networks
- Switching Technologies
- Influence of High Speed Optical Technology on Telecommunication Networks

EXHIBITS/PRODUCT PRESENTATIONS

January 23–25, 1990

The world's foremost exhibit of products and services used in the field of fiber optics will be held in conjunction with the meeting. Close to 200 companies are expected to exhibit. In addition, the product presentations will provide a series of demonstrations and lectures on new and important fiber optic products and systems. No fee is required for qualified professionals who wish to attend the product presentations and the technical exhibits.

OPTICAL SOCIETY OF AMERICA

IEEE

Cosponsored by Lasers & Electro-Optics Society of IEEE and Optical Society of America

For technical information contact:
Optical Society of America
Meetings Department
1816 Jefferson Pl., N.W.
Washington, DC 20036
(202) 223-0920
Telex 510 600 3965

For exhibit information contact:
Exhibits Department
Optical Society of America
1816 Jefferson Pl., N.W.
Washington, DC 20036
(202) 223-8130
Telex 510 600 3965
FAX 202-223-1096

We report on what the system managers

There are more than 6700 systems in the cable industry. And how each and every system manager feels with regard to topics affecting the cable industry is critical to the future success of the industry.

Midwest CATV, CableVision magazine and CED magazine have sponsored a nationwide, independent survey of system managers. We obtained their opinions on syndex, cable labs, CLI, customer service, customer relations, programming services, technician certification, HDTV, theft of service, equipment issues and management issues.

are talking about.

Now we're bringing the information to you via THE CABLE POLL. A unified voice for system managers of the cable industry.

For up-to-date information on the opinions of system managers, watch for THE CABLE POLL in CableVision and CED magazines.

The CABLE POLL™

Midwest CATV • CableVision • CED

HELP WANTED

Leader in the placement of Cable Television Professionals
Call toll free 1-800/433-2160; In Texas call collect 817/599-7623.

REGIONAL ENGINEER Top MSO, West Coast location. $60K
DIRECTOR OF TECH OPS High visibility. Fast growth, Midwest. $60K
DIRECTOR OF TECH OPS Newbuild, fiber, dynamic growth, Northeast $55K
PLANT MANAGER Top MSO, ground floor opportunity. Northwest $42K
CHIEF ENGINEER Attractive Southwest location. $45K
PLANT MANAGER Mid Atlantic, fast growing MSO. $40K
PLANT MANAGER Top 10 MSO, Southeast location. $38K
ENGINEERING MANAGER Large southern urban system. Top MSO. $35K
TECHNICAL TRAINER Midwest, top MSO. $32K
PLANT MANAGER Rural north, high growth. $30K
PROJECT MANAGER Multiple projects, top MSO. Northeast $45K
HEADEND/MICROWAVE Top MSO, Northeast suburban. $35K
TECHNICAL MANAGER Southeast coastal location. $35K
CHIEF TECHNICIAN Rural Northeast mountain location. $30K
HEADEND/MICROWAVE Top 5 MSO, West Coast location. $30K
MANAGER/CHIEF TECHNICIAN Mid Atlantic, addressable technology. $30K
LINE AND SERVICE TECHNCIANS Jobs nationwide, companies will relocate. $8/hr.-$15/hr.

JIM YOUNG & ASSOCIATES
One Young Plaza 1235 Ranger Highway Weatherford, TX 76087
Call for information about these and many other opportunities nationwide.

CHIEF TECHNICIAN

10,000 subscriber Michigan cable system has an immediate opening for a Chief Technician. Responsibilities include supervising technical operations relating to headend, system maintenance, plant projects and CLI audit. Also responsible for technical training and department budgeting. This position reports to the General Manager.

Qualified applicants will have advanced electronics knowledge, a minimum of 5 years cable television experience in troubleshooting, testing, repairing, training; familiarity with OSHA, FCC regulations, and NEC and supervising a technical staff.

Competitive salary and excellent benefit package. Qualified candidates submit resume and requirements to:

CED 12189

Baker Scott & Co. EXECUTIVE SEARCH
1259 Route 46 Parsippany, NJ 07054 201 263-3355
Specialists in the COMMUNICATIONS INDUSTRY
CABLE TV/BROADCAST DIVISION TELECOMMUNICATIONS DIVISION
POSITIONS AVAILABLE AT ALL LEVELS OF MANAGEMENT, COAST TO COAST
Call or write in CONFIDENCE
FEE PAID
"WE DON'T TALK CABLE, WE KNOW CABLE"
PRINCIPALS DAVID ALLEN & JUDY BOUER

HOW TO RESPOND TO A BLIND BOX:

CED (Blind Box No.), c/o CED, 600 So. Cherry Street, Suite 400, Denver, CO 80222.

CATV TECHNICIAN WANTED

- Must have strong trunk/distribution troubleshooting/alignment skills
- Immediate opening for right person
- Headend/AML experience a plus
- Location: Central Illinois
- Salary: Commensurate with experience
- Good benefits. Call if interested
- 800-231-5171 Ask for Bret Hughes

TECHNICIANS WANTED

Trunk and Service Technicians needed for large M.S.O., starting construction in Michigan. Send resume to:

AMERICABLE
Attn: Mr. Ed
P.O. Box 859
Miami, FL 33197-0859

EQUIPMENT FOR SALE/RENT

BASE MAPS

* High quality Base Maps of your area *
* All major Computer formats available *
* Complete with Index/Grid Map *
* Start Receiving Maps within 1st Week *

$20 per Base Map mile

Gulf South Graphics
(601) 374-7544

EMERGENCY ALERT SYSTEMS

by
Idea/onics

69 channels 14 day delivery
compatible with all headends
—AFFORDABLE—
(701) 786-3904

24 and 88 channel units also available

EQUIPMENT FOR SALE/RENT

Complete Head-end system, Approx. 30 channels of equipment, primarily Scientific-Atlanta and Blonder-Tongue with (2) SA 4.6m antennas. Original cost over $70,000.

503-297-4803

CHANNELCUE

Audio/video switching equipment repair
Line equipment and meter repair
LEE ENTERPRISE
623 4th STREET • P.O. BOX 590 • OESHLER, NEBRASKA 68340
(402) 365-7520

ANTHONY'S MANUFACTURING SERVICE
PLOW BLADES
Irrigation/Wire/Combination
For Any Machine—For Any Application
1-800-383-PLOW
(719) 475-PLOW P.O. Box 17701
Colorado Springs, CO 80935

WANTED TO PURCHASE: SURPLUS CABLE INVENTORY

Zenith, Jerrold, Oak, Hamlin, Scientific Atlanta, Pioneer

S.C.I. Inc.
718-262-0900
FAX: 718-657-4015

WANTED: SURPLUS CABLE EQUIPMENT

Jerrold, Oak, Hamlin & Scientific Atlanta equipment.
Highest Prices Paid
Cable Equipment Brokerage Co.

(818) 709-3724

Continued from page 136
ability of Cable Designer, allowing layout and design of all systems usign a tree and branch architecture. Cable Designer conforms to all known IEEE, NCTA and SCTE system design specifications. The program comes with full documentation, an "extras" diskette containing sample designs, a stand-alone, menu-driven program for AC powering, preconfigured data files for several manufacturers and Lotus and Quattro templates for calculating distortion analysis in amplifier cascades. For additional info call, (319) 337-8412.

Jerrold Communication's **Digital Cable Radio** has announced that its audio service can now be transmitted by cable operators on the upper end of the cable band, as well as discrete channels in the FM band, using a block conversion device developed by Jerrold. The block converter gives cable systems the flexibility to send DCR signals above the last video channel where signal roll off becomes too severe for another video channel to be carried. Call, (215) 957-8290 for more info.

R.L. Drake Company has introduced a new video modulator for small private cable installations. The Model VM200 is a frequency agile modulator which covers the VHF band for chan-

R.L. Drake's Model VM 200

nels 2 through 13 and features D.I.P. switch selection of channels on the front panel, a frequency stability of ± 5 kHz, and a noise floor (from visual carrier) of -60 dB. The unit weighs 1.3 pounds with dimensions of 2.4 inches wide by 3.8 inches high by 8.4 inches deep. For additional info call, (513) 866-2421.

Available from **Chaparral Communications** is the Monterey™ Model 50 satellite receiver. The Model 50 offers digital stereo; MTS stereo; a 2-way

Chaparral's Monterey 50 satellite receiver

audio/video switcher; AutoTrack for locating satellites automatically during installation; 100 favorite channels; and parental lock-out. The Monterey 50 is backed by a two-year factory warranty and 30 day DOA coverage for both retailer and consumer. For more info call, (408) 435-1530.

Bits of news

General Instrument Corp. has announced the acquisition of Semitron Industries Ltd. for $4.7 million, plus future consideration dependent on attaining certain earning goals. Semitron Industries is located in Cricklade, Swindon, England and manufactures transient voltage protection devices for

Winning Reception

Choose From Over 30 Models of Indoor/Outdoor Amplifiers That Will Go The Distance.

Stop fumbling with interference. It's time to improve your *gain* plan with our wide range of "F" and hard line amplifiers that help solve long drop costs, low tap signals and multi-set demands.

Our amplifiers come with a five-year warranty against manufacturing defects and are sold at affordable prices.

So eliminate your costly line extenders and increase your return on investment by making a sure bet on the winning reception.

For more information, call us toll free at: (800) 645-7600. In New York: (516) 921-7080. Fax: (516) 921-2084.

VS Viewsonics inc.

PRODUCTS ▪ WITH ▪ INTEGRITY

170 EILEEN WAY, SYOSSET, N.Y. 11791

Reader Service Number 83

the telecommunications industry. The company will be an addition to General Instrument's power semiconductor division. For additional info call, (212) 207-6200.

Announced by General Instrument's **Jerrold Division** is the purchase of approximately $1 million worth of distribution gear by St. Thomas-St. John Cable TV, in the U.S. Virgin Islands. The equipment will be used to rebuild the Caribbean cable television system, destroyed by Hurricane Hugo, and includes a two-way AM fiber link between the system's headend, office and studios; full 550 MHz distribution electronics for a two-way conventional plant, including status monitoring; and other assorted distribution line equipment. Call, (215) 674-4800 for more info.

In another announcement from Jerrold, **Cable Video Store** and **CableData** have completed a successful beta test for CableData's PPV Autoload. Jerrold has enhanced its addressable controller wire link interface to accept channel scheduling information from CableData. The system works with cable systems using any ordering scheme, including ANI, ARU and customer service representatives. For info call, (215) 674-4800.

Guam Cable TV has selected **Catel Telecommunication's** TransHub III equipment for conversion of AM-on-fiber signals to VSB for coax. Guam Cable will install the first TransHub III system in its main northern route which serves the system's major civilian population and runs approximately 17 miles, ending at Anderson Air Force Base. Plans call for about eight nodes where signals will be converted for further transmission over coax. The system will be powered by 24-volt batteries with floating chargers. For more info call, (415) 659-8988.

Trilogy Communications Inc. has announced that production of MC² trunk and feeder coaxial cable is running 50 percent ahead of production rates posted five months ago. Increasing the capacity has allowed Trilogy to cut its lead time for product deliveries said William Kloss, national sales manager. Expansion is also taking place at Trilogy's Freehold, N.J. plant where production has increased 25 percent. For details call, (212) 223-4747.

Scientific-Atlanta Inc. has introduced its addressable subscriber products for the Japanese market. The products include the Model 8591 set-top terminal and the System Manager V. The Model 8591 has character labeling on both the set-top and remote. The one-way addressable terminal features interface options with home audio and video systems. The System Manager V also uses Japanese character language interface. For additional info call, (404) 441-4000.

Announced from **Blonder-Tongue Laboratories Inc.** is a contract it received from **Radiation Systems Inc., SatCom Technologies Division** to provide modulators and distribution amplifiers for use in the Whittle Educational Channel. A total of 6000 installations will be made during the first phase of the contract. Deliveries will start in November and continue through August of 1990. The products being supplied are customized versions of the company's standard product line, designed to meet special requirements of the Whittle Educational Channel.

Ortel Corp. has been awarded a

CALL FOR NCTA TECHNICAL PAPERS

ATLANTA CABLE '90 THE NATIONAL SHOW

Synopses for planned papers due at NCTA by

JANUARY 5, 1990

NCTA invites you to submit one-page abstracts of planned technical papers -- on any comunications engineering topic of interest to the cable television industry -- for consideration by the Cable '90 technical paper selection subcommittee. Forty to fifty paper ideas will be selected in mid-January for placement in ten technical sessions. Judges look for reference value and originality [although updated works are acceptable] in papers that solve engineering problems through new designs or improved operations. **Product pitches are not acceptable and will not be judged.**

To qualify for consideration as a technical session speaker, send a one-page synopsis of your paper/speech idea to:

Katherine Rutkowski
Director, Technical Services
National Cable Television Association
1724 Massachusetts Ave., NW
Washington, DC 20036-1969
Fax: 202/775-3675; or 202/775-3604

With your synopsis include a draft paper title, complete name, job title, work address, and telephone number for the primary author and any co-authors. Provide the judges with enough specifics about the planned (never before published) paper to show its reference value. Topics addressed in recent years include HDTV, fiber optics, addressability, CLI, system architectures, and security.

Dates to keep in mind:

Authors' notified of accepted papers - January 31
Completed papers due at NCTA - March 30
Cable '90 show in Atlanta- May 21-23

Small Business Innovative Research contract by the Naval Ocean System Center for millimeter wave packaging of optoelectronic components. Ortel will receive $50,000 for the Phase 1 six-month contract. For details call, (818) 281-3636.

Drop Shop Ltd has announced the availability of its new product catalog. Each section of the catalog guides the reader through the product selection process via precise technical specifications, detailed photographs and line drawings, dimensions and applications information. For more info call, (201) 686-0788.

Donley Cablevision Supply has been named a master stocking distributor by **Uniden** for its line of commercial headend equipment, the "CAT" Series. For details call, (713) 956-2984.

Wegener Communications Inc. a subsidiary of Wegener Corp. has announced that **Comlink Systems Inc.** has been designated as the exclusive Canadian distributor of Wegener products and services. In addition to distribution, Comlink also provides service and maintenance to its accounts, including those in remote Artic communities. For info call, (404) 623-0096.

—Kathy Berlin and Roger Brown

Continued from page 104

tional 140 Mb/s feeds to the premises. The number of subscribers connected to the system is only limited by the practical maximum number of lines to a large CO switch. The number of available video channels in the network can be increased simply by adding CME terminal equipment and trunking.

The remote board switch matrixes can be extended to a SW2060 DAX, a 60-channel video switch or to the SW64192 DAX a 192-channel switch can be added in a network configuration. The voice and data capacity can be increased up to a 1.544 Mb/s per subscriber or multiples thereof.

Pricing

The pricing presented is based on some assumptions that are to be taken into consideration for subscriber premise equipment including volume, sophistication and capacity. Volume is a straightforward topic that describes quantity of units. The sophistication is defined as to what level of bidirectional communications are needed, such as teleteaching and teleconferencing, EQTV performance, and the last variable is capacity. This project is described using 48 channel selectable video. Sixty channel or greater capacity can be engineered into the network. To give a fundamental budgetary price to gauge the level of value, a basic service of unidirectional video/audio and bidirectional telephony/data service is what will be proposed.

A minimum subscriber level of 1,000 units will reflect a cost of $12,000 per subscriber. To look at the most advantageous cost per subscriber, a volume of 100,000 units will reflect a cost of approximately $1,000 per subscriber.

Again, these figures are based on the studies done to justify SPE and they do not take into consideration future values and variable quantities. The target pricing ABL Engineering is designing to is approximately $600 per subscriber. ■

In the October issue of *CED*, Eagle Comtronics Inc. was inadvertently left out of the impulse pay-per-view (IPPV) chart starting on page 35. Since Eagle's Addressable Trap System does add addressability and IPPV to basic traps, the product should have been included. *CED* apologizes for any inconvenience this may have caused.

ADVERTISER'S INDEX

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

Reader Service Number 88

Technology from a strategic viewpoint

I am delighted to be writing a column for *CED* magazine. I look forward to visiting with you on this page every month. I hope you will find these pieces interesting and valuable, and occasionally stimulating. Let me hear your opinions, either in writing or the next time I see you. Your feedback is welcome and will make sure that this column is useful.

My personal interests and efforts center on Advanced Television (ATV), High Definition Television (HDTV), the consumer electronics interface, CableLabs, competitive technologies, technologies for new businesses and services, and strategic issues as applied to technology. Those are the sorts of things you should expect to see discussed in this column from month to month. Of course, the opinions are my own and do not necessarily represent those of *CED* magazine, American Television & Communications, or Time Warner. If you disagree with the opinions expressed here, consider yourself in disagreement with me, not necessarily the organizations with which I am affiliated.

A strategic viewpoint

A strategic viewpoint is one which attempts to see beyond immediate needs. Good technical strategy does not ignore the present, rather it tries to serve the present while preparing for the future. It is difficult to be strategic when the needs of the moment are pressing. But the moment passes and the future is here all too soon. Without preparations, the future can be harsh.

It was mentioned at a recent conference that in the cable industry, "strategic" is a word used for things that don't make money. While this brought quite a laugh, the speaker, Jim Chiddix, went on to say that as this industry matures, "strategy" takes on new importance.

There are two principal reasons for increasing the emphasis on strategic thinking in technology for the cable industry: 1) the potential for serious competition, and 2) growing interdependence on other industries and technologies. When competition threatens, being strategic is especially important. Either strategy or luck are required to survive competition over the long haul. Strategy is more controllable than luck. Cable is more and more impacted by other technologies. Important examples include: consumer electronics, telephony, digital transmission, broadcast technology, magnetic and optical recording, fiber optics.

Tracking strategic technologies

Someone who commits to track strategic technologies finds that the good news is that the work is fascinating and never boring. The bad news is that the work is never done. There is an almost unlimited number of sources for information. Much of the information is redundant; but there are little gems of useful information everywhere. The technology tracker must read continuously, attend a variety of conferences and seminars, and make friends in several industries. A difficult part of the job is to make connections between information gleaned from different sources to see trends or potentials. The most difficult task is to sift through the chaff to find the wheat. So much of the information is either irrelevant or erroneous or misleading.

I have found that technologists from most industries are much like us. They are curious, interested in learning another's technology, willing to share, anxious to brag about what their technology can do. Technologists rarely are very political. Even representatives from supposedly competitive industries are usually friendly and open. The key to success is to be open about your technology experiences. This "breaks the ice" and sets the mood for an interesting interchange of ideas. A good technology tracker has many friends in a variety of industries.

A good peek into the future can often be realized by following events in another country. Some countries have fewer restrictions than the United States and can try technologies before they are proven out to U.S. satisfaction. In much of Europe, the phone companies and the cable companies are one and the same. We can get a peek at what a large U.S. telephone company might do if it was allowed into cable by observing the situation in Europe. The Montreux Television Symposium, held every other year in Montreux Switzerland is a resource of information on worldwide television progress and practice.

I look forward to exploring cable-relevant technology from a strategic viewpoint each month on this page. ■

By Walter Ciciora, Vice President of Technology, American Television and Communications

A short biographical note

Dr. Walter Ciciora is vice president of Technology for American Television and Communications, ATC, located in Stamford, Connecticut. Walt joined ATC in December 1982 as vice president of research and development. Prior to that, he was director of sales and marketing, cable products, with Zenith Electronics Corporation. His career with Zenith began in 1965 in their R&D department specializing in electronic systems.

Ciciora has nine patents, presented over 100 papers and published over 50, two of which received awards from the Institute of Electrical and Electronic Engineers, IEEE. Walt is a Fellow of the IEEE and also a Fellow of the Society of Motion Picture and Television Engineers, SMPTE, as well as a Senior Member of the Society of Cable Television Engineers, SCTE. Walt serves on the CATV Program Coordinating Committee of the Montreux Television Symposium.

He is in his fourth term as chairman of the Engineering Committee of the National Cable Television Association and also chairs the Technical Advisory Committee of CableLabs. He is active in the IEEE Consumer Electronics Society.

Ciciora has a Ph.D. in Electrical Engineering from the Illinois Institute of Technology, IIT, and an MBA from the University of Chicago. The BSEE and MSEE are also from IIT.

Replace in 2014 A.D.

Anixter Cable TV stocks the complete line of Reliable pedestals because they're made to last. Made to last, because it's just good business to protect valuable equipment inside quality enclosures.

Reliable's products are made to outlast the equipment inside. They average 25 years in use. Buy today and don't think about replacement until 2014.

Reliable's nine-step finishing process generates a high gloss weather-fighting finish that resists corrosion and the onslaughts of acid rain, pollutants and other atmospheric contaminants.

For more information about the full line of Reliable pedestals, call the Anixter Cable TV distribution center in your area.

RELIABLE
RELIANCE COMM/TEC + 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) 625-5110; **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

Come challenge the future with us...

New technology. New revenue opportunities. Innovations in system design. New standards for picture quality and customer service.

Anixter Cable TV is the driving force in bringing technology and product innovations to the cable television environment.

Visit us at Booth #532 at the Western Cable TV Show.

- 1 GHz product development with Regal Technologies, Ltd., known for quality products.
- Laser Link AM Fiber Optics using leading edge technology from the labs of AT&T.
- Raychem and Anixter Cable TV bring advanced connectorization and sealing technologies to cable television.

Come challenge the future with us... The Driving Force in Technology

ANIXTER® CABLE TV

Reader Service Number 87

WEST-ANAHEIM: (714) 779-0500, (800) 854-0443; **DENVER:** (303) 740-[illegible]; **SEATTLE:** (206) 251-6760, (800) 426-7665; **MIDWEST-CHICAGO:** (708) 350-7788, (800) 544-5368; **CLEVELAND:** (216) 526-0919, (800) 321-[illegible]; **DALLAS:** (214) 446-CATV, (800) 231-5006; **IRON MOUNTAIN, MI:** (906) 774-4111, (800) 624-8358; **SKOKIE, IL HDQTRS:** (708) 677-2600; **EAST-ATLANTA:** [illegible] 242-1181; **LONG ISLAND, NY:** (516) 293-7788, (800) 645-9510; **NEW JERSEY:** (201) 328-0980, (800) 631-9603; **ORLANDO:** (407) 240-[illegible]; **CANADA-CALGARY:** (403) 250-9646; **MONTREAL:** (514) 636-3636; **TORONTO:** (416) 625-5110; **VANCOUVER:** (604) 321-5885.

In an emergency, weekends and [illegible] toll free 1 (800) 323-8166.
CORPORATE OFFICES, ANIXTER CABLE TV, [illegible]e, IL 60076, (708) 677-2600