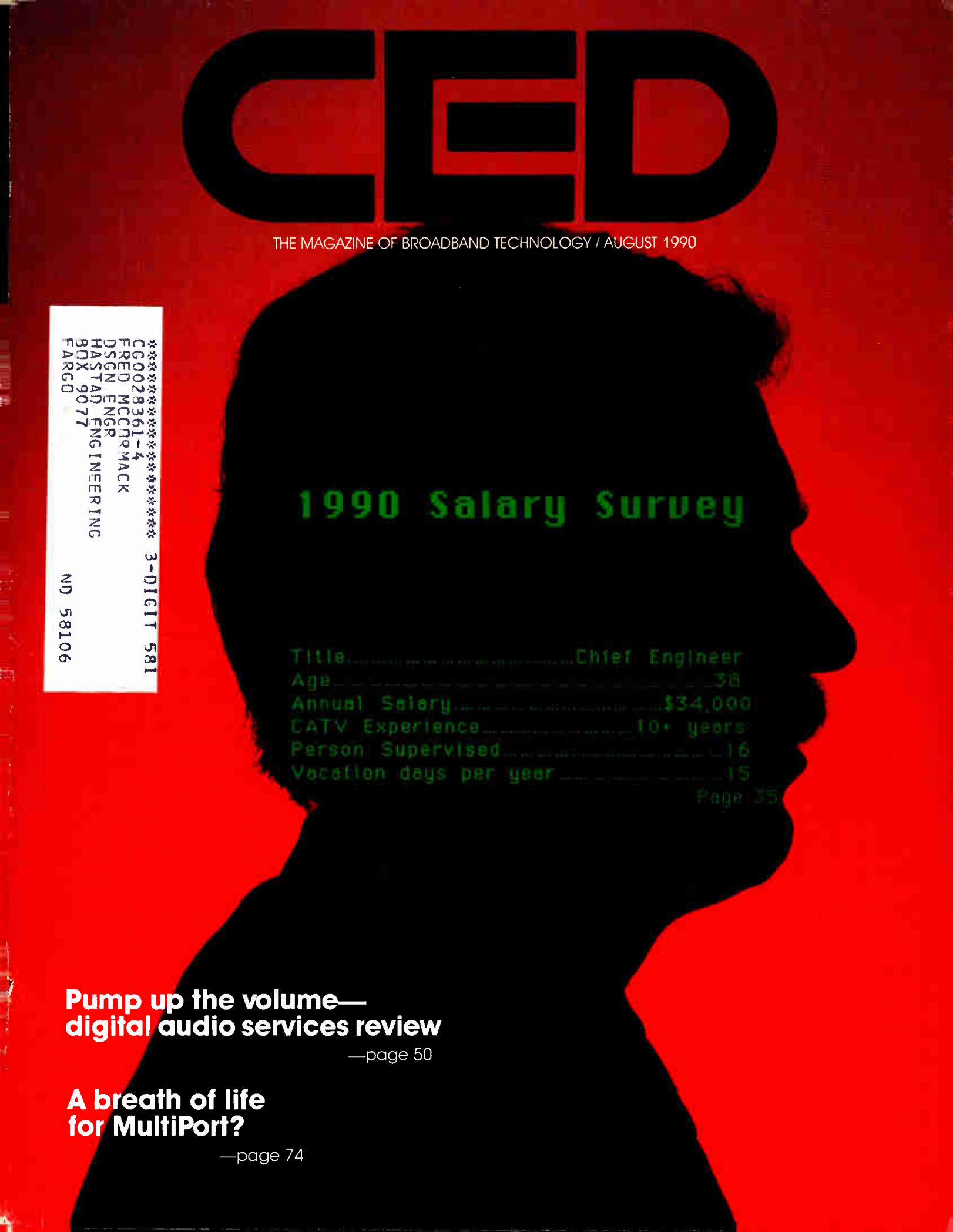
CED

THE MAGAZINE OF BROADBAND TECHNOLOGY / AUGUST 1990



Pump up the volume—digital audio services review

—page 50

A breath of life for MultiPort?

—page 74

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

For Information via FAX RESPONSE
call 1-800-876-2299, code number 008.

Reader Service Number 1

The Best Customers In America Deserve The Best Products.

Air.

The sophisticated dielectric of MC².

Conveys the signal faster. Undampened by foam. Without noise. Flat.

The air enclosed in short chambers. Hermetically sealed. Fully bonded to outer dielectric sleeve and center conductor.

Airtight. Inner strength and outer strength. Bending without creasing, cracking, leaking.

Wards off water. Or keeps it confined. No migration.

20% Fewer amplifiers needed over longer distances.

The Perfections Of Air Are Apparent

QUALITY
TECHNOLOGY
SERVICE

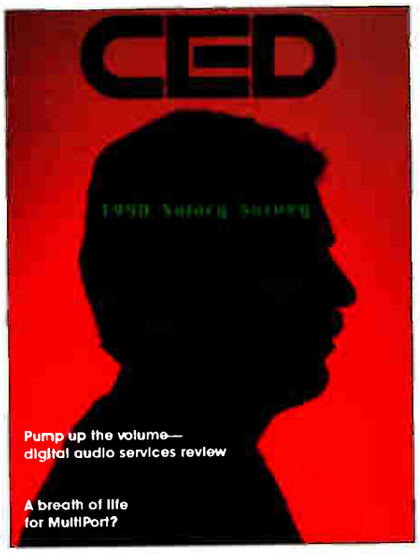
Trilogy
COMMUNICATIONS INC.

Reader Service Number 2

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

August 1990 CED Volume 16, Number 9

CED. (USPS 330-510) (ISSN 1044-2871) is published monthly except twice in May by Diversified Publishing Group, a Division of Capital Cities Media, Inc., 600 S. Cherry St., Denver, CO 80222. ©August 1990, Volume 16, Number 9. 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.



About the Cover:
How do you compare to the average cable manager, engineer, or technician? Cover by Don Riley

DEPARTMENTS

Leak And Ye Shall Find.

CLI compliance begins with leakage detection and measurement.

And nobody offers the cable television industry more ways to detect and measure RF leakage than ComSonics.

The industry standard. On the ground or in the air.

Our Sniffer® III is the perfect measurement tool for system drive-outs. It not only finds leaks, but its microvolt per meter display tells you how strong they are.

Exceptional sensitivity of both Sniffer II and Sniffer III allows monitoring of rear-easement plant or subscribers' homes set back from the road.

For the most complete system, use Sniffer in the field together with our crystal-controlled transmitter at the headend.

Powerful squelch and mute and narrow IF bandpass enable Sniffer to tell the difference between your signal and other RF interference.

You asked for a low-cost installer usable device, and we responded with the hand-held Sniffer Jr. to locate leaks at their source.

Detection, of course, is only part of the solution. Use our SniffWare™ computer software to turn your field data into a comprehensive leakage management program.

These patented technologies, and the knowledge and experience that produced them, are at the heart of our CLI Flyover service. We've accurately measured dense metropolitan areas and wide open rural communities. No system is too large or too small.

If you've got a leak, ComSonics has a way to find it. To learn more, call us at 800-336-9681. In Virginia, call collect, 703-434-5965.

ComSonics, Inc.

An Employee Owned Corporation

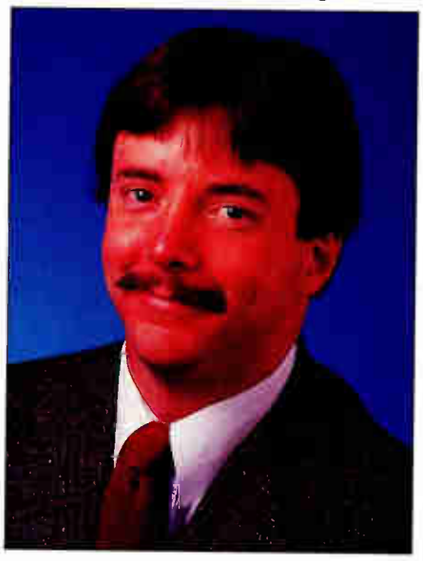
"Sniffer" is a registered trademark and "SniffWare" is a trademark of ComSonics, Inc.

Reader Service Number 3

The missing piece of the re-reg puzzle

To the casual observer, it would seem that the efforts in Washington to re-regulate the cable industry have somehow overlooked the source of many subscribers' woes. So far, much of the legislative thrust has been toward rate caps, limits on vertical integration, channel positioning and must-carry. Excepting rates, however, few of those issues are of importance to the 53 million cable television subscribers.

Let's face it, viewers get angry when their service fails and there's nothing to watch. Or when they've scheduled a service call or install, taken the day off, and no one shows up. Customer service, or the lack of it, is what gets most people steamed.



Why then has there seemingly been little or no effort to define and mandate technical standards?

Unbeknownst to most people outside Washington, a struggle is underway. Officials with the National Cable Television Association and the National Association of Telecommunication Officers and Administrators have been quietly meeting behind closed doors to formally develop a set of technical standards for the cable industry.

So far, the two groups have purposely eschewed the public eye, preferring to say nothing until an agreement has been reached, whenever that may be. In fact, it could take some time. The NCTA must carefully balance the interests of the local telecommunication officers, who desire reliable, state-of-the-art plants, and the MSOs, who can afford to plow only so much of their annual revenue back into their systems without raising rates. Clearly, what is technologically achievable in Manhattan, Detroit, San Francisco or any other major urban area is the same as in rural Georgia or Kansas. But at what cost? In urban areas, you can see a return on an investment in fiber optics, pay-per-view, etc. In rural areas, probably not.

This wide disparity between what can be *done* and what can be *afforded* makes it extremely difficult to develop national standards relating to system performance or specifications. That's why, when NCTA and NATOA get down to it, they'll have to settle for agreements relating to system reliability (reducing down-time), time limits on plant corrections (fixing outages), scheduling service calls or installs, etc.

What is likely to emerge is a laundry list of practices that will be strived for. Perhaps something like the Cable Television Association of New York's Bill of Rights will be used as a model. That document calls for preventive maintenance programs, regular and routine monitoring of audio and video signal levels, technical training and a host of other items designed to compel cable systems to provide the best pictures, and the best service, they can—without citing specific numbers.

While cable operators will likely welcome a series of recommendations, some I'm sure will refuse to recognize the spirit in which they were developed. However, they shouldn't be complacent. For if they agree to such standards yet do little to achieve them, NATOA won't be impressed and the next go-round will be lot less pleasant.

Roger J. Brown

Roger Brown
Editor

CED

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

EDITORIAL
Roger Brown
Editor
Leslie A. Miller
Managing Editor
Kathryn Berlin
Contributing 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
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, Viacom Networks Group
Tom Jokerst, Regional Engineering Director, Continental Cablevision
Fred Kaiser, President, Alpha Technologies
Dave Large, Director of Engineering, Intermedia Partners
Robert Luff, VP Engineering and Technology, Jones Intercable
Ed Milner, VP Technology, Arlington Cable Partners
Joe Van Loan, Senior VP Engineering, CableVision Industries

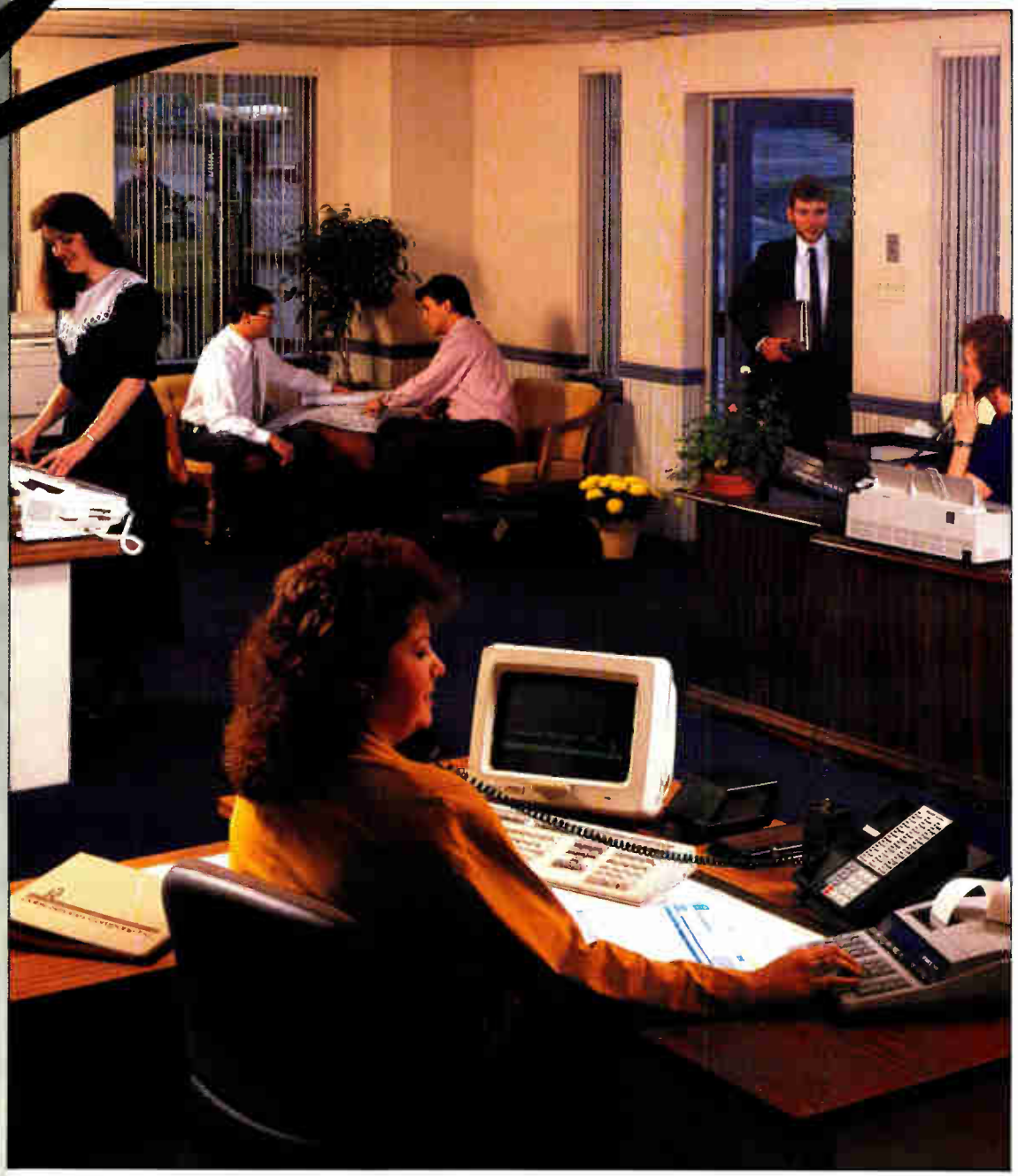
PRODUCTION
Don Ruth, Art Director
Elaine Callahan, Production Manager
Renee Jordan, Circulation Director

ADVERTISING
Cathy Wilson, National Sales Manager
Judy Medley, Account Executive

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

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

GIVING YOU THE RIGHT INFORMATION, WHEN YOU NEED IT.



We have the broad-based CATV experience to answer your questions. That's because we build, rebuild, upgrade, design, and test cable systems. We're also a full-line equipment distributor: we carry head-end, distribution, aerial and underground equipment, house drop materials, converters, safety gear, and more.

When you call with a question about your order, about particular equipment, or even just to talk about which equipment can do the job, our people can help. If we can't give you the facts on the spot, we'll get them and get back to you—fast.

TWENTY-FIVE YEARS SERVING THE CABLE INDUSTRY

THAT'S SERVICE. THAT'S

Cable Services Company/Inc.

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

Reader Service Number 5

Cardinal, Ameritech jointly test fiber to the curb

Yet another cable operator has announced plans to join forces with a telephone company to test the delivery of digital video over fiber optics to residential customers.

Cardinal Communications, the 74th-largest MSO with roughly 75,000 subscribers, will work with Ameritech's Indiana Bell subsidiary to test a fiber distribution system made by Broadband Technologies Inc. The test will take place in Tipton Lakes which is located 45 minutes south of Indianapolis. It will encompass about 20 existing homes and up to 100 new homes.

Indiana Bell was scheduled to file its request with the Federal Communications Commission last month and is planning to begin installing the system in the fourth quarter of this year, pending approval of the request. The trial will consist of two phases: standard telephone service, which will commence in early 1991; and cable-TV transmission, which will begin in the second quarter of 1991. The trial will last for one year after the second phase begins.

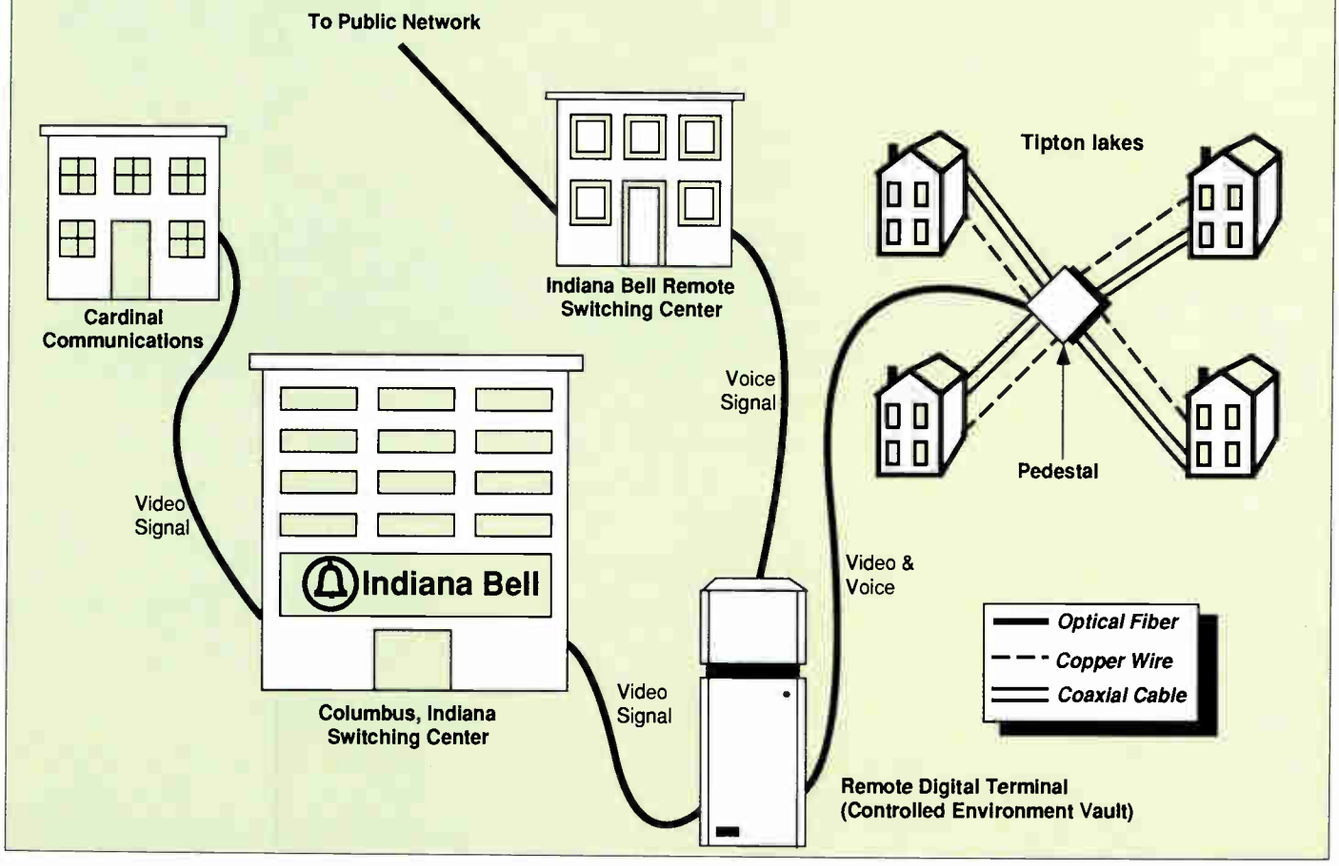
This latest fiber test is the second of Ameritech's planned series of trials designed to determine the most cost-effective use of fiber in the local loop. The first fiber test, consisting of standard POTS (plain old telephone service), will be conducted by Ohio Bell and is slated to begin later this year.

BT's transmission system will convert Cardinal's signals from electrical to lightwave for fiber optic transport at Cardinal's office in Columbus. The signals will be sent via fiber through Indiana Bell's switching center to a remote digital terminal, where the video will be multiplexed with telephone services.

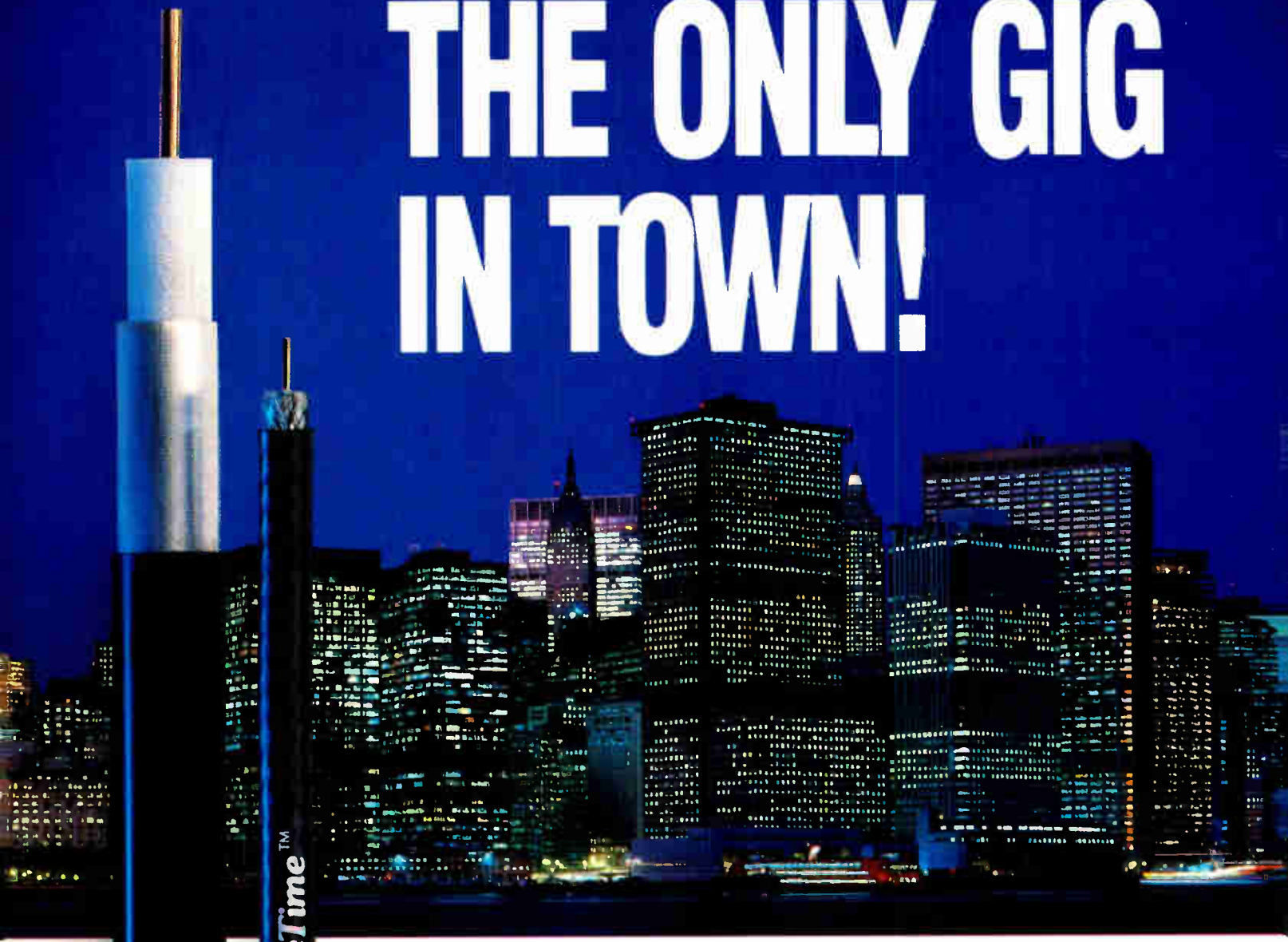
From that point, the voice and video signals will be transported to pedestals, where they are sent over copper twisted pair and coaxial cable to each home. This architecture strongly signals that fiber-to-the-curb technologies are becoming economically preferable to fiber-to-the-home systems in the minds of most telcos.

Although it may take heat from other cable operators for joining forces with a telephone provider, Cardinal chose to participate in the test in order to gain experience with digital fiber technologies. "We want to remain on the leading edge of technology by taking advantage of the convenience and quality that fiber promises," said James Ackerman, Cardinal's CEO. "We believe the future of cable television is to have many links to other communication paths, such as shopping services, PPV technology and security services, all tied into one fiber optic cable combining cable TV and telephone services coming into the home."

Ameritech's Cable TV Fiber Trial



THE ONLY GIG IN TOWN!



Town, country, or city, there's only one cable available with 1GHz bandwidth and that's T10 from Times Fiber Communications. T10, the highest bandwidth drop and semiflex cable in the industry, is now ready for delivery. This cable is *the* solution for upgrades or rebuilds, since it is compatible with your present configuration and your future requirements.

T10 will carry more channels with better picture quality than ever before. And, T10's higher bandwidth capability will support the new high definition television signals. The cable is triple bonded to eliminate cold temperature pullout problems and provide added resistance against moisture and corrosion.

T10 is a product of the acknowledged leader in cable technology — Times Fiber Communications. When it comes to making sure your upgrade or rebuild brings future returns, specify the Only Gig in Town — T10.

For more information, see your TFC representative or call 1-800-TFC-CATV.

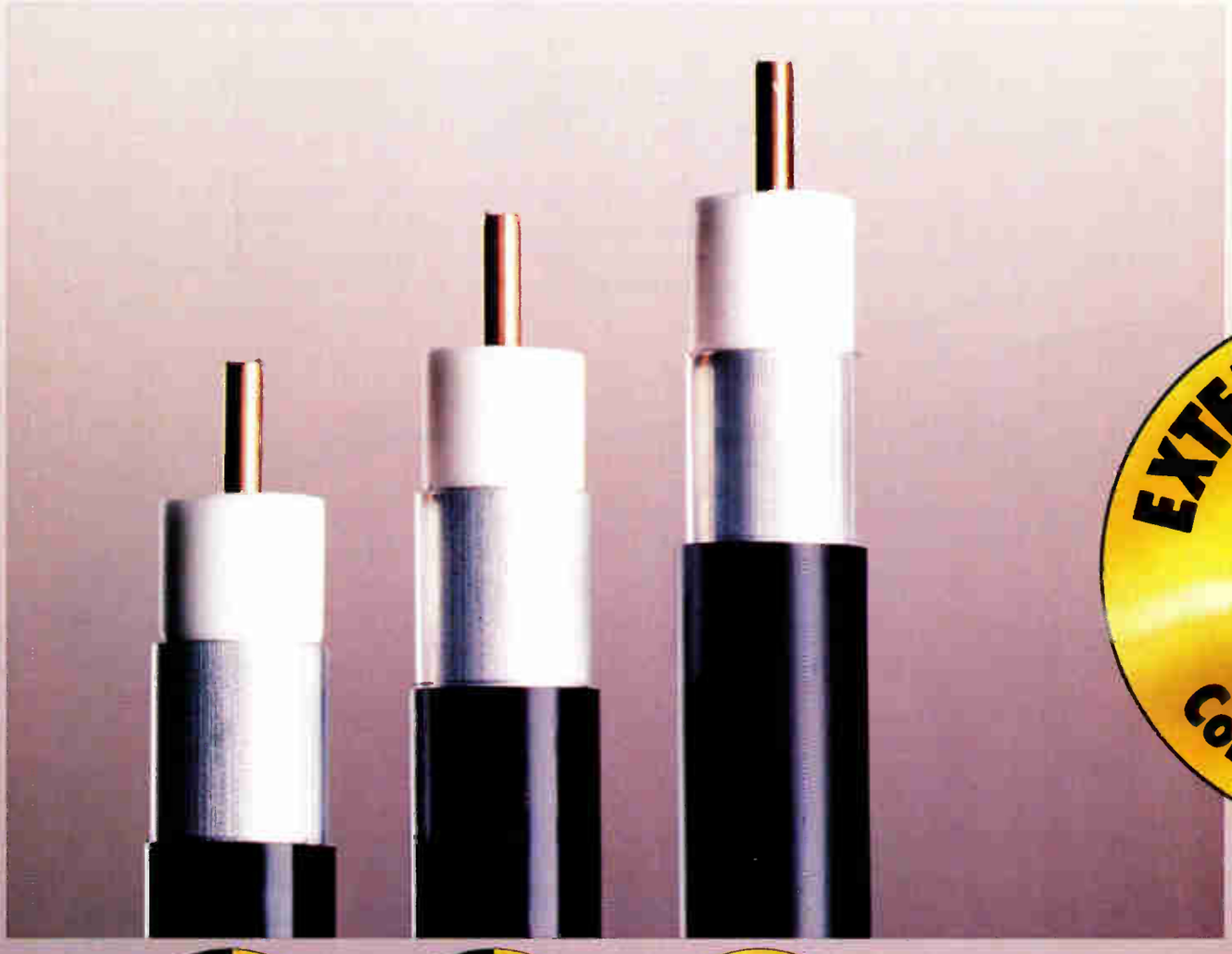
TFC TIMES FIBER COMMUNICATIONS, INC.®
a company of
LPL Technologies, Inc.

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

TFC...*Where technology meets the bottom line.*

Reader Service Number 6

HOW COMM/SCOP
WILL RELIEVE YOU



500 GHz.

750 GHz.

1000 GHz.

E'S PATENTED QR
: GROWING PAINS.

When we introduced Quantum Reach a few years ago, we saw it as the cable of the future. Today, it still is. Because we also made it the cable you can grow with, too. Construction crews love QR because it is construction friendly and easy to handle. It has an attractive price, too. And now we have given QR one more advantage, 1GHz bandwidth capacity. It's the reason why we say QR will relieve your growing pains.

Simply put, we know of no cable manufactured today that compares with Quantum Reach. No comparisons unless you consider the entire Extended Reach family of cable products together. But that's another matter.

More goes into this single cable product than any other coax made today. Plan your growth with QR. You won't be disappointed. For more information about Quantum Reach, contact your nearest Comm/Scope representative or call Comm/Scope, Inc. (800) 982-1708 or (704) 324-2200.

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

Comm/Scope, Inc., P.O. Box 1729, Hickory, NC 28602.
Phone: (800) 982-1708 or (704) 324-2200.
FAX: (704) 328-2400. Telex: 802-166

Reader Service Number 8

Growth is goal of new SCTE president

After a year of self-imposed isolationism, the Society of Cable Television Engineers is once again preparing for explosive growth under its new president, Wendell Woody.

A year ago, when Jack Trower took the helm of the SCTE, he likened the organization to a company that was growing too fast. Trower suggested the Society pause to contemplate the effects of unbridled growth. Consequently, he led a review of the Society's bylaws at both the national and chapter levels and called for greater commitment from CATV technical personnel around the country.

Woody, on the other hand, wants to build upon the efforts made by past presidents to grow the organization both domestically and abroad and establish new relationships with other associations and organizations. By the time his one-year term is over, the affable Woody hopes to have made a signficant contribution to the health and organization of the SCTE.

A natural progression

Presently Director of Fiber Optics for Anixter Cable TV, 55-year-old Woody brings nearly 25 years of CATV industry experience and a dedication to hard work with him to the Society's apex. In fact, Woody's career in electronics can be traced back to his childhood and the early days of television.

Wendell says he literally grew up in his father's Missouri appliance store. By the time he entered high school, Woody had gained experience selling radios and installing antennas, and repairing the equipment. By the time he graduated in 1952, the younger Woody ran the radio and television repair side of his father's business.

Later in 1952, Woody's innate entrepreneurial spirit next led him to rural Brush, Colo., where he opened a business installing television antennas so local residents could receive Channel 2 from Denver, which had just signed on the air. From there, he decided to pursue a college education and enrolled part-time at the University of Colorado in Boulder.

However, Woody's work ethic interfered. In addition to his business in Brush and education in Boulder, he took a job in the Little Beaver oil field working on a rotary oil rig. (He later discovered that TCI Director of Engineering Dave Willis worked in the same field at the same time. It was not the last time their paths would cross.) He also married his high school sweetheart, Ruth, with whom he remains united today.

By 1958, Woody emerged from Boulder with a business degree while Ruth graduated with a business education sheepskin. The two took jobs in Denver—Ruth taught grade school while Wendell went to work for Electronic Parts Co., a wholesale distributor that sold, among other things, Blonder-Tongue and Jerrold antenna systems. One of Woody's best customers was Collier Electronics, which sold amplifier tubes to early cable operators like Dave Willis and Glenn Jones.

California-bound

In 1966 Woody left his post as general manager at EPC and moved his wife and two young sons to Redwood City, Calif., where he worked for Jerrold's distributor division as an assistant regional manager. While there he sold CATV equipment for use on college campuses, track housing and similar developments.

In late 1968, Jerrold opened a regional office in Kansas City and Woody moved back to his home state, where he continued to sell to distributors and held a variety of management and marketing positions. By the time he

ANNOUNCING: THE STANDBY POWER SYSTEM FOR THE 1990's

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

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

ALPHA TECHNOLOGIES

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

decided to leave the company at the end of 1983, he was part of the RF Systems Division, headquartered in Tucson, Ariz.

As 1983 changed to 1984, Woody changed employers. Catel Telecommunications, a small, California-based manufacturer of FM headend gear, had recently purchased RCA's CATV division and Woody was brought on to set-up and train a network of representatives.

It was during this time that Woody became active in the SCTE. He was among the first to recognize the need for a chapter in the Kansas City area. In fact, he spearheaded the formation of the Heart of America chapter (114 persons attended its first meeting and ATC's Dave Pangrac was its first president) which, in turn, was a catalyst for the formation of the Great Plains and Wheat State chapters.

His tireless support of the Society paid off. In 1987, when Wendell was given the Society's National Achievement Award for his efforts on behalf of the SCTE. He also was named to the national Board of Directors, representing Region 5, and served as the Society's secretary last year.

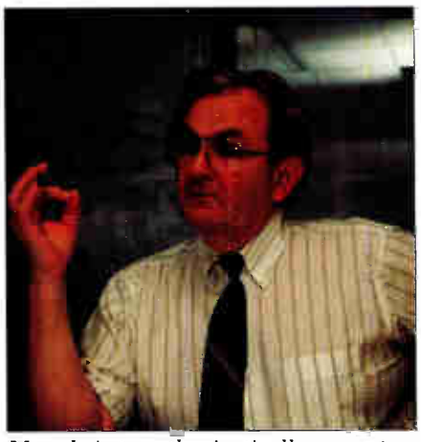
Also in the late 1980s, Catel became a pioneer in the delivery of video over fiber optics. Woody eventually aspired to director of sales for the company. However, a reorganization in 1989 left Woody unemployed—but not for long. Anixter, which had recognized the market potential of fiber optics and linked itself with AT&T, latched on to Woody and named him manager of fiber optics technology.

With the recent spin-off of its fiber optic business into Optical Networks International (ONI), Anixter now utilizes Woody's technical knowledge and industry contacts as a bridge between the two companies. For example, he'll make presentations to cable operators regarding ONI's R&D progress and report back to the system design engineers at ONI with comments.

Goals and thoughts

Right now, Woody plans to follow Trower's lead and serve a single one-year term as the Society's president. While some observers criticize that approach, Woody believes it's difficult to commit the amount of time necessary to be president of a $1 million, national organization for more than a year. Consequently, one of the planks in his platform was to amend the bylaws to limit the president's term to one year. The issue is being addressed by the Bylaws Committee and Wendell expects a recommendation to limit the term to two years.

There's never been a time in the history of our industry when education and training has had so much focus. The time is right for us to be exploding.



My role is to enthusiastically promote the merits of the Society, or team, and keep all the players on winning course.

Winning means to stimulate the individual SCTE member to better serve himself, his company and the industry through educational growth.

However, Woody plans to make the most of his tenure. "I plan to make this the year that we restart our expansion," he said. "There's never been a time in the history of our industry when education and training has had so much focus. The time is right for us to be exploding."

What does Woody bring to the organization to direct that growth?

"I see my responsibilities and capabilities like that of an orchestra leader—or perhaps like a baseball manager with the National Board being the team," said Woody. "We have Board members serving in key offices, writing training materials and working on key committees and subcommittees. It is this group that is the moving force of the Society—the ball players on the field—and each is talented and professional.

"Then we have 'farm clubs' like chapter officers, the general membership and a strong group of manufacturers, suppliers and consultants. My role is to enthusiastically promote the merits of the Society, or team, and keep all the players on a winning course.

"Winning means to improve th BCT/E program; get more BCT/E participants; accelerate the recent launching of the new Installer Certification Program; support the training needs at the chapter and meeting group meetings; edit and publish a new SCTE Health and Safety manual; involve more of the general membership in national working committees; fine tune the organizational reporting of the SCTE committee and subcommittee structure to promote greater productivity; add new meeting groups; plan for global SCTE participation and programs; and last, but not least, stimulate the individual SCTE member to better serve himself and the industry through educational growth.

"My role as president? Well, using the orchestra leader concept, I may not personally play any of the instruments (or not very well, anyway), but I know the sound of good music. It is my dedicated goal that this 1990 Board of Directors will create some excellent music and perform some memorable concerts."

Building bridges

Woody will also set the tone for the SCTE as it develops a formal relationship with Cable Television Laboratories (CableLabs). In his keynote speech at SCTE's Engineering Conference, Dr.

CONGRATULATIONS TO SCTE'S 1990-91 BOARD OF DIRECTORS!

Wendell Woody
President
and Region 5 Director

Vic Gates
Eastern Vice President
and Region 7 Director

Richard Covell
Western Vice President
and At-large Director

Jim Farmer
Secretary
and Region 9 Director

Leslie W. Read
Treasure
and Region 4 Director

Tom Elliot
At-Large Director

Rober Luff
At-Large Director

Peter Petrovich
Region 1 Director

Ron Hranac
Region 2 Director

Ted Chesley
Region 3 Director

Bill Kohrt
Region 6 Director

Jack Trower
Region 8 Director

Michael Smith
Region 10 Director

Pete Luscombe
Region 11 Director

Walt Ciciora, Ph. D.
Region 12 Director

We salute you, and support your efforts to make 1990-91
another successful year for the society

ANIXTER CABLE TV

CORPORATE HEADQUARTERS: ANIXTER CABLE-TV, 4711 Golf Road, Skokie, IL 60076 (708) 677-2600 -- Telex 289464

Richard Green, president and CEO of the Boulder, Colo.-based research consortium of industry MSOs, proposed that CableLabs, the NCTA Engineering Committee and the SCTE work together in harmony.

"We have three valuable organizations on which to rest the professional growth, training and development of new technology," said Green in his speech in Nashville. "I see the need and desirability of closer ties between these organizations. We would like to work with the SCTE in its efforts to address engineering training," he added.

Woody wholeheartedly agrees with Green's thoughts. "We (the cable industry) have three engineering-oriented groups, and each has a major purpose, but there are certain areas that really do overlap. We're not a research group (like CableLabs) and we don't have the political interest (like NCTA), but we do have some common interests. My goal is to identify what role is ours and go forward.

"In my mind our role is education and training," continues Woody. "We should be looked upon as the training arm of this industry. Secondly, we should identify and develop standards and practices for the industry."

In fact, the Society is already moving in this direction. Last year a committee was formed to examine industry practices. "The Society should develop and publish these practices for future reference," Woody said. "This is just the beginning of something new you're going to see out of us," he promised.

Within the SCTE, Woody will also be busy. He's already developed a plan to fine-tune the internal committee structure. Another idea is to draw upon the expertise of the Society's past presidents by establishing a Past President's Advisory Council, which would help the Society solicit money for the Building Fund as well as help it with forecasting its future direction.

In the meantime, Woody is working to ensure that SCTE remains the industry's premier training tool. But he's concerned that more of the industry's general managers and other non-technical personnel aren't aware of SCTE's benefits. An internal committee, formed last year, determined that the Society's greatest weakness was awareness outside of the technical ranks. That lack of awareness keeps attendance at local meetings lower than it should be, said Woody. And that lack of training is partly responsible for the attacks the industry has suffered this year, he said.

"Rates wouldn't be as big if we had good service. This brings us back to education and training. Here's an opportunity for the SCTE to really shine. When it's all boiled down, the people who are in contact with the subscriber are either the techs or CSRs—and although we (techs) have been around longer than CSRs, there's been more (training) done for service reps than us. And that's because SCTE doesn't have the visibility at the general manager level it needs."

Finding time to devote to all these projects will be tough, but Woody is confident he'll find the time.

"I just hope I can be an inspiration to those who 'never have time' and challenge them to give a little help to their Society, or listen to others," said Woody. "Start by dedicating a small amount of time with 100 percent dedication for that time period. Resulting awards are rewarding!"

If even 10 percent of the Society's 7,000-plus members took that advice to heart, the SCTE would become a true international force. Think about that. ■

—Roger Brown

Time to show your hand

Two or three years ago, the cable industry was being beat up (in a technical sense) by lay people who were constantly asking us about digitizing the TV signal and transmitting the same over cable systems. We would all patiently explain that digitizing a TV picture is not an easy task, nor is it a particularly efficient thing to do.

We then heard about people who wished to send fully digitized pictures down regular old 6 MHz communications channels. The problem, of course, was that a digitized signal occupied considerably more bandwidth than an analog TV signal. Indeed, even today the "state-of-the-art" for everyday compression of an NTSC signal is around 45 megabits. Squeezing 45 megabits into 6 MHz for transmission, while certainly possible, is not necessarily practical.

Compressing video

Furthermore, all of this says nothing about what we understand to be HDTV. For instance, at a recent technical seminar on digital television and high definition television, the issue was stated over and over and *over* by speakers who proclaimed the essential starting point for reducing the data of a high definition TV picture was in excess of 1 gigabit (that being the number of bits of information needed to fully represent one second of high definition television).

The questions then were, first, how did you compress the data to get down to a more reasonable bit stream (everyone seemed to want to get to 45 megabits)? and secondly, how did you get that onto a 6 MHz channel?

There are a variety of ways to do that, but all of them essentially involve finding ways to get three, four or more bits of information in each hertz. Just for reference, many FCC rules and regulations reference one bit per hertz as an efficient system, even though we have long known that there are certainly more efficient systems than that. Indeed, in some cases they appear in everyday applications.

I have brought all of this up because of the number of people who have been working on this from a variety of sources—telephone companies being one, but also military specialists, medical specialists, spacecraft designers and chip builders.

By Wendell Bailey, Vice President Science & Technology, NCTA

Even today the "state-of-the-art" for everyday compression of an NTSC signal is around 45 megabits.

CATV first in digital proosals

The most interesting thing, of course, is that the first purely digital HDTV proposal to land on our doorstep for close examination will be from a cable company. I call it a "cable company" because the company in question has been involved in the cable industry since its inception. Many things about this proposal remain to be resolved, but for the time being, the possibility that an HDTV signal, fully digitized, can be sent in a 6 MHz wide channel slot appears to be receiving the kind of scrutiny and testing that will teach us much about what's possible in this particular mode.

Presentations look good

The people working on this project are extremely bright and have a tremendous set of resources to bring to bear on the problem. They've given presentations to learned groups of engineers representing several disciplines. These learned groups have agreed to indications that this can be done, and they have thus been admitted to the limited number of proponents for a high definition television transmission system to be tested by the Advanced Television Test Center.

As exciting as this news is, even the proponents who are putting forth this project caution that the "to-do list" is long before their point is proven. Like good engineers and scientists, they do not wish anyone to take it on faith. They want to provide both results and an understanding of the scientific and engineering disciplines used to accomplish this feat. That's just fine with those of us who are observers. Don't just tell me you can do it; "show me" is certainly the watch word for cable engineers.

After all the technology and equipment, after all the science and art—with video compression, one has a right to ask two essential questions. One, what does the picture look like compared to what it could have looked like in its raw, digitized form, or even its raw analog form? Secondly, what does it cost me to get this picture displayed on my home TV screen?

Show me!

In the coming months and years, as digital HDTV issues are bandied about and signal transmission methods proposed and demonstrated, these two consumer-focused questions are the only two worth asking. Because ultimately, that's who has to judge whether these efforts are successful or not.

I have the highest regard for the people proposing this standard and indeed, after having heard the presentations I have to think that if anyone can do it, these people can. But like cable engineers everywhere, while I am willing to applaud and shout encouragement—in the end, you have to show me what you've got. ■

OUT WITH THE OLD, IN WITH THE NEW

Save time and money by Retro-Fitting– Not replacing, your worn out power supplies.

- You don't pay for a new cabinet or its installation
- Installation time is reduced
- You use your existing input and output wiring
- Eliminates need for expensive electricians
- Eliminates expensive inspections (in most cases)

SDT-1000-0

- Allows for "grandfather clause" installations
- Upgrades to state-of-the-art electronics
- Each kit is fully covered by our new product warranty (the strongest in the business)

Power Guard's standby and non-standby kits are now available to fit most manufacturer's models, including Lectro, Data Transmission Devices, RMS, Alpha, Control Technology, Texcan, Sawyer, and Power Vision.

For more information on the Retro-fit model to fill your requirements, call today, toll-free 1 800 288-1507.

POWER GUARD

FAX RESPONSE 1-800-876-2299
ID Code 028

506 Walker Street, P.O. Box 2796, Opelika, AL 36801, 1 800 288-1507
Stocked and Distributed by Midwest CATV

Reader Service Number 14

A view of audio loudness

Recently, renewed focus has been placed on audio by the NCTA Engineering Committee. It has formed a new subcommittee that has been tasked with reporting on the current "state-of-the-industry" relative to audio performance, especially with respect to signal-to-noise ratio (S/N) and channel-to-channel audio loudness consistency. The goal of the subcommittee will be to report its findings with an eye toward making recommendations, where appropriate, to improve overall audio performance. This month, we'll review the subjects of level consistency and S/N relative to audio to see if there might be some improvements that we can make to our current performance.

Commercials typify audio discrepancies

As I've mentioned in this column previously, channel-to-channel audio level consistency seems to be a hot topic in many circles these days. We've all recognized the problem the industry has had with audio level consistency into the subscriber's home. The recent proliferation of audio/video switching because of the dramatic rise in commercial inserts has simply made the problem worse. Peak audio levels on a cable system are rarely consistent from channel to channel, and quite often, switched audio levels aren't consistent within a channel.

By Chris Bowick, Vice President Engineering forHeadend Equipment, Scientific-Atlanta Inc.

Why inconsistencies exist

Some MSOs have opted for the use of compressors and/or limiters for every audio channel, or at least for some of their "problem" channels. But there's one thing that we all *must* understand as we try to tackle a solution—audio levels are inconsistent for a multitude of reasons, and a lot of it has to do with the content of the audio material as well as the method that was used in the original production process to record the audio. Was it compressed during the production/recording process?

Let's face it, there are some audio passages that were meant to be "soft," and some that were meant to be "loud." We will never get away from that fact. Therefore a subscriber who is a "clicker" (a person who is constantly and rapidly changing channels via remote control) like I am, might never be satisfied with his audio levels, especially when it's late at night and the rest of the family is asleep, unless all of the channels on the system are run through a compressor (or AGC). Audio purists, on the other hand, might be appalled at the use of compression. You'll never please everyone! But note that the broadcasters are almost sure to use some form of audio processing prior to transmission.

Perceived loudness tested

In order to get a feel for the magnitude of the problem, a controlled experiment was run on a couple of cable systems to check the variation in loudness from channel to channel (all channels), and to measure the S/N performance of the BTSC channels. In one case, a Dorrough Loudness Monitor was used to get a visual indication of the perceived loudness of the channel.

The Dorrough meter is interesting in that it measures "perceived loudness"—which is a very complex, subjective, frequency dependent, non-linear perception of the density or strength of the sound as experienced by a listener. It does this through a complex array of filters to provide both an average loudness as well as a true peak signal reading simultaneously on a complex LED bar graph.

Fears were well-founded

During the experiment, we weren't looking for "absolute" numbers, but instead were looking for the amount of variation from channel to channel. The results seemed to confirm our fears that levels are, in fact, all over the map. In order to get good consistent data, however, we had to monitor the channel over an extended period of time to ensure that we had seen a true peak.

We found that the standard deviation on both the peak and average audio levels on the 42-channel system was *only* around 3 dB. But there were a *few* channels on the system that were significantly outside of that standard deviation. For example, the perceived loudness spread as measured by the Dorrough meter from the loudest to the quietest channel on the system after extensive monitoring was around 18 dB! Certainly not a trivial amount. On another system, that spread was measured at around 12 dB. This is the kind of spread that we need to minimize.

Room for improvement

The S/N performance of the BTSC channels as measured on the cable plant ranged from a miserable 38 dB for one local broadcaster to 53 dB for another local broadcaster, with everything else running at an average of just under 50 dB. The channel that measured 38 dB S/N seemed to be plagued with sync buzz which may have been caused by transmitter ICPM. These measurements were made at the end of a drop with an HP-8903 audio analyzer being driven by a set-top, a high-quality TV demodulator and a Modulation Sciences SRD-1 stereo decoder. The numbers were referenced to the level in the left or right channel when the sound carrier is modulated by a 400 Hz tone at 25 kHz deviation with no pilot or difference energy.

Clearly, we (including the broadcasters) have an abundance of opportunity to improve our audio performance—with respect to both level control and S/N performance. While BTSC stereo does have its limitations, if encoders are installed properly, and if the signal is transmitted through a properly operating transmitter or modulator, then we should expect to see S/N ratios on the order of 50 dB to 55 dB at the end of a reasonable cascade of amplifiers. Respectable, but certainly nothing like the quality that the British will be able to receive via their NICAM audio, nor anything close to the quality available through any of the new digital audio formats available to the industry. ■

Will you be ready for the big picture?

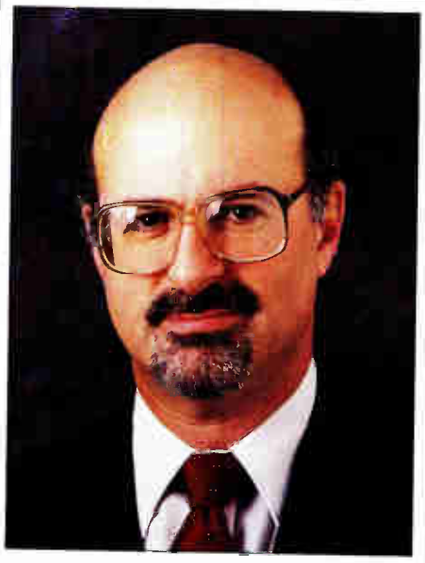
Someday soon, a few demanding subscribers will pull up a chair, turn on their HDTV, and put your system to the test.

With C-COR's new fiber optics and extended bandwidth products, you'll pass with high resolution colors. If the demand is for more channels, we'll make sure you're ready. Data and video services? Just ask. C-COR's outstanding quality and highly respected service? All included.

Even better, it's all available now. Just write C-COR, 60 Decibel Road, State College, PA 16801. Or call toll free 1-800-233-2267. In PA, 1-800-356-5090.

Whether you're planning for the big picture, or upgrading for a better one, we're ready when you are.

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



Part 15 of the FCC Rules

All cable operators had better be familiar with Part 78 of the FCC Rules—this is the section that contains the cable leakage rules, the CARS microwave rules, and *nearly* all of the FCC regulations that affect the technical operations of a cable system.

But Part 15 is almost as important as Part 78. Part 15 deals with two areas: the unintentional emission of radio signals and the use of unlicensed low power radio transmitters. Part 15 contains some headaches for the cable industry. But it also contains some tremendous new product opportunities for the electronics industry.

Effects of Part 15 rules

The Part 15 rules place a limit on the amount of radio energy that can be emitted by local oscillators of TV sets, by computers, by microwave motion sensors, by garage door openers and by other electronic products. These rules are needed to protect against interference, because products operating under Part 15 often use the same radio frequencies that are used by licensed radio services.

In April 1989, the FCC rewrote Part 15 so there are now two major sections: intentional radiators and unintentional radiators. The FCC also made some substantive changes.

By Jeffrey Krauss, Independent Telecommunications Policy Consultant and President of Telecommunications and Technology Policy of Rockville, Md.

Cable TV converters

It used to be that only the Part 78 leakage rules applied to converters, but not anymore. There is now a section in Part 15 that defines a "cable system terminal device" (Section 15.3(e)) and another section that contains technical rules for cable system terminal devices (Section 15.115). For example, section 15.115(b) contains limits on the output signal levels that can come out of a converter. Section 15.115(c) contains isolation limits for A-B switches. Section 15.115(d) says that converters must contain automatic gain control circuitry to make sure the output signal level is controlled. This AGC requirement applies to RF heterodyne converters as well as baseband converters. This applies to all converters that you buy after July 1, 1990, but not to converters that you already own. It applies to refurbished converters that you buy, as well as new ones.

In addition, all cable converters that you buy from now on must have a label on the bottom that says the converter complies with Part 15. New converters must have a label affixed by the manufacturer. Refurbished converters must have a label affixed by the refurbisher.

Why, you may ask, does the FCC now require AGC circuits on all converters? The FCC's argument goes something like this. Suppose the customer puts in an A-B switch to use an outside antenna, but connects it incorrectly so the cable TV signal from the converter is broadcast out the antenna. Even though it is tuned to an unused channel (usually 2 or 3 or 4), it can emit enough power on the adjacent channel (which usually does carry a TV broadcast signal) to cause interference to a neighbor's TV reception. Is there a real risk here? The cable industry told the FCC that this requirement would impose unnecessary costs on the industry. The FCC said the costs would be minimal, and would reduce interference.

Low-power transmitters

The FCC started worrying about this kind of interference in the mid-1980s, when someone started selling an illegal TV transmitter called the TV Genii. The TV Genii allows a consumer to use a VCR in one room to play a movie, and to watch that movie in a different room—without wires to connect the VCR to the TV. The TV Genii puts out a signal that can be tuned to TV channels 14 through 20. It can cause interference to licensed TV stations on those channels. Even though they are illegal, you can still find them at hamfests and computer flea markets for about $39. And if you hook one up to an outdoor antenna, all your neighbors can watch your videotapes.

The FCC had a problem stopping sales of the TV Genii. There was a big consumer demand for it. Rather than create a perpetual black market, the FCC decided to legalize this type of product, but to allow it to operate under Part 15 in the 902 MHz to 928 MHz frequency band where it could do little or no harm.

Between now and Christmas, you will start to see audio-video dealers carrying these new products: the "Videocaster" from Gemini, "Room Service" from Recoton, the "Bi-Klon" transmitter from Remex, and similar products from Fox Marketing and Universal Security Systems.

With all of these products, the unit at the VCR source transmits a video signal. But with the Bi-Klon, the consumer also has a hand-held infrared remote control unit that sends signals to the unit at the TV. The unit at the TV sends the infrared control back to the source unit at the VCR. This allows the consumer to perform such functions as fast-forwarding a tape from a remote location!

If you can control a VCR from another room, can't you control a cable converter from another room? Does this mean that a cable subscriber can use this product as a substitute for an additional drop? At $189.95, the Bi-Klon may be a little too expensive. But you can bet that someone will try it.

More new Part 15 products

There will be an explosion of new Part 15 products in the next few years. Many of these will be oriented toward the voice and data markets, rather than video. Some will use a relatively new technology called spread spectrum modulation. Wireless local area data networks are already on the market. Wireless local voice networks, connected to a PBX switch, will be next. These products will be valuable because they can avoid the tremendous costs of rewiring offices to accommodate moves and rearrangements. Watch for them! ■

THE WORLD OF PIONEER

Our global commitment to CATV

From North America to Europe to Asia and back, Pioneer cable television converter technology is there. Pioneer's full line of addressable converter products has the capability of delivering CATV programming to over 450 million TV sets worldwide. Pioneer also offers a global network of sales, service and support. So wherever you are, you can count on the worldwide strength of the Pioneer name.

PIONEER®

PIONEER COMMUNICATIONS OF AMERICA, INC.

CATV Division 600 East Crescent Avenue Upper Saddle River, NJ 07458 (201) 327-6400 Outside New Jersey (800) 421-6450

Access to the European market

Broadcasters and motion picture producers have expressed indignant concern regarding efforts by the European Community (EC) to restrict the broadcast after 1992 of television programming produced outside the EC. American cable TV operators have encountered indications that restrictive technical standards may be used similarly to prejudice the application of American technology and experience in the European Community.

The issues of free trade and the protection of domestic industry are as old as trade and industry themselves. There appear to be no firm answers; only strongly held opinions. We are just as sure that we have superior cable TV technology as Europeans are that their 625-line PAL (even with its 50 Hz flicker) is superior to our "tired old 525-line NTSC (Never Twice the Same Color)."

Purpose of technical standards

The primary purpose of technical standards should be to assure that the diverse parts of the system will work together. Without such standards, the successful operation of a complex system can only be achieved (if at all) by a dominant supplier whose market power is strong enough to establish *de facto* standards.

Without universally accepted, worldwide standards, facsimile transmission on voice telephone circuits could not have developed. Without the regionally, if not universally accepted NTSC, PAL and SECAM standards, neither color TV, nor even monochrome TV, could ever have left the laboratory.

A more controversial, but historically secondary, purpose of technical standards is to define one or more quality levels of performance. It was more than 20 years after the start of commercial sound radio broadcasting before annual noise and distortion measurements were required for AM radio. Even they were scrapped in the recent flurry of deregulation. FCC television standards have never included picture quality specifications; only those matters necessary to match the receivers to the transmitted signal are specified in FCC Regulations. While picture quality was a factor in setting the standards, it is the characteristic of the signal that is specified and measured, not the subjective quality of the picture.

High quality at affordable price

With adequate signal definition standards, the consumer marketplace is better able than government to achieve a reasonable balance between the quality and price of the product. Questions of technical excellence and affordable price are inherently subjective, "in the eye of the beholder." They are much better answered in the marketplace than by government fiat.

Many regulators tend to perceive their responsibility to include assurance to the public of the highest quality of the product. They seem inclined to forget that a great many consumers purchase Fords, Chevrolets and Hyundais, despite the fully recognized technical superiority of Rolls-Royce, Cadillac or Lincoln.

Americans in cable TV are soon very likely to come head-to-head with European inattention to costs. It will not help much merely to understand that this may be a consequence of the government operation and subsidy of television, and the technical pride of government engineers who are scarcely accountable for costs.

The American objective of providing the best quality at an affordable price stands in direct conflict with the European objective of providing the highest technically feasible quality, while largely ignoring affordability. The marketplace dictates quality in America; the government imposes its notion of quality in much of Europe.

Much can, and is being said on both sides of the issue. Americans are accused of delivering inferior quality while worshipping at the shrine of the bottom line. Europeans are accused of demanding unnecessarily costly technology and procedures, thereby seriously hobbling technological development with inflexible rules and standards.

Outside the U.S., the move to combine cable TV and competitive telephone services is driven in part by strong recent privatization trends, and in part by a perceived need to upgrade. In the U.S., the telecom industry has been privately owned from the beginning, although closely regulated by government. It is flattering to be told that cable TV might provide the financial support for the switch to competitive telephone services. However, if the inefficiencies of the government telephone system, operating on a "cost-plus" economy are loaded onto the prospective television distribution business, both could falter under the burden.

Component specs restrict trade

Our problem in developing international opportunities is but a small part of the broad concern of American business for more open access to foreign markets. Nevertheless, it is indeed distressing to discover the plan by CENELEC, to develop component specifications for cable TV in the European Community, with apparently strong support of many of its National Electrotechnical Committee members. This might include specifying copper "bamboo" type coaxial cable (so-called because of its spaced dielectric disc construction); 46 dB port-to-port tap isolation; non-current-passing taps. It could also push the EC to require switched star or mini-star network configuration in order to combine video program distribution with voice and data telephony.

CENELEC is a non-profit technical organization whose members are the National Electrotechnical Committees of 18 countries in Western Europe. CENELEC has a cooperative relationship with the European Free Trade Association, (EFTA) and exchanges all relevant information on standards with the International Electrotechnical Com-

By Archer S. Taylor, Senior Vice President Engineering, Malarkey-Taylor Associates

HIDE & SEEK.

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

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

The Searcher Plus provides vehicle mounted and handheld calibrated leakage measurements. The Searcher midband channel receiver and the FDM Series of dedicated carrier receivers offer affordable leakage monitoring. The TFC-450 and TFC-600 frequency counters insure that your carriers are on frequency. And our Cumulative Leakage Index Computing Software (C.L.I.C.S.) backs it all up.

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

TRILITHIC

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

CONTACT YOUR TRILITHIC REPRESENTATIVE

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

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

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

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

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

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

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

Reader Service Number 17

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

mission (IEC). *CENELEC standards are implemented identically as national standards in all member countries.*

The Foreword to IEC Publication 728-1 (1986) (see box) clearly sets forth the nature and intended use of its standards for Cabled Distribution Systems for sound and television signals operating between 30 MHz and 1 GHz. In this document, IEC has assiduously avoided specifying particular devices or network configuration in favor of specifying end product performance and practicable methods of measurement.

Unlike CENELEC, its recommendations are not binding on member countries. CENELEC would do well to follow the example of IEC.

Protectionism and inflexibility

It is hard to find a supportive rationale for the concept of component specifications that is not rooted in protectionism. Component specifications inherently presume that there is one best way, perceived by government regulators as essential to technical excellence. Typically, this way would be available only from domestic sources. Non-complying foreign sources would be stymied, even where the required characteristics can be shown to be unnecessary, undesirable or needlessly expensive.

European governments would frustrate the development of high quality television distribution by imposing paternalistic regulations intended to implement preconceived notions of technical excellence and how it can be achieved. Mandating particular component types, design strategies and network configurations would have the effect of freezing technology at a premature domestic state-of-the-art. Changing to new and improved technology is difficult, even if domestically developed; it is virtually impossible if developed abroad.

The proposal by CENELEC, or others, that the European Community adopt component specifications should be vigorously opposed, not only as a barrier to free trade (which it is) but primarily because it so poorly serves the EC public.

Ambassador Bradley P. Holmes, U.S. Coordinator of International Communications and Information Policy for the Department of State, formerly assistant to FCC Chairman Dennis Patrick, has been meeting informally with a group of U.S. cable TV people, seeking the views and experience of MSOs, cable TV equipment suppliers, consultants and RBOCs with foreign cable TV interests.

He has expressed considerable interest in the work of the United States Telecommunications Training Institute (USTTI), sponsored by such commercial firms as AT&T, MCI, Comsat, Motorola, Andrews Corp., Scientific-Atlanta and government agencies including FCC, NTIA, USIA and others. The Board of Directors consists of representatives of four RBOCs, four government agencies, two attorneys, a former senator and several non-Bell telecommunications and manufacturing firms.

Since its formation in 1982, USTTI has graduated 1,700 men and women who manage the telephone systems and broadcast outlets in 111 developing nations of the world. It now offers 45 courses, each lasting one to four weeks, focused on both technical and managerial skills, with training slots for 609 students in 1990, funded largely by commercial contributions. Ambassador Holmes asks whether a comparable training program in EC might help to provide better access for U.S. cable TV technology in European markets. What do you think? ■

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

— IEC Publication 728-1 (1986)

Reregulation in 1991?

The June 1990 meeting of the NCTA Engineering Committee was held in Nashville, Tenn., just prior to the SCTE Engineering Conference and Cable Tec Expo '90 with a record setting 92 people in attendance.

Several bills pending

Wendell Bailey led off the meeting with his Washington update. In Congress, there are a number of bills pending which would have an impact on the cable industry. These bills could re-regulate various aspects of cable rates; limit concenctration of ownership, cross-ownership, and vertical integration; and encourage such technologies as DBS and MMDS. While it is believed that the liklihood of any of the bills making it into law this year is remote, there is a good possibility of some legislation being enacted next year. The industry must be seen to be improving its customer relations over the summer and fall to minimize the impact of the legislation.

The FCC report to Congress on the impact of the Cable Act is expected to be completed by the end of July. The Cable Act requires that the FCC prepare a report on the industry five years after the implementation of the Act. This report is to review the impact of the Act on the industry. The FCC has received comments through the normal inquiry process and as of the meeting date were preparing the report.

The FCC is also reviewing the effective competition rules to determine if three off-air channels are sufficient, or if more off-air channels should be present in order to free the system from local rate regulation. Some groups believe that five channels should be present, while others believe that a second multi-channel distributor, such as MMDS, should be present before relief is obtained.

There is a notice of proposed rulemakeing which would allow SMATV's access to the 18 GHz band now allocated for cable CARS usage.

Electronic guides researched

The EIA-NCTA joint engineering committee is investigating electronic program guides to determine the applicability to cable. There is presently one satellite program guide which provides customers with an interest-specific list of programs which are easy to read and fast to access. The program guide would also be tied in to VCR programming and automatic recording of desired programs.

A visit to Japan manufacturers by cable engineers resulted in good discussions of the importance of direct pickup shielding and MultiPort requirements for both TV sets and VCRs. One manufacturer agreed to begin investigating the need for a tuner direct pickup specification.

At the Consumer Electronics Show, there were a number of 900 MHz units displayed that are designed to distribute TV channels around the home. This is a potential problem, since an amplifier attached to the output of the unit could distribute the signal over a much larger area than originally designed.

Advanced TV testing scheduled

There is not alot of action visible in advanced television development, but meetings are continuing at a very high rate. CableLabs has signed a contract with the Advanced TV Test Center and now has offices at the Center. The cable test bed is on order with delivery expected in October. Tests are now expected to begin very late in the year. The test procedures are under final review and will be formally adopted by the end of July.

General Instrument, Video Cipher division has completed the development of a reliability improvement kit which can be field installed and will be incorporated in any units returned for repair.

In addition, a kit is available to eliminate the horizontal streaking present on weak signals.

Automatic transmitter ID system

The FCC has adopted an automatic transmitter identification system for satellite uplink operators. The identifying signal will help FCC locate uplink operators that interfere with other satellite users. This was a major problem a couple years ago when poorly trained portable uplink operators would energize the uplink prior to ensuring they were on the correct satellite and transponder.

The standards subcommittee is investigating the need to develop or elaborate on the procedures for testing headend equipment, fiber systems, and signal leakage.

CLI forms late

The FCC has received about thirty percent of the 320 forms which were due by the first of July. One in four of the forms submitted require follow up by the Commission as they are incomplete or appear to be inaccurate.

A study of audio loudness levels on two cable systems revealed a large variation of levels from one channel to the next. These changes are believed to be due to programming changing loudness levels from one program to the next. Most cable operators do not have any automatic level control at the headend so their level received from the satellite is the level delivered on the system.

Operators have reported that while levels may be set close at one time during the day there will be a large variation in levels after a few hours because programmers change the audio loudness levels delivered to the headend.

In home wiring

In-home wiring is getting more attention. CE-Bus and Smarthouse are proposing standards and equipment to allow interaction between computers and various in-home devices, includng TV sets. Their decisions will have a significant impact on cable systems in the home and industry needs to be a part of the decision making process to protect its interests.

Ghost cancelling

The Advanced Television Systems Committee is investigating possible ghost cancelling schemes. Japan broadcasters are now transmitting a training signal for ghost cancellers. These were demonstrated in Atlanta at the NAB convention with much success. AT&T has developed another system which is under investigation. The cost increment for a ghost canceller on normal TV sets may be prohibitive at first, but they could have application at cable headends where ghost impaired signals are received. This could provide the cable operator with a relatively inexpensive means of improving the quality of off-air signals.

The next meeting is scheduled for August 8 and 9 in San Francisco, Calif.

By Brian James, Director, Advanced TV Testing, CableLabs

Re-reg tops list of industry's concerns

It's amazing the power uncertainty possesses.

Whereas previously two *CED* salary and job satisfaction survey uncovered wide dissension between technicians and their management as well as general dissatisfaction with their salaries, something new has crept into the picture: the prospect of re-regulation.

For the first time ever, one subject tops the list of concerns for all three personnel titles surveyed: managers, engineers and technicians. Clearly, the Washington scene is the focus of everyone who works in CATV.

This third annual survey is the result of a nationwide mailing, sent to 450 system-level technical personnel culled from a CableFile Research database. One hundred and thirty-five persons responded in time to be included in the results, for an overall return rate of 30 percent. Separated by title, 60 managers, 47 engineers and 28 technicians returned the questionnaire. From those responses, we've been able to develop an "average" profile of technically oriented personnel working in CATV.

> Overall, the two newest concerns voiced by industry personnel were related to industry "greed" (or increase in rates) and signal leakage.

In addition, for the first time, the survey was expanded to gather information related to benefits received, including: medical, dental and vacation time; whether or not employers pay for education and training and if employers pay for SCTE membership.

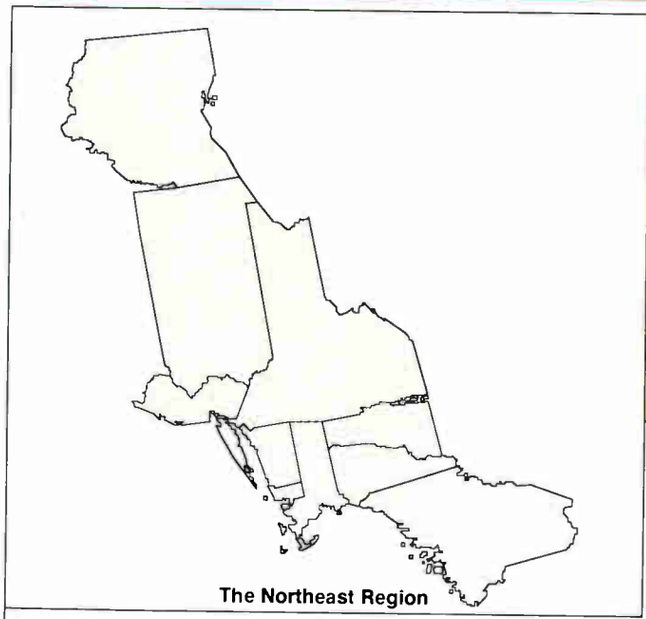
Survey highlights

Some of the highlights of the survey include:

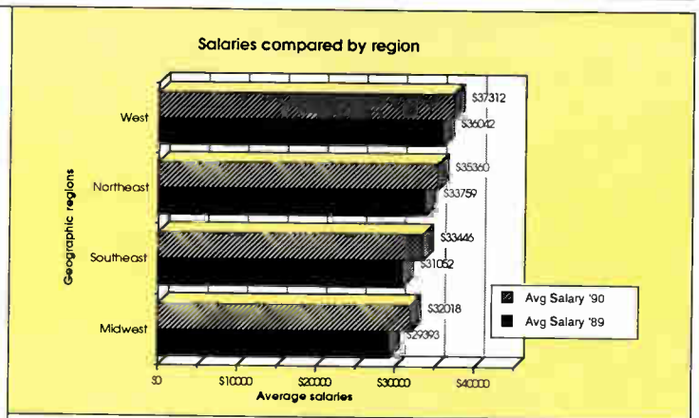
- The average annual salary of technicians has topped $30,000.
- A larger percentage of engineers expressed a desire to leave the industry than in past years, easily outpacing the number of managers and technicians who feel that way. The reason? Most expressed some form of burn-out from increasing responsibilities on the job. Last year, managers and techs led this category.
- Training and salary satisfaction levels seemed to stabilize, with most

Top 10 issues of concern

	Management	Engineering	Technicians
1	Re-regulation	Re-regulation	Re-regulation
2	Telco competition	Lack of training	Telco competition
3	Low Salaries & Benefits	CLI	Low Salaries & Benefits
4	Education & Training	Low Salaries & Benefits	Rates too high
5	CATV's poor image	Customer service	Other competition
6	Consolidation & job security	Telco competition	Lack of training
7	Other competition	Other competition	Keeping up with technology
8	Customer service	Commitment to quality	Advancement
9	Program costs	CATV's poor image	Customer service
10	Keeping up with technology	manpower	CLI



The Northeast Region



respondents expressing general satisfaction with their incomes. However, more managers indicated they were unhappy with the amount they are able to pay their engineers and technicians.

• Technical personnel who work in the West, on average, are paid more than their colleagues elsewhere. However, those who work in the Northeast receive better medical and dental benefit packages.

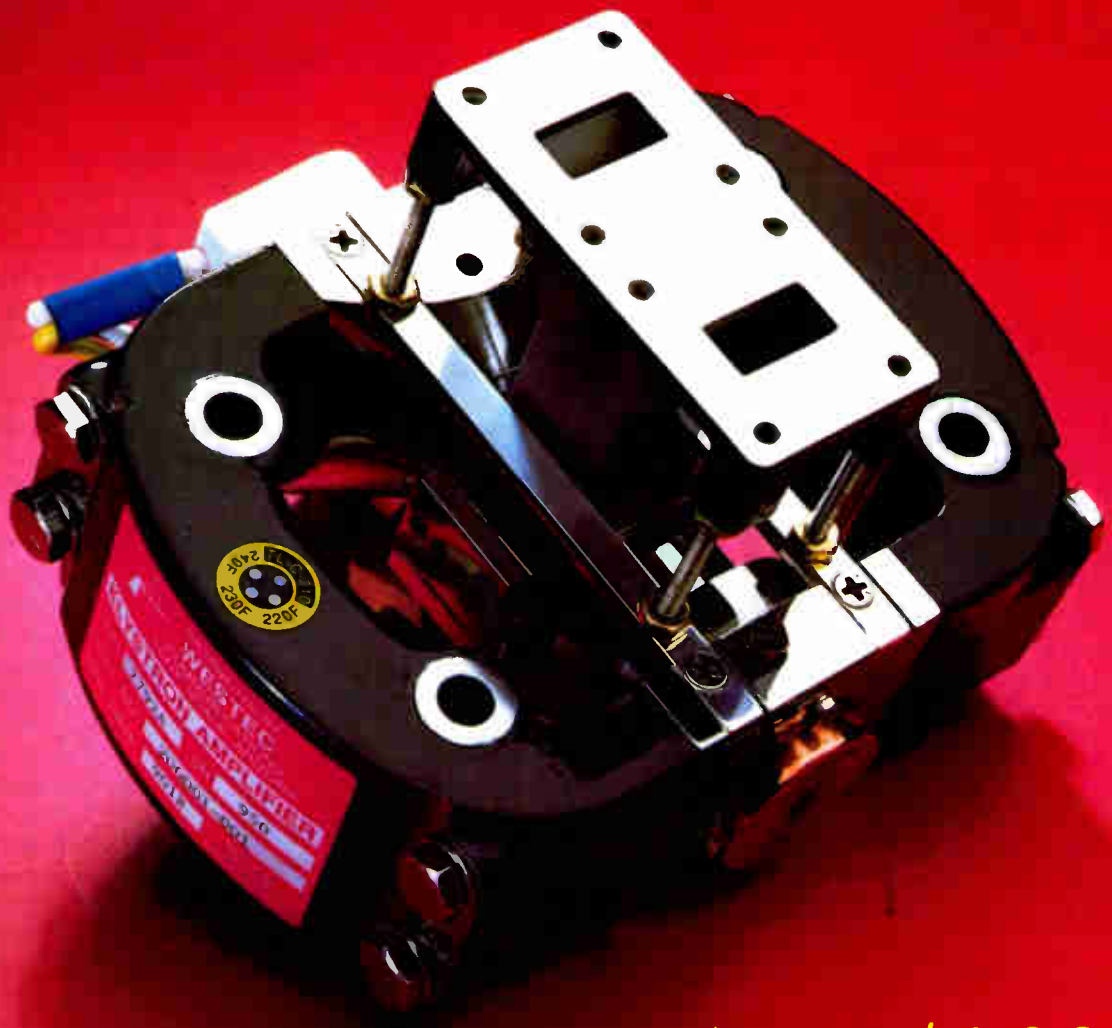
• Nine out of 10 employers have programs in place to help employees defray the costs of education and training. Meanwhile, 80 percent of the MSOs pay for SCTE memberships.

• Across the board, most industry personnel surveyed have more than 10 years of industry experience and receive approximately three weeks of paid vacation per year.

• Predictably, managers are highly concerned about industry re-regulation and telco competition. However, those concerns permeate through to the lower levels, too. And, engineers are extremely concerned about signal leakage (expressed here by the buzzword "CLI"), perhaps because they feel they are the ones responsible for a passing score.

Managers

Who is our typical engineering manager? According to the 1990 survey, he



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

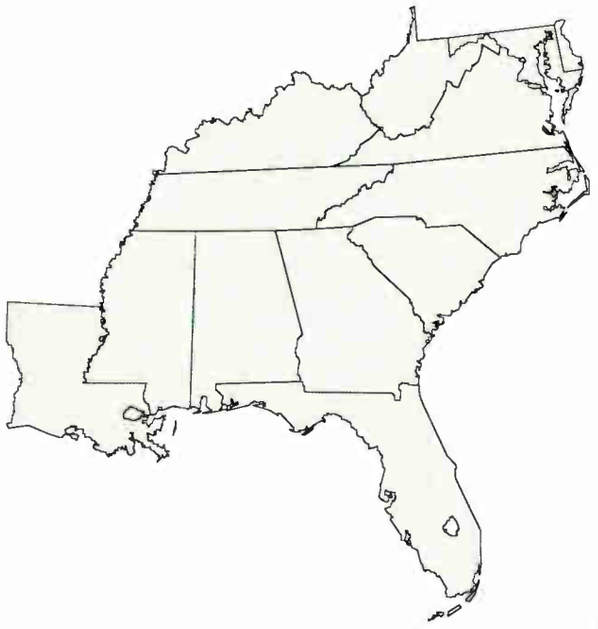
WESTEC — Your AML Support System

"CPR for AML"

WESTEC COMMUNICATIONS

14405 N. Scottsdale Road, Scottsdale, Arizona 85254

(602) 948-4484 Microwave Service (800) 666-4441 FAX (602) 998-8701



The Southeast Region

(it's almost always a he) is 38½ years old, makes just about $36,000 per annum, has more than 10 years of CATV experience and more than six years in with his employer. However, almost one-third of those responding have only recently (within the past three years) been promoted to management, while nearly half have more than five years in that category.

His benefits package usually consists of a health insurance plan to which he contributes some portion of the premium. As for dental insurance, nearly one-third of the respondents said they receive no dental benefits while nearly one-half contribute to the cost of the insurance. About 23 percent receive fully paid dental benefits.

Although regulatory issues topped the list of concerns mentioned by managers, their written comments tend to reflect issues more close to home—like compensation, training and industry consolidation.

"The cable industry needs to come to terms with paying employees a decent wage," wrote a manager from a medium-sized system in New Jersey. "Corporate MSOs are too wrapped up in acquisitions. We must pay all employees competitively to keep good people in the industry."

Regarding training, a plant manager from Indiana wrote: "I have people who

Management Statistics

Question	Mgmt	
Avg salaries (1990)	$35,998	
high	$90,000	
low	$18,750	
Avg salaries (1989)	$33,796	
high	$85,000.00	
low	$17,300.00	
Avg Age (years)	38.51	
Time in position		
<1 year		10.00%
1 to 3 years		31.67%
4 to 6 years		8.33%
6 to 10 years		23.33%
over 10 years		26.67%
Time w/company		
< 6 months		4.92%
6 mnths to 1 year		3.28%
1 to 2 years		9.84%
2 to 4 years		18.03%
4 to 6 years		6.56%
Over 6 years		57.38%
Time in CATV		
< 1 year		0.00%
1 to 3 years		3.33%
4 to 6 years		1.67%
6 to 10 years		23.33%
Over 10 years		71.67%
Avg # supervised	15.36	
Benefits:		
Health Ins.		
100% paid/emplyr		37.70%
Co-op payment		57.38%
No insurance		4.92%
Dental		
100% paid/emplyr		22.95%
Co-op payment		45.90%
No insurance		31.15%
Education		
Employer helps		90.00%
Employer doesn't		10.00%
SCTE membership		
Employer helps		78.69%
Employer doesn't		21.31%
Avg. vacation days paid per year	14.11	
Plan to stay in CATV		88.52%
Don't plan to stay		11.48%

BUILD IN TOMORROW'S TECHNOLOGY, TODAY.

To address the growing demands of today's subscriber systems, Magnavox has designed the Spectrum 2000 Amplifier System. It incorporates the very latest in electronic manufacturing, including Surface Mounted Devices (SMD), to help assure product integrity.

The Spectrum 2000's universal design makes plug-ins interchangeable throughout the series. And, as always, every new component is compatible with most of our past mainstation and line extender products.

The new Spectrum 2000 Amplifer System includes the 7TH housing with ports and convection fins that optimize both aerial and pedestal installations. Inside, our 2-way interconnection chassis holds amplifier modules available in Feedforward, Power Doubling™ or Push-Pull versions, and a variety of bandsplits to suit your system's needs. Our new LE90 line extender, offering backwards compatibility, is also available in Push-Pull or Power Doubling, and a variety of bandsplits and gains. Completing the Spectrum 2000 System, the Magnavox Management System helps keep your system operating at peak performance by gathering and evaluating information at monitored points.

Additionally, our company-wide Quality Improvement System (QIS), with the goal of defect-free performance, results in products that deliver higher quality, higher reliability and lower maintenance costs.

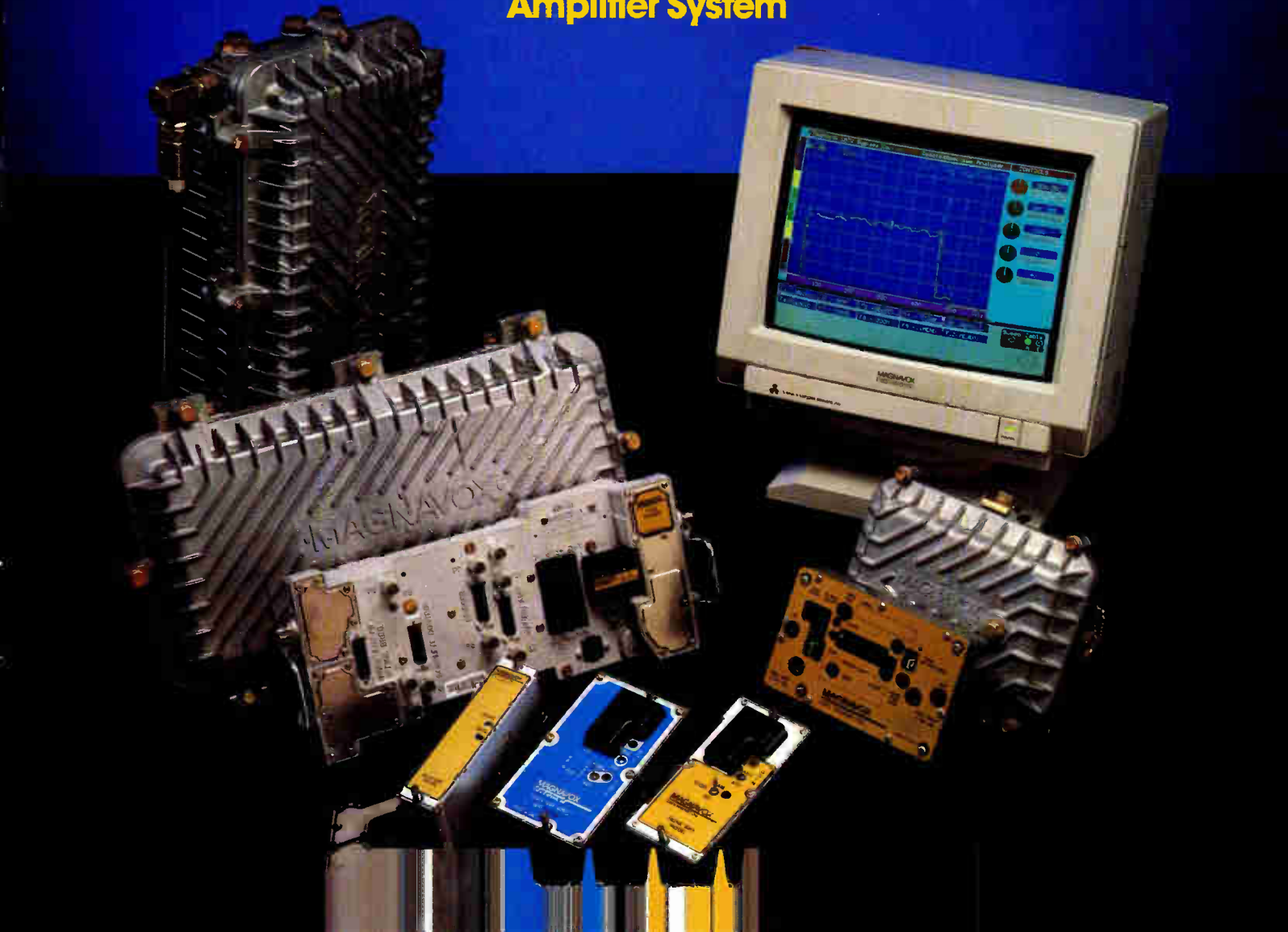
To fully understand the benefits of the new Spectrum 2000 Amplifier Series, contact your Magnavox representative.

MAGNAVOX

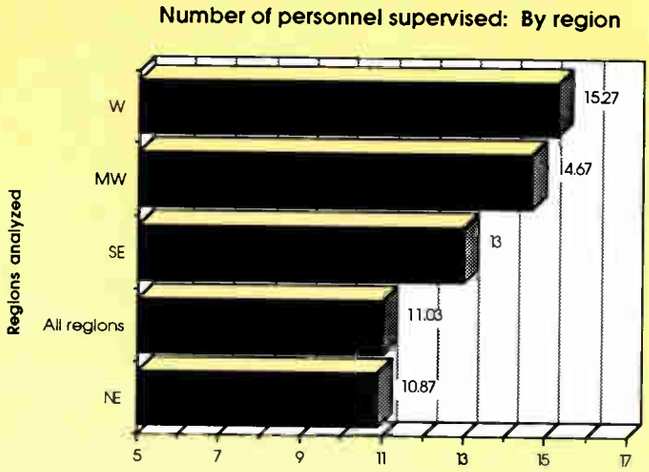
CATV SYSTEMS, INC.
100 Fairgrounds Drive, Manlius, NY 13104
(315) 682-9105 FAX: (315) 682-9006
(800) 448-5171 In New York State (800) 522-7464

SPECTRUM 2000

Amplifier System



The Midwest Region



have been in this business for five to 10 years who can't perform certain job duties due to lack of training. I don't have time and am not fully qualified to provide training myself."

Finding enough time to perform the various duties assigned to management personnel is becoming a serious challenge to many others. According to a large-system manager in Oregon, who is satisfied with his income, "I'm still frustrated by an intense work schedule, large job responsibility list, very long hours and stress caused by job/family balance (or imbalance!) After 20 years in opera-

MICRO-BEAM®... A Commitment to Service.

Channel Master® believes that customer service shouldn't be a "High-Cost" option. That's why MICRO-BEAM system specialists offer more customer services **at no extra charge** than anyone in the business.

Total Customer Service

- **2 Year Warranty - Includes Parts and Labor.**
- **24 Hour On-Site Service - 7 Days a Week.** (Continental U.S. Only)
- **System Design/Path Feasibility.**
- **On-Site Training.**
- **FCC Application Assistance.**
- **Equipment Installation and Path Alignment.**
- **Fastest Lead Time in the Industry. Equipment and Spare Parts are In-Stock Ready to Install.**

MICRO-BEAM allows you to cost effectively consolidate system equipment into a single headend. 1, 2, 5 & 10 watt high performance CARS-BAND microwave systems can be designed in a variety of hub configurations delivering up to 80 channels.

For more information about the MICRO-BEAM service advantage, contact:

Jim Crownover
MICRO-BEAM Sales Manager.

Channel Master® Division of Avnet, Inc.
P.O. Box 1416, Industrial Park Drive, Smithfield, NC 27577
Phone (919) 934-9711 • Fax (919) 934-0380

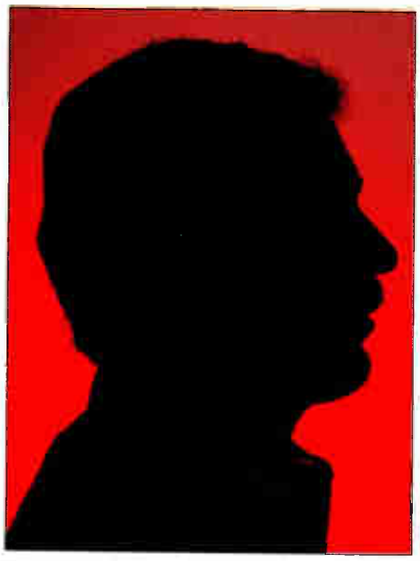
The West Region

tions, I'm not sure it's worth it!"

The buying and selling of systems continues to worry personnel who see themselves as potentially the odd man out. Others cast a wary eye on consolidation because they don't want to compromise their efforts. "I expect my system to be sold," wrote a man from Kansas, "and depending on what the new owner's philosophy of customer service and methods of operation are will determine whether I leave the industry after 17 years."

Engineers

CATV's average engineer makes roughly $35,600 per year, is nearly 38 years old and is well entrenched in the industry, with more than 10 years under his belt, according to the survey. On average, he's been with his employer for more than six years and been in his position for several years. He typically supervises 14 others.



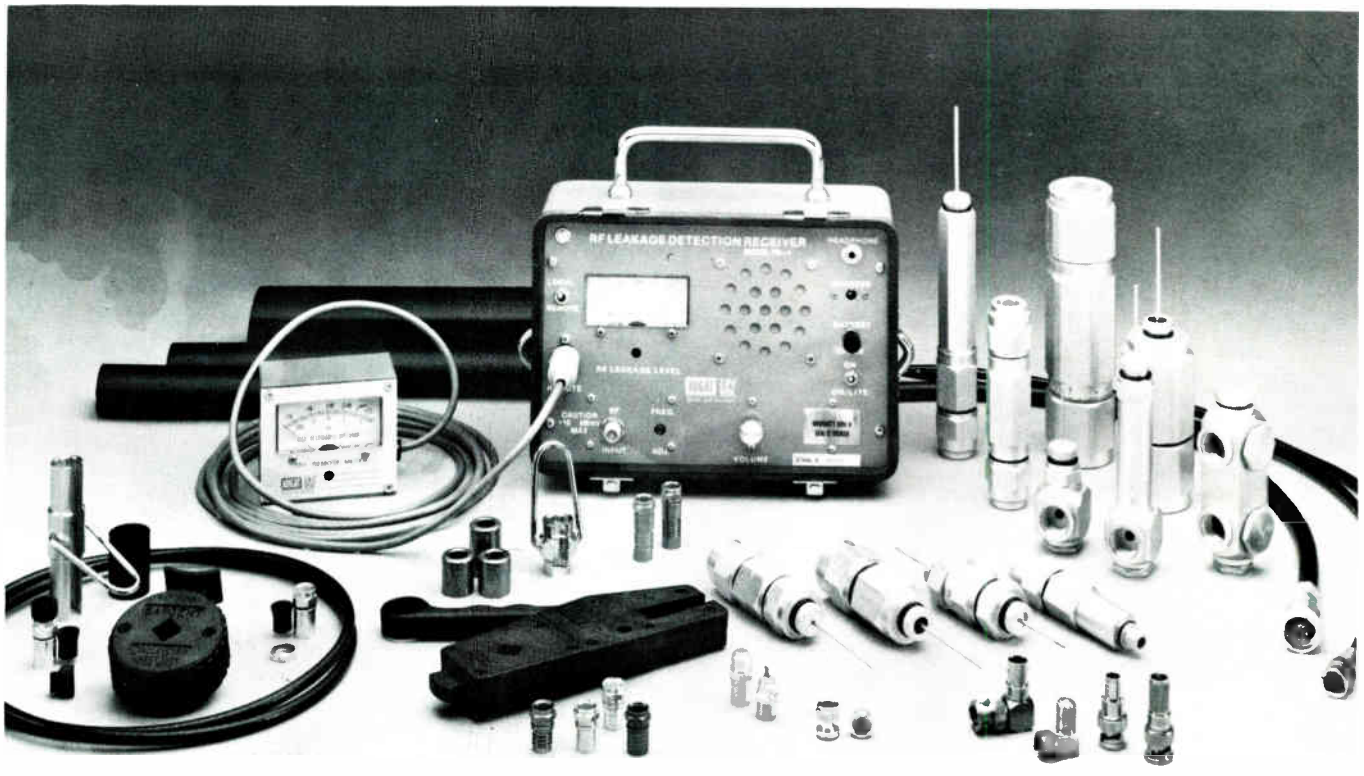
He, too receives a benefits package, but usually shares the cost of the premium with his employer. Surprisingly, nearly 40 percent of the engineers surveyed receive no dental coverage from their employer.

But, increasingly, engineers are becoming overstressed as they struggle to oversee the technical department, file accurate signal leakage compliance figures and stay within budget limitations on spending. Perhaps that is why nearly 22

Engineering Statistics

Question	Eng	
Avg salaries (1990)	$35,599	
high	$60,000	
low	$9,360	
Avg salaries (1989)	$33,938	
high	$61,500	
low	$6,000	
Avg Age (years)	37.72	
Time in position		
<1 year		12.77%
1 to 3 years		25.53%
4 to 6 years		14.89%
6 to 10 years		14.89%
over 10 years		31.91%
Time w/company		
< 6 months		4.26%
6 mnths to 1 year		4.26%
1 to 2 years		10.64%
2 to 4 years		8.51%
4 to 6 years		14.89%
Over 6 years		57.45%
Time in CATV		
< 1 year		0.00%
1 to 3 years		0.00%
4 to 6 years		0.00%
6 to 10 years		21.28%
Over 10 years		78.72%
Avg # supervised	14.07	
Benefits:		
Health Ins.		
100% paid/emplyr		38.30%
Co-op payment		55.32%
No insurance		6.38%
Dental		
100% paid/emplyr		17.02%
Co-op payment		44.68%
No insurance		38.30%
Education		
Employer helps		91.30%
Employer doesn't		8.70%
SCTE membership		
Employer helps		80.85%
Employer doesn't		19.15%
Avg. vacation days paid per year	15.02	
Plan to stay in CATV		78.26%
Don't plan to stay		21.74%

YOU CAN GET IT ALL



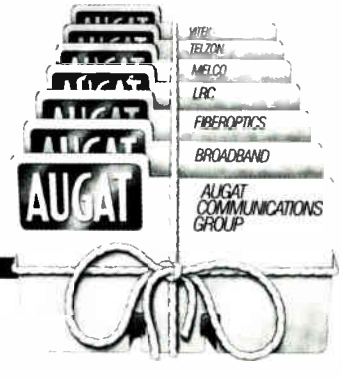
WITH LRC!

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 26

Technician Statistics

Question	Tech	
Avg salaries (1990)	$30,574	
high	$55,000	
low	$10,000	
Avg salaries (1989)	$29,196	
high	$53,000	
low	$10,000	
Avg Age (years)	38.1	
Time in position		
<1 year		14.29%
1 to 3 years		42.86%
4 to 6 years		17.86%
6 to 10 years		10.71%
over 10 years		14.29%
Time w/company		
< 6 months		3.45%
6 mnths to 1 year		3.45%
1 to 2 years		3.45%
2 to 4 years		10.34%
4 to 6 years		17.24%
Over 6 years		62.07%
Time in CATV		
< 1 year		0.00%
1 to 3 years		0.00%
4 to 6 years		6.90%
6 to 10 years		17.24%
Over 10 years		75.86%
Avg # supervised	8.83	
Benefits:		
Health Ins.		
100% paid/emplyr		28.57%
Co-op payment		67.86%
No insurance		3.57%
Dental		
100% paid/emplyr		17.86%
Co-op payment		32.14%
No insurance		50.00%
Education		
Employer helps		78.57%
Employer doesn't		21.43%
SCTE membership		
Employer helps		77.78%
Employer doesn't		22.22%
Avg. vacation days		
paid per year	14.4	
Plan to stay in CATV		88.89%
Don't plan to stay		11.11%

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

MIDWEST CATV

A division of Midwest Corporation

More than supplies. Solutions.

Ready to ship from any of our nationwide warehouses.

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

stern Region
304 624-5459
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

FAX RESPONSE 1-800-876-2299
ID Code 007

Reader Service Number 27

percent of those surveyed do not expect to remain in the industry three years hence.

One chief engineer from Wisconsin is close to the end of his rope. "We were always told to stick it out through the early, lean years. Well, I love my job but 9½ years is long enough. It is embarrassing when McDonald's pays the same wage to kids who empty the garbage cans. When will the powers that be realize you get what you pay for?"

The average technician makes just over $30,000 a year and supervises about nine persons.

Still another writes: "With the industry laden with leveraged buyout debt, the day-to-day attitude is rather morose. It's not fun anymore."

An engineer from Texas is ready to bail out because he's taken on additional, less desirable, responsibilities: "Our manpower situation is borderline at best. We cannot do everything I know *should* be done in maintaining a cable system.

Upper management seems to have forgotten what is involved in a day's work in the field. The quality of work has risen, the specs have become tighter and with VCRs and other equipment it takes longer to do service and installs than some people realize."

Benefits averages by region

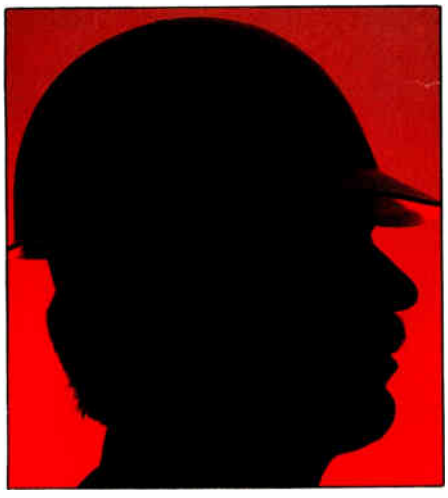
	NE	SE	MW	W
Health Ins.				
100% paid/emplyr	56.00%	39.29%	31.58%	26.67%
Co-op payment	40.00%	53.57%	65.79%	66.67%
No insurance	4.00%	7.14%	2.63%	6.67%
Dental				
100% paid/emplyr	32.00%	25.00%	13.16%	15.56%
Co-op payment	44.00%	25.00%	47.37%	48.89%
No insurance	24.00%	50.00%	39.47%	35.56%

Competition concerns engineers

And here's some food for thought: "There's not a big enough or aggressive enough organized effort to stay competitive with alternative delivery technologies," wrote a man from Ohio. "CableLabs is a good thing and I'm a bit surprised the industry isn't supporting it more actively."

Technicians

Of those techs who responded, the average person makes just over $30,000 a year, has lots of industry experience



under his belt (probably as an installer because a large percentage have been in their present positions for three years or less) and supervises about nine persons.

Two-thirds contribute to their own medical premiums while a whopping 50 percent receive no dental benefits from their employer. About 79 percent of the employers contribute to education, training and SCTE memberships, those numbers are less than for managers and engineers (which isn't surprising because the turnover at this level is much higher).

In general, techs expressed fewer overall concerns than their colleagues, but those who had fears categorized them as regulatory and salary related. "I put in 50 to 55 hours a week and only now am making $24,000. I love my job but I wish I made more money," wrote one respondee from Arkanasas.

Because they have so much contact with subscribers, technicians are becoming increasingly aware of the anger being created by rate increases. "I am very concerned with spiraling rates in the cable business," wrote a Georgia tech. "I feel my company in particular is inadvertantly asking for re-regulation because of our increase in monthly rates and installation charges which were implemented in recent years."

Overall, the two newest concerns voiced by industry personnel were related to industry "greed" (or increase in rates) and signal leakage. Engineers in particular have become sensitive to the difficulties related to CLI and reporting, logging and fixing leaks on an ongoing basis.

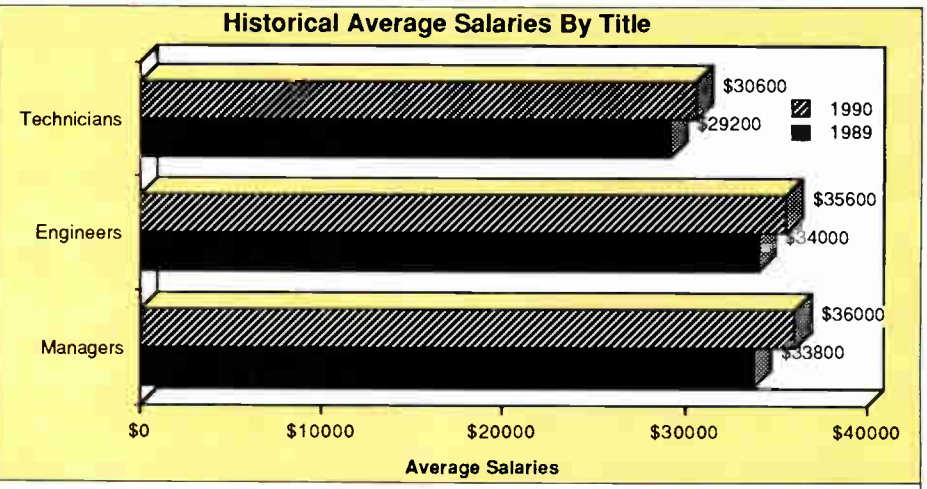
The problem with rates seems to compound the industry's poor public image, industry veterans say and it's time CATV fought back. "The CATV industry has not done a very good job of informing the public and regulators of the good things we have done," wrote one man. "Therefore, they do not have a good understanding of the issues behind the actions that have been taken and our detractors are able to make all of us look like 'bad guys.'

Public newspaper articles like those in the trade publications would help."

Regional differences

Looking at the information from a regional slant, it's obvious that tech personnel working in the West (primarily California) are compensated better than any other region. On average, those in the West receive more than $36,000 in salary, compared to a low of $29,000 in the Midwest. The Northeast and Southeast are in between, at $33,700 and $31,000, respectively.

> Regionally, technicians in the West are compensated better than those in the Midwest, Northeast and Southeast.



On the other hand, those who labor in the Northeast receive significantly better benefits, with 56 percent receiving fully paid medical benefits and 32 percent having dental coverage paid for. That contrasts sharply with Westerners, 27 percent of whom partake of fully paid medical coverage and 15 percent of whom have paid dental plans.

There was little regional difference regarding education, training or vacation time accrued. However, it seems those in the Northeast are leading the charge to leave the industry, with 20 percent of all respondents from that area saying they plan to leave.

On the whole, the survey doesn't show the deep, bitter divisions between technicians and upper management that was so apparent a year ago. Instead, most people seem to have a watchful eye on Washington as they sort out what re-regulation means to them.

We'll find out next year. ■

—Roger Brown

Now Getting More Doesn't Mean Paying More

You're looking for an addressable system that can generate revenue through fast, effective pay-per-view. A system with more features for your subscribers. A system that offers more security, more control, more options. And a system that won't cost more than your budget can afford.

Now you can have it all with Zenith's new PMII addressable system. Its exclusive PROCESS scrambling is the most advanced RF security available. The PC-Based controllers are designed for the demanding world of pay-per-view, offering fast response times and 24-hour operation.

PMII's built-in, two-way option is now based on Zenith's proven PSK contention system which offers real-time interaction including channel monitoring and system status reports. Zenith also offers exclusive Phonevision, the fastest ANI system available.

With all this at a price you can afford, why waste any more time.

NEW

ZENITH PMII

More Features, More Control

Volume Control	**Yes**
256 Program Tags	**Yes**
84 Channel Mapping	**Yes**
VCR Timer/Clock	**Yes**
Built-in Real-time IPPV Module	**Yes**
Next Generation RF Scrambling	**Yes**

Write: Zenith CATV Sales
1000 N. Milwaukee Ave.
Glenview, IL, 60025.
Or call 708-391-7702.

ZENITH | cable products

ADDRESSING YOUR FUTURE TODAY

Audio services: The music goes round and round

Joe Capobianco, Director of Programming, DCR, begins national rollout May 21, 1990.

They've been a long time coming when you consider that satellite-delivered cable pay audio services were first introduced more than five years ago. Many were proposed at that time but few even made it to market.

But what's "new" about those today is the promise of compact disc quality sound, digital transmission from studio to the home, huge audio channel capacity, likewise huge marketing commitments and impressively broad intra- and inter-industry support.

Jerrold's digital cable radio tuner

By now, one has launched and the others will soon follow. Jerrold's Digital Cable Radio (DCR) kicked off this past May in Willow Grove, Penn. and is rolling out elsewhere at press time. Digital Radio Labs' Digital Planet will be in three systems this summer on a trial basis and have commitments to be before over a million homes by year's end. And International Cablecasting Technologies's Digital Music Express (DMX) will be launching in October of this year.

Also, an analog music service up and running since 1982, Jones International's Tempo Sound (see accompanying article), has undergone significant changes. Jones' basic analog service, Galactic Radio, has been merged with Tempo to become Galactic/Tempo Sound and will be offered as a basic tier along with Digital Music Express as the pay tier.

C-SPAN's Audio I and Audio II services are available as well as a new FM service, Japan Cable Radio (JCR), which will be launched by press time and offer satellite-fed simulcasting of Japan's national public radio.

But, of couse, what's of greatest interest is that this is the year of launch for the three digital audio pay services, Digital Music Express, Digital Planet and Digital Cable Radio.

Digital Music Express

Digital Music Express, ICT's service, was originally called CD-18, reflecting the intention of offering 18 channels of CD-quality audio. It will now offer 30 channels as a package but claims to have the capacity for up to 240 channels.

Digital Planet will initially offer 26 channels. According to Doug Talley, chairman of DRL, "We will be starting out with 26 but by the end of the year we will be up to 91."

Jerrold's Digital Cable Radio's David Del Baccaro claims, "Immediately, we have 28 offered. We intend to offer 250." And he adds, "The capability is thousands."

Perhaps the most interesting new hardware and technology development has been that Scientific-Atlanta has taken on much of the transmission design as well as the design and manufacturing of Digital Music Express' in-home tuner. Molly Seagrave, ICT's marketing VP, says, "That move that (CEO) Bill Johnson and his team has made is an incredibly strong endorsement of our service." S-A will be selling, distributing and servicing the tuners.

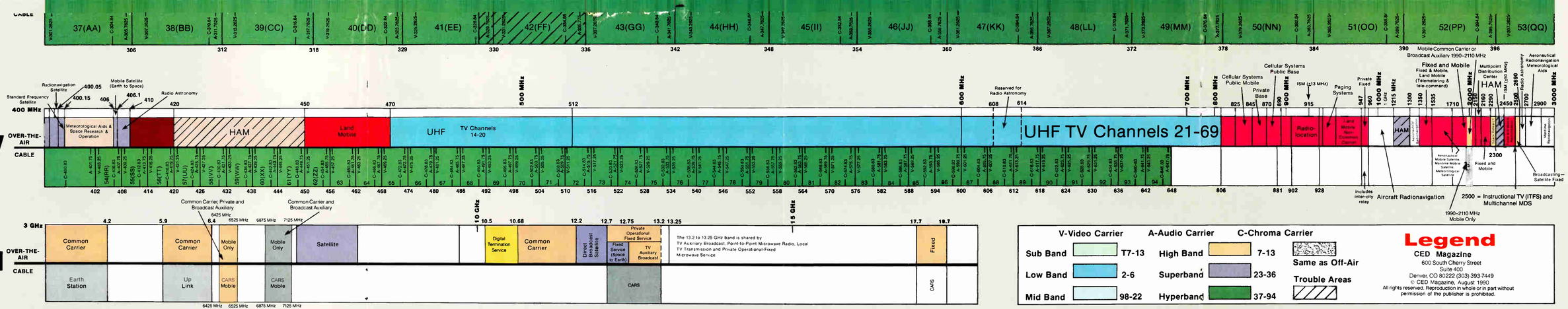
ICT will be sticking to its knitting. According to Tom Oliver, president of ICT, "We are programmers and marketeers, period. We have an alliance with what we feel is the highest quality manufacturer in the cable industry in S-A." Oliver believes a division of labor will allow each company to focus on what each does best and also points to the cable industry's endorsement of separating hardware and software. Oliver thinks that hardware and software both developed by the same company will result in corners being cut in one area or another. "Obviously, our two competitors think that by blending the two activities they can prove the economic viability of that business structure."

David Levitan of Scientific-Atlanta explains the equipment configurations: "At the headend there will be two options the cable operator can have. One will be a very simple, low-cost headend system priced at less than $7,500 to allow the operator to receive and transmit the 30 channels actually as they are delivered." In this configuration, the local operator will have no opportunity for tiering the service.

"There will also be a more flexible and capable headend product," Levitan adds, "with extended capabilities that will allow for complete mix-and-match. They will be able to choose from among any of the 30 satellite channels as well as any quantity of local origination channels and put them over the system with complete flexibility. That headend configuration, depending on the combination of equipment required, will be about $15,000."

Continued on page 67

By George Sell, Contributing Editor



CATV channel designations reflect the Cable Television Channel Identification Plan recommended by a joint committee of the Electronic Industries Association and the National Cable Television Association. Former standard designations appear in parentheses. It should be noted that some manufacturers using phaselock IRC channel spacing avoid using Channels 5 and 6 as designated on this chart. Instead, they set the frequencies so the video carriers are at 79.25 MHz and 85.25 MHz, respectively, and usually designate those channels with numbers other than 5 or 6. The joint EIA/NCTA Committee has not chosen to give these channel spacings any numerical designation.

Also note that CATV channel designated carrier frequencies in the bands 108 MHz to 137 MHz and 225 MHz to 400 MHz are subject to the frequency offset and notification requirements in Sections 76.610 through 76.617 of Part 76 of the Federal Communications Commission's Rules and Regulations. Positive offsets are displayed on this chart, but different offsets are employed where HRC systems are used or if the CATV operator elects to use negative offsets (see Section 76.612).

Realize The Promise Of The Future Without Sacrificing Your Investment Of The Past

Jerrold Communications has teamed with Cable Television's leading engineers to bring you the best of all worlds with the **SX Amplifier**. You can now expand and upgrade your system without sacrificing your SJ amplifier investment or missing out on the latest technology.

Jerrold's SX Amplifier fully supports over two decades of our SJ technology. At the same time, it is so advanced that our X Series and Cableoptics™ technology is supported as well.

MOVE FORWARD WHILE REACHING BACK

Future SX channel capacity to 750 MHz has been designed into the passive features. Currently, a full 550 MHz active design combines with improved noise figure and distortion performance to supply whatever services your customers need. Depending on your system requirements, you can choose among FeedForward, Power Doubling or Quadrapower® technologies. All SX test points are easily accessible, plus only three tools are needed for set-up, cutting SX installation time to a minimum. A superior heat dissipation capability translates into long-life and long-term SX reliability.

All of this underscores Jerrold's continuing commitment to cable television through the research and development of technology that supports the dependable Jerrold equipment that is in service today.

To find out how the new SX Amplifier can move your system forward, get in touch with your Jerrold Communications account representative or contact us at 2200 Byberry Road, Hatboro, PA 19040, 215/674-4800.

SX Housing with SJ Electronics

SX Modular Design Offers You:

- 750 MHz Design For Upgrades
- SJ Chassis Backward Compatibility
- X Electronics Compatibility
- Cableoptics™ Adaptability
- Simple Routine Maintenance
- Easy Test Point Access

SX Housing with New SX Electronics

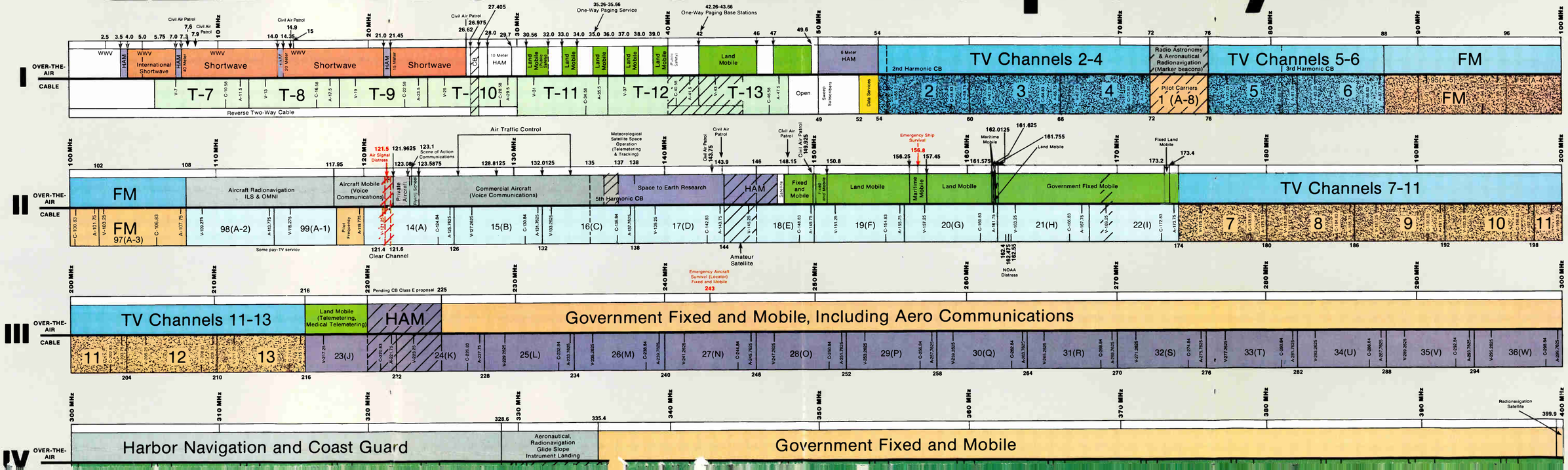
JERROLD COMMUNICATIONS

SX

GENERAL INSTRUMENT

Reader Service Number 32

CED 1990-91 CATV Frequency Chart



1990-91 CATV Frequency Allocation Chart

Updated by the FCC

A SPECIAL PULL-OUT SECTION

Continued from page 50

Scientific-Atlanta analyzed many different transmission modulation schemes before settling on QPR. It also decided to divide the 6 MHz channel into two 3-MHz sections. This will allow the operator to make use of impaired channels, adjacent trapped channels, or a fast roll-off, and also the guard band space that's available in some systems between 72 MHz and 76 MHz.

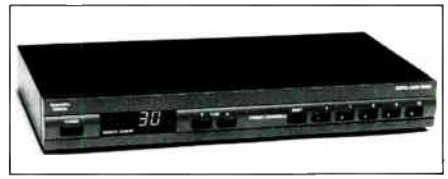
The headend equipment includes six five-station modulators to get 30 channels and, according to S-A, those six are cheaper than three would have been, and more flexible. The S-A tuner in the home outputs a 16 bit, 44.1 kHz digital audio signal which is a match to the same format as the consumer electronics industry CD standard.

Joe Stern of Stern Telecommunications has consulted on DMX's technology from the beginning, and comments, "The key here is what S-A has put together in its plan is a totally agile system. It operates with a reserve. That is, the five stations in 3 MHz or 10 in 6 MHz, still gives us a safety factor. We were concerned about not wanting to push everything to the limit. It has the flexibility of operating 10 dB to 12 dB or so below the visual carrier. The chip is the same chip regardless if we are using QPR, PSK or PAM approaches, so it's flexible for a variety of uses."

The splitting of a 6 MHz video channel into two 3 MHz components allows for the use of unused spectrum on a cable system. Says Oliver, "One of the great things about that is, you are going to be able to slam five of our channels in between 72 MHz to 76 MHz and with much more integrity be able to carry this at band edge (at the roll-off after the last video channel)."

Although there's been doubt expressed about the ease and facility of carrying signals at band edge, Oliver claims they haven't had any problems to date with cable operators finding band carriage space.

Stern says: "The biggest problem with talking about band edge is that nobody knows what it is. When you have a 450 MHz system, the newest trunk may roll off at 460 MHz or 470 MHz, but distribution leg number seven may roll off at 451 MHz and leg number six may roll off at 400 MHz. So you have no way of knowing what's going to happen. However, S-A came up with an improvement because having a 3MHz package available means that



S-A's digital audio tuner

you can make a quick test and see if you get it. As a matter of fact the receiver/tuner in the home has been channel mapped so if you move a channel to someplace else, if it doesn't work to well there, fine. The consumer doesn't know anything about it."

The S-A tuner will be offered in several models. The top-of-the-line model (not available at launch) will feature a handheld remote that may have an LED display to show information about the music (remember, these services promise no commercials or DJ interruptions).

The S-A tuner will be available from the cable operator for a one time suggested charge of $89.95. But ICT and S-A are also putting together a cooperative merchandizing system between cable operators, local consumer electronics retailers and S-A as the distributor.

While this may seem an expensive

way to go and a risky distribution method new to the cable industry, Oliver points out, "Our distribution agreements are enormous. We have over 14 million basic subscribers under contract from cable operators. And in our roll-out program, we have almost 5 million subscribers that operators are contractually committed to introducing the service to."

Digital Planet

Digital Radio Laboratory's Digital Planet has not changed its technology from what has been described in the trade press previously. According to DRL's Talley, DRL uses quadrature

Digital Radio's tuner

AM to multiplex a large number of signals into a single carrier. Adaptive equalization is used to make the signal work in the roll-off and the total bandwidth requirement is 4MHz for each of the carriers.

DRL's tuner will be manufactured by a major Japanese company. While it will be addressable, the addressing function is controlled nationally by Digital Planet. According to Talley, "It has the capability to turn on or off any of the 91 channels individually. You have to do that to satisfy the pay services (and pay-per-listen)."

All channels will be offered without tiering but because one or more pay services may not be offered in a given system, the simulcast audio function must be addressed on a system by system basis as well as pay-per-listen.

Digital Planet will provide the headend equipment free to the cable operator, but the tuner will be offered for purchase for about $80 or for lease, at about $2.50 per month.

Digital Cable Radio

Jerrold's Digital Cable Radio now has a full-range tuner available. The headend equipment processes the Dolby Adaptive Delta Modulation satellite transmission into discrete channels which can be individually addressed, and the tuner has a range up to 600 MHz. The channels can be placed anywhere.

"That's why it's an unlimited system," says Del Baccaro, "because if you put nothing but audio on the system you could handle up to 4,000

voice-quality channels. You wouldn't do that, but it's really not system limited." The tuner's price will average around $80.

But it should not escape the cable operator's attention that the DCR system has each audio channel as discrete and addressable signals as opposed to DMX's five channels in 3 MHz or 10 channels in 6 MHz groupings and Digital Planet's packaging of all channels into one national signal. Cable operator flexibility in DCR's configuration is achieved through headend processing and headend addressing.

If the cable operator sees an advantage to controlling the subscriber, complete control of the tiering of offerings, and control of the authorization and billing process, DCR's system will provide that for a price higher than competitor's headend costs.

DMX's headend equipment will average around $7,500 for a non-

CABLE PAY AUDIO SERVICES AND THEIR FEATURES

Features	Digital Cable Radio	Digital Music Express	Digital Planet
Launch date	5/90	10/90	7/90
Channels to be offered	250	240	91
Channels at launch	28	30	26
Tiering	Yes	Yes	No
Video simulcasting	Yes	Yes	Yes
Radio superstations	Poss.	Poss.	Yes
Record label preview channels	Poss.	Poss.	Yes
Pay-per-listen	Yes	Yes	Yes
Pay-per-concert	Yes	Yes	No
CD quality	Subjective equivalent	16 bit 44.1kHz	Subjective equivalent
Transmission method	ADM	QPR	QAM
Tuner channel mapping	Yes	Yes	No
Headend cost ranges	Average $18,000	$7,500 to $15,000	Free to op
Tuner costs	$80	$80 to $100	$80
Per sub fee per month	$6.95 for 8 up to $11.95 for 28	$6.95 to $8.95 for 30	$8
Licensing fee per month	1/3 revenue	$2.50 per sub	$3 per sub
Cooperative marketing	Yes	Yes	Yes
Break even threshold	500,000 subs	300,000 subs	250,000 subs

*All above information supplied by services listed.

processing system and $15,000 for one that processes; Digital Planet's headend costs about $2,000 but is given to the operator free; and DCR's full processing headend averages $18,000 and can cost as high as $21,000.

"Our system has an addressable controller in it and that's why the headend costs so much, for one," Del Baccaro says. "It's a bit unfair to compare their (Digital Planet's) headend price of zero vs. our headend with an average price of $18,000 because they do very different things.

"Secondly, our headend, by demultiplexing the signal and putting them on individual carriers, allows you total flexibility on added local origination programs and doing local ad insertion on things like MTV."

Originally, ICT's system was not addressable, either. "ICT has gotten S-A to design it so that it can be addressable," Del Baccaro points out. "Instead of them only having a $2,000 headend, they're now saying between $7,500 and $15,000 because now they've got an addressable controller in it. What they don't have in it is something that totally demultiplexes the signal into individual carriers which would give you the ultimate flexibility that I'm talking about."

Without full processing of each individual channel, operators don't have the flexibility to do such things as stripping out certain channels or adding local ads over a national one.

> What you really ought to ask is, for a 50 channel system, how much am I going to spend on equipment?

"What our system does is set up your cable system, technically, to be able to be run the same way that your video system is run," says Del Baccaro."

In terms of operational and functional flexibility, DCR offers the operator much choice. Del Baccaro suggests, "What you really ought to do is ask, 'For a 50 channel system of tomorrow, how much am I really going to spend on reception, modulation, insertion and origination equipment under each of the systems?' And then you will find that our system isn't the most expensive. It's going to be the cheapest."

Choice

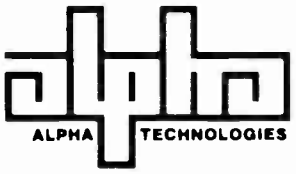
Be that as it may, there are clear choices for the cable operator among the audio services available this year. Digital Cable Radio is betting that the cable operator will want a highly sophisticated system in terms of total operational control flexibility and, therefore, they have built that control into the headend equipment and not the box, and put the cost of the technology in the headend.

Digital Music Express is offering the cable operator CD standard audio out of a sophisticated tuner with somewhat less control over configuring the offering locally. And Digital Planet is providing a straightforward roster of channels formatted at the uplink that an operator can offer subscribers with less operator involvement and inexpensively as well.

Whatever the choice the cable operator makes, the subscriber will have abundant choice and high quality in the new cable pay audio services. And that's what cable has always been about. ■

Congratulations Mr. President

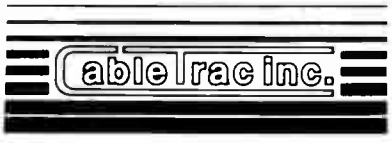
Much continued success to Wendell Woody and the SCTE



ARVIS™

BELDEN

C-COR®
ELECTRONICS INC



Channel Master®
MICRO-BEAM®

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

DROP SHOP
LTD. Inc

Scientific Atlanta

U.S. CABLE, INC.
Communications Contractors

WAVETEK

How Jones' Galactic/Tempo Sound Works

Galactic/Tempo Sound is a 24 hour-a-day, seven-day-a-week audio service currently delivering six music formats (with a maximum of four minutes of commercials per hour) and three other non-music services.

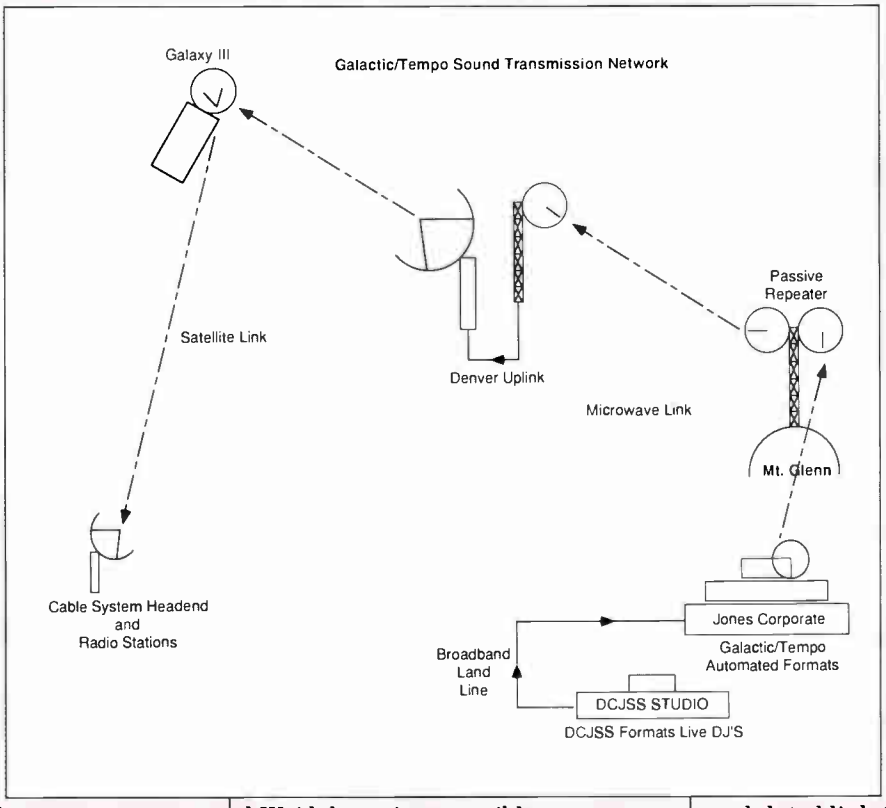
The six formats are:

- Great American Country
- Classical Collections
- Light & Lively Rock
- Soft Sounds
- New Age of Jazz
- Classic Hits

The three other services are:

- "In Touch," a reading service mainly for the blind.
- Business Radio Network from Colorado Springs.
- A third service to be announced shortly.

The Great American Country, Light & Lively, and the Classic Hits programs are hosted by live DJs. Chuck Leary, shown in the below right photograph, is the 2 p.m. to 6 p.m. (EST) "Great American Country" DJ and one of 30 who take shifts in manning these three formats around the clock. Leary is a veteran DJ with 19 years experience gained in six different stations in California and Colorado.



The network

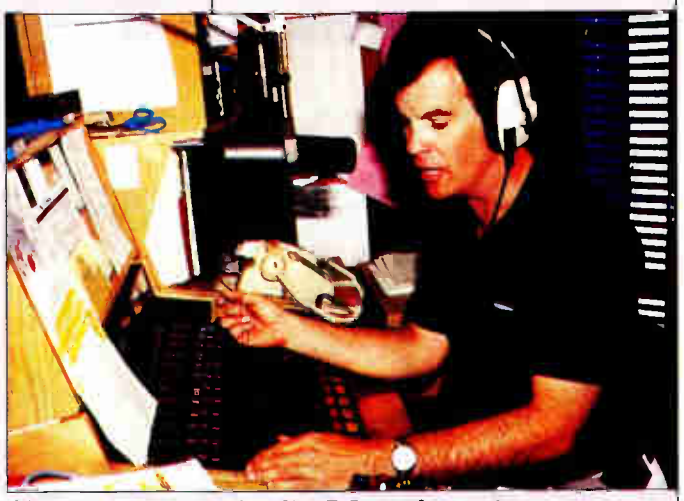
The studios are housed in a building just half a mile from the Jones Intercable corporate offices and are tied in with broadband landlines tested flat to 18 kHz. The physical lines are of course noise-free and distortionless. The three studios are supported by a 5 kW Alpha uninterruptible power supply (UPS) which will sustain the operation for up to two hours, and a silent generator is scheduled to be installed just outside the building to extend the power support for indefinite periods.

The remaining three channels are fully automated, which has the capability of programming as many as six channels on a 24-hour basis. This eye-appealing installation is located behind glass in the Jones Denver corporate building.

The Studer reel-to-reel tape decks shown are meticulously maintained flat and distortion-free from 20 Hz to 20 kHz and have a specified, weighted signal-to-noise ratio of 66 dB. These high standards are preserved by strict adherence to written daily, weekly, monthly and annual preventive maintenance procedures. This operation floats on a 35 kVA uninterruptible power supply which, in the event of a city power failure, bridges the gap until the 1,000 kVA generator comes up and takes the entire building load including the elevators. At this location, the three stereo channels from the automation equipment, the three live stereos and the three "other services" are combined with MEU[1] video and audio and routed to the transportation system. The latter consists of a high power, frequency modulated link (FML) microwave located on top of the Jones four-story building which beams the signals to the Denver Uplink/Communiport—nestled in a valley in the Rocky Mountain foothills.

Redundant equipment

In order to "turn the corner," the



Chuck Leary is one of 30 live DJs on the service.

By Roy Ehman, director of engineering, Jones Intercable

microwaves are passed through a passive repeater. This consists of two 10-foot microwave dishes connected back-to-back. One faces the Jones building to receive signals while the other faces the Teleport to retransmit the signal without amplification or processing. Everything in this operation has "belt and braces" and the microwave is no exception. There is a completely redundant "hot standby" with automatic changeover should the first microwave system falter.

From the TVRO port, all these signals are beamed up to the Galaxy III satellite (G3), transponder 11, amplified and beamed back to cover all of the United States with "spot beams" to Hawaii and Alaska.

All Jones Intercable and Spacelink systems throughout the U.S. and Hawaii receive Galactic/Tempo Sound on the same TVRO dish they use to pick up HBO and other popular satellite programs. These systems insert some or all of the nine high-quality audio programs on an individually processed basis into the FM band and deliver them free to all Jones subscribers.

Jones subscribers also receive a free "hook-up kit" which allows them to set up their systems without the use of tools. This kit splits off the FM portion of the spectrum from the cable and routes it to the subscribers' stereos or other consumer equipment.

Audio's promise

These programs are also available to other cable operators at a nominal per-subscriber cost as well as by contract to radio stations. Among those cable MSOs already using this opportunity are such well-known operators as Tele-Communications Inc., Cablevision Industries and Cablevision Systems.

Automation equipment set up.

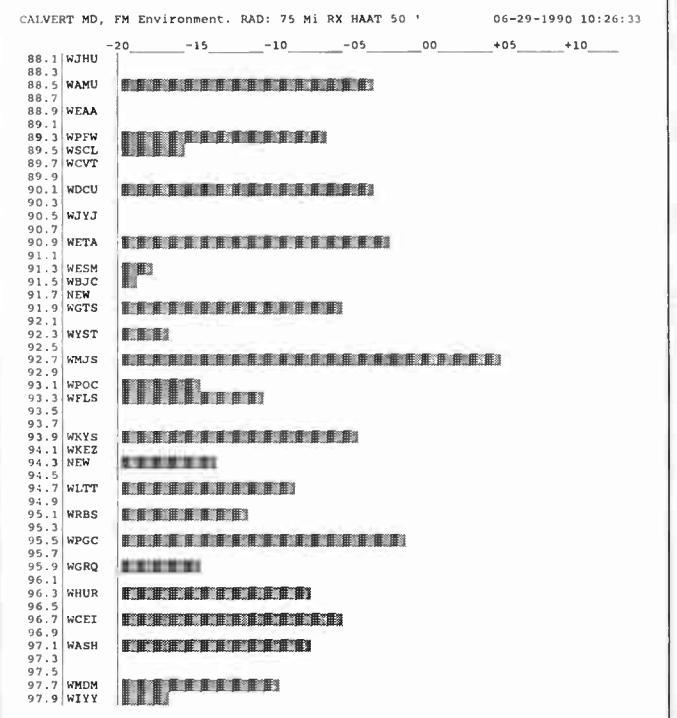


Figure 1

In a recent interview, Glenn Jones stated that "Galactic/Tempo Sound was created to help drive the fulfillment of cable's promising future. Billions of dollars of cable distribution plant was waiting for more efficient use and the audio availability was not being optimized. A market for audio existed. Included free with basic cable service, it is an outstanding marketing tool.

Galactic/Tempo assists users and systems who are implementing the service for the first time by supplying a printout from the FM-Manager program from Eecomp. Apart from printing a list of all FM stations and/or repeaters within the specified radius, usually 70 miles, a graphic is delivered which shows the FM environment in terms of the strongest signal (if any) for each of the 100 available slots in the FM band. By using this method, it has been found that even in congested areas, Galactic/Tempo Sound can still be slotted into the existing band. In fact, in many cases the graphic is so revealing that improvements can often be made to existing channel assignments. Figure 1 shows a portion of a typcial FM environment grpahic and the portion of the full printout that it illustrates.

As of July 1, 5 million cable subscribers were already being served by Galactic/Tempo Sound, with commitments received for 5 million more within the next few months. Also, 105 FM stations and three AM stations around the country are actually on air with the format of their choice and an additional 45 have signed up to come on by year's end.

This high-quality audio service, combined with local commercials, has the power to augment a cable operator's local programming. In fact, it can sound so local, it actually fools people. Recently around midday, one of the DJs in Denver was making chit-chat and happened to mention that he had not had his lunch yet. This was heard by a dear lady on the East Coast where it was two o'clock in the afternoon—so she immediately sent up a box lunch to the local station announcer! ■

Reference: I. MEU stands for Mind Extension University, which is a 24-hour-a-day, 7-day-a-week satellite delivered educational channel affiliated with 15 noteworthy universities. MEU offers college level courses for credit toward AA and MBA degrees as well as self-enrichment and secondary education.

MultiPort gets another chance

Zenith expected to add plug to VCR line

To MultiPort proponents, it has to feel like building the great pyramids of Egypt.

MultiPort, long touted as a way to make descramblers "customer friendly," remains deadlocked as cable operators, decoder vendors, and television and VCR manufacturers each wait for somebody else to move first with the technology. But proponents hope that a forthcoming announcement of MultiPort connectors on a major VCR line will spark MultiPort's ember-like burn into a major blaze.

MultiPort is a multiple purpose connector designed to interface CATV decoders to consumer devices—mainly TVs and VCRs. With competitive challenges such as those posed by direct broadcast satellite and telcos looming, the underlying objective of MultiPort technology is both timely and strategic: to make cable systems more consumer electronics friendly.

MultiPort achieves this objective by removing the conventional channel tuner from set-top descramblers. Roughly the size of a cigarette pack, MultiPort plugs onto the back of the television set or VCR, allowing the consumer to use the remote control purchased with the TV to access all available cable channels—including pay services.

MultiPort is not a new concept; indeed, it has been in development for close to nine years. In fact, MultiPort's success to date is largely the result of a dedicated group of individuals who remain committed to the technology despite years of setbacks and frustrations (for a chronology of MultiPort development, see sidebar). The primary driving force has been a joint Electronic Industries Association (EIA) and National Cable Television Association (NCTA) engineering committee established in 1982.

"We realized that we essentially have the same customer: the cable subscriber and the TV/VCR purchaser are really the same person," says Walter Ciciora, vice president of new technologies at American Television and Communications. "So if cable television operators and television/VCR manufacturers can work together to address consumer interface issues, we can make the consumer happier. The end result is reduced complaints and stimulated business for both groups."

MultiPort advantages

Operators using MultiPort cite it as a reliable, flexible and cost effective method of increasing subscriber satisfaction. "We've had no real problems in implementing it, other than finding the TV set to put it on," says Charlie Kennemar, VP of addressable technology, Telecable Inc. "I've actually gotten several calls from people who want a MultiPort decoder and ask where they can find a compatible television set. Unfortunately, my answer is usually, 'I don't know.' " Telecable cur-

EIA/ANSI - 563
Connector Pin-Out

Audio Select Function	:1		
		2:	Audio Input (left)
AGC Time Constant	:3		
		4:	Audio Ground
2nd Audio Prog. Select	:5		
		6:	Audio Input (right)
B-Y	:7		
		8:	Audio Output
Video Format	:9		
		10:	Peripheral Communications
Luminance (Y) Input	:11		
		12:	Reserved
FB/Chroma Ground	:13		
		14:	Channel CHG. & Power Indicate
R-Y	:15		
		16:	Fast Blanking/Chroma Input
Video Ground	:17		
		18:	Decoder Present & DRS
Receiver Video	:19		
		20:	Peripheral Video
Shield	:--		

MultiPort connector pin-out

AUGAT & Channell
THE CONNECTION FOR THE 90'S

Augat's Snap-N-Seal™ Connectors...

A "snappy" solution for CLI and the environment!

Complete and mail the attached card

I'm interested. Please send me literature and a FREE coffee mug.

☐ ***I have an application for Snap-N-Seal Connectors***
☐ Immediate ☐ Six months ☐ One year
☐ Estimated number of subscriber drops: _____

Products currently used:

F Connectors:
☐ Augat ☐ Gilbert ☐ PPC ☐ Raychem EZF®
☐ Pyramid ☐ Other: _____

Coax Connectors:
☐ Augat ☐ Gilbert ☐ PPC ☐ Pyramid
☐ Other: _____

Drop Wire:
☐ Comm/Scope ☐ Times ☐ Beldon
☐ Other: _____

Coax Cable:
☐ Comm/Scope ☐ Times ☐ Trilogy
☐ Other: _____

Name _____
Title _____
Company _____
Address _____
City _____
State _____ ZIP _____
Telephone: ( ) _____ Ext. _____

Augat's Snap-N-Seal™ Connectors...

A "snappy" solution for CLI and the environment!

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

Due to their environmental seal design, Snap-N-Seal connectors prevent moisture migration on subscriber drops and virtually eliminate RF leakage. The craft-friendly design of the Snap-N-Seal connector allows for "fool proof" installation. No more crimping and no need for sealing sleeves or boots.

Marketed by Channell's direct sales organizations throughout the U.S. and Canada, Snap-N-Seal connectors are easy to obtain and an excellent choice for aerial and underground applications.

Look for the one-step Push-N-Lock™ Connector this Fall...A "snappy" solution for indoor applications!

AUGAT & Channell
THE CONNECTION FOR THE 90'S

26040 Ynez Road
P.O. Box 688
Temecula, CA 92390
800/423-1863
800/345-3624
714/694-9160 · FAX: 714/694-9170

AUGAT & Channell
THE CONNECTION FOR THE 90'S

Augat's Snap-N-Seal™ Connectors...

A revolutionary new "F" connector that reduces maintenance costs and increases service life.

- 360° compression of the cable jacket ensures a complete radial seal, virtually eliminating RF leakage
- Triple sealed for maximum environmental protection
- Nut seal prevents loosening of "F" connector and eliminates moisture migration through passive "F" port threads
- Longer, dependable service life with reduced maintenance
- Standard ¼"x ¼" prep. Optional tools for cable preparation and connector installation
- Stamp coded and color coded for identification
- Manufactured with UV-resistant plastic

AUGAT & Channell
THE CONNECTION FOR THE 90'S

26040 Ynez Road
P.O. Box 688
Temecula, CA 92390
800/423-1863
800/345-3624
714/694-9160 · FAX: 714/694-9170

Augat's Snap-N-Seal™ Connectors...

A "snappy" solution for CLI and the environment!

I'm interested.
Please send me literature
and a FREE coffee mug.

Channell COMMERCIAL CORPORATION
26040 Ynez Road
P.O. Box 688
Temecula, CA 92390

Affix Stamp Here

rently serves "more than 50 but less than 100" subscribers who have sets equipped with MultiPort. Viacom, ATC, and Cencom also service MultiPort-equipped subscribers.

Operators extol MultiPort reliability, explaining the advantages of a small, out-of-sight decoder. "Once decoder volumes get large—large meaning a few hundred thousand a year—the parts count in a MultiPort decoder becomes significantly less than in a set-top unit," Ciciora comments. "Reliability increases for two principle reasons: one, there are fewer elements in there to break, and two, the box runs cooler."

Still, MultiPort has never enjoyed widespread industry support, and many—perhaps most—operators remain skeptical about it.

So—if MultiPort technology offers such flexibility, economy, and reliability, why isn't it being used in more addressable CATV systems? "MultiPort technology is a technical success, but not a marketplace success," says Tom Jokerst, VP of engineering for Continental Cablevision.

"Essentially, we're asking for cooperation from two groups of people: TV/VCR manufacturers and decoder manufacturers. Both view the situation as cable's problem—which it is."

Who goes first?

The road has been anything but smooth for MultiPort development, which has been a classic example of "chicken and egg" frustration: nobody wants to go first. Decoder manufacturers are reluctant to produce a unit without an installed base with which to interface. Likewise, TV and VCR manufacturers are disinclined to add expense to an already margin sensitive market without proof of an assured revenue stream.

To TV and VCR manufacturers, the potential market is seen as economically bleak. According to the EIA, TV manufacturers enjoy a 98 percent market penetration, based on 91.8 million U.S. households. A.C. Nielson's latest reports reveal that of the 91.8 million households, 58.6 percent, or 53.9 million, are cabled. Subtract, then, the number of non-addressable homes, estimated at 75 percent. This leaves an estimated market of 11.6 million addressable homes, only some of which could be prime for MultiPort.

Despite the less than electrifying numbers, however, one manufacturer (RCA) took an aggressive stand by including the connectors on several models in its 1987, 1988 and 1989 model years. Several other manufacturers, including Zenith, Quasar and Panasonic, followed suit. However, actual decoders didn't become available until early 1989. By the time Jerrold and Zenith introduced MultiPort version decoders, many frustrated TV manufacturers had plans to remove the connector from future sets.

At a Consumer Electronics Symposium hosted by CableLabs earlier this year, RCA announced that it will discontinue including the MultiPort plug and wiring harness in all new models. However, the internal circuits will remain in selected lines, to enable retrofitting as necessary.

Still, MultiPort is seen by officials at CableLabs as one of several technologies—including traps, addressable trap systems, and interdiction—that offer customer friendly addressable control. With channel tiering looming on the horizon, operators are realizing that they need addressability to aptly handle subscriber's service demands. MultiPort allows operators to scramble every channel, yet keep the process transparant to the subscriber. For cable, this is a significant advantage, because subscribers are more likely to purchase pay-per-view and premium services if they aren't slaved to a set-top converter. "Some people are sacrificing their premium channels for versatility. They'd much rather give up premium channels than have a box on the top of their set," says Joe Wilhit, president, Gene Love TV, St. Louis.

Additionally, if MultiPort connectors make their way into VCR design, yet another consumer interface issue is licked—that of viewing one pay service while recording a second premium without being tied to two set-top converters. However, currently only one high-end manufacturer of VCRs, Bang and Olufsen, offers the connector on some of its VCR products.

Many MultiPort proponents view VCRs as the one bright star remaining in the technological firmament, for two primary reasons. One, because of the high density of mechanical elements within the VCR, there is a higher replacement rate than television sets. Secondly, in the interest of both viewing and taping two different pay services, subscribers prefer the ability to record over merely viewing. "It's almost better to have the MultiPort connector on the VCR than on the TV. If the VCR can decode the premium channel for the TV, the VCR's tuner can be used and can also be recorded,"

Wilhit explains. "If a limitation existed where subscribers could record a premium channel and not watch another, that would be better than being able to watch it and not record."

When produced in quantities, MultiPort has the potential to offer operators a healthy price incentive. The final (non-prototype) version would differ from the normal set-top converter in its exclusion of cabinet, power supply and cable. The module could sell for about $30 or $40—that's almost throw away technology," says Joe Van Loan, senior VP of engineering, Cablevision Industries.

Ciciora echoes Van Loan's opinion. "The one thing I am continually trying to convince vendors of is that once the decoders are produced to scale, many customers will want two of them—one to put in the VCR, and one to put in the TV set. So if the MultiPort box is half the price of the set-top unit, the cable operator is much more willing to provide it."

According to Vit Brugliera, Zenith's VP of marketing and product planning, cable products division, its MultiPort decoder costs "under $70." Between 1,000 and 2,000 Zenith decoders are operating to date. Jerrold, another MultiPort decoder provider, quotes a price of $140 per unit and has sold approximately 500 units to date, according to Dan Moloney, director of product management, subscriber systems division. Neither Zenith nor Jerrold's price reflects volume production. Scientific-Atlanta officials were not available for comment on its line of MultiPort decoders, which were scheduled for release in June 1990.

What will drive it to fruition?

Despite some drawbacks, operators remain optimistic about MultiPort's future. "I am committed to the concept," says Kennemar, "I think, more than anything else, we need to see some large size MSOs embracing the concept."

Using MultiPort for alternative applications may also be an impetus to drive the technology. By including functions that are not entirely related to CATV addressable technology, the MultiPort marketplace immediately widens. Included in discussions for alternative uses are concepts such as simplifying stereo VCR connections, accommodating of both telecaptioning decoders and television video games, accommodating high definition television tuning formats, and addressing Consumer Electronics Bus developments.

"If we can keep this thing going, our next step is to design a bus structure to hang off the MultiPort plug, so that you could have three or four things plugged in at the same time," says Claude Baggett, director of systems engineering, CableLabs. "The plugs would have pins on one end and a socket on the other, and you could just plug them all in together—like Christmas tree lights. You could have a MultiPort decoder, a game interface, a closed captioning decoder—all of these things, hanging off one MultiPort plug."

A typical stereo VCR uses several cables between the unit and the TV set—which consumers view as unsightly and confusing to hook up. Theoretically, the MultiPort box could be utilized to serve the stereo VCR hookup over one cable.

A second market potential lies in assisting customers needing telecaptioning devices. The information is sent in the vertical blanking interval, where the decoders pick it off and, through a character generator, insert text in the bottom of the picture to track along with the video. Current closed captioning decoders are fairly large and expen-

sive. Interestingly, the National Captioning Institute has recently asked Congress to mandate placement of a closed captioning integrated circuit into every television set manufactured. "Rather than put an expensive chip into millions of television sets per year, why not include it in an aftermarket device and plug it into the MultiPort bus?" asks Baggett.

Baggett is quick to point out that the MultiPort plug (same physical plug with a different pinout) is already a reality in Japan and Europe. "It's really frustrating to us, because over here we're begging for it." In Japan, Nintendo manufactures a special Japanese version—special because it plugs directly into a baseband port with a MultiPort plug. "Going directly into baseband like that produces graphics that are just outstanding," Baggett continues.

Alternative applications such as these could well provide the stimulus needed to convince television and VCR manufacturers to incorporate MultiPort into consumer devices. Widespread industry conjecture, in fact, looks forward to an announcement by Zenith to include the plug on forthcoming VCRs. "Even if used to market pairs of Zenith products—televisions and VCRs connected with one plug—that will still have a widespread, positive affect on CATV consumer interface issues," muses Baggett.

However, some industry leaders feel pure competitive advantage is enough to spur MultiPort support from fellow CATV operators. "In the case of DBS and telcos, they both deliver a signal to the home in a method that is foreign to the television set," observes Ciciora. "The TV set and VCR is looking for a vestigal sideband amplitude modulated (VSB/AM) signal, which is what RF CATV systems provide. DBS, on the other hand, provides an FM signal, and the telcos have been talking about providing a digital signal. In either case, they would need some kind of box in the home. So cable has a tremendous strategic advantage in that it can offer the service without the need for boxes, if it will do the consumer electronics friendly thing. That means MultiPort."

It also means that MultiPort supporters will have to continue to work on combining the right mix of consumer, manufacturer, and CATV operator knowledge to drive the technology into widespread use. The feeling is, if concentrated on long enough, MultiPort is bound to happen. And if it doesn't, it certainly wasn't due to a lack of effort. ■

—Leslie Miller

MultiPort Chronology

1983: The Electronics Industry Association (EIA) and National Cable Television Association (NCTA) officially ally to address issues of common interest and facilitate the interface of consumer products to cable. MultiPort technology.

1985: Field tests conducted in conjunction with American Television and Communications and Mile Hi Cablevision, Denver, Colo. In the tests, television manufacturers and decoder manufacturers convene to measure and fine tune the MultiPort interface.

1986: MultiPort technology exhibited at the International Conference on Consumer Electronics (ICCE), sponsored and staffed by members of the EIA/NCTA joint engineering committee. MultiPort booth exhibits continue at CATV's Western Show in 1986, and at the National Shows in 1987, 1988 and 1989.

1986: First draft of the MultiPort standard submitted to the American National Standards Institute. The interim standard is designated as "IS-15."

1987: Interim MultiPort standard IS-15 incorporated into the production of television sets manufactured by RCA, Panasonic, Quasar, General Electric, J.C. Penney and Curtis-Mathes.

1988: Cable Television Laboratories (CableLabs) forms a Consumer Interface subcommittee, currently chaired by Tom Jokerst, Regional Engineering Director, Continental Cablevision.

1989: Modified MultiPort standard IS-15A submitted to ANSI. Changes include pay-per-view capabilities. IS-15A becomes the new label for the interim standard.

1989: Decoder manufacturers (Zenith, Jerrold) begin shipments of MultiPort decoders.

1990: Interim standard IS-15A gains final EIA-ANSI approval which deems the permanent tag "EIA-563." Also, CableLabs officials tour major Japanese manufacturers NHK, Sony, Matsushita (Panasonic), and Toshiba to discuss consumer interface issues.

Optimizing 'obstacle gain' using constructive interference

In the '50s and '60s the tremendous proliferation of TV receiving antennas constituted an inadvertant experiment in long-distance TV reception, with the discovery by the public of so-called "freak reception." Where "line-of-sight" plus a few miles, had been considered the reception limit, people were reporting useful signals at hundreds, and occasionally even at thousands, of miles.

The explanations were varied: Sporatic-E; meteor trails; tropospheric inversion; knife-edge diffraction; etc. In the following discussion we will be concerned with only those phenomena which have been developed into reliable long distance communication systems and, particularly, with those so-called "freaks" that are described as "hot spots." These are characterized by exceptionally strong and dependable signals, usually found in a space so small that a single yagi antenna out-performs any stacked array.

Beyond the horizon systems

Brute force. This is the conventional approach, exemplified by TV broadcasting, developed for reaching the general population at the least cost. It consists of using high effective radiated power (ERP), transmitted from atop high towers, to (in ultra-fringe locations) high-gain receiving antennas, also located atop towers or hills.

At some short distances "beyond-the-horizon" this approach becomes unworkable, in that the wave-energy available near the ground, having been reflected repeatedly and randomly, has become chaotic and largely offsets the usually well behaved "sky-wave" energy entering these regions. This region is known as the "shadow zone" (see Figures 1 and 2).

Scatter propagation. This system utilizes highly directive antennas, on both ends of the path, directed at a "common volume" in the atmosphere located mid-path and many miles above the earth's surface (see Figure 3).

Antenna directivity largely eliminates the disorganized ground-wave

By James Wright, Technical Services Consultant, J.B. Wright & Co.

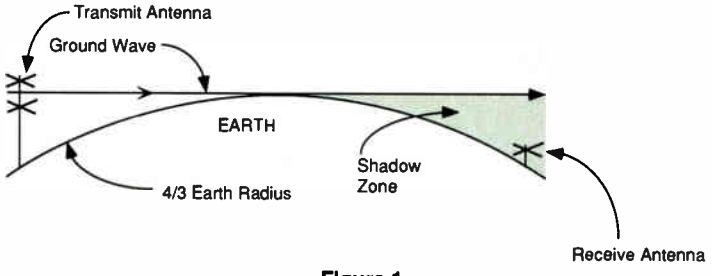


Figure 1

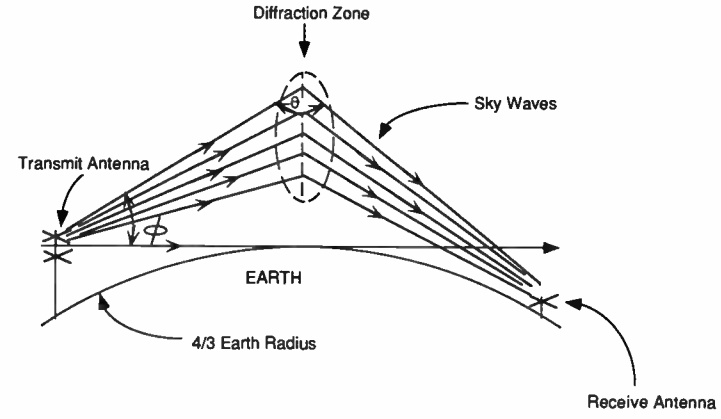


Figure 2

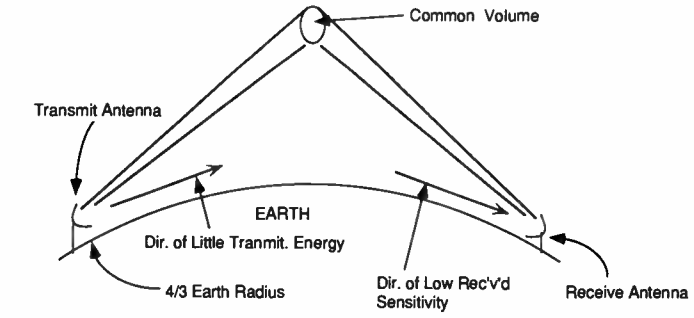


Figure 3

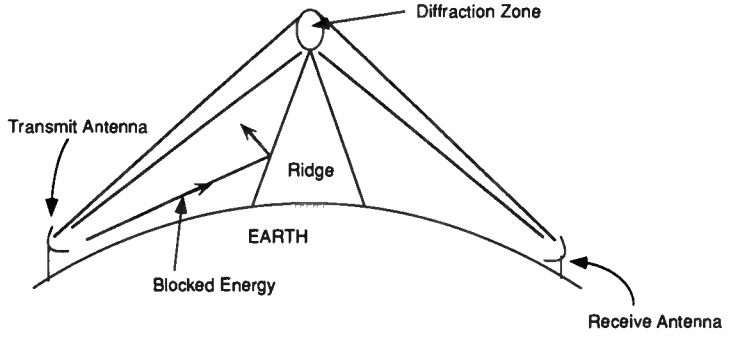


Figure 4

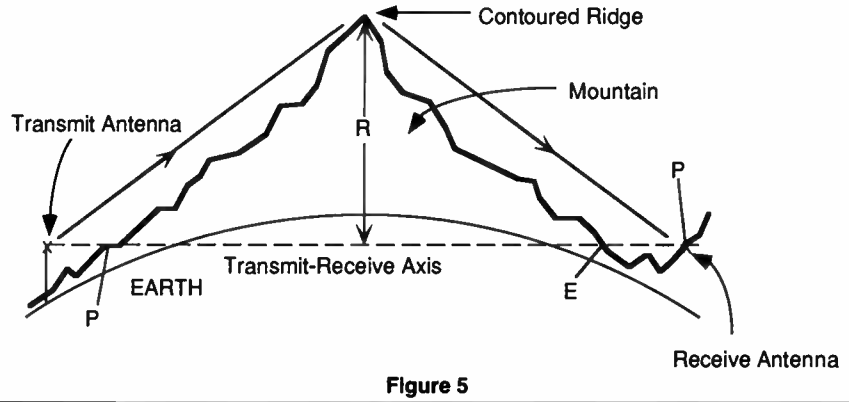


Figure 5

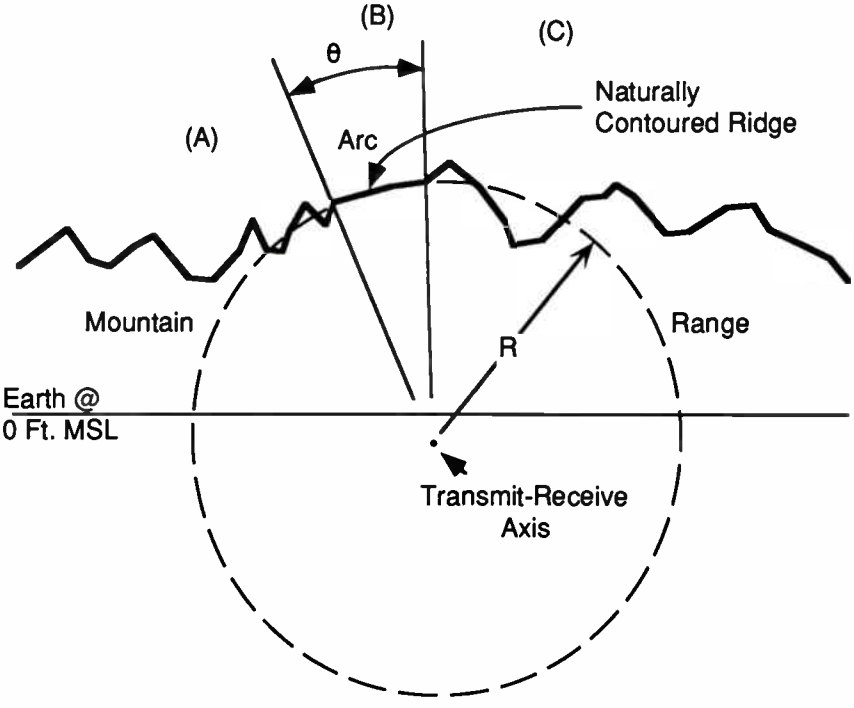


Figure 6

and allows the sky wave energy to be recovered, thus providing an acceptable transmission system.

Knife-edge diffraction. Analysis of stable reception phenomena observed in some remote mountain valleys led to the discovery of what is termed "obstacle gain." This effect is based on the fact that a high ridge, which is visible from both path terminals and which happens to cross the signal path (see Figure 4), can act to block the chaotic ground-wave energy and make the sky-wave usable at less oblique angles than with "scatter" systems, providing yet another mechanism for an acceptable transmission system.

Obstacle gain is based on the fact that a high ridge can act to block the chaotic ground-wave energy and make the sky-wave usable at less oblique angles.

Hot-spot phenomena

Neither the scatter propagation nor the knife-edge diffraction systems develop the focusing effect obviously involved in producing the tiny "hot spots" described above. Such hot spots are created by a uniquely "contoured"

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

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

PERFORMANCE ON COMMAND.

JERROLD COMMUNICATIONS

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

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

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

COMMANDER® 6.

GENERAL INSTRUMENT

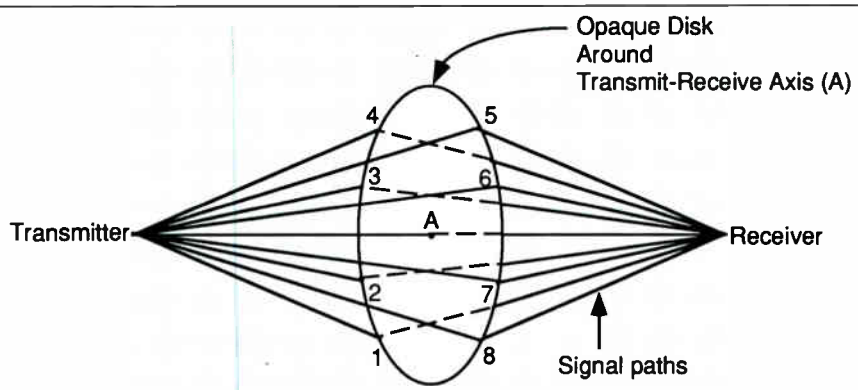


Figure 7

This contoured ridge, or arc of a circle, provides multiple, equal length paths for the signal to travel, i.e., it creates multiple fields whose energy combines on a 20 Log N basis (N being the number of such fields). Not only is the gain benefit of a knife-edge diffraction situation realized, but a substantial bonus gain is added. What nature has provided is a Constructive Interference Transmission System, which lends itself to rather precise loss calculations, over that of "free space" vs. the currently employed "obstacle gain" calculations added to "beyond the horizon" loss calculations.

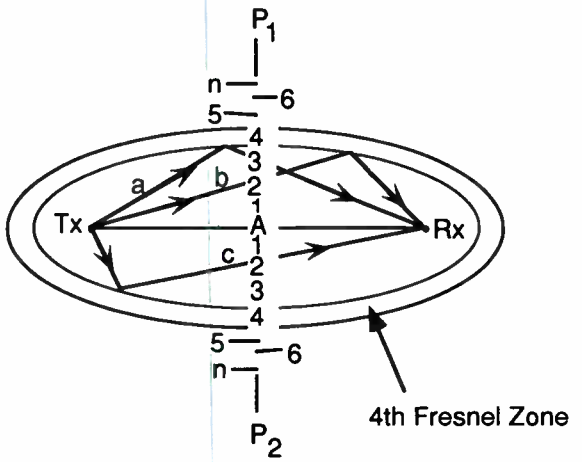


Figure 8

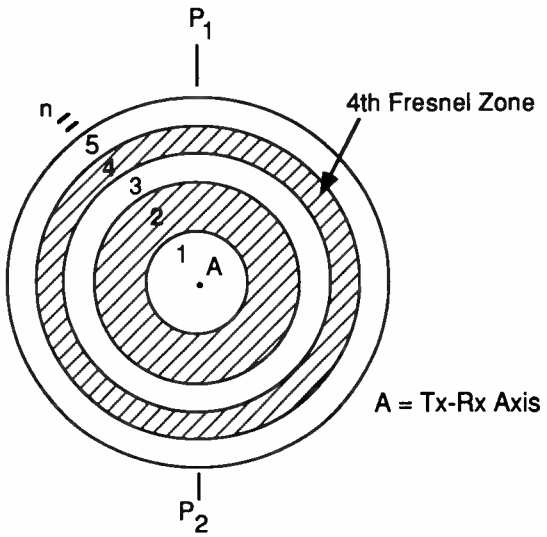


Figure 9

Path propogation data

Path parameters	70 Mhz	200 Mhz	600 Mhz
Free-space loss	117 dB	127 dB	137 dB
95% Obstacle loss	26 dB	26 dB	26 dB
Barrier (roughness) loss, est. (Includes obliquity losses)	2 dB	3 dB	8 dB
Total path losses	145 dB	156 dB	171 dB
Maximum EIRP (per FCC)	80 dBm	85 dBm	97 dBm
Total path losses	−145 dB	−156 dB	−171 dB
Signal at receive site	−65 dBm	−71 dBm	−74 dBm
Receive antenna gain	6 dB	8 dB	12 dB
Received signal level (RSL)	−59 dBm	−63 dBm	−62 dBm
Conversion to dBmv, add	49	49	49
RSL, in dBmv	−10 dBmv	−14 dBmv	−13 dBmv
Receiver noise, est.	−56 dBmv	−55 dBmv	−54 dBmv
Carrier/noise ratio	46 dB	41 dB	41 dB
Fresnel zone d(R), at ridge	210 ft.	70 ft.	23 ft.

ridge occurring naturally across the signal path, with the contour following an arc of a circle drawn around the axis between the transmitting and receiving antennas (see Figures 5 and 6).

Facts from physics

First, consider a typical point-to-point transmission system. If we add a parallel transmitter radiating precisely the same signal to the receiving antenna, in phase, we observe that the received signal level doubles, indicating a four-fold power increase at the receiver. However, we only doubled the ERP from the transmitter terminal!

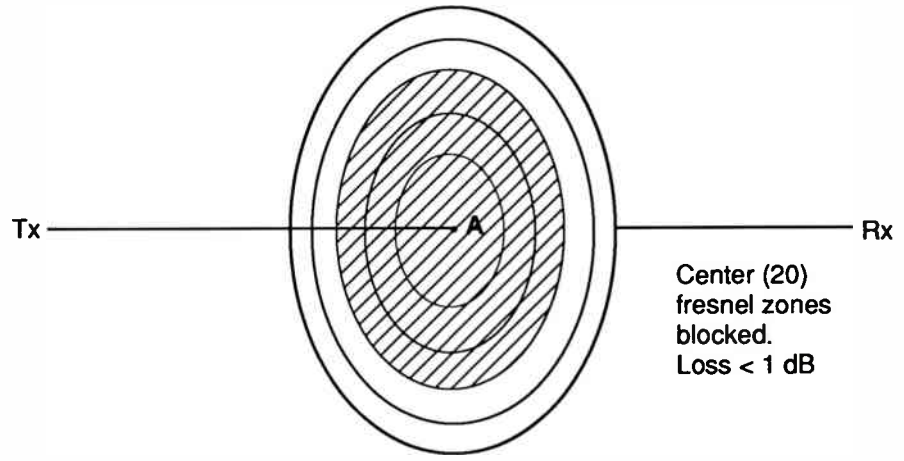


Figure 10

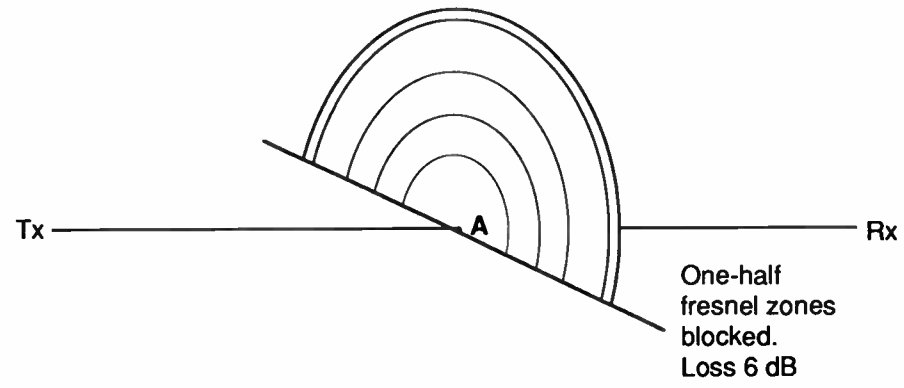


Figure 11

(This may be understood simply as two fields independently acting on the same electrons in the receiving antenna causing twice the electron displacement, or twice the induced current. As power is a function of the square of the current, the received power is quadrupled.)

If we go to four in-phase transmitters of equal power, we get 16 times the received power; eight transmitter assemblies produces 64 times the receiver power, etc. This is the technique utilized in the Phased-Array Battle-Control Radars, used by the U.S. and the U.S.S.R. to obtain high ERPs.

(Observe that if we stack eight dipoles to produce a 9 dB gain antenna we still obtain the 64 times received power gain from the eight antennas, however, as we have taken the output of a single transmitter and split it eight times within the antenna array in order to feed the eight dipoles, we net only [1/8 x 64], or an eight times power gain.)

Now, if instead of multiple transmitters we cause eight diverging transmitted fields to converge, in-phase, onto a common receiving antenna (see Figure 7) we accomplish the same 64-fold increase in received power (or eight-fold increase in received signal level [RSL], in microvolts) as with the eight transmitters discussed earlier. (Note also the fact that a perfect disc, as depicted in Figuire 7, acts to, [a], allow any transmitter on the transmitter-to-disc portion of the Tx-Rx axis to "focus" on any receiver on the disc-to-receiver portion of the axis, and [b], causes an inverted and reverted image of the transmitting antenna array to appear at a receiving site.)

Second, let's review fresnel zones as they would appear in free-space around an unobstructed Tx-Rx path (see Figure 8). Several points may be made:

- Each fresnel zone forms a three-dimensional ellipsoid enveloping the Tx-Rx path, with each successive fresnel zone forming an ever larger ellipsoid;
- All signal paths (a, b, c...n) within any one fresnel zone are of equal length;
- A cross-sectional view of the fresnel zones at mid-path would appear as concentric circles formed around the Tx-Rx axis (see Figure 9);
- The Tx-Rx path lengths, via successive fresnel zones, increase at increments of one-half wavelength, such that with monochromatic signals, energy reaching the receiver for odd numbered zones is of one phase and that received from even numbered zones is of the opposite phase;
- Assuming even "illumination" of all zones, the energy received from an outer zone is only slightly less than that from the adjacent inner zone;
- The algebraic sum of the received energy from all zones is 6 dB less than that present in the first zone.

Now, in a fairly long Tx-Rx system, if we block out the first 20 or so fresnel zones at mid-path with a radi-opaque disc, the received signal will fall off only a fraction of a dB (see Figure 10). Going a step further, if we block off an

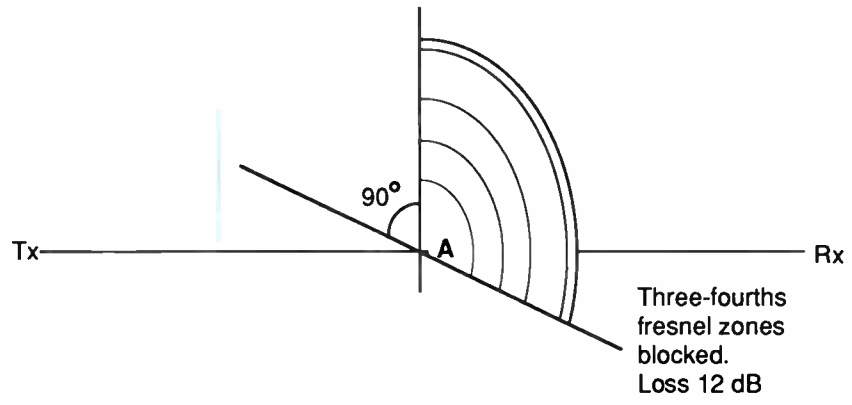


Figure 12

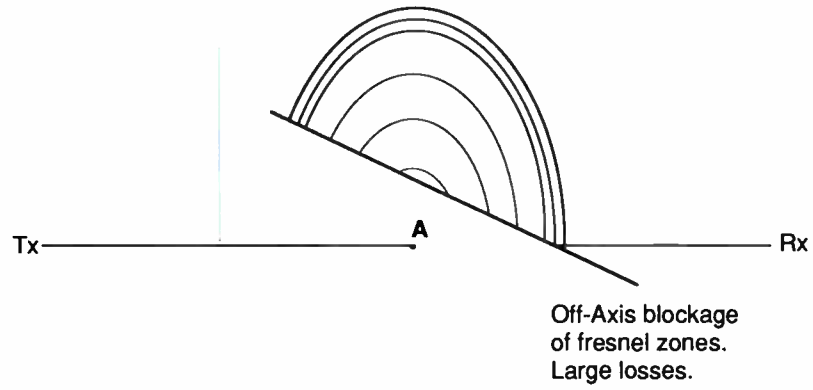


Figure 13

entire half of the fresnel zones with a barrier passing through the Tx-Rx axis (see Figure 11) the received signal drops by 6 dB.

(We've blocked one-half the total field.) If we continue and block three-fourths (and seven-eighths) of the zones, being careful to rotate around the Tx-Rx axis (see Figure 12), we lose 12 dB and 18 dB, respectively. Note that in every instance we have been careful to maintain the relative size relationship of the successive fresnel zones, so that an outer zone energy contribution is always slightly less than that of it's neighbor toward the axis.

Suppose, now, that we ignore the symmetrical zone relationships and obstruct the fresnel zones as in Figure 13. In this situation, the outer fresnel zones wil have greater areas, and therefore greater energy, than the inner zones out to a certain distance at which the original relationship will partially restore itself, with the result that the sum of the signals reaching the receiver is disproportionately reduced. (In knife edge diffraction and scatter propagation systems it is the "spot" pattern of the antennas that, to an extent, restores the desired fresnel zone energy relationship.)

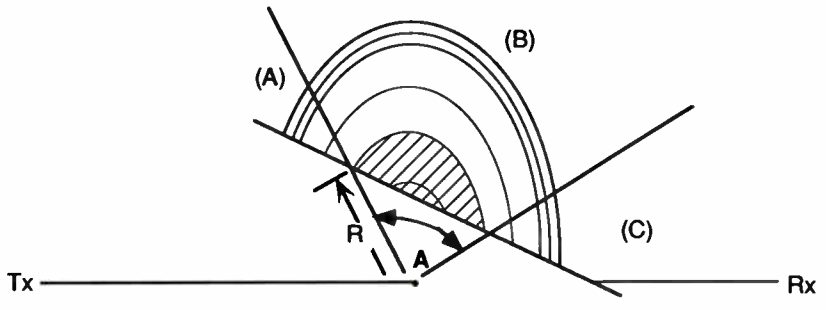
If it were possible to construct a barrier, the top of which followed an arc around the Tx-Rx axis (see Figure 14), we could re-establish the energy relationship of the fresnel zones in the sector formed by the arc, and thereby return (approximately) to the theoretical minimum in obstruction loss, i.e., to 20 log (Angle A/360) dB.

Through proper beam "spot" illumination of this barrier arc (see Figure 15) the RSL is further enhanced by (a) favoring the first (effective) fresnel zone in sector (B) over the outerzones, and (b), largely eliminating energy contributions from vestigial sectors (A) and (C).

The real world

Using Figures 5 and 6 we now will construct a hypothetical TV path of 150 miles, with 6,500-foot mountains in mid-path, operating at each of 70 MHz, 200 MHz and 600 MHz. A portion of the obstructing mountain forms a natural arc around the Tx-Rx path that is 18 degrees, or 5 percent, of the included circle.

These results are not inconsistent



Off-Axis and center blockage.

Figure 14

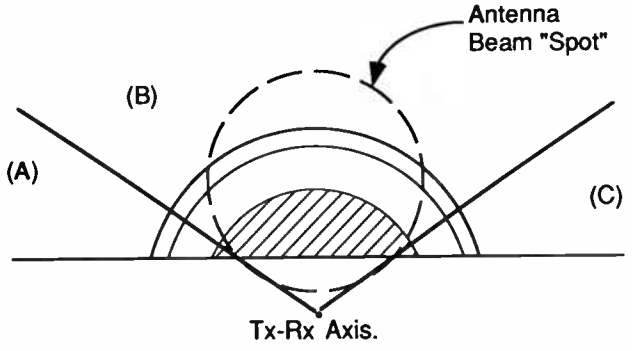


Figure 15

with observed "hot spot" signal levels and require only 2,200 feet of cooperating ridge. At a mid-path radius of 7,000 feet we are in the 50th fresnel zone (at 200 MHz), which zone has an incremental radius of 70 feet. This means that the contoured arc can deviate from perfect by a foot or so and still provide the required substantially equal-length paths. At 70 MHz the tolerance is three times greater than at 200 MHz and at 600 MHz it is one-third as great.

In Figure 16 is shown the profile, etc., for a 70 mile microwave path, with a 1,000 foot hill at mid-path, operating at 6175 MHz, and for which we've constructed an artificial barrier 150 feet high in the center and 500 feet in length. The calculations follow:

By centering the antenna beams slightly above the barrier center (see Figure 17), the 1 dB "spot" enhances the energy from the first (effective) fresnel zone vs. the higher zones in sector (B), while reducing the energy received from vestigial sectors (A) and (C), as discussed in Figure 15.

Conclusions

Constructive interference seems to be a largely under-utilized and under-recognized technique in communications, although the phenomena is well known and extensively used in astronomy and optics, and with radar and laser systems, etc. The multi-path technique was used in early optical (double-split) interference studies a century ago, and the 20 Log N gain in deposited

System level fiber optic testing

Today's system engineers are facing problems and situations unseen 3-5 years ago. Fiber optic technology that was working only in the lab at that time is now being installed and tested in the field.

Understanding why something works is equally as important as knowing how to fix it when it doesn't. Comm/Scope has undertaken an effort to help the Engineering community of our industry to understand what is happening when two pieces of glass fiber are joined together and what the effect may be on the system performance.

There are many papers written describing how to use an OTDR (Optical Time Domain Reflectometer). In most of these papers, it is assumed that the two fibers have the same optical and physical characteristics and nothing out of the ordinary is observed at the splice point. The splice is then evaluated based on the signature from the OTDR.

For the vast majority of the optical fiber splices made today, an OTDR trace similar to that of Figure 1 is observed. This trace shows that two fibers were joined and an optical loss of some minimal value was observed. However, there are two questions that need to be addressed. Number one, what is the splice loss and two, are there any reflected signals from the splice that might damage the link.

However, on occasion, in splicing fibers together that have been manufactured by two different vendors or perhaps two cables made of fiber that have different optical characteristics, you will not get the normal trace. When that splice is tested with an OTDR, a trace similar to Figure 2 can be seen. Figure 2 appears to say that the splice has an optical gain. Since the engineer knows the fiber is a passive device he is left with a question. What is wrong with this picture?

Before we delve into this problem let's take a moment to develop the items that cause the effect.

By Paul Wilson, Product Manager, Fiber Optics Division, Comm/Scope, Inc. and Al Bonnyman, Photon Kinetics, Inc.

Fiber manufacture

Today's low-loss fibers are made from silica quartz with various additives (dopants) used to control the refractive index profile of the glass. This process holds for all vapor deposition fibers (both matched clad and depressed clad).

Unavoidably, these additives and the subsequent manufacturing processes of laying down the preform and the drawing of the fiber to its final diameter leave microscopic particles in the core and cladding glass. These particles reflect very small amounts of light back toward the source. This reflected light is called Rayleigh scattering which cannot be changed once the glass fiber is made.

As light from an optical source is introduced into the core, some of the light is scattered by the basic molecular structure of the silica glass and some from the microscopic particles as it travels through the fiber. Most of this scattered light enters the fiber cladding and is dissipated, but a very small amount is actually captured by the core glass and carried back towards the transmitter. This backscatter signal is very weak (often 65 dB below the transmit signal). It is this scattering of reflected light that indicates the relative consistency of the optical properties of the glass.

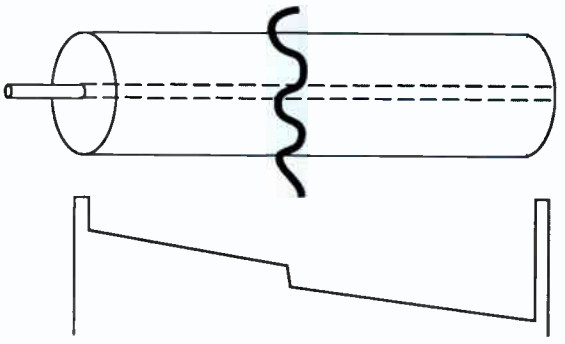


Figure 1

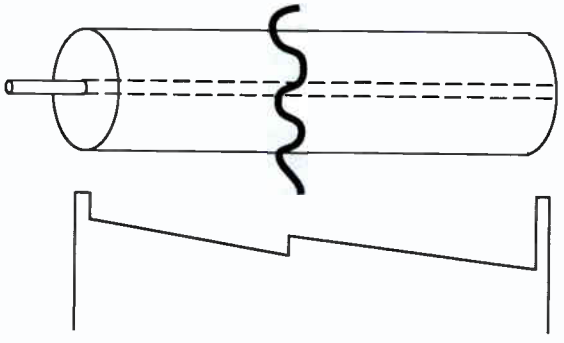


Figure 2

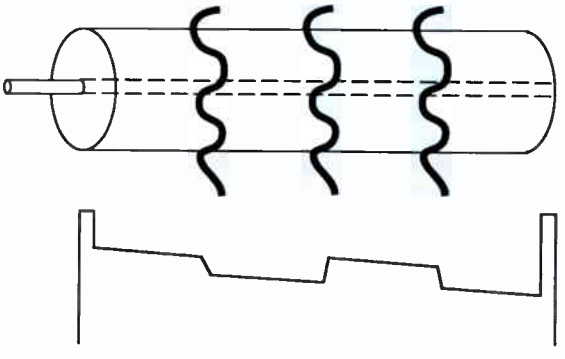


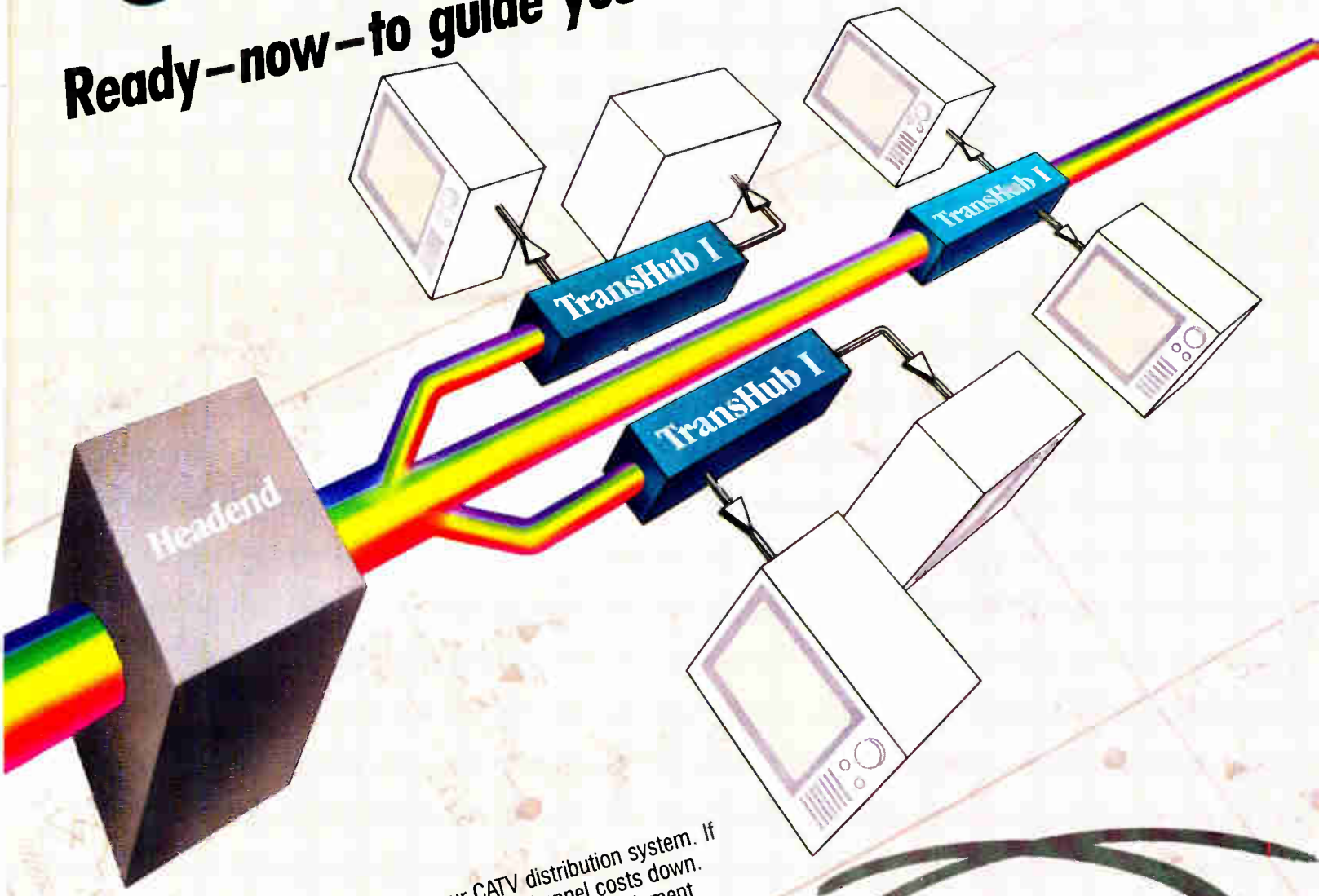
Figure 3

Figure 3 (not to scale) represents a series of four fibers with different backscattering properties as they are spiced together. Fibers two and three have higher levels of Rayleigh backscatter.

It is the glass manufacturer's responsibility to minimize fiber backscatter and variances. However, as with all manufacturing processes, variances oc-

CATEL

Ready–now–to guide you into the fiber optics future.



It's inevitable—fiber optics in your CATV distribution system. If you're to compete in signal quality. Keep per-channel costs down. Expand smoothly. The real questions are how best to implement fiber optics and how far into the network you'll ultimately go.

Catel's family of FM and AM backbone fiber optics equipment answers the first question. And poises you for any answer to the second—by paving a clean fiber migration path. Right to that "last mile" and—when you're ready—right to the subscriber.

Our TransHub I, for example, gives you RS-250B headend quality video signals at the hub. Handles both clear and scrambled channels. Converts your FM-on-fiber to VSB-AM for use on cable or on AM fiber—taking those quality signals "deeper" into your distribution system.

TransHub I reflects two decades of CATV technology leadership. And like our entire AM and FM fiber optics product family, it's ready for delivery. Send for more information. And take a major stride toward a system superior in quality, flexibility and cost-effectiveness.

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.

CATEL

THE CLEAR CHOICE IN FIBER

Reader Service Number 45

Let the Wavetek 1882A sweep you in

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

A clear path home.

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

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

No interference.

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

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

1000 MHz to grow on.

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

See the light.

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

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

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

Elegant but easy.

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

It takes only a few minutes to store your HEADEND,

to the future. Without interference.

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

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

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

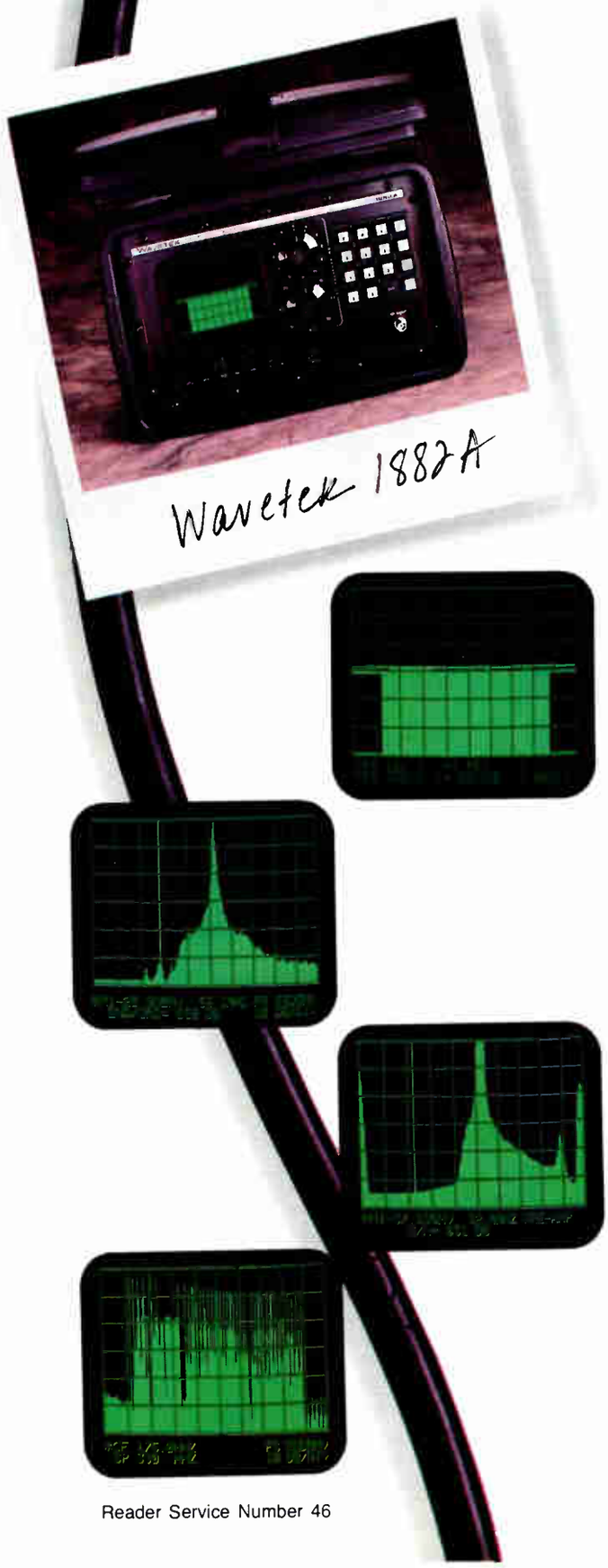
Fill in the blanks.

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

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

Find the faults.

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



Reader Service Number 46

Bring back the hard facts.

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

When you reach the end of the line.

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

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

Get the picture?

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

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

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

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

WAVETEK®

CICIORA'S PAGE

Digital mania

"Digital Mania" is the affliction which causes its victims to believe that everything can be done digitally and in three years it will all be free. It is stimulated by marketing hype and the experiences we've all had with personal computers, calculators, watches and other consumer products. The main problem with Digital Mania, is that it may cause sub-optimal choices. This is especially dangerous when the decision makers are non-technical or have limited experience with the trade-offs between the analog world and the digital world.

It's an analog world after all

The inputs to most systems are analog. The outputs of most systems are analog. Often the first circuit in a system is an analog to digital converter, A/D, and the last circuit is a digital to analog converter, D/A. It is important to always ask the question: "Is this trip really necessary?" The trip has a certain cost. Not only do the A/D and D/A circuits cost money, but they also introduce an irreducible amount of noise, called quantizing noise. The benefits gained must justify the financial and noise costs.

While digital technology has made dramatic advances, analog techniques have not been idle. Analog integrated circuits have improved in speed, cost, capability ad general performance. They are a moving target. It is important to keep an eye on the target. Perhaps an optimal solution is a combination of analog and digital approaches.

By Walter Ciciora, Vice President of Technology, American Televisin and Communications

Spread spectrum

Spread spectrum techniques are based on the principle that if the signal is spread out over a wider bandwidth, it can be detected in a manner that enhances the signal and discriminates against the noise in the communications channel. This is because the signal is correlated and the noise is not.

Commonly used spread spectrum techniques include frequency modulation, FM, and digital appraoches. The wider the spread, the larger the benefit. Those with experience with narrowband FM know that it loses nearly all of its advantages over AM. At some point their performance is equivalent.

An important question to investigate is the point at which digital performance is equivalent to AM if there is no spread of the spectrum. Can a signal be so completely compressed digitally that it is no better than an AM signal? In that situation, we've lost our compatibility with existing consumer hardware, we've added new digital artifacts, and perhaps gained very little performance for our troubles. It is important to find that point of inflection where the benefits fail to match the disadvantages.

Another difficulty with spread spectrum systems is their tendency to "fall off the cliff." Performance holds up nearly perfectly and then suddenly fails almost completely. Non-spread spectrum approaches tend to fail more gracefully. Which is the desirable characteristic for a cable system?

Digital artifacts

If you've seen Improved Definition Television (IDTV), you've seen digital artifacts. The signal is processed in little blocks. To save processing circuit costs, the blocks are not so little. When the processing algorithm has difficulties, the boundaries of the blocks become visible. It's like looking at the world through a coarse screen door, but not quite. The "blockiness" of the picture is annoying because it is unlike anything seen in the real world.

We've seen another digital artifact when a transmission path becomes overloaded. The picture suddenly freezes. Sometimes only part of the picture freezes. Sometimes we see parts of several pictures frozen together on the screen. It happens very infrequently, so it is interesting. It would be annoying if it happened more often.

Entertainment grade video

Entertainment grade video is very difficult to compress. That's not to say it can't be done. Quite the contrary. But it must be done carefully. Consider some particularly difficult video characteristics: video scene changes, camera changes, scenes with flash pictures, aggressive zooms. Here nearly every pixel changes. Some pictures just naturally are short on redundancy. A forest picture with millions of leaves blowing in the wind. Water with ripples. How will these pictures look? What would be subscriber reaction?

The consumer electronic interface

We must not forget that the 200 million television receivers and 70 million VCRs are built for analog inputs. The most important input is the amplitude modulated, vestigial sideband RF port called the F-connector. The second most important input is an analog terminal for composite video. Third on the list is the Y/C component analog video S-connector. Digital inputs don't even exist yet.

Cable has an important strategic advantage in that it can be consumer electronic friendly. Only cable, of all the competing media, can deliver the broadband, analog, RF input which the consumer electronics products require.

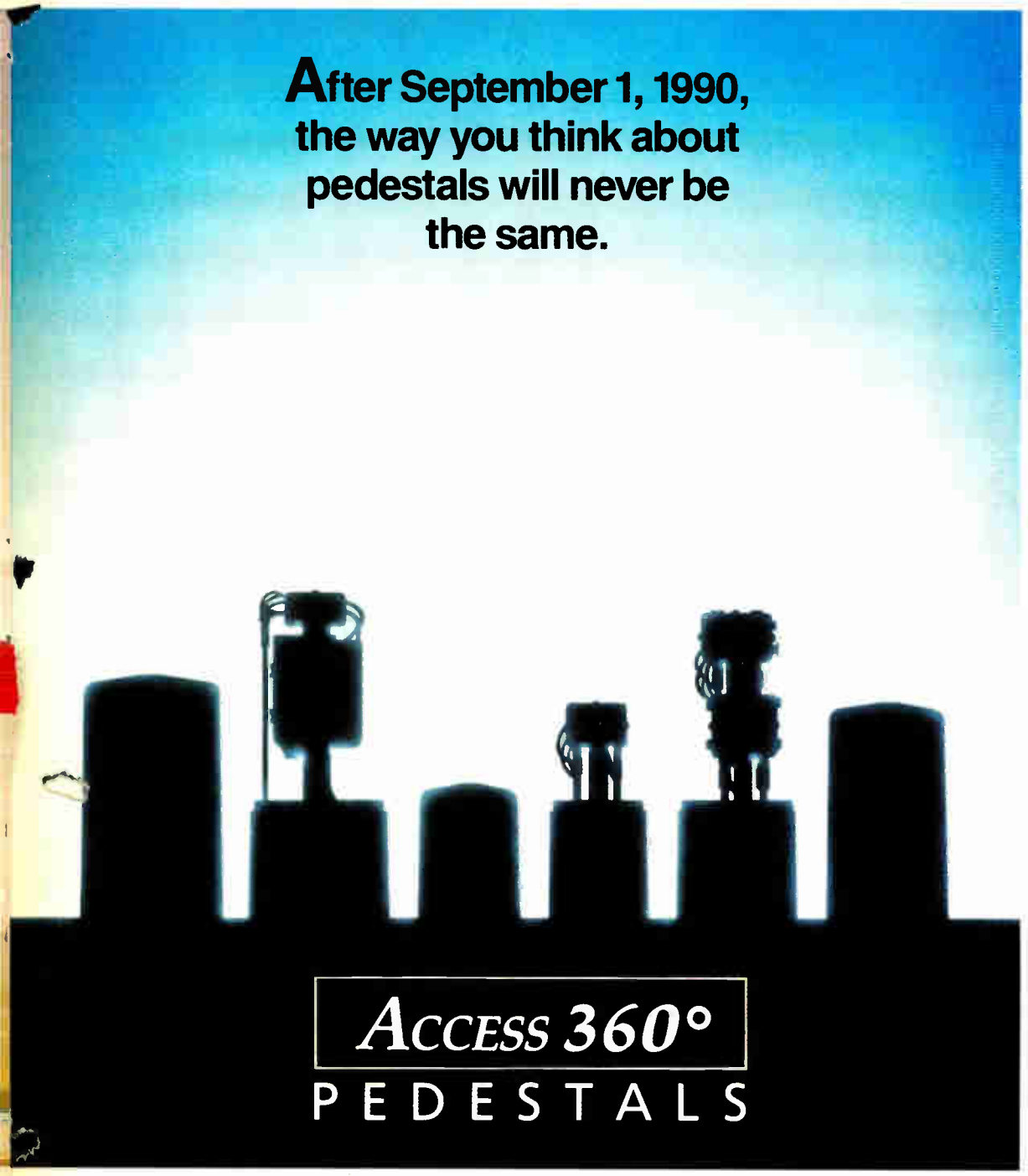
Rational expectations

Don't get me wrong. I'm a digital enthusiast. The very first project I worked on after graduating from school was on digital television for scrambling. I've been involved with things digital all my professional life. However, that is not good enough reason to ignore alternatives. As with all things technical, rational expectations are difficult. Proponents of an approach overhype it while opponents try to ignore it. The truth usually lies somewhere in between. That in between place is often a hybrid of the two extremes.

The most creative solutions come from not only asking "what if?" but also from asking "what else?" ■

U T I L I T Y P R O D U C T S

After September 1, 1990, the way you think about pedestals will never be the same.



On September 1, 1990, Utility Products, the leading manufacturer of closures for the CATV industry, is introducing a new line of products that will revolutionize the way you think about pedestals.

Our new Access 360° Pedestals will outperform all other pedestals currently on the market.

PLASTIC OR METAL

360° ACCESS

GREATER STABILITY

GREATER VOLUME

Find out how Access 360° Pedestals can enhance your system. Call Reliance Comm/Tec's Utility Products group at 708-455-8010 or call or write Anixter today for more information.

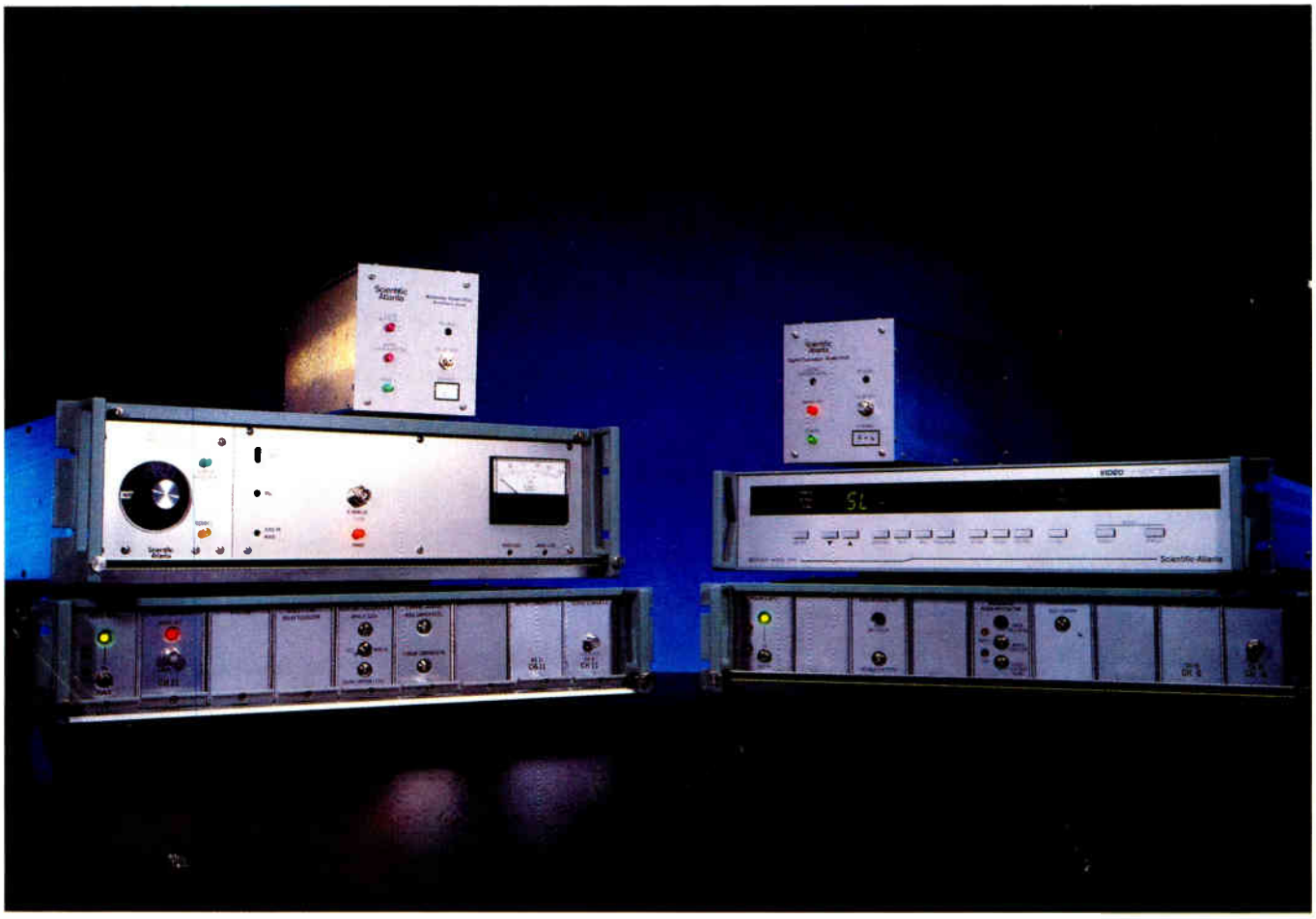
RELIANCE COMM/TEC + ANIXTER® CABLE TV

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; **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.

Reader Service Number 61

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

Now you can call the best in the service business for the best in headend equipment.



ANIXTER CABLE TV stocks the complete line of Scientific Atlanta headend electronics, bringing you immediate availability on the industry's finest headend products.

Modulators, processors, combiners, and replacement modules are all in inventory. Call your Anixter Cable TV representative for all your headend needs.

Scientific Atlanta + 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) 845-9510; **NEW JERSEY:** (201) 328-0980, (800) 631-9603; **ORLANDO:** (407) 240-1888, (800) 477-8396;

In an emergency, weekends and holidays or after 5 P.M. call toll free 1 (800) 323-8166.

Reader Service Number 62

CORPORATE OFFICES, ANIXTER CABLE TV, 4711 Golf Road, Skokie, IL 60076, (708) 677-2600