Billing software

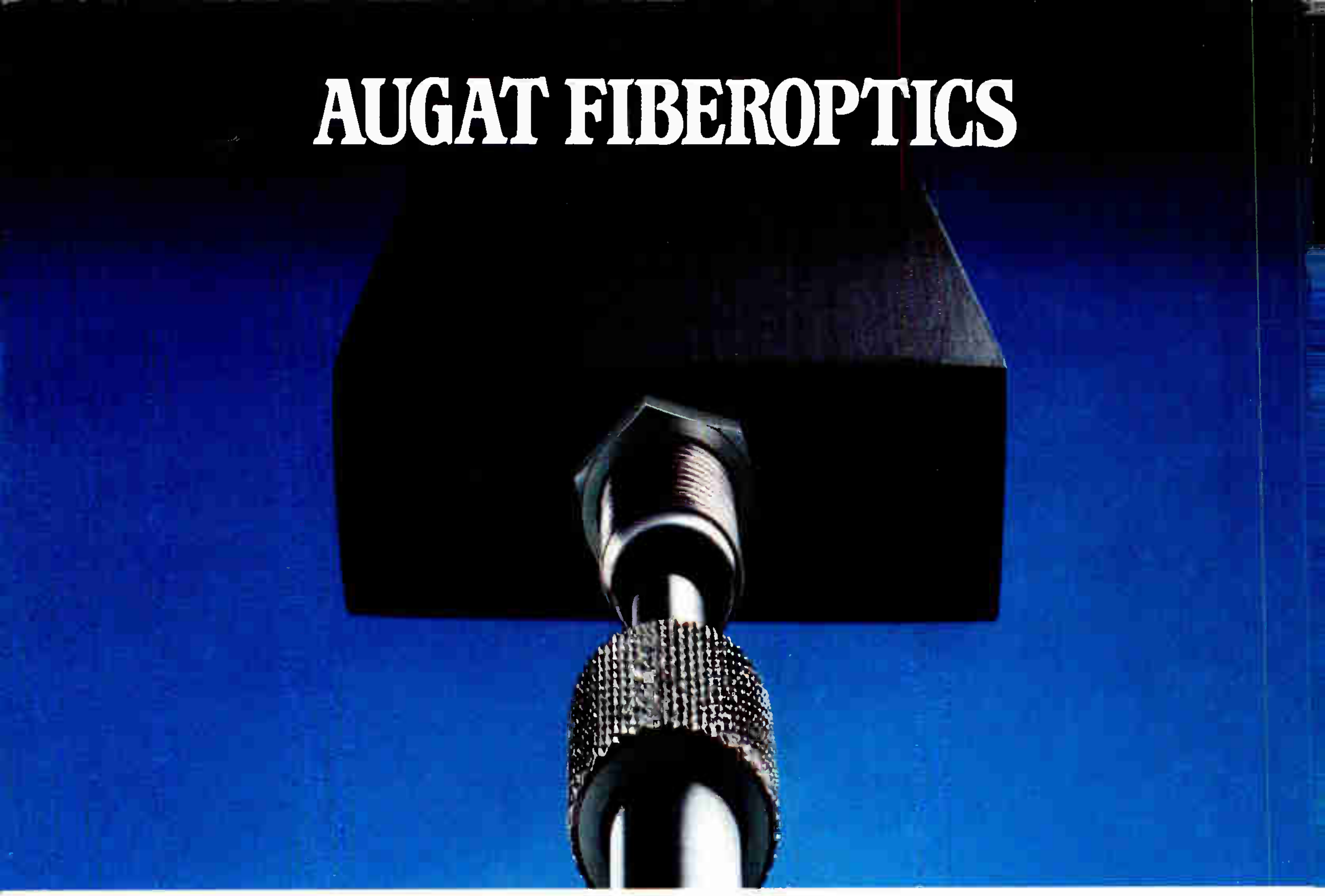
# CED™

nunications Engineering & Design/The Magazine of Broadband Technology

April 1985

CED0000002727 01
F E MCCORMACK ENG
HASTAD ENG CO
BOX 5221 STATE UNIV STA
FARGO ND 58105


## Worth: Digital TV
## Taylor: CLI
## Morse, Adamec: BTSC
## Brown: MTS tracking
## Ejima: Digital MTS




# IN ALL PROBABILITY, YOU'LL NEVER MAKE A BETTER CONNECTION.

Here are some of the reasons why AUGAT FIBEROPTICS is your best connection for optical transmission components and systems that combine reliability, adaptability, performance and economy.

**CONNECTORS** are just the beginning. Our JSC ferrule connectors are backed by statistically-proven performance. DSC connectors adhere to EIA standards for maximum compatibility. Both feature a crimpless backshell design.

**ACTIVE RECEPTACLES** offer connector-compatible emitters and detectors in ready-to-use devices not requiring additional assembly.

**M25 DATA LINKS**, our newest, have a loss budget for 2 km applications. They're designed for digital transmission from DC to a minimum of 25 Mb/s and also accommodate simultaneous analog.

**CL10 DATA LINKS** are designed for maxium adaptability and offer data rates from DC to a minimum of 10 Mb/s.

**D40 DATA LINKS** accommodate high data rate transmission from DC to a minimum of 40 Mb/s.

**CUSTOM LINKS** will be designed by our experienced applications engineers at your request.

**TOOLS AND ACCESSORIES** include connector installation tool sets and our innovative fiber-holding vacuum chuck.

For more information, just connect with Bob Goeckeler at AUGAT FIBEROPTICS 40 710 Narragansett Park Drive, Pawtucket, Rhode IS 02861 (401) 724-4400.


Reader Service Number 1

AUGAT® Quality and Innovation


## The AuTap Off-Premise Addressable Tap

is a powerful, and "intelligent" computerized system that gives you total control over security. Yes, *total* control . . . for the first time.

And it goes far beyond. AuTap cuts costs significantly and opens up the dynamic revenue sources of the future . . . right now.

### "Pay Per View" Today

AuTap lets you cash in on "PPV", the revenue generator of "tomorrow", immediately. It passes stereo without interference, is upgradeable to two-way communications and works with digitalized TV.

In simple terms, AuTap consists of a "Smart Controller" remotely communicating via your cable with the Taps. Each Tap serves up to 4 drops from the strand.

### Other Unique Advantages

- Instructions to Tap are initiated by an operator and/or computerized billing system.
- Control factor is moved from house to the strand for maximum security. The effects of "Churn" are substantially reduced
- No converter necessary with new "cable ready" sets
- Passes any type signal . . . scrambled or normal
- Broadband Technology passes entire signal spectrum in any combination

Get your hands on a new kind of power over your system for a new lease on profits. Send for more information and, if you'd like, a demonstration of this truly remarkable engineering achievement. Write Augat Broadband Communications Group, 710 Narragansett Park Drive, Pawtucket, RI 02861, (401) 724-4400.

AUGAT® BROADBAND COMMUNICATIONS GROUP

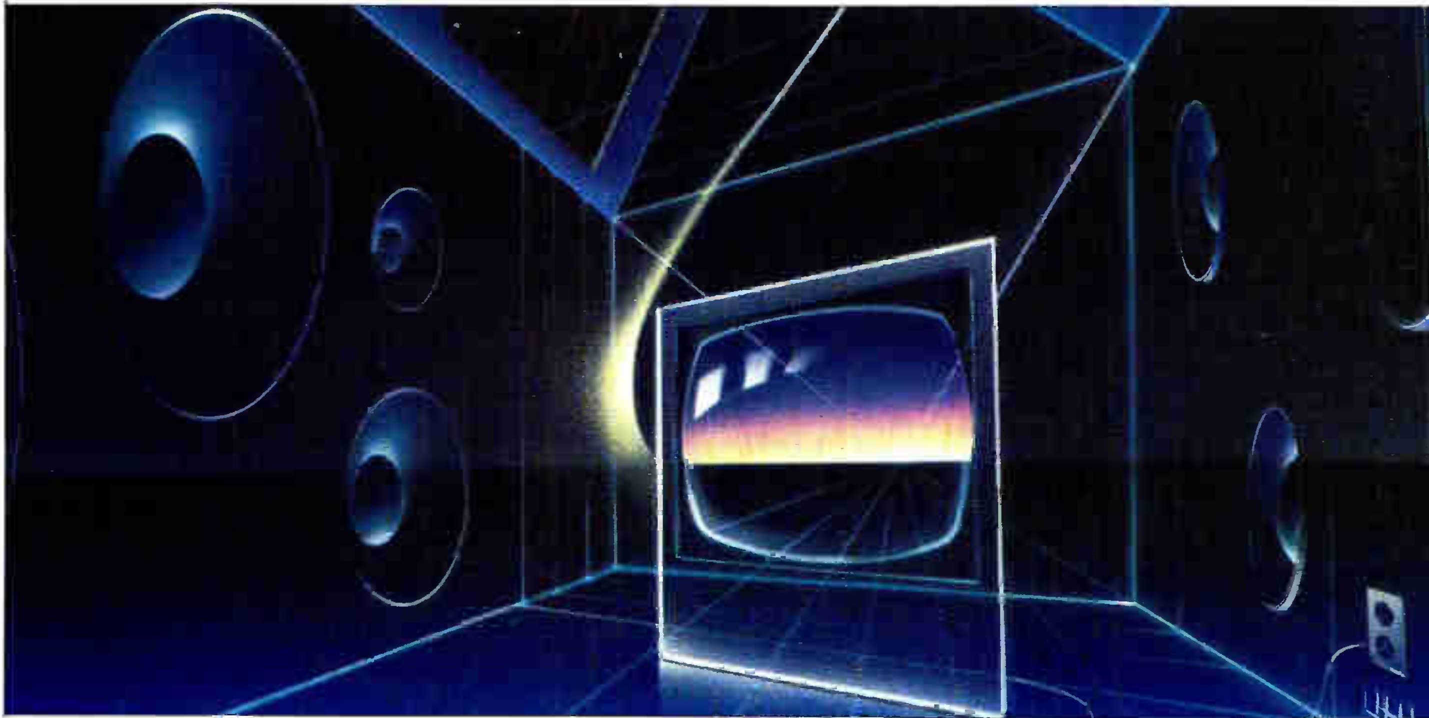
L

*Quality and Innovation*

Reader Service Number 2

# CED™

April 1985



SPOTLIGHT 6

**Bob Luff**

"It's always the engineers and scientists that get an industryy out of a lull," and United Artists Cablesystems Senior Vice President Bob Luff is doing his part.

MY TURN 8

**More on CLI**

Archer Taylor takes a look at CLI, and argues it isn't burdensome.

FEATURE 16

**Digital TV update**

Nick Worth of Telecable discusses NCTA tests of the new ITT digital chip set. Can it defeat sync suppression? Possibly, but not easily.

FEATURE 20

**Digital MTS systems**

N. Ejima of Masushita Electric Industrial Co. illustrates how digital MTS can be delivered to subscriber terminals.

FEATURE 32

**Using BTSC for MTS**

Pete Morse and Richard Adamec of Jerrold focus on the BTSC format for stereo transmission over cable.

TECH II 43

**The MTS tracking method**

Pioneer's Larry Brown describes the tracking method of out-of-band FM stereo simulcasting.

***Larry Brown***

PRODUCT PROFILE 54-57

**Billing software**

This month, *CED* takes a look at billing software packages.

DEPARTMENTS



**About the cover**

Bob Luff, Washington Bureau Chief of the Luff News Network, is depicted in this fictional setting by artist Frank Kim.


1985 by International Thomson Communications Inc. All rights reserved.


CED. (USPS 300-510) (ISSN 0191-5428) is published monthly by International Thomson Communications Inc., 600 Grant St., Denver, CO 80203. April 1985. Volume 11. Number 4. Subscriptions free to qualified industry readers. All other one-year subscriptions are $26, prepaid in U.S. funds only. Second-class postage paid at Denver, CO. *CED* is published on behalf of the cable television and broadband communications industries. POSTMASTER: Please send address changes to P.O. Box 5208 T.A., Denver, Colorado 80217. MEMBERS OF THE BPA.

BPA

**Scientific Atlanta**


# THE STEREO STORM. COME THROUGH IT IN ONE PIECE.

ALL SCIENTIFIC-ATLANTA CONVERTERS ARE STEREO READY. WITHOUT ADD-ONS.

Stereo looms on the horizon. With stereo broadcasts beginning and stereo television sets already available, the storm of public demand has begun. And some hard business decisions are going to have to be made. Stereo ready Scientific-Atlanta 8500 Series converters will make your decisions easy. When stereo hits full force, you'll be ready.

Scientific-Atlanta 8500 Series converters are ready right now. Competitors are offering a deluge of other options; stopgap attempts that *may or may not* suffice. And they're all expensive. Sidecars, for example–extra equipment and extra expense–are necessary for some converters to pass stereo. Most baseband units need sidecar additions for all signals. Some converters, when they're fixed internally, will pass stereo. Of course, that'll take a service call, time *and* money.

Scientific-Atlanta 8500 Series converters need no extra add-ons. They're stereo ready right now and they always have been. They give you stereo in one piece with no increase in price. That's a very good reason to buy Scientific-Atlanta. There are plenty of others.

The 8500 Series–8520 programmable, 8530 programmable with descrambling and 8550 addressable–enjoys a reputation for quality, signal security and reliability unmatched in the industry. Plus, Scientific-Atlanta backs them all with a *two year warranty*! There's no better warranty in the business.

Scientific-Atlanta and the stereo storm. We've seen it coming for some time now. We've prepared for it, so *you* can prepare. When it hits, just come in out of the rain and enjoy the show.

Call (404) 925-5057 for more information or send in the coupon below.

I want to be ready when the storm hits. Please send me information on Scientific-Atlanta stereo ready converters. **CED 4/85**

Name ______________________

Title ______________________

Company ______________________

City ______________________

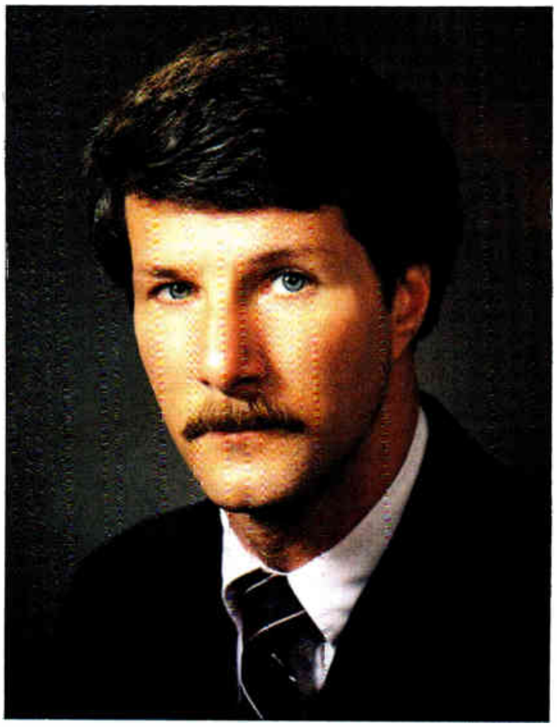
State ____________ Zip ____________

Phone (      ) ______________________

☐ Have a sales representative call me.

Mail to: Scientific-Atlanta, P.O. Box 105027, Dept. AR, Atlanta, GA 30348

**Reader Service Number 3**



# Robert Luff

Bob Luff is used to being drafted. Just before graduating from college in 1970, Luff wrote a letter to the Federal Communications Commission inquiring about job openings. He received a response asking him to come down and "talk." He arrived, as requested on July 6, 1970, and was immediately sworn in as a United States government employee. No application, no resumé, no interview, no bureaucratic red tape. It was the first step in Luff's journey to senior vice president of engineering foı United Artists Cablesystems, the twelfth largest MSO in the country.

In 1977, Luff was ready to move on and, because of his intimate knowledge of the regulatory issues facing the cable industry, the National Cable Television Association recruited him as their vice president of engineering. Almost three years later, Luff was ready to move on again. "Even though I saw the regulatory structure from the other side with the NCTA, I was really beginning to tire of the filings of comments, reply comments, reply to reply comments and so on. It all began to get a little old."

So, without much hesitation, Luff stepped in at United Artists Cablesystems as director of engineering. On his way up to the office of senior vice president of engineering, Luff received the ACE Special Recognition Award, the Science and Technology Award from the NCTA and also was asked to chair the NCTA Engineering Committee for the current term.

What is Bob Luff's advice to an engineer or technician just starting out in cable television? "You must do your technical homework. This is a very complex industry. It's growing extremely fast, and there is a big gap between the textbooks and what we are actually doing. If you have just entered the industry, your technical education has just begun."

Luff also advises those who want to get ahead to expand their personal skills such as speaking, listening, writing, leadership, problem solving, etc. "To be a wonderful engineer but a novice at management skills is just not good enough anymore. With the enormous size and complexity of most companies, the industry desperately needs men and women who can lead and direct technical departments. A technician is not just a technician for long; you are a technical manager before you know it, so start acquiring the skills now. If you wait until the day you need them, it's going to be awfully tough."

What's in store for the cable industry? "First of all, we simply have to solve the compatibility problem. We must develop the technology to interface with the home electronics available now and what is coming in the future. We also must begin to target multiple outlets in the home if we are to keep the growth of pay TV and other ancillary programming on an up scale." Luff stated. "We have really done a disservice to ourselves with the set-top converter. It restricts the freedom of the consumer to attach other devices, including multiple TV sets and FM radios, to the cable service. There is too much product now available via cable to expect that folks are going to continue to purchase multi- and maxi-pays in the quantity that we are offering simply for one TV set in the living room. It is very hard to make money on the second, third and fourth outlet in a home because of that expensive box."

Luff also is concerned that cable is becoming a "me too" in the entertainment industry. "I fear that if we continue to be about the same as broadcast TV, only a little more of it, that we are letting our competitors catch up to us at a time when we could be making big strides ahead. There are so many ways to make cable TV more appealing and to really capture the public's interest. High quality stereo, multidimensional sound, high resolution —we could attain a realism that has not yet been achieved through conventional TV. There would be a thousand different applications for such a clear corridor to 50 million households, but the time for us to wait for the manufacturers to lead us into new technologies is past. So, many of the top MSOs have started going out on their own trying to develop new products." How successful will they be? "I don't know, but most of the major MSOs command enough subscriber count that an appropriate long-range plan with a manufacturer could be put into effect."

The cable industry is at a plateau, and Bob Luff is confident that new technologies will be the way out. "It is always the engineer or the scientist that gets any industry out of a lull. It's good old-fashioned engineering perspiration that figures out a way to remove the barriers and get bigger and better. I have confidence that it is going to be somebody wearing Hush Puppies with a slide rule strapped to his belt that is going to get us beyond where we are today in basic entertainment service to full service telecommunications using all the capacity and horsepower we have in our cable systems."

This, no doubt, is true and rumor has it that Bob Luff has a pair of Hush Puppies hidden in his closet.

*—Lesley Dyson Camino*

# Performance, Price and Reliability Have Made Standard the Fastest Growing Name in Commercial Satellite Receiving Technology

In this rapidly growing, constantly changing industry, Standard Communications' complete line of satellite telecommunications products gets noticed for delivering what we promise—dependable performance at a very affordable price.

Since 1979, when we first entered the satellite marketplace, we've been operating under the same philosophy that has placed our mobile radios, pagers and Horizon marine radios at the forefront of their markets.

The result: new technologies like our LNBC 24 and LNBC 4 Low Noise Amplifier/Block Down converters, which reduce the possibility of UHF interference and eliminate the need for long runs of awkward, expensive cable, and innovative designs such as our unique loop-through feature, which lets you add up to 100 slave receivers without losing signal strength or using expensive external power dividers and splitters.

**Agile Receivers: Economical, Broadcast Quality Performance**

"If the Agile 24 wasn't the best receiver for the money, we wouldn't use it." **-ATC-**

**The Agile 24M/S Series**—Our most sophisticated receivers, with loop-through design for economical system expansion. Known industrywide for quality and reliability, year after year.

**The Agile 24SC**—A direct descendant of the 24S, our new Agile 24SC offers the same reliable broadcast quality—at a lower price.

**The Agile SK**—Bringing Agile performance to the Ku band, the SK accepts field-changeable plug-in PROMs for a variety of Ku band formats.

**The Agile PC**—Bringing Standard's reputation for quality into the private cable market, our new PC offers a mean-time-to-failure three times better than other expensive receivers.

**Complete System Capability**

Standard knows that there's more to a good picture than a good (or even a great) receiver. That's why we offer complete TVRO systems with quality in every component.

In addition, we offer the personalized technical support you need to start or expand your operations.

## THE INDUSTRY'S FINEST WARRANTY AND REPLACEMENT PROGRAM

Standard warrants all parts and labor on all of its receivers for one full year. If any Agile 24M/S, 24SC or SK fails in the field during that year, we'll replace it fast—usually within 24 hours. In years two through five, you can have this same protection for only $100 plus shipping.

No other manufacturer offers this kind of warranty, because no other manufacturer can match the reliability of the Agile line of receivers. For example, in 5 years of service, our Agile 24M/S has a proven record of less than 0.5% failure in the field.

**A Commitment to the Future**

Our dedication to research and innovative design is what has made Standard the fastest growing name in satellite receiving technology. By maintaining, and even expanding that commitment, Standard is making certain that we will maintain that position of leadership.

For more information call us: 800/243-1357 or in California 800/824-7766 ext. 275.

**Standard® Communications**

Standard Communications
P.O. Box 92151
Los Angeles, CA 90009-2151

**Engineered to a new standard**

**Reader Service Number 4**

# More on "CLI"

*By Archer S. Taylor, Malarkey-Taylor Associates*

The FCC Second Report and Order in Docket 21006 requires quarterly leakage monitoring and an annual demonstration of compliance with the leakage criteria called "Cumulative Leakage Index" (CLI). To many operators, these requirements appear to be giant monsters demanding endless man-hour sacrifices to the great god, FAA.

I disagree. There is evidence in paragraph 63 of the Report, buttressed by FCC staff comments at various conferences, that the "monitoring can be done by service personnel while conducting service calls" and making installation in the normal course of business. The wording of the new Section 76.614 apparently is being revised to make clear that the monitoring program need be no more elaborate than equipping enough service vehicles with detectors to assure a reasonable and practicable likelihood of covering the system at least four times a year.

Moreover, I submit that, in most cases, routine leakage monitoring logs can provide all the data needed for demonstrating compliance with the CLI criterion except for calibration of the monitoring facility. To this end, however, the leakage logs should provide some quantitative indication of the magnitude of a leak, such as the Sniffer meter reading, and the approximate distance between the monitoring vehicle and the cable. Actual measurement of field intensity, with dipole at 10 feet, may only be necessary at the strongest leak; although to be sure of determining which is the strongest, one should probably check several strong leaks.

On the date chosen to "demonstrate compliance," count the number (N) of leaks shown in the log as not yet repaired. Determine the field intensity (E) in microvolts per meter of one or more of the strongest leaks, using a Wavetek RD-1 or equivalent, at 10 feet (3 meters) above ground and 10 feet from the leak with the dipole parallel to both the cable and the ground.

Calculate $NE^2$; where N is the number of unrepaired leaks and E is the field intensity of the largest leak, in microvolts per meter at 10 feet. Estimate the percentage of the aerial plant covered by the monitor survey (must be at least 75 percent). Multiply $NE^2$ by 100 and divide by the percentage of plant covered to determine the index $I_\infty$. Since E is the largest leak, there is no way the CLI could be any greater than this. Now convert to decibels by calculating 10 log $I_\infty$. If that number is less than 64, you have demonstrated conclusively that the CLI is in compliance with (less than) the specified criterion.

The table shows that you can have a good many leaks that most of us would consider to be rather large and still be in compliance with the CLI criterion:

| Total Number of Unrepaired Leaks in System | Field Intensity, Measured at 10 feet, of the Largest Leak that would be in Compliance if All of the Leaks Produced the Same Field intensity |
|---|---|
| 1 | 1372 microvolts/meter |
| 7 | 500 |
| 188 | 100 |
| 754 | 50 |
| 4710 | 20 |

If the number is greater than 64, all is not necessarily lost. Repairing the largest leak may take care of the problem. Substituting the sum of the squares of actual leakage fields (in microvolts per meter at 10 feet) for $NE^2$ will produce a lower number, but requires the equivalent of a dipole measurement for each leak. Moreover, leaks measuring less than 50 microvolts per meter at 10 feet can be eliminated from the computation. For systems covering a wide area, the use of the $I_{3000}$ index, based on the slant height from each leak to a point 10,000 feet (3,000 meters) above the center of the system, also will produce lower numbers, but requires much more computation.

Monitoring leakage in high-rise MDUs was just as difficult a problem under the old rule as the new. The only difference is that nobody did it before. A quarterly fly-over may be the only answer.

I believe cable TV systems constructed in the last 10 years or so (except for those with extensive high-rise MDUs) will be able to comply easily with the CLI criterion, providing that:

- sleeved connectors are installed throughout;
- drop cable is moderately well shielded using well-designed and properly installed F connectors;
- leakage is conscientiously monitored and leaks are corrected promptly after detection; and
- response to customer trouble calls is prompt and effective.

The old rules as well as the new rules require that the monitoring procedures be capable of detecting a leak anywhere in the system that has a field strength of at least 20 microvolts per meter, measured with a dipole at 10 feet. (Proposed Rule Making in Docket 85-38 would raise this minimum to 50 microvolts per meter at 54-216 MHz; 150 microvolts per meter above 216 MHz. In another essay, I plan to discuss several ways to do this.) CED

# Don't Give Them A Thing Unless They Pay For It.


The problem with most converter systems is that they give too much.

They give free remote control. Free volume control. Free parental control. Free favorite channel. Free direct channel tuning. They even make it easy to rip off regular service.

You can't make a profit giving away cable service for free.

So M/A-COM's new 3025 addressable converter system lets your customers decide which features they want or don't want *and pay for them accordingly*. In fact, our new converter has more sophisticated operational and billing software than you're likely to find on any system, anywhere.

Some people call it revenue enhancement. We like to call it making bucks.

If you're interested in selling more and giving away less, contact your M/A-COM field representative or call 1-800-438-3331.

M/A-COM

M/A-COM Cable Home Group, PO Box 1729, Hickory, NC 28603, 800-438-3331, in NC 800-222-6808, telex: 802-166

**Reader Service Number 5**


## NCTA Convention

It's time to register for the 1985 NCTA show, being held June 3-5. If you're a manager, see that your staff attends, and if you're an engineer, tear this page out and take it to your boss. Register before April 12 and save some money. You won't want to miss this year's convention.

The technical program we've designed is practical, hard-hitting and still one of the cable industry's most prestigious engineering forums. Look at the line-up. Eleven 90-minute sessions covering issues ranging from "cable-ready" interface to signal leakage rules to multichannel sound will give you and your staff the information you need to solve current problems while keeping pace with the future.

Over 50 technical papers form the basis for presentations in the 11 sessions. Don't miss the sessions or their Q/A periods. All papers will be published as the 1985 edition of "NCTA Technical Papers," a softcover volume to be available for purchase at the convention and by mail from NCTA afterward. Volume discounts are planned; check at the publications booth for details.

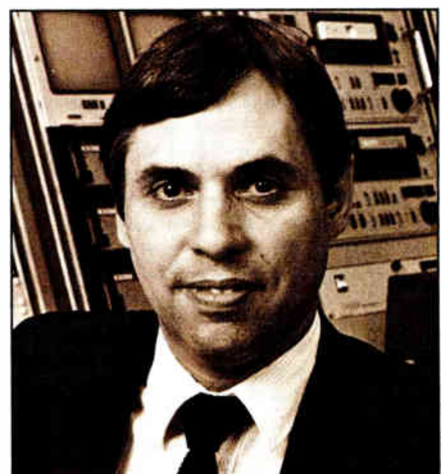
A new convention format highlights doing business in a deregulated environment and contending with the ever-changing consumer electronics industry. Also, 11½ hours have been set aside for exclusive exhibit viewing. Finally, one of the three general sessions will be a videoconferenced debate between top management at the IEEE Consumer Electronics show in Chicago and cable CEOs on the "cable-ready" issue.

The cost? Before April 12, 1985, NCTA member price is $225; non-members, $450. After April 12, 1985, NCTA member price is $275; non-members, $550. Full program includes all management, general and technical sessions, entrance to exhibits and scheduled luncheons. Check with convention headquarters (202/775-3606) for further details.

The sessions?
**Ingress/Egress**
mod.: J. Wong; spkrs.: T. Hartson, R. Dickinson, J. Ward, W. Homiller, R. Haller
**Addressability and Pay-Per-View**
mod.: G. Stubbs; spkrs.: S. Sirazi, M. Ermolovich, A. Hospador, A. Wechselberger
**Off-Premises Promise: Get Out of the House**
mod.: R. Kearns; spkrs.: J. Preschutti, N. Kowalski, J. Van Cleave, J. Simons, B. Campbell
**Tests, Measurements and Performance Analysis**
mod.: D. Stasi; spkrs.: L. Katzfey, J. Mitchell, W. Kostka, M. Ellis, L. West
**MTS and Digital Audio**
mod.: J. Van Loan; spkrs.: T. Stutz, W. Thomas, I. Switzer, A. Vigil, A. Best
**Fiber Optics: Reports from the Field**
mod.: B. Garrett; spkrs.: P. Kerstens, R. Hoss, M. Carr, J. Chiddix, L. Engdahl
**"Cable-Ready"**
mod.: D. Large; spkrs.: J. Stern, L. Brown, G. Gates, J. Cherry, W. Ciciora
**Plant Design**
mod.: W. Riker; spkrs.: R. Blumenkranz, R. Thayer, S. Moote, K. Babb, D. Atman
**Improving Customer Service**
mod.: L. Janes; spkrs.: S. Thompson, R. Clevenger, F. Baker, G. Nydegger, J. VanKoughnet
**Signal Relay**
mod.: S. Tipton; spkrs.: R. Hsu, P. White, N. Mountain, T. Straus
**Digital Transmission**
mod.: A. Taylor; spkrs.: N. Jain, F. Stratton, G. Baxes, A. Wechselberger
Don't miss it!

***Wendell H. Bailey, Jr.***
***Vice President, Science & Technology***
***National Cable Television Association***

NCTA Cable 85
Las Vegas: June 2-5


*Nick Worth*

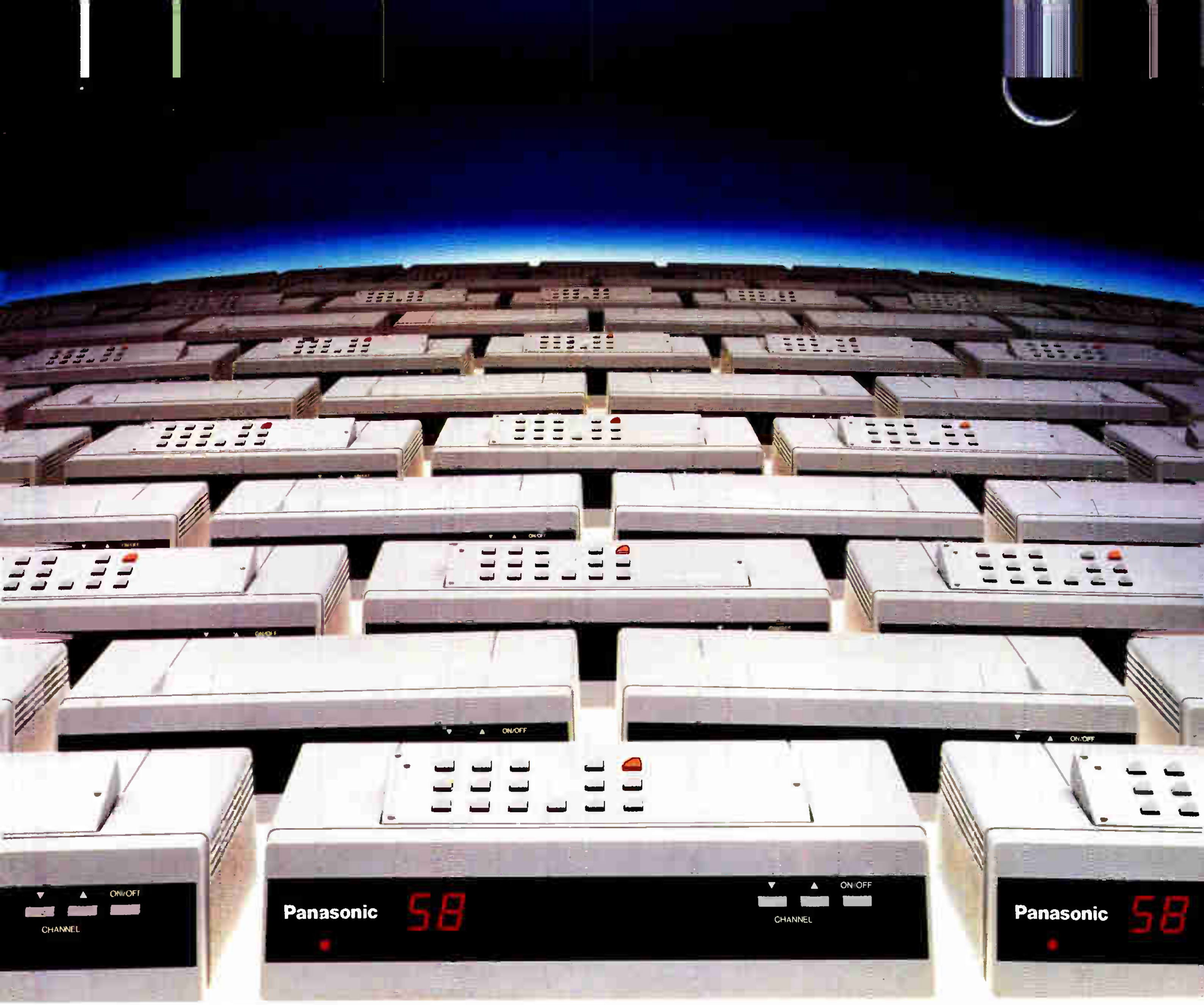
## Kudos

Congratulations to Bob Mauney on an excellent article. Engineers who are developing a noise "budget" for their systems must also consider the C/N of the converter. If a converter with a C/N of 47 dB at a particular input level is added to a system with a C/N of 43.9 dB, the overall C/N as delivered to the subscriber TV input will be 42.2 dB:

$$-10 \log (10^{-47/10} + 10^{-43.9/10})$$

Thus, if an overall C/N of 44 dB is desired, combined headend plus distribution plant C/N must be somewhat higher than 44 dB.

***Nick Worth***
***Vice President, Engineering***
***Telecable Corp.***




# Behind every Panasonic® cable converter lies 25 years of cable know-how.

Cameras. Switchers. Monitors. Video recorders. You name it. For over two decades Panasonic has been supplying high-quality video components to both the broadcast and cable industries. In fact, we've been supplying CATV converter components for years.

But cable know-how is just one reason to install Panasonic CATV converters. There's also the reliability you and your subscribers expect from Panasonic.

For your subscribers who want remote control, there's a Panasonic converter with a full-function infra-red control unit that fits snugly on the converter when it's not in use. You can also give them 15-channel memory for easy tuning. Two-speed up and down channel scanning. Even an optional parental guidance key for controlling the channels children watch.

No matter which Panasonic converter you choose, you'll discover that it pays to buy CATV converters from Panasonic. After all, we've been cable ready for years.

For more information, call Panasonic at (201) 392-4109 or contact one of these Panasonic CATV distributors.

Cable TV Supply Company
1-800-241-2332

S.A.L. Communications
1-800-645-9062

**Panasonic**
**Industrial Company**

**Reader Service Number 6**

Volume 11, No. 4

CED

EDITORIAL

Gary Y. Kim
Publisher/Editor

Lesley Dyson Camino
Production Editor

BOARD OF CONSULTING ENGINEERS

Chairman

**Wendell H. Bailey,** NCTA Vice President, Science and Technology

Members

**Ron Cotten,** Vice President of Engineering, Daniels & Associates Inc.
**Bob Dattner,** Vice President/Director of Technical Services, Media General Cable
**John Dawson,** Director of Engineering, Mile Hi Cablevision
**Roy Ehman,** Director of Technical Services, Storer Cable Communications
**Mark Elden,** Director of Engineering, Showtime/The Movie Channel
**Robert Luff,** Senior Vice President of Engineering, United Artists Cablesystems
**Steve Raimondi,** Director of Engineering (East), United Artists Cablesystems
**Sruki Switzer,** Consulting Engineer
**Joe Van Loan,** Engineering Vice President, Viacom Cablevision
**Nick Worth,** Vice President of Engineering, TeleCable Corp.

PRODUCTION

**Kathy Berlin,** Production Director
**Diane Krensky,** CED Art Director
**Nancy Laverty, Lynda L. Bickel,** Typesetters
**Judith Ferland,** Circulation Director

ADVERTISING

**Cathy Wilson,** National Sales Manager
**Suzanne Sparrow,** Classified Sales
**Kevon Storie,** Marketing Manager

International Thomson Communications Inc.

**Patrick Keleher,** President/Chief Executive Officer
**David Carlton,** Chief Financial Officer

OFFICES

**Denver** International Thomson Communications Inc., 600 Grant Street, Suite 600, Denver, CO 80203 -or- P.O. Box 5208 T.A., Denver, CO 80217, (303) 860-0111.
**Washington Bureau** 1625 I Street, Suite 615, Washington, D.C. 20006, (202) 835-0900.
**New York Bureau** 101 Park Avenue, Fourth Floor, New York, N.Y. 10178, (212) 661-7410.

## In Perspective

# Not worried? You ought to be

As the FCC proposes to drop its section 76.605 rules on signal quality, you might wonder why Mass Media Bureau Chief James McKinney recently warned the industry to worry about the change. Less FCC regulation is a good thing, isn't it?

Perhaps. Of course, there's the other possibility McKinney pointed out: "One of the concerns of our technical deregulatory efforts revolves around the possibility that we will, by default, create 50 or more sets of technical criteria that will have to be met in the various states."

Worried yet? Think this might be a problem? McKinney does. It's one thing to meet a single set of uniform national technical standards—quite another to meet dozens of varying rules. And that's assuming possible local rules vary only in roughly comparable numerical ranges.

Visual and aural carrier levels can fluctuate between jurisdictions. It's a bother and an expense, to be sure. But so long as the acceptable limits of signal quality track closely with the old FCC standards, it's a familiar beast.

There is, unfortunately, another scenario. Suppose a regulatory authority decided the old FCC technical rules were too lenient. Start worrying.

McKinney is suggesting the setting of in-house industry standards to replace the old FCC rules. He also is proposing some help in the area of technical guidelines franchising authorities can adopt. He would do so by publishing an FCC Office of Science and Technology bulletin containing the old rules. Local franchising authorities could adopt any of the rules as part of their agreements.

But any rules in excess of those guidelines would be barred. The FCC wouldn't recommend or require the adoption of these rules, of course, but regulatory bodies still would have technical quality standards to refer to if they desired.

But McKinney didn't just tell technical personnel to worry. He wants you to do something about it. Specifically:

- Learn all you can about new technologies.
- Educate your non-technical boss.
- Become more professional.
- Get more involved in the setting of technical policy.

Regarding the policy side, McKinney specifically called for more direct input from field level technical personnal as new FCC rules are pondered. He wants to hear from you—not just from the NCTA and other industry-wide representatives. He has asked *directly* for your input. As the Notice of Proposed Rule Making on Section 76.605 is considered, you've got a chance to make your views known.

The ball is in your court. You can worry or you can act. But you can't very well complain that things are done to you or that nobody asked. NCTA's Department of Science and Technology can tell you how to get your comments to McKinney. Give them a call.

Gary Y. Kim

# P III. SOMETIMES, LEAVING WELL-ENOUGH ALONE IS THE HARDEST PART.

In this space shuttle, micro-chip world of new today, gone tomorrow, it's good to know there are some things you can still rely on to stay the same. P III. Years of dependability. Years of proven service.

M/A-COM

**WHEN IT WORKS SO WELL, WHY TAKE A CHANCE ON ANYTHING ELSE?**

M/A-COM Cable Home Group, PO Box 1729, Hickory, NC 28603
800-438-3331, in NC 800-222-6808, telex: 802-166

**Reader Service Number 7**

# Digital television update

*By Nicholas Worth,*
*Vice President of Engineering,*
*Telecable Corp.*

Will the new generation of television sets, based upon digital processing chips, be able to defeat sync suppression scrambling? In August 1984 the NCTA Engineering Advisory Committee appointed a subcommittee to seek answers to this question. Subcommittee membership includes four representatives from cable MSOs and three from decoder manufacturing firms. During the period from August 1984 to the present, subcommittee members performed various tests utilizing television sets built with ITT Digit 2000 chip sets. The ITT Semiconductor Division in Lawrence, Mass., cooperated fully in providing materials and information to subcommittee members.

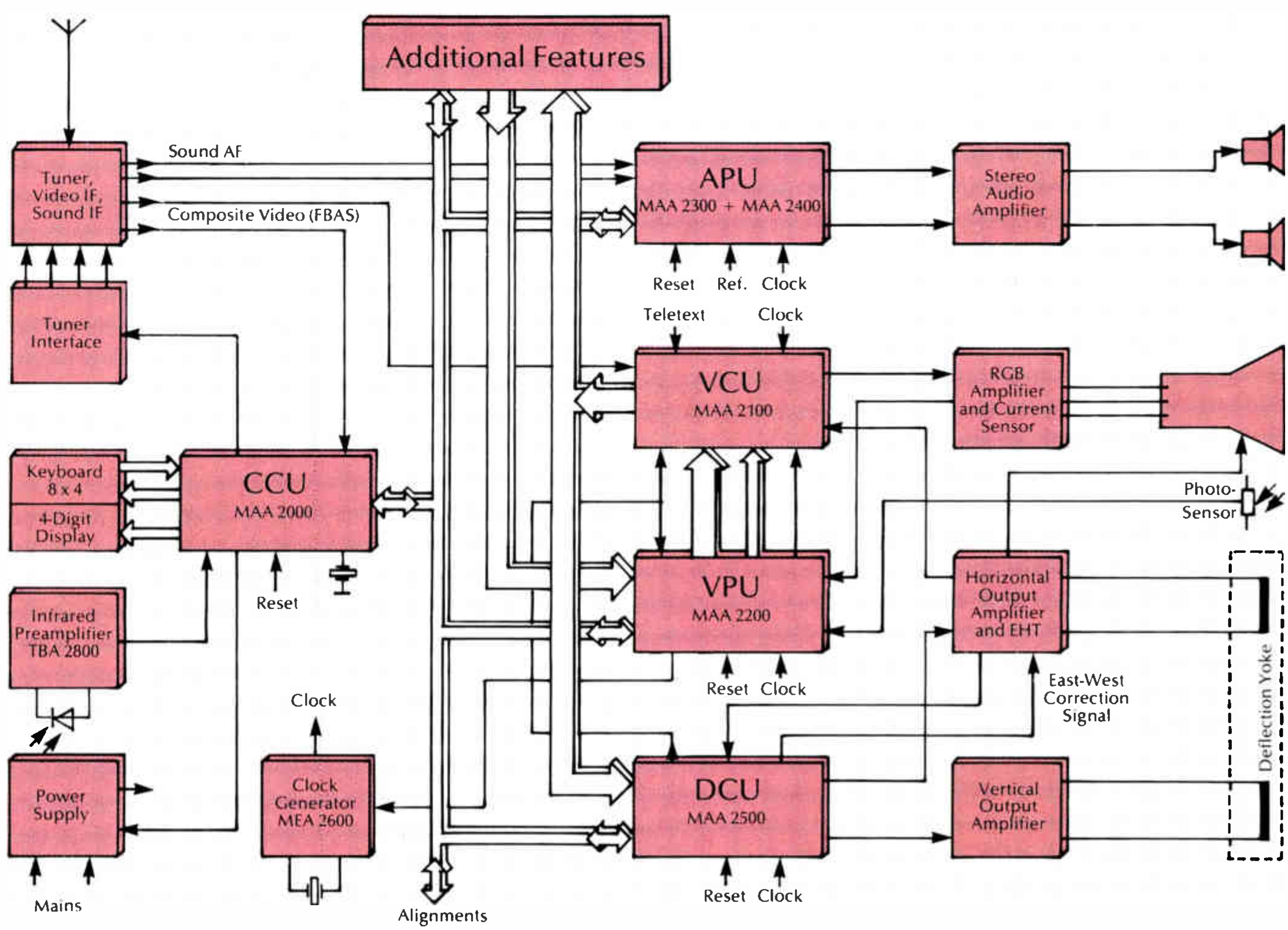
Before discussing the test results, a little background information is in order. A color television signal meeting the National Television Systems Committee (NTSC) standard has a fixed relationship between its vertical and horizontal synchronization frequencies and its color subcarrier frequency. This fixed relationship allows frequency interleaving of luminance and chrominance energy, reducing chrominance interference with luminance information.

In an NTSC video signal, $F_h = F_{sc} \times 2/455 = 3.579545\ \text{MHz} \times 2/455 = 15{,}734\ \text{Hz}$. Also: $F_v = F_h \times 2/525 = 15{,}734\ \text{Hz} \times 2/525 = 59.94\ \text{Hz}$. Because of this relationship, it is impossible to derive the synchronization frequencies by counting down from a multiple of the color subcarrier frequency.

Shown in Figure 1 is a block diagram of a typical television receiver which uses the ITT Digit 2000 concept. The MAA 2000 Central Control Unit stores and outputs factory programmed alignment and control information and controls other chips in the set via the control bus. The CCU also interfaces with tuner circuits and user inputs. The MAA 2100 Video Code Unit converts the analog composite video signal from the

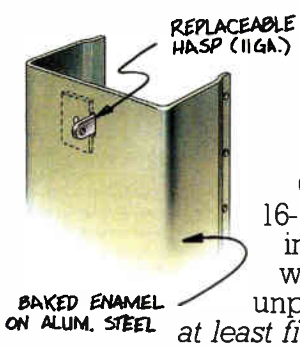
**Figure 1**

**Block diagram of a CTV receiver built on the DIGIT 2000 concept**




# We put the cable industry on its own pedestal

While others were adapting telephone pedestals for cable television applications, CWY was designing pedestals exclusively for the cable industry…a complete line of pedestals built to *your* specifications …not someone else's.



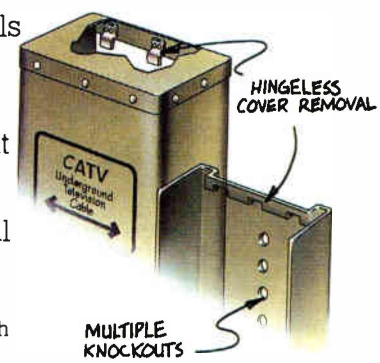

For example, CWY pedestals feature 16- and 18-gauge T2 aluminized steel construction, which tests show outlasts unpainted galvanized steel *at least five-to-one*. Plus, the rectangular design assures ease of installation and maximum use of interior space.

CWY pedestals are easier to service, too; the positive, secure, hingeless cover removal system allows the front cover and top to lift off as one unit, giving you full exposure of the pedestal interior.

And while other manufacturers bend out a piece of steel and call it a hasp, CWY pedestals feature tough, 11-gauge plated steel hasps that are rugged and fully replaceable.

Multiple knockouts for ease and flexibility in equipment mounting…interior lid guides for extra security…an innovative stake lock that keeps the pedestal right where you planted it…and a whole lot more. All at prices you'll find *very* competitive.

So why buy pedestals made for someone else? CWY designed them just for you. For more information about CWY's complete line of pedestals and other cable TV solutions, call or write today.




Standard sizes: 4"x5", 5"x8", 7"x7", 6"x9", 10"x14". Call with specifications for custom sizes.

**Not just supplies. Solutions.**

CWY electronics

P.O. Box 4519—Lafayette, IN 47903—Call Toll Free: 1-800-428-7596—Indiana: 1-800-382-7526

**Reader Service Number 8**

video demodulator into a digital signal for processing in the MAA 2200 Video Processor Unit and the MAA 2500 Deflection Processor Unit. Subsequent to processing, the digital signals are reconverted to analog red, green and blue signals in the MAA 2000 chip. The MAA 2200 Video Processor Unit digitally (arithmetically) processes chrominance and luminance information. The MAA 2500 Deflection Processor Unit performs clamping, sync separation and sync recovery. It is the MAA 2500 chip which is of primary interest in this discussion.

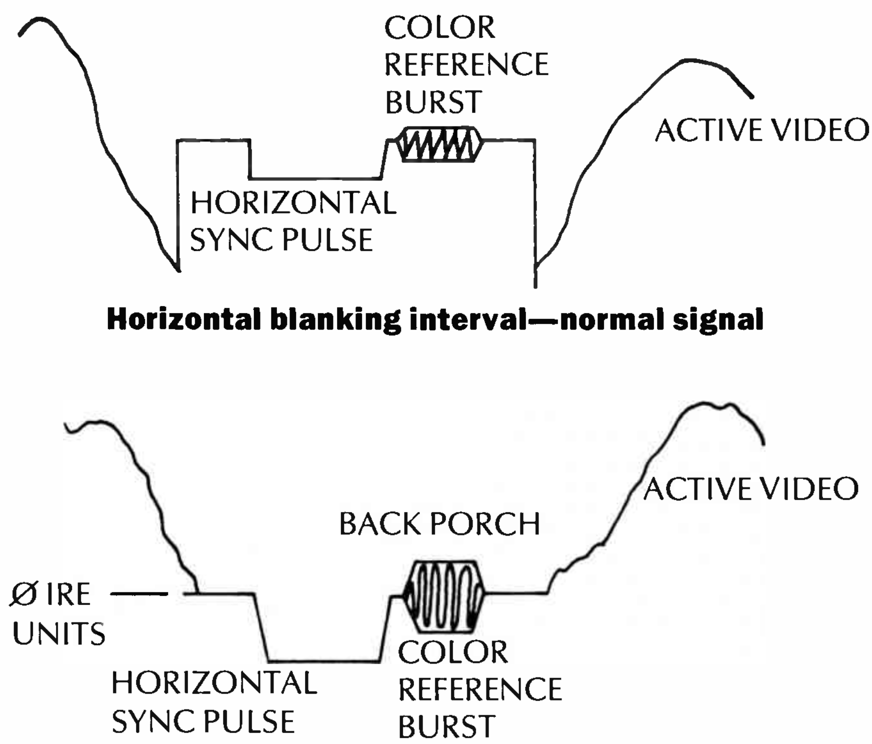
Horizontal sync first is recovered by traditional clamping and slicing methods. To improve noise immunity, an internally generated CW signal is digitally phase locked to the recovered sync and used for horizontal synchronization. With an NTSC signal, even further noise immunity is possible. If the ratio of color reference burst to recovered sync is stable, indicating a fixed relationship, the MAA 2500 chip automatically switches to the "burst" mode in which $F_h$ is derived by counting down a multiple of $F_{sc}$.

Vertical sync is first acquired by digitally integrating the separated composite sync, then acquired by phase locking an internally generated CW signal to the recovered vertical sync signal.

When a television signal is scrambled by suppressing or offsetting horizontal sync (Figure 2), a TV employing the ITT Digit 2000 chip set cannot normally acquire sync. However, it is possible to preempt control of the MAA 2500 DPU chip from the MAA 2000 CCU and, by interfacing to the control bus, force the DPU chip to operate in the burst mode. The DPU will randomly sample the video signal until it captures the color reference burst. It then will recover the horizontal sync frequency and registration from the color reference burst. Capture time may vary from several seconds to several minutes. Even if synchronization can be established in this manner, the picture brightness and contrast (determined by sampling the back porch and sync amplitude) will be in error if the sync is suppressed, resulting in a dark, faded picture. It is, therefore, necessary to manipulate various viewing parameters such as brightness and contrast to recover a viewable picture.

Utilizing ITT digital television sets with externally available control buses, together with special bus interface hardware and an IBM PC with custom software, subcommittee members succeeded in obtaining viewable (although slightly darkened) pictures from sync suppressed scrambled signals. Every known type of fixed sync suppression scrambling was tested, with similar results. It is important to note that the viewing parameters necessary for recovery of a sync suppressed signal are not suitable for recovery of a clear signal. Therefore, each switch between clear and scrambled signals requires reconfiguration of viewing parameters and changing of horizontal and vertical sync recovery modes.

**Figure 2**




**Horizontal blanking interval—normal signal**

**Horizontal blanking interval—sync suppressed signal**

How much of a threat will television sets employing digital chip sets pose? Obviously, the average cable subscriber will not acquire the expertise and expend the money necessary to control a digital television set in the manner described above, but what if this expertise and equipment is provided by a third party? Far fetched? The largest consumer electronics retailer in the nation currently supplies an "enhancer/stabilizer" for $59.95 that just happens to defeat "copy guard," used to protect video tape cassettes from unauthorized duplication.

When will digital television sets penetrate the marketplace in significant quantities? According to the Oct. 29, 1984, issue of *Television Digest*, ITT currently is supplying chips to 21 television set manufacturers. Toshiba, Zenith and several other manufacturers have announced plans to introduce digital television sets in 1985. But futuristic services for which the chip set was designed, such as teletext, have been slow to gain consumer acceptance. And set manufacturers' attention currently is focused on television stereo. Nevertheless, the ITT chip set promises to reduce assembly labor costs and improve picture quality. Digital televisions may achieve significant marketplace penetration within a few years.

What can be done to avoid future problems? First, NCTA *strongly urges* television set manufacturers to make accessible only those bus control functions necessary for alignment and repair by television service persons. This step will preclude the possibility of forcing the MAA 2500 DPU chip into the burst mode from a rear panel receptacle. Second, decoder manufacturers may take advantage of the knowledge gained from the tests which have been conducted, to develop effective counter measures. For instance, processing the satellite premium signals to periodically alter the frequency relationship between color reference burst and horizontal sync frequency for short durations might disrupt sync acquisition in the forced burst mode. Changing the depth of sync suppression produces varying brightness when viewing a sync suppressed signal on a digital TV. Third, decoder manufacturers and MSOs should strive to develop more secure encoding schemes. CED

# DYNAMIC DUO


# THE DRAKE PROFESSIONALS

Thousands of CATV, SMATV, and broadcast operators everywhere have placed their trust in DRAKE's professional equipment — and for good reason. Our name has been synonymous with excellence and reliability in the communications field for many, many years.

And this proud tradition continues with our professional VM2410 Modulator and ESR2240 Earth Station Receiver. Operated together or separately, the VM2410 and ESR2240 are an unbeatable choice for solid dependability and performance.

**The DRAKE VM2410 Modulator**
With the Drake VM2410 a single modulator provides 60 channel frequency agility. A simple push of a button will set the VM2410 output to any VHF Broadcast, Mid-Band, Super-Band and Ultra-Band channel up to 400 MHz. The VM2410 also features video low pass and IF SAW filtering for reliable operation in the most crowded systems. A full 57 dBmV output ensures maximum performance.

**The DRAKE ESR2240 Earth Station Receiver**
A true step ahead in design technology. Some of the ESR2240's outstanding features include fully synthesized transponder and subcarrier selection, block down conversion with our BDC-24 Block Converter or LNB, IF loop-through for easy multiple receiver installation, SAW filtering for maximum interference rejection and adjacent channel performance, full signal metering on front panel — and much more.

*When the bottom line is reliability, long-term service, and simple peace of mind — demand a DRAKE!*

**Call or write us today for more information.**

**R. L. DRAKE COMPANY** DRAKE

540 Richard St., Miamisburg, Ohio 45342, USA
Phone: (513) 866-2421 • Telex: 288-017

©COPYRIGHT 1985 R L. DRAKE COMPANY
**Reader Service Number 9**

# Digital sound

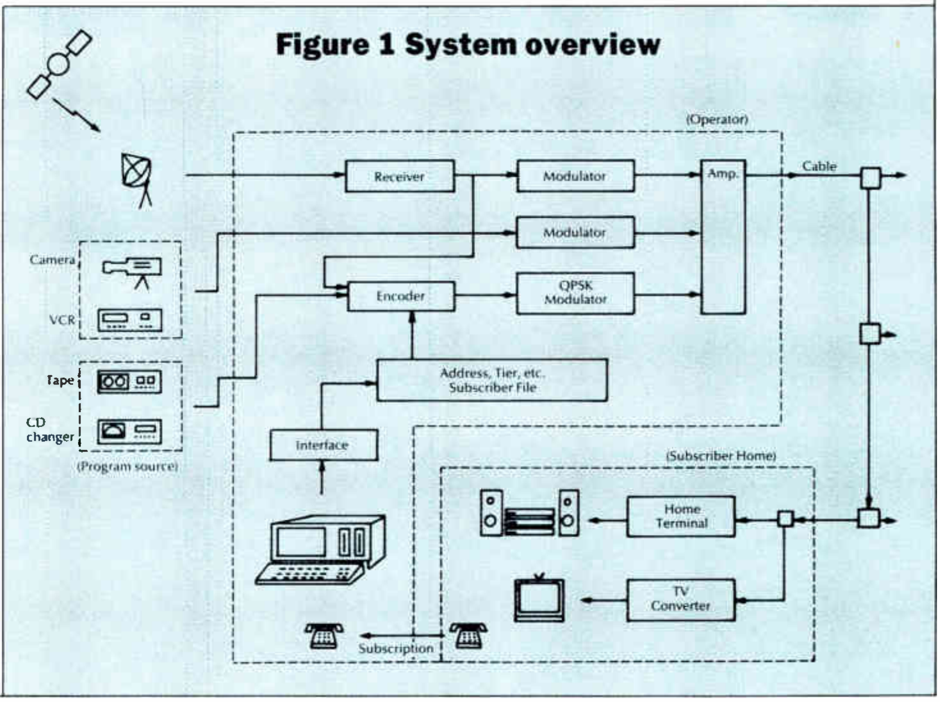
*By N. Ejima,*
*Masushita Electric Industrial Co. Ltd.*

The current requirements for a cable network transmission system, especially for cable audio, are: high fidelity transmission from the headend to a home receiver, high protection from signal piracy, frequency spectrum efficiency and electronic system control from a central office for signal allocation, bit-width mode change, program tiering, addressing, etc.

Digital format transmission, a long-awaited technology, can meet the requirements of today by virtue of sophisticated LSIs. Data compression techniques now are mature enough to become practical.

By careful study, it is possible to realize a digital home terminal cost that is less expensive than the analog type at a certain guaranteed level of signal quality. This paper describes our currently developed system which includes the above features.

**Figure 1 System overview**




## Does Your *Cable System* Have A *Filtering Problem*? Need Help Today?

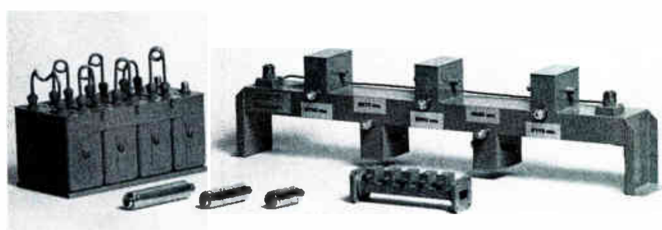
**Call our Applications Engineers Now!**

They can help you choose from over 800 CATV filters, or they can quote you a special before you hang up. How long will you have to wait? Delivery is usually *less than* 10 days.

- **Bandpass Filters**
- **Pay TV Traps and Tiering Filters**
- **Filter Networks for Multisubscriber Hookups**
- **Co-Channel Eliminators**
- **TVRO Interference Suppression Filters**
- **CARS Band Filters & Traps**

You don't have catalog C/84? This complete product guide features over 800 filters and traps for CATV/MATV/SMATV/TVRO. Call us for your free copy today— and have it on hand when problems crop up. It's FREE!

**DISTRIBUTORS WANTED!**
*Call Bill Bostick at our plant toll free for more information*



*Jean Dickinson will help you select a standard filter—or design a special for you.*

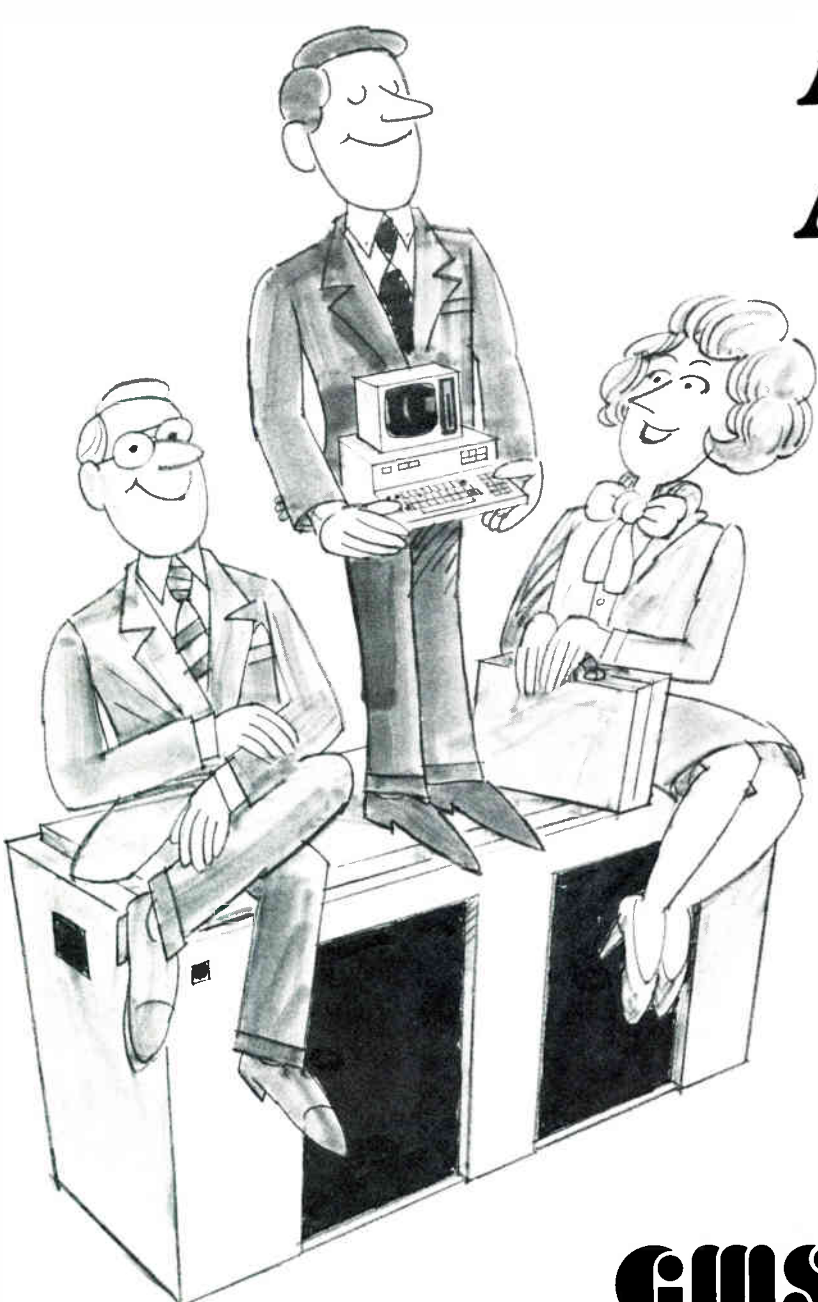

*Free catalog C/84*

MICROWAVE FILTER COMPANY, INC.

**Toll Free: 1-800-448-1666**
**Collect (NY/HI/AK/Canada): 315-437-3953**

6743 Kinne St.
E. Syracuse, N.Y. 13057

Reader Service Number 10



# All Clients Are Big To GMS !

Some of our clients need our Business Manager on-line computer service.

While others want our Business Manager product as a license to operate on their own large IBM computer.

Still others need our Business Manager product running on IBM personal computers.

And that's fine with us, because regardless of size, 1,000 to over 100,000 subscribers, we have an on-line product to fit your needs.

All of our products feature IBM Computers. From the biggest of the little, the PC-AT*, through the 4300 series, to the biggest of the big, the 3081 mainframe. With IBM you know your investment in hardware is secure.

So no matter which on-line system you have, you'll still be big to GMS!

*GMS is an authorized IBM PC-AT dealer.
IBM, PC-AT, 4300 and 3081 are trademarks of International Business Machines Corporation.

**GMS**

2050 Bering Drive • San Jose • California 95131
(408) 998-8078

**Reader Service Number 11**

---

If your company wants to change to a more productive on-line system, fill out this coupon and mail today.

☐ Send more information
☐ Have a sales representative call me to arrange a demonstration

**Gill Management Services, Inc.**
Business Manager Sales
2050 Bering Drive
San Jose, CA 95131
CTVB 85

Name: ____________________ Title: ____________________

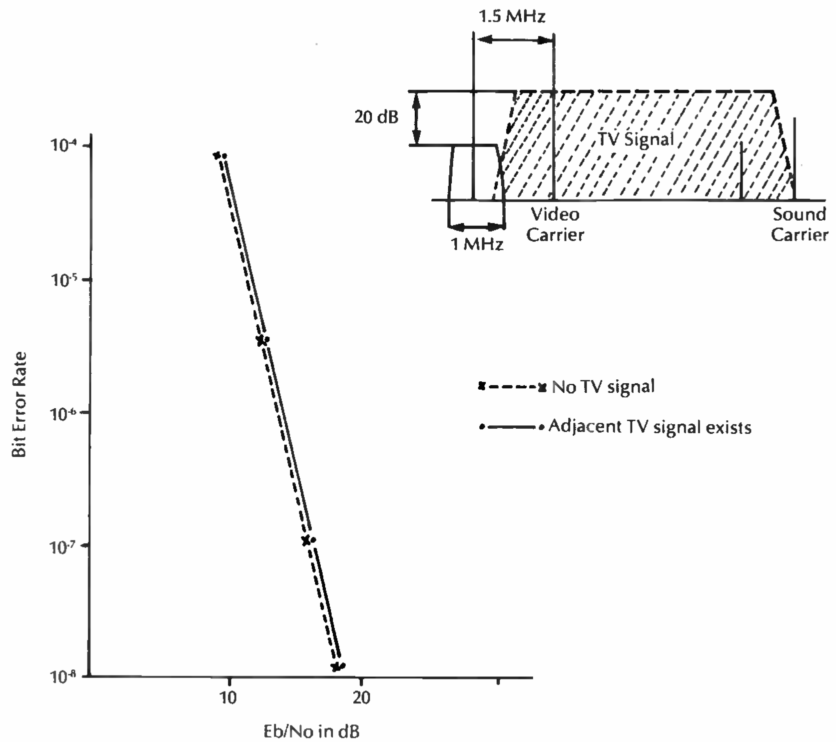
Company: ____________________ # Subscribers: ____________________

Address: ____________________ City: ____________________

State: ____________________ Zip: ________ Phone: (     ) ____________________

**CED 4/85**

**Figure 2**
**Characteristics of interference from adjacent channel**




### System overview

The system consists of headend equipment and a home subscriber terminal (Figure 1). There are two kinds of headend equipment for the system: an encoder that converts the analog audio to a digital format and control signals, and a modulator that modulates the RF (radio frequency) signal by QPSK (quadrature-phase shift keying).

This equipment is connected with currently used operator headend equipment such as a line distribution amplifier. The control signals include channel codes, mode codes (hi-fi or ultra hi-fi mode), addressing code, tiering codes, etc., and can be connected to a billing computer through an interface.

The home terminal, which is a receiver/decoder, is installed in the same way as a CATV converter in a subscriber home. Audio is available from the L and R output terminals, which then are connected to the stereo amplifier.

A transmission frequency is assigned independently from the channel number. It is a convenient system; for example, when CH 3 of the TV program is stereo or bilingual, an operator can assign any frequency slot for TV stereo or bilingual program. Moreover, should it happen that the frequency must be

ANOTHER TOP HEADEND PERFORMER

NEW FM SUPERTRUNK MODULATOR AND DEMODULATOR

**Models 8100/8200.** The 8100 modulator and 8200 demodulator provide a winning combination for keeping your video signal intact over the long haul, and can help put a simplified, reliable long-distance transmission system within reach of your budget. Faithful reproduction and an excellent signal-to-noise ratio are ensured by ultralinear modulation through UHF IF, along with minimal differential phase and gain. Both the 8100 and 8200 also provide bandwidth versatility of 12 to 18 MHz, while delivering from 17 to 28 dB FM improvement. For more information on this or any of Phasecom's high-performance headend equipment, contact:

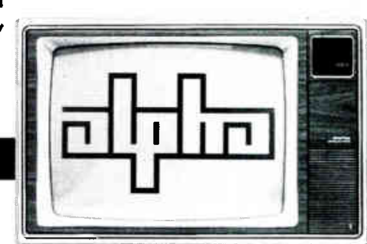
PHASECOM CORP.

6365 Arizona Circle, Los Angeles, CA 90045
(213) 641-3501 • Telex 181899

**Phasecom reliability: because everyone's watching you.**

Reader Service Number 12

Lasting Image



Alpha standby power

Reliable Standby Power will leave a lasting image on your subscriber's TV set.

Let Standby Power help cure your outage problems, not create them. Use Alpha Standby Power supplies. They last!

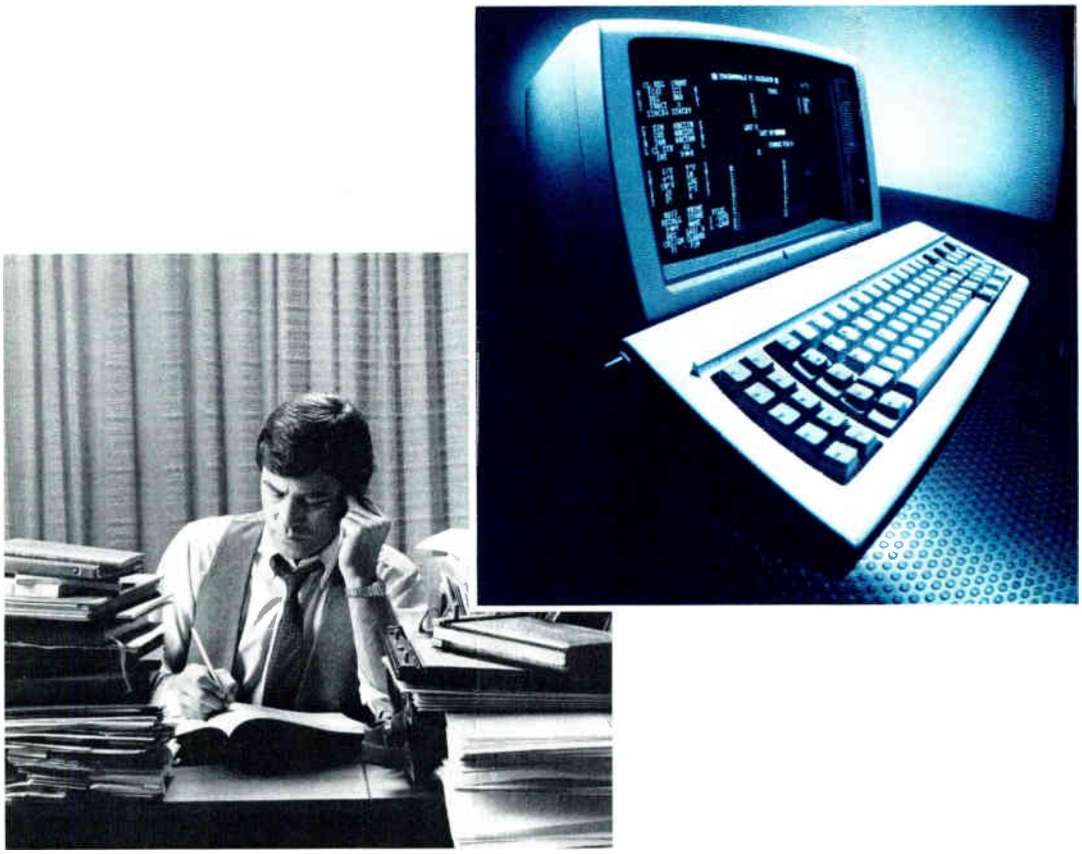
*Represented in your area by:*

MN,WI,ND,SD,IA, **A & M COMMUNICATIONS** (612) 920-5215 • MI,IN,KY,IL,OH,MO,KS, **R. ALAN COMMUNICATIONS** (317) 849-7572 • TX,AR,LA,OK, **CABLE TV SERVICES** (214) 494-3348 • WA,ID,MT,OR, **BILL DONALDSON CO.** (206) 745-3454 • GA,FL,NC,SC,AL,MS,TN, **MICRO-SAT S/E, INC.** (404) 971-1021 • PA,NJ,DE,MD,VA, **NCS INDUSTRIES** (215) 657-4690 • NY,NH,ME,VT,CT,MA,RI, **R.F. TECHNOLOGIES** (516) 623-5899 • AZ,NM,UT,CO,WY, **WESTEC COMMUNICATIONS, INC.** (602) 948-4484 • CA,NV, (707) 255-2010 • CA,NV, (714) 521-9833 • DISTRIBUTED BY: **ANIXTER COMMUNICATIONS** 800-323-8166

YOUR BEST BUY IN THE LONG RUN

**ALPHA TECHNOLOGIES (206) 671-7703**

Reader Service Number 13



# Now even your smallest system can afford on-line, on-time subscriber management.

## FDR's new Micro Delivery Option provides consolidated financial reporting, centralized statements and more.

Even the smallest cable operation is a contributor to their MSO's big picture. MDO ends old-fashioned record keeping and reporting by providing hands-on control of all information.

Most important, MDO was developed from performance proven software. It's available NOW, ready to give your operators welcome relief from primitive procedures.

### More MDO Benefits:

- 16 bit micro computers with networking capabilities, flexible hardware configurations, adaptability to existing hardware, and multiple hardware vendors.
- On-line access to both current and historical subscriber information.
- Comprehensive work order processing for multiple tiers and service codes.
- Complete accounts receivable reporting, extensive management reporting, exclusive consolidated MSO financial reporting and centralized statement processing.
- MDO is easy to operate!

### The FDR edge

First Data Resources has the reputation of being in tune with the ever changing world of data processing. Micro Delivery Option was developed to broaden FDR's product offerings to encompass the growing needs of Cable MSOs. Now, no matter how large or small your system, First Data Resources delivers quality on-line capabilities.

FDR's Micro Delivery Option is ***available now***. Call or write First Data Resources, Inc., Marketing Department (CS-10), 10815 Old Mill Road, Omaha, NE 68154. Call 1-800-228-9079.

**See us at the Western Show — Booth #580.**

First Data Resources Inc.

**Reader Service Number 14**

changed for some reason, it easily can be assigned without the subscriber becoming aware of the change.

## Digital modulation

The QPSK modulation system is used to transmit the digitized audio via cable. QPSK needs 23 percent less bandwidth compared with BPSK-VSB (biphase shift keying, vestigial side-band). Table 1 shows the result of our study for modulation choice.

Table 1

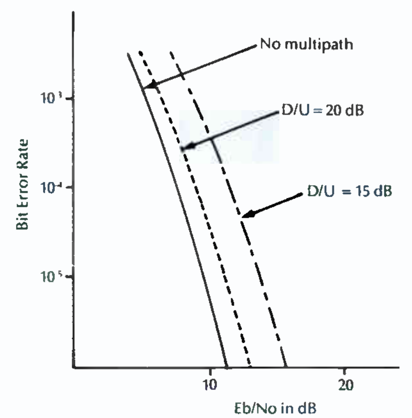
| Modulation | Eb/No* at $10^{-4}$ BER | BW *** |
|---|---|---|
| ASK | 14.4 dB | 1.3R** |
| BPSK | 8.4 dB | 1.3R |
| BPSK-VSB | 11.4 dB | 1.6R/2 |
| QPSK | 8.4 dB | 1.3R/2 |

* Eb/No: bit energy to noise density
** R: bit Rate
*** Roll off rate = 0.3

Another merit of QPSK is that carrier transmission is not required. It, therefore, contributes to a lower beat interference from the adjacent channel. (VSB needs a carrier for reproduction.)

Figure 2 shows experimental data from a study of interference from the adjacent channel. Even with an increase of 20 dB of an adjacent TV signal, the quality of the data is not signficantly degraded.

**Figure 3**
**BER vs. Eb/No (worst case)**




One factor of great concern in a CATV plant is a reflection (echo) caused by mismatching. The signal degradation caused by reflection appears as a lower S/N (signal to noise) ratio, which is varied by phase difference of RF signal and delay time. The worst case in QPSK occurs when the phase difference of the RF signal is 90 degrees and the delay time (t) = T. (T is the period between samples.) In this case if the D/U ratio (ratio of desired to undesired signal) is 15 dB, the Eb/No ratio (bit energy to noise density ratio) becomes 3.5 dB worse equivalently. (See Figure 3.) If the D/U ratio is 20 dB, Eb/No ratio becomes about 1.5 dB worse. Then, the BER (bit error rate) is acceptable even when other terminals of the cable are open or short since the D/U ratio is more than 15 dB.

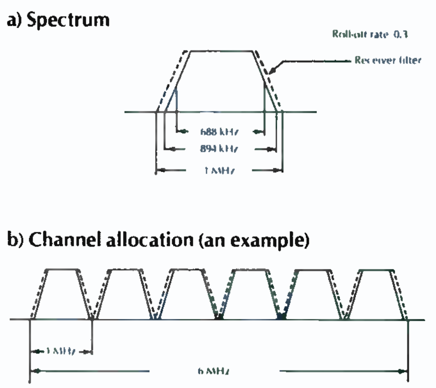
In order to limit the bandwidth of the RF signal, 30 percent roll-off filter is used and 1.376 Mbps of digitized data is transmitted in a bandwith of 894 kHz. A guard bandwidth is necessary so that the total bandwidth is 1 MHz. Figure 4 shows the spectrum and an example of channel allocation.

The signal is transmitted in a form of frame periodicity. It is important, therefore, to design an effective bit allotment in the frame for simplicity of decoding, error correction and efficiency of transmission.

The frame structure is shown in Figure 5. Each of the S-1 and S-2 blocks has 32 samples of 16-bit PCM data in either the "ultra high fidelity" mode or alternatively 32 samples of two 8-bit PCM data in the "high fidelity" mode. Each frame is sent every lms; therefore, the total bit rates result in 1.376 Mbps and a sampling frequency result in 32 KHz.

To maintain digitized data through the transmission system at a low error rate during a limited period, interleaving is performed in a frame structure. Figure 5 shows the interleaving matrix of the system. Two PCM data (S-1 and S-2) make a 32-bit line and the lines make an interleaving matrix. Each bit is sent in sequence vertically from top to bottom and left to right. This means 32 successive errors are spread out into 32 different lines and the signal error bit can be corrected in each line. Through this interleaving, any pulse type noise below 23 microseconds in duration does not generate a 'click" or "pop" in the reproduced sound.

**Figure 4**
**Frequency spectrum and channel allocation**

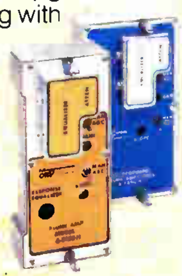




BEN HUGHES
COMMUNICATION PRODUCTS CO.
304 BOSTON POST ROAD, P.O. BOX AS,
OLD SAYBROOK, CT 06475 (203) 388-3559
Reader Service Number 25

# How to prevent your rebuild from turning into a can of worms.

Talk to Magnavox immediately. We have years of rebuild-upgrade experience from working with hundreds of different cable systems.



Plus, we have very advanced, yet economical drop-in modules you can depend upon.

Our modules are designed to help you save money, make money and win refranchise battles.

For example, our exclusive single hybrid Power Doubling™ and Feedforward electronics provide optimum distortion/noise performance. With high output levels so you'll invest in fewer amplifiers; and high gain for a longer, more economical reach.

And everything you need to rebuild is available from Magnavox which guarantees hardware compatibility, simplifies ordering, and saves time and money.

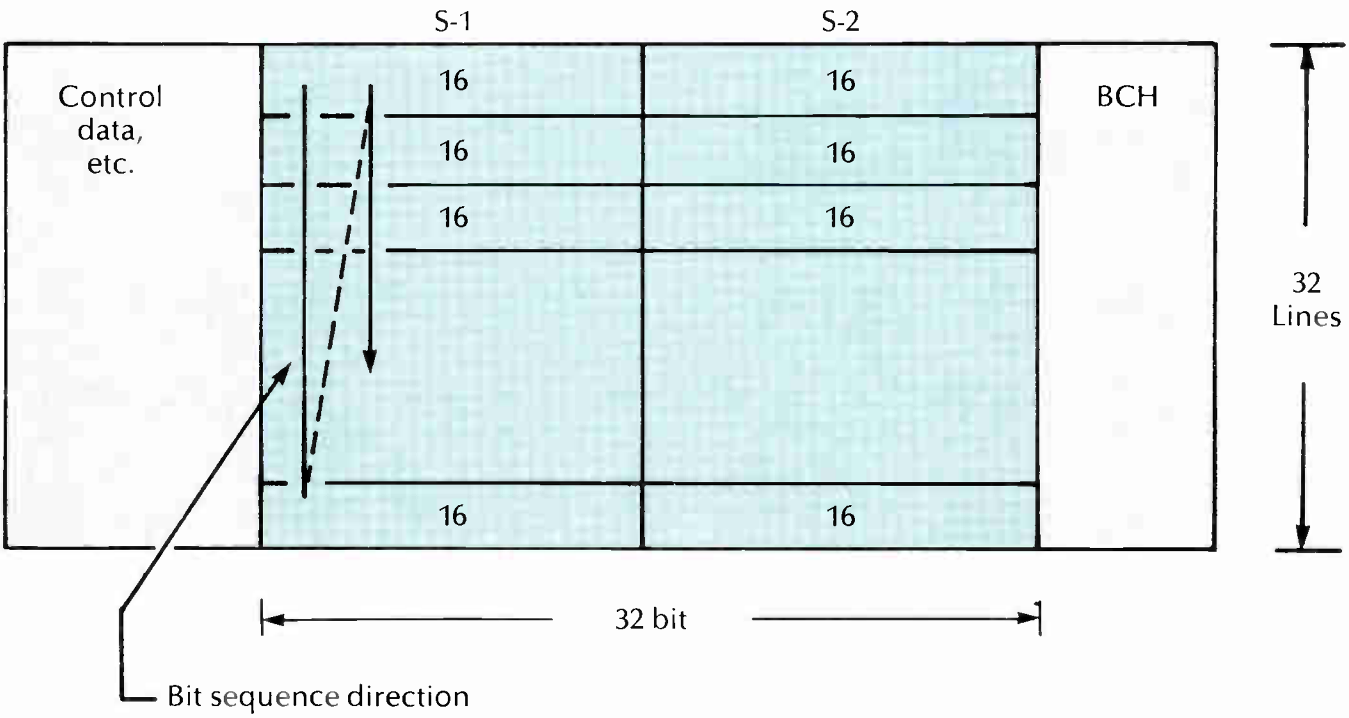
Make sure your rebuild turns out to be a bowl of cherries. Instead of a can of worms. Please contact your Magnavox account executive, or write, or call us toll-free.

Magnavox CATV SYSTEMS, INC.

A NORTH AMERICAN PHILIPS COMPANY
100 FAIRGROUNDS DR., MANLIUS, N.Y. 13104
TOLL-FREE 800-448-5171 (IN NY, 800-522-7464)

Reader Service Number 16

**Figure 5 Interleaving matrix**





# King of Rack n' Roll

Rack n' Roll is here to stay and the king is producing the hottest numbers around! When Triple Crown creates a new head end the results are solid gold for sure! We start with our best electronic equipment, get it all together, plug in our instruments, set the levels and balance everything for superb harmony. Only if our people are pleased to the max, do we pack it up and put the show on the road.

When it rolls onto your site, the hookup is quick and the performance will blow you away. For a picture perfect Rack Video, this shining silvery monolith is heavy metal like you've never seen before.

Let Triple Crown book a Rack n' Roll Superstar for your viewers ... they won't believe their eyes.

**TRIPLE CROWN ELECTRONICS**
MISSISSAUGA, ONTARIO
(416) 629-1111
DEERFIELD BEACH, FLORIDA
(305) 429-0870

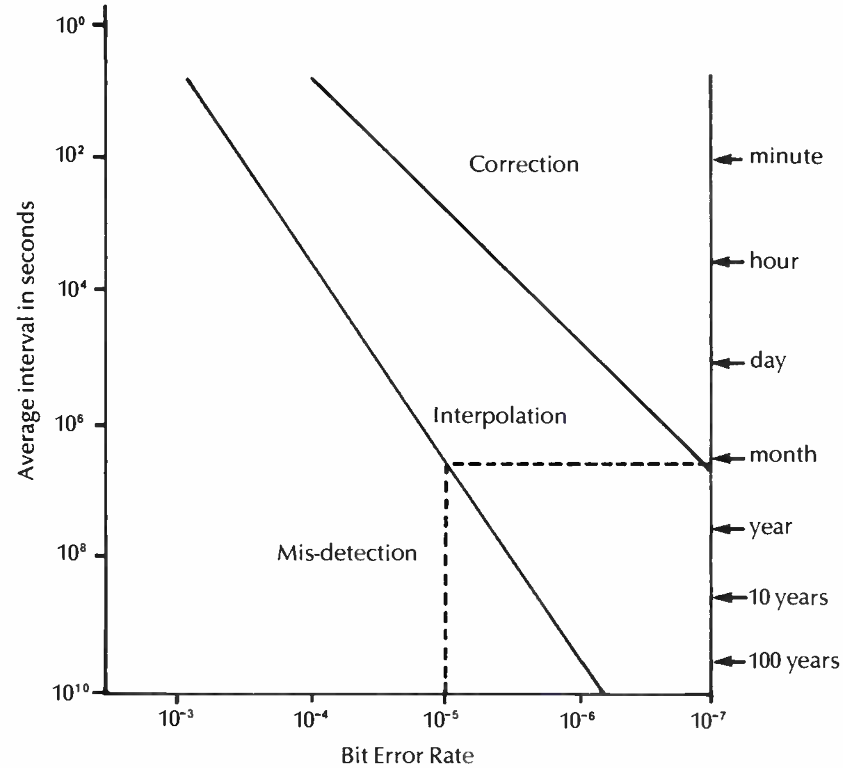

Reader Service Number 17

The data format includes BCH codes that allow a one bit error of sound data to be corrected and a two bit error to be detected. When a two bit error occurs, it is interpolated with other data. Two kinds of interpolation are utilized in order to obtain error concealment in this system. One is interpolation by using the average data; the other is by using the previous data. If one block is detected, the average of previous and following data would be substituted. If more than two blocks are consecutively detected, the previous data would be substituted until a correct block comes. It was experimentally confirmed that the dual interpolation method is effective for the least degradation of reproduced sound. Probability of misdetection, which might be translated to "click" or "pop," is calculated as Pm = 39C3 *ER3 (where ER is a bit error rate before detection). Therefore, average interval of misdetections (Tm) is Tm = 1/(Pm*fb) (where fb is the block frequency). This is illustrated in Figure 6. For instance a subscriber would hear one "click" at an error rate $10^{-5}$ during one month of continuous listening.

The data format also includes control codes.

- The channel code is an index to indicate the allocation of a channel,

**Figure 6 Performance of error protection**





# Checking response flatness for these units?

± 0.25 dB
Accuracy
4.5-450 MHz
MHz Ratio: 100 to 1

Call or write for
free color brochure
**Available at major**
**CATV Distributors**


## it's easy with Sadelco's SC 450 Spectrum Calibrator

**Sadelco, Inc.** 75 West Forest Avenue, Englewood, New Jersey 07631 201•569-3323
General Representative for Europe: Catec AG, Habsburgerstr 22, 6003 Luzern TEL. 041-559-275 TELEX SICOM 78168


Reader Service Number 18

# If your cable system needs a reliable Billing/Accounting System, get the computer system most cable operators rely upon* . . .

## get SMART® by TONER.

If you need instantaneous and accurate financial information, choose the system that most cable operators rely upon. It's a proven performer.

Designed by cable experts, easy to use, SMART replaces cumbersome error prone manual systems or shared data systems that are inflexible and expensive.

®Subscriber Management and Accounts Receivable Tracking

**Modular in design, the SMART Package consists of:**

- Subscriber Billing
- Daily Cash and Accounts Receivable Journals
- Month/Year End Cash and Accounts Receivable Summary Reports
- Outlet Count, Penetration, Churn, and Pay Tier Distribution Reports
- Delinquent Account Identification
- Production of Labels, Coupons, Invoices, Late Notices, and Letters
- Converter Serial Number Reports for Inventory Control
- A Report Generator for Customizing Subscriber Listings
- Homes Passed Listings for System Audits & Marketing Campaigns
- Automatic Account Number Assignments
- Account Recall by Name and Street
- Franchise Breakdowns of all Management Information
- Manual Work Order Scheduling
- Automatic Work Order Scheduling
- Automatic Production of Disconnect Orders for Nonpays
- Automatic Update of Subscriber Data from Completed Work Orders
- Production of Orders by Schedule Date
- Work Order Status Reports

**ADDITIONAL MODULES AVAILABLE**

- Accounts Payable
- General Ledger
- Payroll
- Inventory Control
- Addressable Interface

That's why our SMART® computer is the CATV industry's number one choice for in-house data processing. It's backed by toll-free customer hot lines, trained software support specialists, and our own staff of CATV programmers. All with one purpose in mind: to keep your SMART® computer running efficiently and trouble-free.

For more information call toll-free: 800-523-5947; in PA, 800-492-2512. SMART comes in configurations to accomodate any size cable company.

**SMART features hardware from Texas Instruments.**

**Toner**
**cable equipment, inc.**

969 Horsham Road/Horsham, PA 19044

*More stand-alone in-house CATV Billing/Accounting Computer Systems sold by Toner, than any other supplier.

**Reader Service Number 19**

not a channel number. By associating the index with a TV channel number, it is convenient to use as a simultaneous audio for MTS applications.

- There are two modes of sound quality. The *Ultra High Fidelity* (UHF) mode is 16 bits linear quantization equivalent to the quality of compact disc, one stereo channel in a 1 MHz bandwidth.
- The *High Fidelity mode* (HF) is 8 bits linear quantization, which is better than the quality of conventional FM broadcasting, two stereo channels in a 1 MHz bandwidth.

  Examples of the availability of these two channels are as follows:
  Stereo + stereo
  Stereo + TV stereo
  English TV stereo sound + bilingual TV sound
  Stereo + high speed data
- The addressing code is the address of the subscriber. It consists of two portions; one is an operator code and the other a subscriber code. This code is capable of assigning 4,000 operators to addressing 500,000 subscribers in each system.
- Other codes include:
  - Tier code
  - Scrambling code
  - Synchronous code
  - Parental control code
  - MTS tracking code

## Bit number reduction technology

QPSK modulation is one method used to reduce bandwidth. However, transmission of high quality sound with less digitized data is an essential point for total bandwidth reduction. A technology introduced as follows is a new system to reduce the bit number.

The objective of this development was to realize a sound quality better than FM. By using 8 bit, we can take advantage of circuits and IC technology already well known. Then the commonly known circuits for digital processing can be adopted.

Figure 7 is a block diagram of the system. An analog input signal is converted into PCM data by a 16-bit analog-to-digital converter. The 16-bit PCM data is transformed into 8-bit data through unique 16 to 8 bit compression, which includes a 16 to 8 bit compressor, 8 to 16 expander, predictor and two kinds of feedback loops.

The 8-bit output signal is the input signal for a receiver circuit which includes an 8 to 16 bit expander and predictor. Finally, an analog output signal is derived through a 16-bit digital to analog converter.

The most effective factor for high sound quality in the system is the quantizing functions of the 16 to 8 bit compressor and of the 8 to 16 bit expander. The final function was determined by many of the experimental listen tests and simulations. The design of the predictor also is useful for protection against bit errors on the transmission line.

As a result of the development of the bit number reduction system, representative characteristics are as follows:
Dynamic Range - more than 85 dB
S/N Ratio - more than 65 dB
Harmonic Distortion - less than 0.08 percent

The quality of most music programs in our listen tests was very good. It was almost impossible for our listening panel to discriminate between the 8-bit digitally companded system and the 16-bit linear system.

## Security against signal theft

Digital modulation of the format itself does have a kind of security since conventional receivers cannot reproduce it. However, more security is necessary to protect from unauthorized subscribers, illegal modification of equipment or black markets.

There is a special scramble system for

PRODUCT CWY electronics BULLETIN

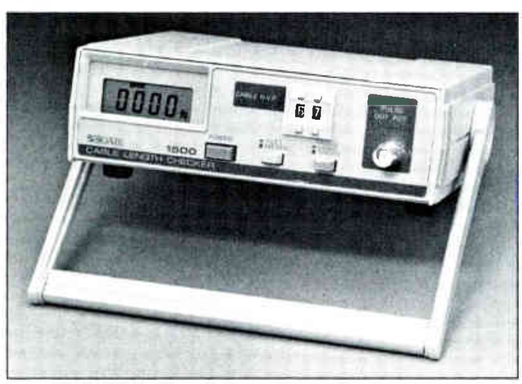
**Cable Length Checker... Easy-to-use, Accurate and Only $495**

Now available to the CATV/MATV industries exclusively from CWY Electronics...the Model 1500 cable length checker (time domain reflectometer) that helps you locate cable problems easily and accurately...at an incredibly low cost.

The Model 1500 can be used to locate opens and shorts in any cable with a constant velocity of propagation, including 50 ohm, 75 ohm, and 93 ohm cable, and paired cable.

And the real beauty of the Model 1500 is that it's so simple to use, requiring no special training. For example, the Model 1500 features a four-digit LCD display for the length of the coaxial cable from 5m (15') to 2,000m (6,500') and indicates whether the cable termination is open or short. The conversion switch on the front panel allows you to select readout in feet or meters, whichever best suits your requirements.

Also, the Model 1500 features two digital switches that allow easy operation for the cable nominal velocity propagation setting from 0.01 to 0.99...and rechargeable Ni-Cad batteries, AC adaptor, and 12-volt battery mean long life and reliable operation wherever you are.




**Look at the accuracy you can expect from the Model 1500:**

| Short Range (22°C) | |
|---|---|
| Cable Length | Model 1500 |
| 10m (33') | 10m (33') |
| 100m (328') | 103m (338') |
| 200m (656') | 200m (656') |
| 300m (984') | 297m (974') |
| 400m (1312') | 396m (1299') |

| Long Range (22°C) | |
|---|---|
| Cable Length | Model 1500 |
| 100m (328') | 102m (335') |
| 500m (1640') | 493m (1617') |
| 1000m (3280') | 986m (3234') |
| 1500m (4920') | 1507m (4943') |

For further information or application assistance regarding the Model 1500 and other products available from CWY, write or call toll-free today.

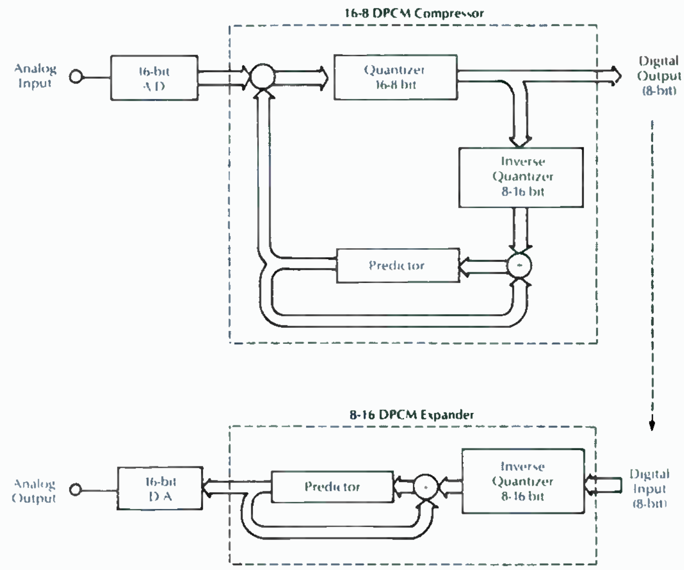
CWY electronics

**Not just supplies. Solutions.**

P.O. Box 4519
Lafayette, IN 47903
Call Toll Free
1-800-428-7596
Indiana
1-800-382-7526

Reader Service Number 20

**Figure 7 Bit number reduction system**




this purpose. A scramble key code is delivered to authorized home terminals in a control period and the key descrambles the signal. In order to deliver the scramble key with high security, an encryption system with crypto address codes is used.

Those time-variant scramble key codes and crypto address codes make it possible for an operator to stop the work of pirates or nonsubscriber home terminals. Also, these codes make it essentially impossible to steal the data format or descramble the key code from the transmission line.

## Signal processing

Figure 8 shows a block diagram of the signal processing including most of the functions mentioned above.

As a sending system, the music signal is digitized by an A/D converter, and the digitized bit is transformed into an 8-bit word by the bit number reduction circuit when in the hi-fi mode.

The data goes through a parallel-serial transformer, BCH code adder, scrambler, interleave process and control codes adder. This output is serial data, and a roll-off filter and QPSK modulation are applied. Finally, power amplifiers send out this data onto the cable line.

A home terminal tunes the RF signal and demodulates the QPSK signal. After frame and bit synchronizing, each control code is separated and the main data are deinterleaved. Then error correction, descrambling and DPCM expansion take place. Finally, the analog L and R signal is available through the D/A converter.

The system control in the sending system is connected to the billing computer and it supplies addressing codes, tiering, scrambling codes, etc. In other words, the system controller controls all codes simultaneously.

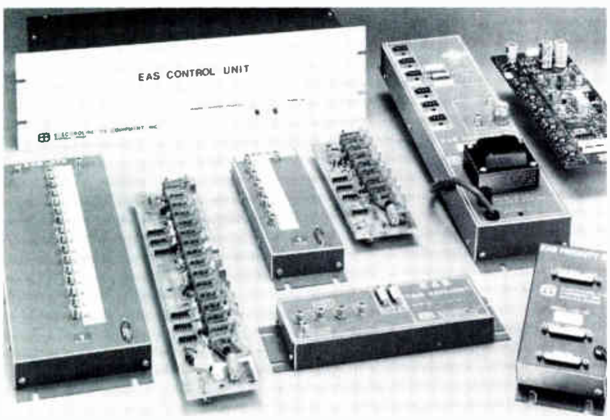
The controller in the home terminal consists of a one-chip microcomputer and authorizes the addressing code, stores data in a memory, deciphers the scramble key code, etc.

## Application

This transmission is useful not only for basic digital audio service but also for addressable pay-per-listen audio service. As mentioned in the section on control codes, the hi-fi mode has a variety of uses, such as a stereo standalone service, stereo simultaneous for TV programs, bilingual service for TV programs, etc. *Continued on page 48.*


# PROFIT & LOSS!

**Increase your profits by reducing losses from piracy and equipment theft with the**




**Complete off-premises system control**

**Initiate or terminate individual subscriber services**

**Pay-per-view control**

**Multi-tiering capability**

**Add-on compatibility**

| Basic Service | $14.25 per drop* | Basic & 1 Tier | $23.00 per drop* |
|---|---|---|---|

*based on a 400 drop system

ELECTROLINE
TELEVISION EQUIPMENT INC.
8750, 8th Ave., Ville St. Michel
Montreal, Quebec H1Z 2W4
(514) 374-6335

Reader Service Number 21

**The online customer service and billing system for cable TV.**

**Designed by Creative Management Systems, the software firm that knows what you need. Because cable is our business, too.**

CMS software expertise comes from helping manage a 58,000-subscriber operation. So we designed a hardworking System that's easy to use.

Customer service reps, online in real time, answer inquiries with up-to-the-minute facts.

The System automatically tracks every work order, routes trucks, and bills subscribers for charges actually incurred over their billing periods.

Simple English-language queries and commands help guide users. And the System's adaptability lets you tie into our Financial Accounting System, or the general-ledger system you choose. It runs on an IBM System 36, for as few as 5,000 subscribers, or as many as 300,000.

**And now, CMS addressability**

Now you can have the "wire link" to marry your billing computer and the addressable controller of your choice.

You can be certain that subscribers only receive authorized services. While pay-per-view pays off since there's no need to "double enter" transactions.

CMS addressability does things for you that other systems don't. But you've got to see our System in operation to appreciate all it can do for your business.

For a demonstration, write or call Creative Management Systems, Inc., 230 Main St., P.O. Box 10, Toms River, NJ 08754. (201) 341-6165.

CMS

USEA

ADAPT

ADRESS

Reader Service Number 22

# MTS-BTSC

*By Pete Morse,*
*Vice President, Marketing and*
*Richard William Adamec,*
*Senior Electronic Development Engineer,*
*General Instrument,*
*Jerrold Subscriber Systems Division*

The title of our paper is MTS-BTSC, and many of you probably think this stands for multichannel television sound-Broadcast Television Systems Committee. But that's not correct. MTS-BTSC is multiple technical solutions for *better* television sound over cable.

Approximately 12 television stations scattered throughout the country currently are transmitting MTS, with many more expected to do so within the next two years. In fact, preliminary industry surveys indicate that more than 40 percent of U.S. TV stations will be transmitting MTS by 1987-1988. As the number of TV stations broadcasting MTS increases over the next several years, it can be expected that almost every CATV operator will have at least one or two local MTS stations around his system.

## MTS? How?

While the parties involved with off-air reception of MTS have been moving full steam ahead with their rollout, the CATV industry, on the other hand, has been moving more cautiously on this issue. This cautious approach has certainly not been due to a lack of interest since a large number of CATV operators and suppliers have been very heavily involved in discussions of cable carriage of MTS over the last two years. In fact, many proposals have been made on how to provide MTS service to cable subscribers. Some of these proposals, such as FM simulcasting, also have included provisions for premium audio services above and beyond the broadcast MTS programming. Yet all of this discussion has yet to yield a clear path or line of attack that we, the cable industry, can follow.

Part of the uncertainty in the cable community can be attributed to the lack of definitive action by the FCC with regard to the selection of a standard system for the generation and handling of MTS broadcasts and part, to the high cost of implementing various proposed approaches. The BTSC system that has been proposed under present FCC rules has resulted in a "de facto" standard for the broadcast community, in that the subcarrier cannot be used for any other service. The FCC, however, does allow for other MTS transmission systems—provided they do not interfere with the BTSC system. Because of this stance by the FCC and the uncertainty surrounding the "must-carry" rules, the cable industry has been wary of proceeding with MTS introduction.

It is apparent that the BTSC system

*Is Your Billing System Working for You?*

**TAKE THIS TEST:**

1. ***Does your system cost you profit?*** Improve your bottom line with dependable A-S Cable Billing software.
2. ***Is your system suited to your needs?*** Our system was designed by cable operators with software experts. Field proven in over 200 systems.
3. ***Do you have the service you need?*** Our system includes complete training, a step-by-step manual and a toll-free quick answer hotline.
4. ***Do you want addressable converter interface?*** We've made it available and affordable to you now.

Full-package software starts as low as $2,000 and runs on most popular micro computers. Call today for facts on the system that can save you time and money. **1 (800) 792-3505 Ext. 596**

A-S Cable Billing

Formerly Apple/Store, now a division of Great Lakes Data Systems.

Great Lakes Data Systems
2801 International Lane
Madison, WI 53704

Reader Service Number 23

**REVOLUTIONARY! A TRUE TDR**

ONLY **$695.00** COMPLETE


**Guaranteed 1 Full Year**

**MODEL 2901A • TIME DOMAIN REFLECTOMETER • CABLE FAULT LOCATOR**

**SIMPLE AND EFFECTIVE**

**"An instrument you can find fault with"**

Manufactured by AVTEK INC.
Aurora, Nebraska (402) 694-5201

Distributed by:

**Western Catv**

**3430 FUJITA AVENUE**
**TORRANCE, CALIFORNIA 90505-4078**
**(213) 539-8030**

Reader Service Number 24

WAVETEK®

# What you could be doing while Autobite checks your system.

Autobite is a cost-effective automatic built-in test equipment system that reduces preventive maintenance costs, leads to better system performance, and frees technical personnel from repetitive tasks.

The Autobite system was specifically developed for CATV testing—to help you catch problems before they become serious. It automatically dials remote signal level meters and scans up to 70 channels (140 carriers).

Everything is under control of your program, including pre- and post-test signal level meter calibration. Amplitudes and hum levels are compared to your references. You can even specify different testing procedures for each site.

Autobite prints out complete test reports, or just the values that are out of tolerance. You can also select high-resolution graphics printout in either spectrum or normalized format with auto-ranged frequency and amplitude.

Autobite comes with everything you need to start testing—computer, printer, programmable signal level meter(s), and auto-dial modem.

The sooner you have Autobite up and running, the sooner you can be taking it easy. So call Toll Free 800-622-5515 today, or write Wavetek Indiana, Inc., 5808 Churchman, P.O. Box 190, Beech Grove, IN 46107; TWX 810-687-6038; Ph. (317) 788-5965.

**Reader Service Number 15**

**Figure 2 Converter compatibility with BTSC**

| | RF | | | BASEBAND |
|---|---|---|---|---|
| | Plain | Pay | Addressable | Addressable |
| Standard converter output compatible with a stereo TV? | Yes | Mono only | Mono only | Mono only |
| Can converter be made compatible with a stereo TV through the use of separate BTSC adapter? | — | Yes* | Yes* | Yes* |

** Through baseband audio input jacks*

tainly not been due to a lack of interest since a large number of CATV operators and suppliers have been very heavily involved in discussions of cable carriage of MTS over the last two years. In fact, many proposals have been made on how to provide MTS service to cable subscribers. Some of these proposals, such as FM simulcasting, also have included provisions for premium audio services above and beyond the broadcast MTS programming. Yet all of this discussion has yet to yield a clear path or line of attack that we, the cable industry, can follow.

Part of the uncertainty in the cable community can be attributed to the lack of definitive action by the FCC with regard to the selection of a standard system for the generation and handling of MTS broadcasts and part, to the high cost of implementing various proposed approaches. The BTSC system that has been proposed under present FCC rules has resulted in a "de facto" standard for the broadcast community, in that the subcarrier cannot be used for any other service. The FCC, however, does allow for other MTS transmission systems—provided they do not interfere with the BTSC system. Because of this stance by the FCC and the uncertainty surrounding the "must-carry" rules, the cable industry has been wary of proceeding with MTS introduction.

It is apparent that the BTSC system will become well entrenched over the next several years, and it will be extremely difficult for the cable community to work around it. And extensive testing shows that cable systems will have problems passing BTSC-MTS signals to their subscribers.

These problems take a variety of forms depending on the type of system involved and its condition. For example, new processing equipment is required to support the increased bandwidth required of the BTSC system. Also, typical headend modulators must be modified to accommodate BTSC.

Although plain RF converters will satisfactorily pass the wider spectrum of the MTS system, in the scrambled mode the descrambling process causes distortion in the audio stereo demodulator. The large volume of baseband converters on the market today do not demodulate the BTSC system to stereo audio. Further, there are no inexpensive modulators to remodulate the BTSC aural baseband to the outgoing RF channel of these converters.

So what do we, as an industry, do?

### MTS choices

Most of the major cable equipment suppliers have announced MTS adapter boxes intended to decode MTS signals

*Customer Service = Customer Satisfaction*

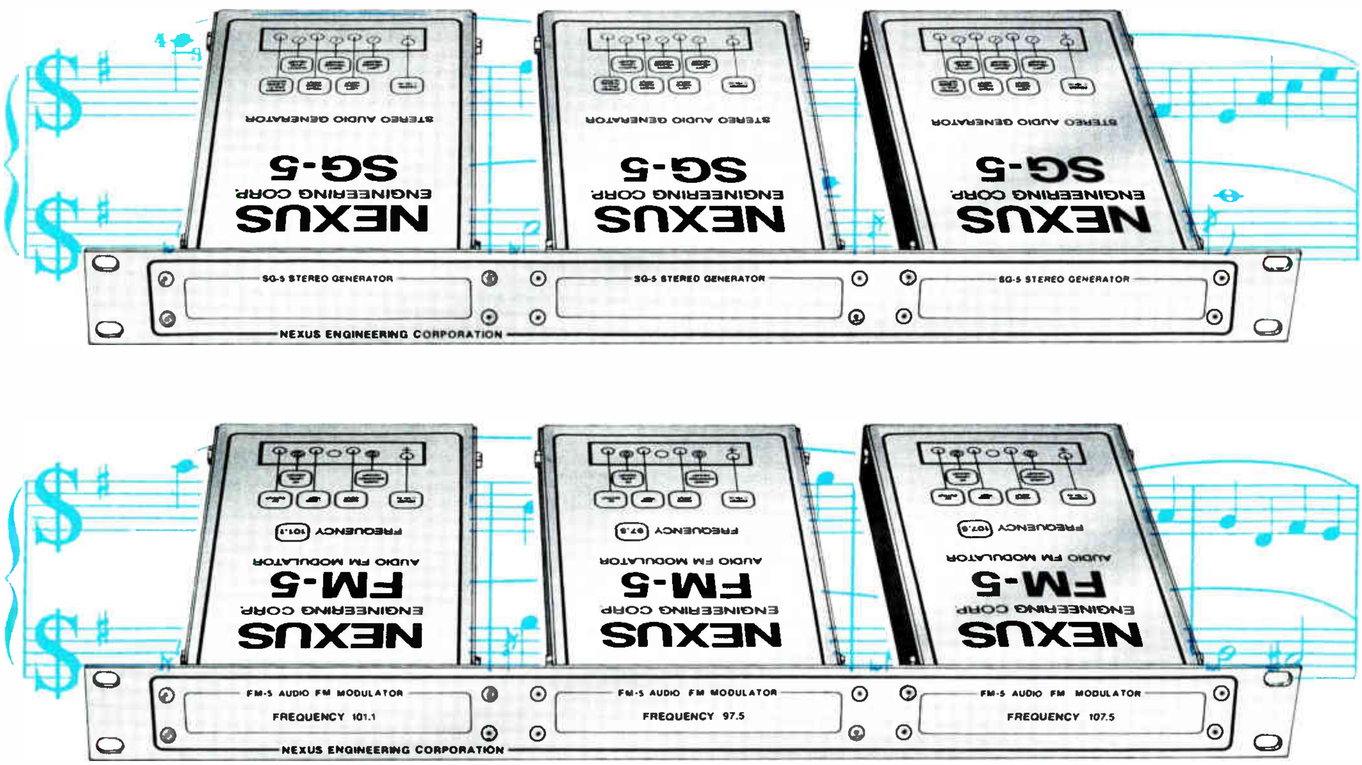
*This equation is brought to you by Computer Utilities of The Ozarks and Cable/1.*

**Find out what others know about this revolutionary In-House, On-Line Management Information and Accounting System for the IBM Series/1 Computers.**

**Computer Utilities of the Ozarks, Inc.**
**P.O. Box 1062, Harrison, Arkansas 72601**
**(501) 741-1616**
**HERB LAIR, President**

Reader Service Number 39

# NEXUS INTRODUCES AFFORDABLE STEREO




## Quality products for new stereo services.

You know adding new audio services to your system will increase penetration, reduce churn and increase revenue, but equipment costs are keeping you tone deaf. Now Nexus brings music to your ears with a new line of stereo and mono headend modulators. The high performance FM-5 modulator has a +40 dBmV output level, spurious outputs over 60 dB down, signal to noise better than 60 dB, and distortion under 1%. Adding the SG-5 stereo generator gives stereo capability with over 30 dB separation. For more information on the Nexus cable audio products and our complete line of headend equipment call: 206-644-2371 or circle the reader service card.

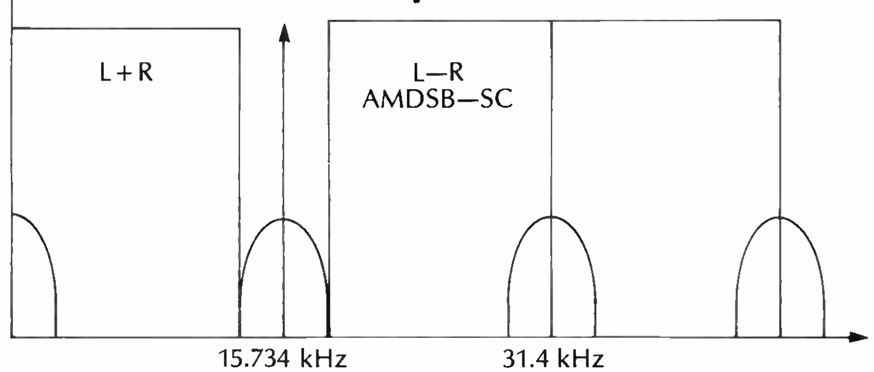
**NEXUS**
**ENGINEERING CORP.**

**PERFORMANCE YOU CAN ~~SEE.~~** *Hear*

4181 McConnell Drive, Burnaby, B.C., Canada V5A 3J7 (604) 420-5322

**Reader Service Number 27**

**Figure 3 BTSC stereo spectrum showing interference due to video components on aural carrier**




and provide baseband audio outputs to be fed to a separate hi-fi system or to the baseband audio inputs of a stereo TV. The method of transmitting the MTS signals to the adapter box, however, varies among manufacturers between analog versus digital and in-band versus out-of-band techniques. Each of the various techniques offers some positive and negative aspects, and each has its own group of supporters. While the vast array of choices has generated a good deal of creative thinking which will ultimately benefit the cable subscriber, the multitude of choices also has created a great deal of confusion for system operators.

To add to the confusion, system operators also must decide whether they should provide adapters to only those customers that experience audio problems with their stereo TVs or whether they should provide stereo adapters to all customers who request them. Either way, additional costs result.

One way a system operator could offset the costs of modifying his system for MTS would be by offering a package of MTS services above and beyond the locally available signals for a small monthly fee. The operator could improve his relationship with his subscribers by treating this potential liability as a revenue generating opportunity. The operator would be enhancing the perceived value of his cable service while at the same time "falling into line" if any FCC must-carry regulations are passed. With the projected growth of MTS over the next two years, most system operators undoubtedly will be carrying MTS signals in some format over their cable system.

## BTSC system

In order to understand the problems associated with the BTSC system for MTS, it first is necessary to understand the BTSC baseband audio spectrum and its processing. Figure 1 shows how the various components of the audio signal are combined before transmission.

To achieve backward compatibility, the information from both the Left and Right audio channels is combined (L+R) and transmitted in the standard 50-15 kHz audio band using 75 $\mu$S pre-emphasis for noise reduction. The spatial information is developed by subtracting the Right channel signal from the Left channel (L—R). This information is modulated using AM double side-band-suppressed carrier (AM DSB-SC) techniques, centered around twice the horizontal line rate (2 x Fh) or 31.468 kHz. A pilot tone at Fh is included to ensure proper detection of the spatial information.

NOW YOU CAN HAVE
CABLESTAR™
for your
IBM PC, XT or AT
starting at
$2500.00

**Cablestar™** is a comprehensive CATV Billing and Management System which is now available on the IBM personal computers. **Cablestar™** provides a cable office with automated statement, postcard, or coupon billing, computer generated work orders, late notices, mailing labels, and financial reports for multiple pay services and franchises. Many reports are available to assist in marketing and subscriber management.

Complete turnkey in-office systems are available on IBM computers for cable systems with up to 30,000 subscribers.

WHY NOT JOIN THE OVER 100 CABLE COMPANIES WHO HAVE IMPROVED THEIR OFFICE EFFICIENCY AND CASH FLOW WITH A CABLESTAR™ SYSTEM?

KMP COMPUTER SYSTEMS
A DIVISION OF FIRST DATA RESOURCES, INC.
135 Longview Dr.
Los Alamos, New Mexico 87544
505/672-1600

Reader Service Number 28

# The big news is clustering and regional networking.


NYT Cable has completed the monumental task of tying together 55 franchises to serve 105,000 suburban subscribers spread across the southern part of New Jersey. To accomplish this, NYT utilized the Hughes AML Microwave System. According to Director of Cable Operations, Dave McDonald, NYT Cable could not have achieved such clustering without an AML. This uniquely cost-effective system is presently serving 35 channels covering 2800 miles of cable plant through 10 hubs—4 from an AML transmitter located at Arney's Mount and 6 from a second transmitter at Audubon, New Jersey. Since the initial installation in 1979, NYT Manager of Engineering, Rich Gregory, reports that they've had no serious problems.

The fact is, more and more major cable companies like NYT Cable are turning to clustering for regional advertising and to improve profitability by the consolidation of marketing, management, and operations. And when regional clustering is under consideration, Hughes AML Microwave is the only choice. With an AML, you also gain the flexibility to continue to expand easily in any direction—without adding costly equipment. Plus with Hughes you get in-depth training and field support unparalleled in the industry.

Find out the full story. Contact the people at Hughes today. For more information write **Hughes Microwave Communications Products**, Bldg 245, P.O. Box 2940, Torrance CA 90509-2940, or call toll-free **(800) 227-7359.** In California (213) 517-6233.

# Hughes AML® Microwave Systems

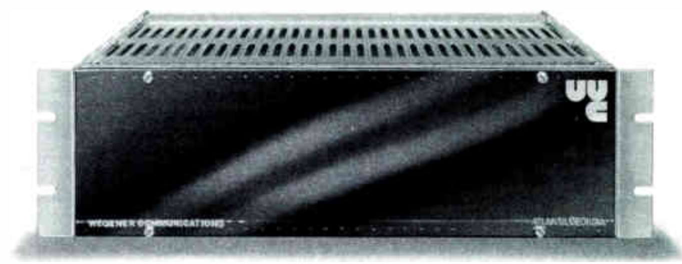
AML—ANY MODULATION LINK

Reader Service Number 29

HUGHES
AIRCRAFT COMPANY

©1985

# Plug-in Broadcast Stereo



# Another Innovation From The People At Wegener.

Wegener Communications, the people who pioneered satellite delivered stereo technology, have done it again.

Introducing TV stereo, the technology known as "broadcast multi-channel sound," that makes true high fidelity and bi-lingual audio a reality with the new stereo equipped TV sets now entering the marketplace.

For cable services, all it takes to start offering subscribers this exciting new audio format is a broadcast stereo modulator card that plugs into your Wegener 1600 Mainframe.

Over 3,000 cable systems are already using our expandable 1600 Mainframe to provide FM delivered stereo services such as MTV and The Nashville Network. Now that plug-in broadcast TV stereo is also available, shouldn't you be talking to the stereo audio experts at Wegener, too?

Call today for more information.

**WEGENER COMMUNICATIONS**
150 TECHNOLOGY PARK/ATLANTA
NORCROSS, GEORGIA 30092
(404) 448-7288 TELEX 54-3634

**Reader Service Number 30**

These techniques are similar to those used for FM multiplex stereo except that the pilot frequency is 15.734 kHz instead of 19 kHz. Borrowing further from FM radio, a secondary audio channel (SAP), which is analogous to the SCA channel in FM radio, is offered. The signal for this channel is limited to 10 kHz bandwidth and is sent on a carrier at 5 x Fh (78.67 kHz) using FM. Provision is made for a low-grade data channel at 6.5 x Fh (102.3 kHz), but this channel currently is not of importance to the cable industry.

This audio spectrum is used to modulate the standard 4.5 MHz aural subcarrier using FM techniques. The deviation is increased from 25 kHz to 73 kHz to reduce noise problems. Using Carson's rule for the bandwidth of an FM signal, the resulting bandwidth of the aural carrier is:

$$\begin{aligned} BW &= 2\,(dF + Fm) \\ &= 2\,(73 + 105)\text{ kHz} \\ &= 360\text{ kHz} \end{aligned}$$

where:

BW = the resulting bandwidth
dF = maximum frequency deviation
Fm = maximum modulating frequency

This is in comparison to 80 kHz for standard aural transmission. Because of this increase, any systems which used tuned signals on the audio carrier should be checked with this increased bandwidth signal to confirm proper operation.

To maximize the signal-to-noise ratio of the incoming aural carrier, the NAB proposed increasing the carrier level to -3 dB relative to the video carrier level. The NCTA was very concerned about this because FCC regulations require system operators to maintain the audio carrier at -15 to -17 dB relative to the video carrier to reduce intermodulation distortion in CATV systems. It was felt that these reduced levels would cause a significant increase in the resulting noise in the audio signal. Further tests performed by the NCTA indicate, however, that these concerns were unfounded. The S/N of demodulated audio signals will not suffer significantly because of system noise.

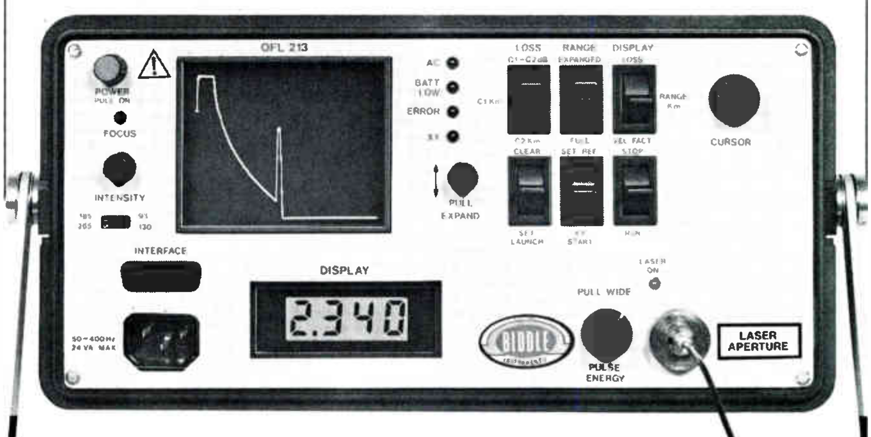
### Converter compatibility

Another concern of the NCTA has been the compatibility of existing CATV converters and BTSC-MTS. Specifically, the widely used sync suppression scrambling and the latest technology baseband converters appear to cause distortion to the audio signal. This went unnoticed with mono signals but appears when BTSC-MTS is decoded.

BIDDLE®

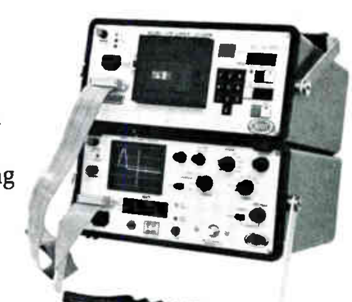
The Experienced Source for Everything you need in Cable Testing.

*For FIBER OPTICS*—We have Standard and new Long-Range OTDR's for Multi-or Single-Mode fibers that do not require special connectors. The Model 213 (below) is the most compact and versatile 1300nm OTDR currently available.




*For HARD-WIRE Testing*—Three Digital TDR's are available: a Short-Range model for avionics, CATV, etc.; a General-Purpose model for longer coaxial and power cables; and a Dual-Trace model for communications cables.

*For Recording / Analyzing*—
The all-new Biddle Digital Data Logger (at right, interfacing with a TDR), can record fiber or wire traces for later analysis, including checks for degradation, water ingress or breakdown.



*Write or Call for Complete Information*

404R

BIDDLE®

Biddle INSTRUMENTS
Blue Bell, PA 19422 • 215-646-9200
A THORN EMI company
THORN EMI
Reader Service Number 31

Figure 2 summarizes the findings of the NCTA and General Instrument, Jerrold Division. It is noted that plain converters or block converters are compatible with the BTSC-MTS signal. That is to say, the audio carrier will not be corrupted with AM, and a stereo-TV could adequately decode the audio signal. This is contingent, of course, on the bandwidth of the output filters of the converter. In most instances, these filters are adequate for BTSC-MTS considerations. Also, the demodulation of the audio carrier must be performed using inter-carrier mixing techniques to eliminate any incidental FM which the tuner in the converter causes.

For reasons described below, RF and baseband converters require the use of a BTSC adapter that demodulates and decodes the audio signal. This adapter could be incorporated into the converter or included as a "sidecar." Through the use of proprietary techniques, this adapter could offer volume control, SAP/stereo selection and other features that are controllable from a converter's handheld remote control unit and addressable from system headends.

Most RF systems scramble the video signal by suppressing the horizontal sync signal at the headend and then restoring it at the converter by changing the RF gain.

There are two main types of sync suppression: sine wave and pulse. In sine wave sync suppression systems, the sync is AM modulated with a sine wave. In addition, the aural carrier is AM modulated with the same sine wave. In pulse systems, the sync is suppressed by a fixed amount (6 or 10 dB) and the aural carrier is modulated with timing pulses to indicate when restoration should begin and end.

In a sine wave sync suppression descrambling converter, the sync restoration is accomplished by modulating the video and audio signal with the sine wave which has been demodulated from the aural carrier. When the wider bandwidth aural carrier is passed through the narrow band pass filters before demodulation, FM to AM distortion takes place. This results in the picture being noticeably modulated by the sound. CATV manufacturers currently are developing methods which will overcome this effect.

In pulse sync suppression systems, the sync restoration is performed by triggering a fixed attenuator to cause a 6 or 10 dB change in gain through the converter. The wider bandwidth aural carrier and any FM to AM distortion will not, therefore, affect the video signal. Some concerns have been raised about incorrect timing, but no problems have been observed in tests performed in the laboratory.

The major concern with sync suppression systems has been the excessive AM put on the audio carrier. When the audio signal is demodulated, the timing pulses and the restoration pulses combine and result in signal components at multiples of the horizontal line rate as shown in Figure 3. When the stereo subcarrier is decoded, two effects can be observed. First, the noise around the pilot signal causes phase jitter on the detector circuit which results in reduced separation of the L and R signals. Second, the components at 2 x Fh will be brought down to baseband and appear as buzz at 60 Hz and its harmonics. Television set manufacturers do not expect this AM to be present and, therefore, do not take adequate precautions against this effect.

To overcome this problem, General Instrument, Jerrold Division, has developed a BTSC decoder designed to access the RF signal before sync restoration. This decoder is a standard BTSC decoder, but with high performance AGC/limiter circuitry. AFT is provided, not separate tuning, because the input signal will be the output of the tuning

*Continued on page 58.*

**AT LAST— A BROADBAND CABLE MODEM THAT WORKS!**


Microphonics, vibration, synthesizer and cable noise are problems of the past with EF Data's BCM-101 Broadband Modem. A new proprietary technique using digital signal processing makes the modem tolerant to system noise and cable intermodulation products. We call it EFplex and it puts our BCM-101 light years ahead of the competition as a totally error-free product for data transmission.

Carrier spacing of down to .6 X data rate allows a BER of $10^{-9}$. The modem is frequency synthesized in 50 KHz steps to provide full agility from 5-400 MHz. DS1 interface-1.544 MB/s. V.35 interface-750 KB/s. Other data rates available.

This is an all digital "tweek-free" modem with a remarkably low single unit price of only **$3,450.** Call **602-968-0447** today or write:

EF DATA

EF Data Corporation
1233 North Stadem Drive
Tempe, Arizona 85281

**Reader Service Number 32**

Communications Engineering & Design

# TECH II

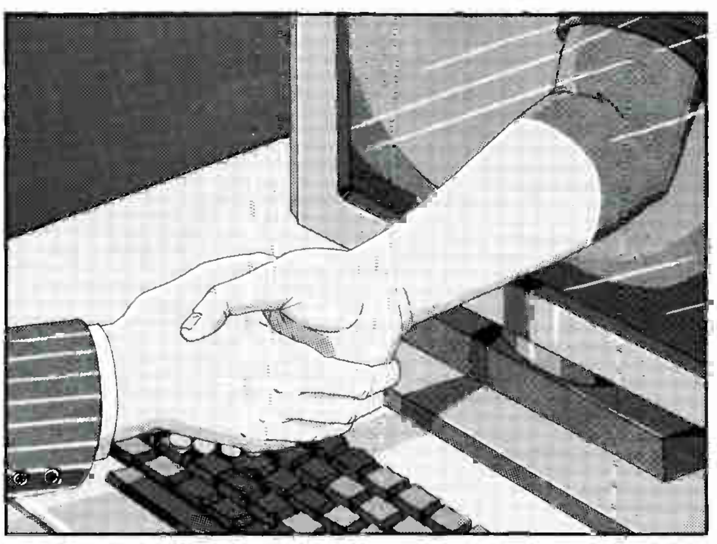
CED's feature supplement and Product Profile

April 1985

- **The tracking method of MTS delivery**
- **Product Profile: Cable billing software**

***Look familiar? Review our billing software profile for the solution to your system's accounting needs.***

the cable manager



**Picture Yourself on Friendly Terms With Your Subscriber Management System**

AM Computer Services has provided computer-based subscriber management systems for the Cable TV industry since 1980.

**AM COMPUTER SERVICES CORPORATION**

877 Kings Highway, Woodbury, New Jersey 08096    609/848-3627

Reader Service Number 33



# Technology Above the Rest

Product design and technology are often copied but seldom duplicated.
At Utility Products, we advance the state-of-the-art by designing better pedestals.

We are thinking of the future when taps, couplers, and amplifiers
may require a more compact designed closure.
Also, the environment is changing; acid rain, pollutants,
and coastal salt contaminants promote corrosion
so we've improved our already long-lasting finish.

In addition, all our closures feature increased mounting capacity
and variety through improved bracketry.
It is this attention to detail that keeps Utility Products above the rest.
Your future is assured with Utility Products.
Phone or write us at the address below.

**Reliable Electric/Utility Products** 11333 Addison Street/Franklin Park, Illinois 60131/312-455-8010

**RELIANCE COMM/TEC**

Reader Service Number 43

# MTS tracking method

***By Larry C. Brown***
***Vice President, New Business Development,***
***Pioneer Communications of America Inc.***

Today's cable systems and the BTSC stereo TV delivery method cannot live together. That is the conclusion of engineering studies commissioned by the NCTA, as well as similar testing conducted independently by several major MSOs.

Offending equipment in CATV systems includes headend processors, modulators, scrambling systems and subscriber converters. The impact of these incompatibilities on subscriber reception—the "subscriber symptoms" which can result from attempting to carry BTSC signals on a CATV system—vary widely.

Subscribers equipped with the new BTSC TV sets may encounter noisy sound on monophonic scrambled channels when the stereo TV mistakenly interprets remnants of the scrambling "key" signal as a stereo pilot, triggering the TV to look for BTSC stereo signals that aren't there.

The gated-sync and sine-wave-sync suppression scrambling systems in widespread use in CATV today will have other repercussions on subscribers. When receiving BTSC stereo signals, stereo separation will be decreased to near FCC minimum, while audio distortion will approach the FCC maximum. Both scrambling systems and converter phase modulation will cause noisy sound on stereo scrambled channels. Subscribers may find themselves unable to receive any stereo reception at all due to elimination of the L—R and/or pilot portions of the BTSC signal by their baseband converter or their cable operator's headend processor. Or they may experience tremendous "garbage noise" during stereo broadcasts, when a headend processor passes a BTSC stereo pilot (telling all BTSC TVs to switch into "stereo"), but the same processor blocks the L—R portion of the BTSC signal. And listeners to a SAP channel will experience similar, but likely more severe, symptoms.

However, most CATV subscribers won't be equipped with a BTSC stereo TV for a long time. So most awesome to the cable operator is the fact that BTSC stereo TV signals also will impact his subscribers with plain old monophonic TVs. A BTSC signal carried, for example, on channel 2 may cause low-frequency interference patterns to appear on all the monophonic subscriber TVs tuned to channel 3, as a result of insufficient adjacent channel sound trap width in the mono TVs. A subscriber may tune in to a local (off-air) channel which has begun broadcasting BTSC stereo only to find that suddenly his pictures appear totally scrambled, as the BTSC signal causes his set-top decoder to mistakenly attempt to "descramble" pictures that were never scrambled in the first place!

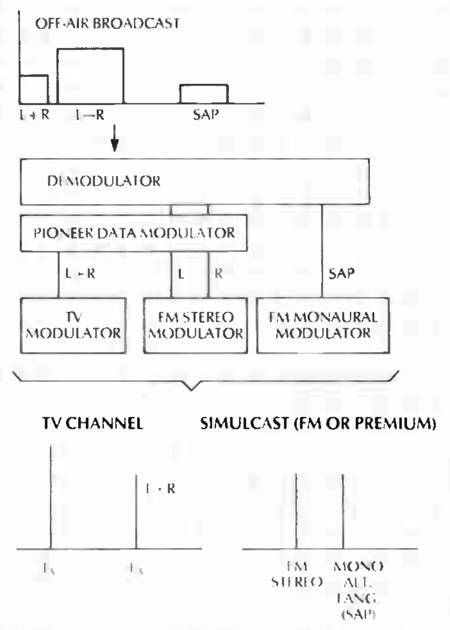



**Figure 1**
**Stereo system diagram**

The list of possible symptoms goes on and on. The net effect, however, is quite clear: Many of today's cable operators will open themselves up to a customer service NIGHTMARE if they place BTSC signals on their existing cable systems.

There is one sure and simple way to avoid all the problems and repercussions expected from carrying BTSC stereo TV signals in a CATV system: DON'T! Simply keep BTSC signals completely out of the CATV system, at least for the time being. Off-air channels may begin broadcasting BTSC signals, but it is a relatively easy and inexpensive engineering task to "block" the trouble-causing stereo portions of this signal at the headend, leaving the signal with only conventional monophonic content on the cable system.

But cable cannot be oblivious to consumer demand for stereo reception. More and more local TV stations are announcing their plans to "go stereo." Consumer awareness of stereo TV will grow as national multimillion dollar marketing campaigns of TV set manufacturers and the TV networks take hold. Other technologies in competition with cable, like VCRs, already are stereo. And, although the threat of a "must-carry" ruling by the FCC seems to have temporarily abated, the issue is not at all dead; it could easily resurface at any time in the form of a must-deliver or must-offer ruling by the FCC in response to renewed pressures from the NAB, set manufacturers and others.

There is one alternative delivery method for stereo TV for cable operators which is as practical as it is simple: out-of-band tracking of FM stereo audio simulcasts. In this method, BTSC format stereo TV signals are kept *entirely off* the cable system. Thus, all the possible repercussions of carrying BTSC signals go away for the cable operator.

Instead, with out-of-band tracking, each cable system channel offered in stereo is processed at the headend into two simulcast signals: 1) a specially "tagged" (but otherwise standard monaural) TV channel, and 2) a simulcast FM stereo channel. Subscriber homes then are offered a new "stereo TV sound service" option by the operator.

*All* homes immediately become potential stereo sound subscribers. No stereo TV set purchase is required by the subscriber for stereo reception. This opens the opportunity for cable TV subscription to be an alternative method of getting stereo TV for consumers—instead of buying a new \$600 to \$1000 BTSC stereo TV set. From a business opportunity standpoint, this attribute is the greatest advantage of tracking.

Each home subscribing to stereo sound is rented or sold an add-on stereo adapter to receive the service. A subscriber picks up this box from the cable operator's office, takes it home and self-installs it between his cable drop, converter and an existing home stereo amplifier and speakers. Once this relatively simple installation is done, the subscriber's stereo audio system becomes his sound source for reception of *all* TV channels—with the attendant quality improvements you would expect on channels delivered in either monophonic or stereo sound.

At CATV headends, the cable operator needs audio processing equipment for each channel offered to subscribers in stereo. This equipment serves to demodulate, separate and remodulate the channel into these 2 or 3 separate signals (Figure 1):

| Format | Bandwidth | Content | Location |
|---|---|---|---|
| Mono TV Channel with Pioneer 'tag' | 6 MHz | (L + R) | TV Channel |
| FM Stereo Channel | 200 kHz | L, R stereo | 88-120 MHz |
| SAP (if applic.) | 200 kHz | SAP | 88-120 MHz |

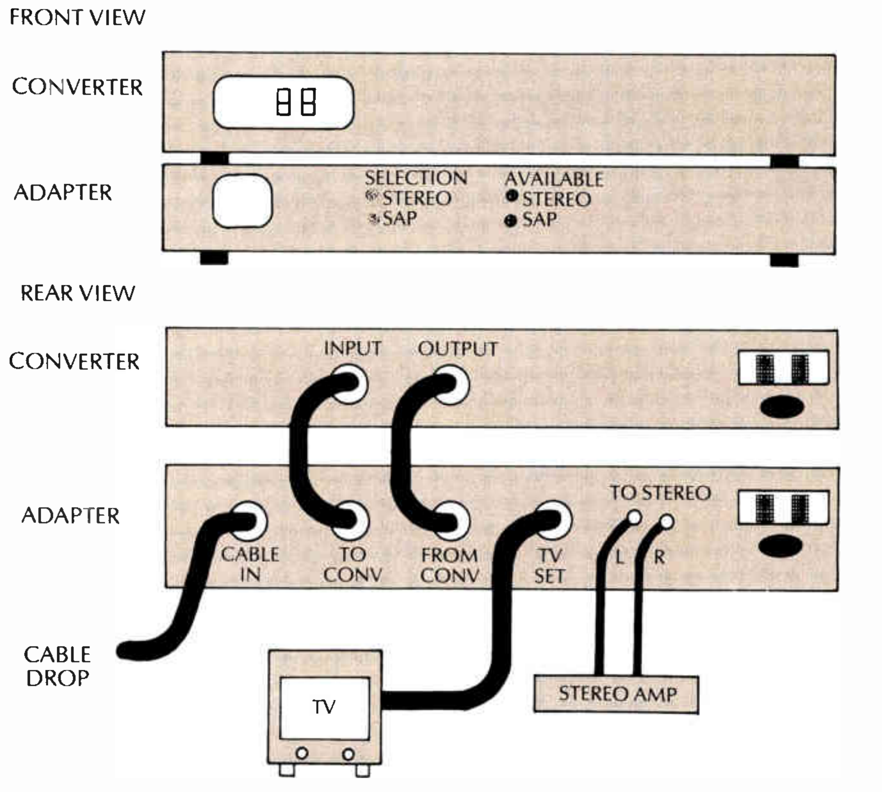
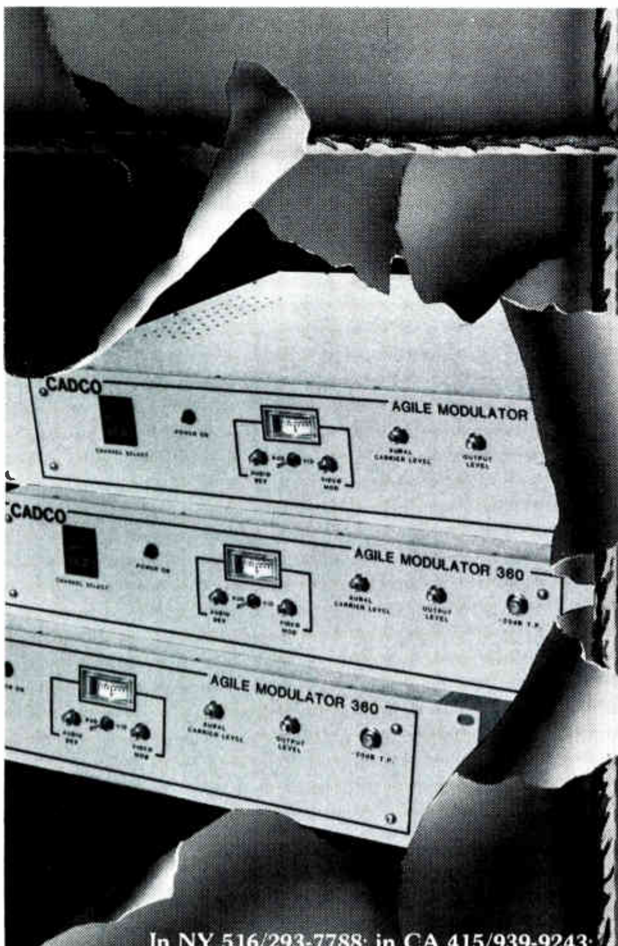



**Figure 2**
**Interconnection diagram of standalone stereo adapter**




# Take a peek . . .

## This brand new tunable modulator is destined to become an industry standard.

Introducing the CADCO 360 — the first low cost frequency agile modulator to deliver professional CATV quality features.

Features like phase locked high stability synthesized oscillators, channel 2 through W tuning, with SAW filters for both standard and high frequency IF.

And the 360 offers separate video, audio and composite IF ports for easy scrambler interfacing.

Find out more about the low cost CADCO 360 tunable modulator. It's in stock and ready for immediate delivery. Call the TELE-WIRE CATV professionals today! Dial toll-free 800/645-9510.

**Reader Service Number 34**

**TELE-WIRE® SUPPLY CORPORATION**

National Headquarters: 7 Michael Ave. • E. Farmingdale, NY 11735

In NY 516/293-7788; in CA 415/939-9243; in FL 813/371-3447; in TX 800/527-1646 (TX only 800/442-9926)

# Televise The Stereo Revolution Live On Your Cable System

## With Leaming Stereo Processors

**DECIPHERED PAY SERVICES sparkle with stereo sound**

- Quality stereo for HBO, CINEMAX, SHOWTIME, TMC
- Increase retention, decrease churn with stereo
- Increase premium channel penetration with stereo
- Lowest investment for highest return
- With state-of-the-art Leaming Industries stereo processors

**WESTINGHOUSE/SANYO (W&S Systems Company) combines FM and stereo TV audio**

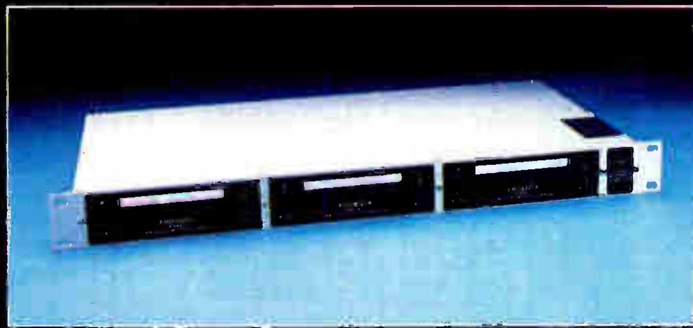
- Stereo TV audio without a stereo TV set
- Bilingual or second audio channel in stereo
- Auto-tracking of stereo sound and TV channel
- Remote volume control
- Stereo satellite & FM music services
- With state-of-the-art Leaming Industries stereo processors

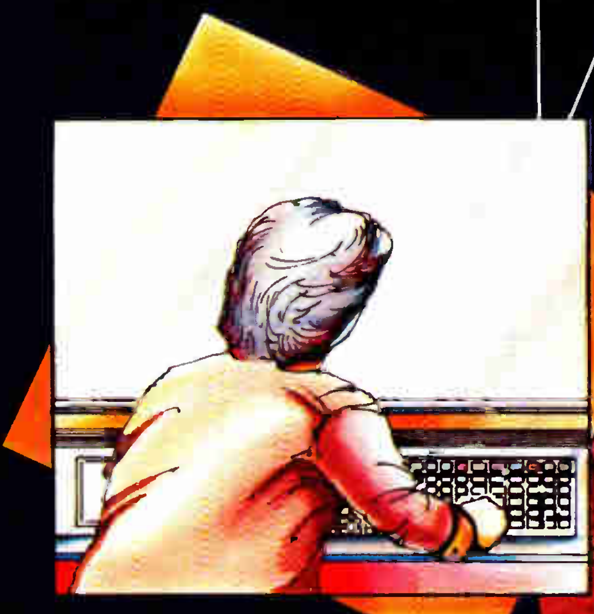
**STUDIOLINE premium pay-audio service**

- Super-Quality nine channel commercial-free music
- Sixty more channels for other FM or TV stereo services
- Addressable for full security
- Tierable for pay audio & premium TV stereo control
- Auto-tracking of stereo sound to TV channel
- Remote volume control
- With state-of-the-art Leaming Industries stereo processors

**CASH IN NOW ON THE STEREO REVOLUTION**

- Buy your new stereo package from Leaming Industries, the complete stereo processor source





Reader Service Number 35

LEAMING INDUSTRIES

180 McCormick Avenue, Costa Mesa, CA 92626
Telephone: (714) 979-4511

facturers' sync-suppression systems.

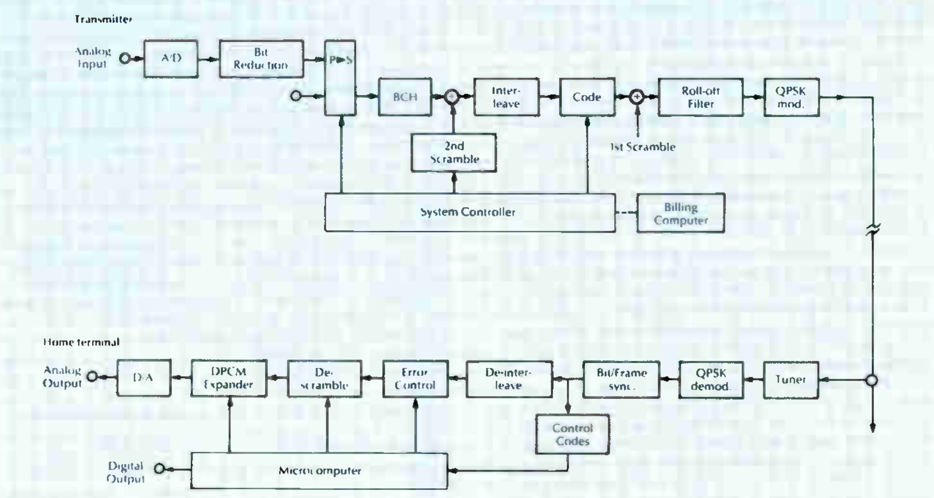
The "tracking" method of TV stereo delivery is a viable and practical approach whereby CATV operators can turn their stereo TV problem into an opportunity. Troublesome BTSC TV signals are kept out of the CATV system. Costly CATV system upgrades, for only a handful of subscribers who own BTSC TVs, are avoided. A smaller investment gets the CATV operator "on the air" with a new stereo audio service attractive to *all* his subscribers. Instead of two or three networks available in stereo off-the-air, and then available only to BTSC-equipped subscribers, *all* subscribers can receive the *many* satellite-delivered cable channels currently programming in stereo. (There are about 14 such channels at this writing.)

Cable operators, equipment suppliers, programming services and subscribers—the "out of band tracking" method of TV stereo delivery appears to be one of those rare cases where everybody benefits. CED

*Note: Pioneer currently is in the process of scheduling field tests of the Pioneer stereo adapter system described here with various MSOs for mid- to late 1985.*

*Continued from page 30.*

**Figure 8 Block diagram of transmitter and home terminal**




Additionally, the digital format includes a space of 10 kbps for such information as computer data, character broadcast and video facsimile, which in the future may be transmitted parallel to the audio program.

Small cable operators have difficulty in preparing self-made programs or addressing capability. In this case, a key station may produce programs or addressing codes instead of an operator, and deliver them via satellite to the operators. If several channels are modulated by QPSK and transmitted by FDM (frequency division multiplexing), each operator can receive the satellite signal, convert the frequencies and re-transmit with reasonable bandwidth. Thus, even small operators easily can launch digital audio services. CED



**And that's why you're in business—Profit!**

If you bring down operating costs, profits go up. Everybody knows that and that's exactly what *esp*® is all about—lower operating costs and higher profits.

CATV 6.0 Billing Accounts Receivable System is specifically for Cable TV operators for use on the affordable TRS-80® Model 12 and multiuser Tandy 6000 under TRS-Xenix®. CATV 6.0 maintains subscriber accounts faster, with efficient payment verification and account updating, and provides timely management reports. All in a language YOU understand.

Call **1-803-787-7256** or write

esp

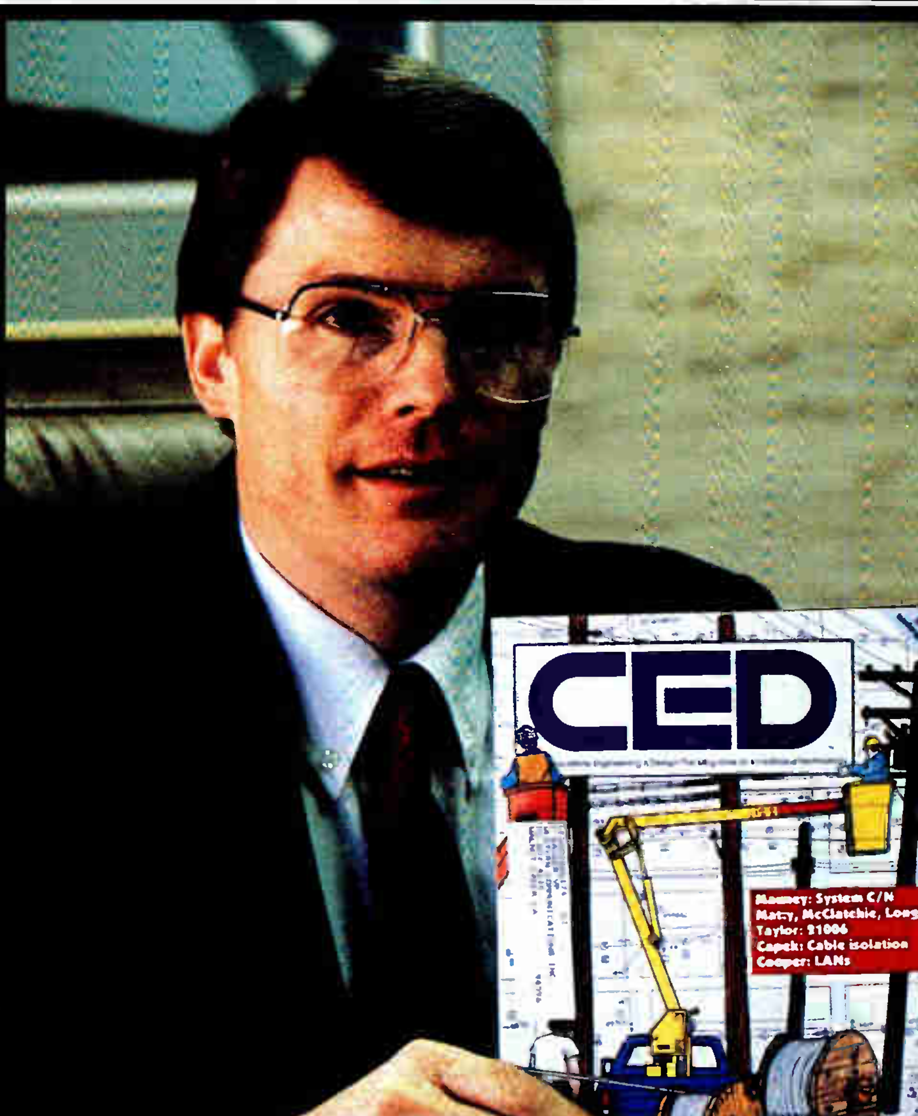
***ehlen software products***
6319 Briarwood Road • Columbia, SC 29206

TRS-80® and TRS-Xenix® are registered trademarks of The Tandy Corporation.

Reader Service Number 40


**Advertisers' Index**

Carl L. Badger
Vice President
Western Communications




"For years the cable television industry has had a problem disseminating technical information to the people that need it the most. At WESTERN COMMUNICATIONS, INC., we think CED Magazine can help us fill that void."

CED

The Engineer's Most Valuable Tool

International Thomson Communications Inc.
600 Grant Street
Suite 600
Denver, CO 80203
(303) 860-0111

# Classifieds

**JIM YOUNG & ASSOCIATES**

"Leader in the Placement of Cable Television Professionals"

Nationwide Service

One Young Plaza
1235 Ranger Highway
Weatherford, TX 76086
(800) 433-2160
(817) 599-7623
Texas Collect

## VIRGIN ISLANDS GROWING INDEPENDENT CABLE TV COMPANY

located in St. Thomas has immediate openings for experienced personnel.

### SYSTEM ENGINEER

Well rounded technician needed with a minimum 5 years hands-on in CATV industry. Must have excellent references and strength in microwave, studio equipment, video maintenance, bench, earth stations, proofing, system powering and headend. The right person starts at no less than $30,000 plus vehicle and excellent benefits.

### LINE CONSTRUCTION

Line personnel needed with a minimum of 2 years in all phases of CATV construction with technical and splicing skills especially helpful. References required. Salary and benefits commensurate with experience and knowledge. Quality workers only need apply.

Send resume or call:

**Jacob S. Kohn, V.P. Technical Services, St. Thomas Cable TV, P.O. Box 7639, St. Thomas, VI 00801, (809) 774-2080.**

## TECHNICAL MANAGER
## CHIEF TECHNICIANS
## TECHNICIANS

Immediate openings in Virginia, Maryland and Delaware. Candidates must have electronic background, minimum of 3 years experience in CATV industry and FCC General Class License preferred. Equal opportunity employer. Excellent salary and benefits. Please send resumes to:

**Storer Cable Communications**
P.O. Box 740
Lanham, MD 20706

**ENGINEERING • MANAGEMENT**
**TECHNICIANS • MARKETING**
**• SALES**

(MSO or Equipment)

CAREER MARKETING ASSOCIATES

**ROBIN SQUIRES**
**Cable Television Specialist**
**7100 East Belleview, Suite 309**
**Englewood, CO 80111**
**(303) 779-8890**

## TECHNICAL MANAGER

Leading MSO is seeking a Technical Manager for large, modern cable system serving over 55,000 subscribers with 800 miles of two-way plant. System technology includes addressability, microwave, local origination, and advertising insertion.

Attractive salary and full benefits for an experienced and competent individual. Reply in confidence to:

**Box: CED 0401-1**
**E/O/E**

## HOW TO RESPOND TO A BLIND BOX AD:

**Box: CED (Box Number)**
**c/o CED MAGAZINE**
**P.O. Box 5208 T.A.**
**Denver, CO 80217**

**BakerScott & Co.**

- *General Management*
- *Operations (corp. & field)*
- *Engineers*
- *Technical*
- *Sales/Marketing*
- *Finance/Accounting*

FEE PAID

Call or write in CONFIDENCE

**THE PROFESSIONAL CABLE PLACEMENT PEOPLE**

Positions available with MSOs, Networks, Regional & Independent Operators, Coast to Coast

**All Levels of Management**

**JUDY BOUER** **DAVID ALLEN**
President, Cable Div

**"WE DON'T TALK CABLE, WE KNOW CABLE"**

1259 Route 46
Parsippany, NJ 07054
201-263-3355

**CABLE SEARCH ASSOCIATES**

Professional Search and Placement

**Engineering** **Sales**
**Management** **Marketing**
**Technicians** **Construction**

Call or Write

WICK KIRBY
**(312) 369-2620**
**Telex: 720-462**

P.O. Box 2347, Naperville, IL 60565

## EXECUTIVE DIRECTOR OF TECHNOLOGY

One of the leading Cable Television operators, Colony Communications, is seeking candidates for its top technical position. Successful applicants must have 5-10 years of varied background in telecommunications including cable, microwave, data, video and telephone. BSEE preferred. Duties include over all engineering and technical responsibilities including system design, equipment selections, assist in supplier negotiations, keeping top management informed on technology developments. Significant travel required. Good interpersonal skills necessary; member of management committee. Interested individuals should send resume and salary history in condifence to:

**Director Personnel Administration**
**169 Waybosset Street**
**Providence, RI 02901**
**E/O/E**

## CORPORATE STAFF ENGINEER

Leading MSO is seeking a technical expert in the field of video production and videotape editing to support its growing automated commercial insertion business. The individual must have leadership ability and good personal communications skills. AAS or BS in electronics. Excellent salary and benefits. Send resume to:

**Box: CED 0401-2**
**E/O/E**

## POSITIONS AVAILABLE

Young and growing MSO is looking for experienced CATV people to work in sunny south. Positions currently available: Office Manager/Customer Serivce (bi-lingual English/Spanish needed), Dispatch Supervisor (bi-lingual English/Spanish needed), Headend Technician, Reverse System Technician, Trunk Technician. The above listed positions require minimum 3 years of experience. Salary commensurate with experience. Please send resume and salary requirements to:

**Attn: Personnel Manager**
**P.O. Box 011791**
**Miami, FL 33101**
**E/O/E**

# NEMAL STOCKS:

• SPLITTERS • SWITCHES
• TRANSFORMERS
• ADAPTERS • CONVERTERS

*Immediate Delivery!!!*

• TRUNK CABLE
• DROP CABLE • AMPLIFIERS
• SATELLITE CABLE

**Call or write for Cable Systems Pricing**

*WE EXPORT WORLDWIDE*

## NEMAL ELECTRONICS, INC.

**12240 N.E. 14th Avenue**
**North Miami, FL 33161**
**(305) 893-3924**

## At Last!
## An Affordable Synthesized Agile Modulator

- Front panel channel select channels 2 through W
- Saw filtered 60 dBmV output
- Metered front panel controls
- Audio/video and composite I-F loop-through

cabco

**Model 360**

**$749.00**

**Mega Hertz Sales**

7061 So. University, Suite 210
Littleton, CO 80122
(800) 525-8386
(303) 797-7900

2700 Rockcreek Pkwy., Suite 304
Kansas City, MO 64117
(800) 821-6800
(816) 842-2880

4001 Airport Parkway
Suite 590
Bedford, TX 76021
(800) 628-0088
(817) 354-7500

## FOR SALE

TEKTRONIC 1430 RANDOM NOISE TEST SET, $2,985.00

**Call: (801) 423-2313**
**or: (801) 768-4852**

## FOR SALE

Hughes 16 Channel AML microwave transmitter. Excellent condition. Channels 2-13, FM, D, F, H. One composite receiver, two 6 ft. antennas and extra parts.

**Call: (512) 345-0611**

## CONTRACTOR SELLING (2) T-40B TELSTAS

With aerial tools and trailers. Very good condition. Reasonable.

**Call: (301) 461-5459**
**or write: P.O. Box 9478**
**Baltimore, MD 21228**

## ARE YOUR SYSTEM MAPS ILLEGIBLE, TATTERED, NON-REPRODUCIBLE, OR NOT UP TO DATE?

*If the answer is YES to any of the above, CALL the map experts for assistance at:*

**(813) 746-8824**

**Or write: E. MARK RUSSELL**
**P.O. Box 1764**
**Bradenton, FL 33506**

**Complete CATV Drafting & Design Services**

*Engineering*

*R.F. St. Louis Associates*

*Innovative Engineering*

*32 Rensselaer Road*
*Essex Fells, New Jersey 07021*

21 years CATV experience

201-226-4571 RAY ST. LOUIS

## JERROLD 400

- **DSX-3-DIC** $55.50
- **DRX-3-DIC105**
  - WITHOUT TRANSMITTERS $63.50
  - WITH TRANSMITTERS $73.50
- **ALL UNITS REBUILT AND GUARANTEED**
- **CALL 1-800-382-BRAD**

IN NEW YORK: (518) 382-8000

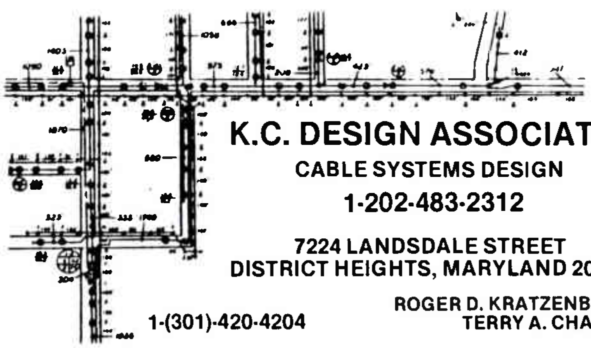
**BRAD™**

1023 State Street
P.O. Box 739
Schenectady, NY 1201
518-382-8000

9325 Bay Plaza
Suite 209
Tampa, FL 33619
813-623-1721

4630 Pacific Highway East
Suite B-7
Fife, WA 98424
206-922-9011

*K.C. DESIGN*



## K.C. DESIGN ASSOCIATES

**CABLE SYSTEMS DESIGN**

**1-202-483-2312**

**7224 LANDSDALE STREET**
**DISTRICT HEIGHTS, MARYLAND 20747**

1-(301)-420-4204

**ROGER D. KRATZENBERG**
**TERRY A. CHANEY**

# Cable billing software

| Company Name | Name of Software | Invoices | Orders | Non-pay Disconnect Orders | General Ledger | Accounts Payable/ Receivable |
|---|---|---|---|---|---|---|
| **AM Computer Services** | The Cable Manager | Yes | Yes | Yes | Yes | Yes |
| **Business Systems** | CATV Management System | Yes | Yes | Yes | Yes | Yes |
| **CableData** | CableData | Yes | Yes | Yes | Yes | Yes |
| **Cablefacts** | Cablefacts | Yes | Yes | Yes | No | Receivable only |
| **Check Free Systems** | Check Free Systems | No | No | No | Yes | Yes |
| **Computer Utilities of the Ozarks** | Cable 1 | Yes | Yes | Yes | Yes | Yes |
| **Cox Communications** | Cable Information | Yes | Yes | Yes | Yes | Yes |
| **Creative Data Systems** | Cable TV Billing System | Yes | Yes | Yes | Yes | Yes |
| **Ehlen Software Products** | CATV 6.0 | Yes | Yes | Yes | No | Receivable only |
| **First Data Resources** | Cable Control System | Yes | Yes | Yes | Yes | Yes |
| **Creative Management Systems** | Online Customer Service & Billing | Yes | Yes | Yes | Yes | Yes |
| **Florida Automated Resources** | Cable Billing System | Yes | Yes | No | No | Receivable only |
| **Gill Management Services** | Business Manager III | Yes | Yes | Yes | No | Receivable only |
| **Gill Management Services** | Business Manager I | Yes | Yes | Yes | Yes | Receivable only |
| **Great Lakes Data Systems** | Apple Store Cable Billing | Yes | Yes | Yes | No | Receivable only |
| **KMP Computer Systems** | Cablestar | Yes | Yes | Yes | Yes | Yes |
| **Logical Data Management** | Subscriber Management & Accounting | Yes | Yes | Yes | Yes | Yes |
| **Magnicom Systems** | Marc-10 | Yes | Yes | Yes | Yes | Yes |
| **Parallex Corp.** | Parallex | Yes | Yes | Yes | Yes | Receivable only |
| **T-C Specialties** | Coupon Book Billing | No | Yes | Yes | Yes | Yes |
| **Telease** | Business Operating System | Yes | Yes | Yes | Yes | Yes |
| **Toner** | SMART | Yes | Yes | Yes | Yes | Yes |

| Adjustment Tracking | Subscriber Counts | Program Guide Mailing | Daily Service Reports | Cash Reconciliation | Converter Inventory Reports |
|---|---|---|---|---|---|
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | No | Yes | Yes | No |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Option | Option | Option |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | No | Yes | Yes |
| Yes | Yes | Yes | Yes | No | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | No | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | No |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |

| Company Name | Name of Software | Pending Installs Records | Delinquent Disconnect Records | Bad Debt Write-offs | Other Reports | Inventory Control |
|---|---|---|---|---|---|---|
| **AM Computer Services** | The Cable Manager | Yes | Yes | Yes | Yes | Yes |
| **Business Systems** | CATV Management System | Yes | Yes | Yes | Yes | Yes |
| **CableData** | CableData | Yes | Yes | Yes | Yes | Yes |
| **Cablefacts** | Cablefacts | Yes | Yes | Yes | Yes | Yes |
| **Check Free Systems** | Check Free Systems | Yes | No | No | Yes | No |
| **Computer Utilities of the Ozarks** | Cable 1 | Yes | Yes | Yes | Yes | Yes |
| **Cox Communications** | Cable Information | Yes | Yes | Yes | Yes | Yes |
| **Creative Data Systems** | Cable TV Billing System | Yes | Yes | Yes | Yes | Yes |
| **Ehlen Software Products** | CATV 6.0 | Option | Yes | Option | Yes | Option |
| **First Data Resources** | Cable Control System | Yes | Yes | Yes | Yes | Yes |
| **Creative Management Systems** | Online Customer Service & Billing | Yes | Yes | Yes | Yes | Yes |
| **Florida Automated Resources** | Cable Billing System | No | Yes | Yes | Yes | No |
| **Gill Management Services** | Business Manager III | Yes | Yes | Yes | Yes | Yes |
| **Gill Management Services** | Business Manager I | Yes | Yes | Yes | Yes | No |
| **Great Lakes Data Systems** | Apple Store Cable Billing | No | Yes | Yes | Yes | No |
| **KMP Computer Systems** | Cablestar | Yes | Yes | Yes | Yes | Yes |
| **Logical Data Management** | Subscriber Management & Accounting | Yes | Yes | Yes | Yes | Yes |
| **Magnicom Systems** | Marc-10 | Yes | Yes | Yes | Yes | Yes |
| **Parallex Corp.** | Parallex | Yes | Yes | Yes | Yes | Yes |
| **T-C Specialties** | Coupon Book Billing | Yes | Yes | Yes | Yes | No |
| **Telease** | Business Operating System | Yes | Yes | Yes | Yes | Yes |
| **Toner** | SMART | Yes | Yes | Yes | Yes | Yes |

| Pay Per View Ordering | Dispatching | Installment Scheduling | Customer Service History Records | Trouble Call Tracking | Addressable Converter Activation |
|---|---|---|---|---|---|
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | No | No | No | No | No |
| Yes | Yes | No | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | No | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| No | Option | Option | Option | Option | No |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| No | No | No | Yes | No | No |
| Yes | Yes | Yes | Yes | Yes | Yes |
| No | Yes | Yes | Yes | Yes | No |
| Yes | No | Yes | Yes | No | Yes |
| Yes | No | No | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |
| No | No | No | Yes | No | No |
| Yes | Yes | Yes | Yes | Yes | Yes |
| Yes | Yes | Yes | Yes | Yes | Yes |

*Continued from page 40.*

section of the converter, channel 2, 3 or 4.

Two baseband audio outputs are provided that supply an external amplifier and speakers with either decoded stereo or SAP program material. The performance of this decoder in a cable system will be equivalent to stereo TVs under broadcast (BTSC stereo audio) conditions.

## Baseband converters

The development of the baseband converter has been a major technological advancement for the CATV industry. Now, sophisticated scrambling techniques are being used which make it very difficult to descramble the signal. In addition, the audio signal is being processed to give added security and volume control. Unfortunately, no full-featured baseband converter offering volume control of the BTSC audio (supplied to the TV set at RF) can be effectively produced.

In a typical baseband converter, the video is brought to baseband and, hence, the audio to a stable 4.5 MHz. This audio subcarrier is sampled, demodulated and processed before being remodulated to 4.5 MHz and recombined with the processed video. The combined signal then is modulated to the output channel of the converter.

The L—R information of the BTSC signal is encoded using dbx-TV noise reduction. This involves active wideband companding of the signal. If the L+R is changed 2 dB in amplitude, the L—R signal should, therefore, be changed 4 dB. In addition, there also is frequency dependent processing being performed which requires compensation. The only way to accurately adjust the volume and maintain separation is to decode the signal, process it and re-encode the signal. This is difficult to do in headend equipment and beyond the capabilities of a set-top converter. Thus, no full-featured baseband converter will supply volume-controlled audio to a stereo TV at RF.

There are various ways of making baseband converters compatible with BTSC stereo TVs. Two methods involve bypassing the audio processing, either by an audio loop through or a 4.5 MHz loop through. If volume control is used, there normally are 15 kHz low pass filters in the audio path which eliminate the spatial (L—R) and SAP signals so that current converters out in the field will not pass the BTSC signal undisturbed.

If baseband audio outputs are desired, the BTSC adapter described earlier could again be used. This version, however, would not need the intercarrier mixing or the 4.5 MHz demodulator if enough limiting is originally used.

Techniques have been presented which achieve this goal with existing equipment. However, the audio signals for full quality performance must be processed independently of the RF input to the TV set. Therefore, baseband audio connects to stereo TVs should be required of the TV manufacturers.

## Conclusion

The technical challenges facing CATV system engineers and managers might be significant in some cases. However, you should be preparing your systems for BTSC compatibility as it is very likely that you will encounter a requirement for it within the next few years. The introduction of multichannel sound to television, even in this rudimentary form, will generate increased consumer interest in television in general and cable in particular. Further, with the application of even a modest marketing effort, it will increase consumer interest in cable television even more so—especially in the area of bilingual sound tracks accommodated through the secondary audio programming capability.

CED

**How to make a decision on a subscriber billing system – with no risk.**

1 **PROVEN RESULTS** Our six-year commitment to the cable industry and our established leadership in computer technology and addressable integration insures your leading-edge position in system performance. We guarantee it!

2 **PROVEN SAVINGS** Our cable system customers will tell you that our in-house solution provides them with complete control of their operation at a per-subscriber monthly cost substantially *less* than the service bureaus they had been using. We guarantee it!

3 **MONEY-BACK GUARANTEE** Confidence in our products, experienced personnel, and a proven track record compel us to offer you our money-back guarantee. It's the *only no-risk solution* available to the cable system operator today!

Business Systems Inc

**1-800-424-0101**

ONE MARCUS DRIVE
GREENVILLE, SC 29615
(803) 297-9290

# EAGLE

# *TRAPS*

**ONLY EAGLE KEEPS MAKING THEM BETTER!**
**NOW AVAILABLE . . . SIX POLE TRAPS TO IMPROVE REJECTION ON BAND EDGES OF MULTI-CHANNEL TRAPS.**

*Only* Eagle Traps have their main bodies totally protected by double neoprene gasketing.

*Only* Eagle Traps are completely sealed around their pins by a special hot-melt process.

*Only* Eagle Traps are 100% foam-filled.

*UNRETOUCHED PHOTOGRAPHS*

Eagle Trap Quality starts inside. Every Trap is completely sealed for superior moisture resistance. Our extensive sealing techniques and 100% filling of all interior cavities insures stability over broad temperature ranges. That's why Eagle Traps are virtually fail-safe in preventing signal drift.

Install Eagle Traps to safeguard existing scrambling methods. Our Traps can be used at high and super band frequencies, as well as low and mid band.

To meet your system's requirements, Eagle Traps are available in 3, 4 and 6 pole configurations for maximum economy and effectiveness.

Some companies can make Traps cheaper. . . only Eagle makes them better!

## *A Secure Investment for System Profitability*

**OTHER EAGLE QUALITY PRODUCTS. . .**
Converters, Addressable Descramblers, Programmable Descramblers, Splitters, Traps, Decoding Filters, Video Amplitude Controllers, Band Pass Filters, Channel Dropper for Batch Descrambling.

**EAGLE COMTRONICS, INC.**
4562 Waterhouse Road, Clay, New York 13041
**TO ORDER, CALL TOLL-FREE: 800-448-7474**
In New York, call 315-622-3402/In Canada, call Deskin Sales, 416-475-1412
In Europe, call Electro Service, Brussels, Belgium, 011-32-15-209575

EAGLE COMTRONICS INC.

NEW!

Reader Service Number 41


The names of the leading manufacturers of cable-TV products are in our computer . . .
. . . and their products are in our distribution centers
Anixter brings you the products of the leading Cable-TV manufacturers through the most modern "online" real time Business Information System available. Using a network of AT&T leased lines, the most powerful and modern IBM hardware, and Anixter's own software, customers are assured of receiving Cable-TV products where and when they need them.
ANIXTER
COMMUNICATIONS
1-800-323-0436
In Illinois call 1-800-942-0905
Reader Service Number 42
© Anixter Bros., Inc. 1985