Stereo TV: Giving the ear its due

Honoring the first BCT/E grad

December 1987
There's more to this race than just reaching the finish line first. In the cable industry, even being a contender takes hard work and commitment—in the best and worst of times.

Pioneer Communications knows first-hand about industry commitment. For the last 10 years, we've stood behind our products. Always ready to make the kind of research and development investment required by a leader.

The risks were plenty. But it all paid off.

We were the first to successfully implement a two-way addressable system. And we introduced quality and reliability to the industry by incorporating PLL tuning, SAW filters, SAW resonators and capristors into our converters. All this setting the standard for today's standard and addressable converters.

When you asked for consumer interface solutions, we were there again. A VCR timer and a programmable SmartRemote® are just two examples of products you asked for, and we supplied.

Why all this commitment? Because the Pioneer name has been synonymous with innovative, quality electronics in the United States and worldwide. And we're not about to sacrifice this reputation.

So in the best of times, and the worst of times, you can count on Pioneer Communications to go the distance...for you and your subscribers.
Anyway you slice it, manufacturers of foamed cables have been scrambling to attain the superior attenuation characteristics of MC. The attempt means increasing our familiar MC diameter of .500" to .565" or .625"; and our .750" must become .840" or .860" or .875"

You may still use MC in one size smaller than the old foamed diameters. Even more MC per duct, and easier handling. In aerial installations, the effects of wind and ice-loading are reduced even further.

And with the superior attenuation of MC² you don't have to clutter your lines with as many amplifiers — about 20% fewer than with foamed cables.

Low-loss MC² is your gain in many ways.

TRILOGY LEADS IN TECHNOLOGY

CALL OR WRITE FOR A FREE SAMPLE AND BROCHURE:
TRILOGY COMMUNICATIONS INC., 2910 Highway 80 East, Pearl, Mississippi 39208
800-874-5649 601-932-4461

Reader Service Number 2.
Features

BTSC in the headend 16
Wegener's Steve Fox investigates RF scrambling and stereo.

BTSC encoders 28
Guidelines are provided by Karl Poirier of Triple Crown.

A Cable Christmas 39

Integrating BTSC 40
Kim Litchfield of Learning illustrates how to add stereo.

Digital audio 50
Bob Reiner of Oak explains the Sigma system.

Tag change 70
Multiple-event PPV implications by Andrew Ferraro of Request TV.

ANI and PPV 72
Jeff Corbett of BSI describes different PPV ordering methods.

RF vs. telephone 77
Jeremy Rosenberg and Mei Yang of Cable Video Store examine the tradeoffs for PPV.

Minding the store and forward 78
John Donahue of Comcast examines technologies for PPV.

Ham radio and cable 80
Amateur radio can be an asset, says ATC's Dave Pangrac.

Cover
Art by Malcolm Farley.
Photo by Brian James.
Remember when 20-12-even 5 channels were your maximum potential? Now...

**Rebuilding?**

**Save Money With JERROLD**

Expand the bandwidth of your system - and your revenue-producing channel potential - simply by dropping in Jerrold STARLINE® SJ-330 modules. This quick and easy upgrade to 330 MHz can help you maximize your revenues and requires:

- No respacing of trunk amplifiers
- No major equipment costs
- No prolonged construction

Regardless of the make or vintage amplifiers now in your system, Jerrold can show you how to rebuild economically. If you have STARLINE 20 equipment, you’ll realize the biggest savings with Jerrold STARLINE SJ-330 drop-ins. Other amplifiers can be replaced easily and economically by a complete STARLINE SJ-330 station. Detailed information on what you will need and what savings you can achieve is contained in a new Jerrold STARLINE 20 SJ Series brochure - yours for the asking.

And Jerrold has other possibilities for you too. For longer cascades and greater channel capacity, there’s Jerrold STARLINE X feedforward and power doubling amplifiers. Whatever your specific needs, there’s a reliable, low-cost Jerrold product to satisfy them.

Send for the Jerrold STARLINE 20 SJ Series brochure, today. Call or write: Jerrold Division, General Instrument Corporation, 2200 Byberry Road, Hatboro, PA 19040. (215) 674-4800.

**JERROLD**

You know we’ll be there.
WE HAVEN’T
HEARD FROM
OUR STEREO
CUSTOMERS
IN YEARS!

At least when it comes to complaints.

Why?

Because CATEL’s products are built to last. CATEL offers a full line of signal processing equipment for the cable and broadcast industries. Products that are technologically sophisticated as well as reliable.

Take our FMS-3000 FM Stereo System, for example. Using a modular design, the FMS-3000 can hold up to six stereo generator/modulator modules in each 5¼ inch chassis, and provide superior stereo separation. And that’s not all. The FMS-3000 is also field tunable—allowing you to easily change frequencies anywhere in the FM range. Combine these features with proven reliability, and the result is the best equipment available on the market.

CATEL has been providing innovative solutions to the telecommunications industry for almost 20 years. Solutions that span video, audio, and data applications. And more importantly, solutions that you can count on—day in and day out.

To find out more about CATEL or to receive a copy of our new product catalog—Call Toll Free 1/800/225-4046.

CATEL

Catel Telecommunications
4050 Technology Place
Fremont, CA 94537-5122
(415) 659-8988

Reader Service Number 4.

PUBLISHER’S LETTER

There’s no business like show business

Welcome to Anaheim, Calif., site of the 19th annual Western Show, one of the largest conventions for the cable TV industry each year. There’s always something interesting happening, either on the exhibit floor or in the classrooms. This year will be no exception, with nearly 200 companies represented in the exhibit hall and plenty of seminars coordinated by the Society of Cable Television Engineers and the California Cable TV Association. Here’s just a sampling:

- “Signal leakage and other deregulatory issues,” with moderator Steve Ross (FCC).
- “Cable consumer interface issues,” moderated by Viacom Cable’s Joe Van Loan.
- “Antenna technology,” with moderator Norman Woods of Hughes Microwave.
- “Fiber optics,” with moderator Jim Chiddix of ATC.

In response to an accelerating pace of developments in the field of high-definition television, there will be a special session on the topic for cable operators on Thursday, Dec. 3. The first half will be technical and will deal with the problem of transmitting the HDTV signal through broadcast and cable facilities. The second half will consist of a presentation by Rupert Stow of CBS with a selection of the works of virtually all the HDTV producers in the world, as well as reports on HDTV viewer perception tests, a demonstration of Super-VHS and a report on how to transmit increased resolution pictures.

While you’re on the exhibit floor, don’t forget to stop by the SCTE booth and register for the BCTE Certification Program exams, to be held Friday morning, Dec. 4. The BCTE Program is a topic we’ve brought up before and is one that can’t be overemphasized. Check this month’s Interval for Bill Riker’s “The Evolution of BCTE.”

IT is here

Don’t forget to pick up a copy of the preview issue of our latest publication, Installer/Technician. As shown from our recent acquisitions of CATU and Cable Tech magazines, we felt that the cable TV installer and technician needed a forum of their own. IT intends to reach the largest audience in CATV technology—the rank and file—consisting of installers, line technicians, field technicians, etc.

Most of all, IT will be an educational tool. Through IT’s features, departments and “advertisoriacs,” readers will be encouraged to learn more about their jobs, to better their current position in the cable industry and to assist in the furthering of the knowledge of their fellow workers. As we see it, IT will be read, reread and referred to each month by all people in the cable technical field from the entry-level installer on up. IT will be on the desks of many chief techs and engineers (after all, they’re the ones responsible for the training of their employees).

We’d love to hear your comments and suggestions about our preview issue.

A profitable event

While “there’s no place like home for the holidays,” many in our industry have and will be traveling away from home as the seasonal festivities approach—much like you, if you’re away from home in Anaheim. CT’s Assistant Editor Karen Naiman is another example: She recently flew to Valley Forge, Pa., shortly before Thanksgiving to attend the General Instrument/Jerrold Division seminar “Cable Insights ’B7.”

According to Karen, the seminar was extremely profitable for its attendees and sponsor. For the attendees, it meant learning from qualified cable leaders and seasoned professionals. For Jerrold, it meant a seminar filled to capacity, as well as taking it on the road to the West Coast in early 1988. Anyone interested in attending this traveling show, contact Jennifer Lambert at (215) 674-4800.

I’d like to close with a flashback of my December 1986 letter I wrote, “Take a look back to where you were at the beginning of the year, where the industry was. All things considered, we’ve made a lot of progress. And next year...”

Happy holidays from all of us at CT Publications. We sincerely hope your new year brings you success and promise.

Paul R. Terne
THE STEREO ENCODER
SO ADVANCED, IT SOUNDS
GOOD EVEN IN PRINT.

- Frequency response
goes to 15 KHz:
  +/− 0.5 dB, 50 Hz
to 14 KHz: − 3 dB at
  15 KHz.

- Encodes discrete left
  and right channel
  baseband inputs
  into BTSC format.

- Compact single-rack
  unit saves space.

- Optional dual subcarrier
demodulator and SAP
  generator.

- Front-panel access
to all audio input
  level controls.

- Front-panel LED
  bar graphs for left,
  right and SAP input
  levels.

- Optional internal
  4.5 MHz modulator.

- Built-in calibra-
  tion test tone.

- LED indicators
  for SAP carrier,
  override, video
  lock and over-
  modulation status.

- Typical stereo
  separation is better
  than 34 dB from
  50 Hz to 14 KHz,
  and always better
  than 26 dB over the
  complete operat-
  ing temperature
  range.

You couldn’t pick a better time to
offer stereo TV. Because there’s
never been a better BTSC stereo
encoder than the Scientific-Atlanta
6380. And the more you hear
about it, the better it sounds.

Everything about the 6380
was designed to make your life
easier. For example, a built-in cali-
bration test tone allows you to
adjust for maximum stereo sepa-
ration without a lot of expensive
test equipment.

All major controls and indica-
tors are located on the front
panel for easy monitoring. And
every unit is factory tuned and
tested to ensure precise, consis-
tent performance.

But don’t let all these features
fool you. The 6380 only sounds
expensive. It’s actually an econom-
ical way of enhancing your service
without adding channels. And in
the bargain, you get the same
Scientific-Atlanta quality that goes
into the rest of our full line of
headend equipment.

If you think our 6380 stereo
encoder sounds good in this ad,
you haven’t heard anything yet.
Call us for more information at
1-800-722-2009 or write to
Scientific-Atlanta, P.O. Box 105027,
Dept. AR, Atlanta, GA 30348.

Scientific
Atlanta

SEE US AT THE WESTERN
SHOW, BOOTH 1130.
...thru the years, we stuck with these standards.

- **High Quality**
- **Competitive Prices**
- **Good Customer Service**

and ... we are proud to say, BRAD maintains its quality philosophy and has earned a reputation second to none in our industry.

**Call:** 1-800-382-BRAD  
**In NY, Call:** 1-518-382-8000

---

**Reader Service Number 6.**
That’s the kind of effort we put out. Because that’s what it takes to become the leading CATV standby power system manufacturer in North America. That’s what it takes to design the technology that sets the standards in the industry. And that’s what it takes to beat the competition.

**Efficiency.** Alpha has developed standby power supply transformers rated at 94% efficiency – the highest in the industry. And this without sacrificing quality, thanks to superior engineering.

**Cost of Ownership.** Alpha systems cost less because our efficiency, reliability and performance monitoring result in lower maintenance and operating costs.

**Modularity.** Alpha pioneered functional modularity. Just add simple plug-in components and your standby power system is updated with the latest innovations from Alpha’s R&D labs.

**Uninterrupted Power.** Alpha’s transfer time is so immediate that we offer standby power with the advantages of uninterruptible power. Uninterrupted power means uninterrupted service to your subscribers.

**Innovation.** We’re never content. We’re always looking for ways to improve. That’s why the industry looks to Alpha for innovations in standby power. Single ferro-resonant design. Temperature compensation. “Smart” battery charging. Performance monitoring. Status monitoring. Major innovations resulting in real benefits – and all introduced by Alpha Technologies.

And have we finished yet? Don’t bet on it.
Western Show to feature SCTE seminars

ANAHEIM, Calif.—"See It Here" is the theme of the 1987 Western Show to be held at the Anaheim Convention Center Dec. 2-4. In cooperation with the California Cable TV Association, the Society of Cable Television Engineers will present three days of technical seminars. The agenda for the show follows. (See accompanying breakdown for technical sessions.)

Wednesday, Dec. 2
8 a.m.—Registration opens
8:30 a.m.-5 p.m.—Technical sessions
10 a.m.-6 p.m.—Exhibits open
1-2:30 p.m.—Welcome and keynote panel
4-6 p.m.—Cocktail party in Exhibit Hall

Thursday, Dec. 3
8 a.m.—Registration opens
8:30 a.m.-5 p.m.—Technical sessions
10 a.m.-6 p.m.—Exhibits open
11:15 a.m.-12:45 p.m.—Exclusive exhibit hours
12:45-2:15 p.m.—Luncheon
4-6 p.m.—Exclusive exhibit hours and cocktail party

Friday, Dec. 4
8 a.m.—Registration opens
8:30-10 a.m.—Technical sessions
10 a.m.-3 p.m.—Exhibits open
11:15 a.m.-12:15 p.m.—Exclusive exhibit hours
10:30 a.m.-1 p.m.—SCTE testing
12:15-1:30 p.m.—Luncheon
1:45-3 p.m.—General session
3-4:15 p.m.—Roundtable sessions

Technical sessions

Wednesday, Dec. 2
• 1:30-3 p.m.—"Building fiber-optic supertrunks today." Moderator: Jim Chiddix, ATC. Speakers: Al Johnson, Synchronous Communications; "Economics"; John Holobinko, American Lightwave Systems; "Optical design"; Doug Trukenmiller, Heritage Cablevision; "Construction"; Tom Jokerst, Continental Cablevision, "Testing and operations."

• 3:30-5 p.m.—"Fiber optics in CATV tomorrow." Moderator: Jim Chiddix, ATC. Speakers: Dave Pangrac, ATC; "Fiber backbone"; Dr. Lawrence Stark, Ortel; "Analog lasers and detectors today and tomorrow"; Jack Koscielski, General Optronics; "AM video on fiber"

Thursday, Dec. 3

• 10:30 a.m.-noon—"Cable consumer interface issues." Moderator: Joe Van Loan, Viacom Cable. Speakers: Dave Large, Gill Industries, "Baseband and stereo interconnection"; Walter Cicicora, ATC, "EIA multiport"; Vito Bruglieri, Zenith Electronics Corp., "Pay-per-view"; Alex Best, Cox Cable, "BTSC: A progress report."


• 4-5:45 p.m.—"HDTV, EDTV, and cable: Demonstration and discussion." Moderator:
Friday, Dec. 4
- 10:30 a.m.-1 p.m.—BCT/E Certification examinations: Examinations in all seven categories. Preregistration in SCTE booth on floor or test site.

Two more years of fiber progress

ENGLEWOOD, Colo.—Recently, a faithful CT reader cited that the first fiber-optic use in the United States occurred two years earlier than the first date given in an outline accompanying an article from the October ’87 issue of the magazine. (“Fiber optics in CATV: 10 years of progress,” page 28).

Teleprompter made history in July 1976 when it replaced a segment of coaxial cable in its Manhattan cable TV system with an 800-foot fiber-optic cable.

ATC to use fiber in cable systems

ENGLEWOOD, Colo.—American Television and Communications Corp. is working with a number of manufacturers to introduce fiber backbone technology that will allow the use of optical fibers to bring cable signals into each of its systems. The existing coaxial cables will then be used for the delivery of service over the last mile to the cable household.

The electronics required in each neighborhood to convert optical signals back to radio frequency signals is a critical element in this application. Practical approaches to the electronics are expected to be demonstrated in ATC’s laboratory within the next six months, followed by field tests, probably in the Kansas City, Mo., system.

The expected cost of fiber backbone installation is $20 to $30 per customer, or $100 million if applied to all of ATC’s systems. However, this is a gradual process that will be driven in part by test results in selected systems, and ATC expects reduced operating costs and improved signal quality as a result.
China—April 1987

By Isaac S. Blonder
Chairman, Blonder-Tongue Laboratories Inc.

At the invitation of the Chinese Mechanical Engineering Society, the Citizen Ambassador Program of People to People selected a team of professionals in engineering from the American Society of Mechanical Engineers to visit China and exchange ideas about the current practices in engineering management. A friend suggested I join this group and see China at the factory and university level. My wife and I were accepted, the trip lived up to its promises and the following are some of my observations (hopefully accurate).

China is a Communist society with all the ills implicit in its philosophy. During the cultural revolution some 20 million citizens were eliminated simply because they were intellectuals or landlords. Schools were closed or restructured, resulting in the severe retardation of education and industry.

However, with Mao gone since 1980, China is now marching down the road to socialism with a dash of capitalism in the mix. Individuals may now sell goods, employ a few workers and build their own homes on very limited parcels of property. We, however, encountered none of this except in the street “free” markets. We did hear that tea farming had gone private with a gratifying increase in quality and quantity. All of the factories, professors, managers and engineers we visited were controlled and paid by the government. When we asked how soon private companies could be formed to compete with the government entities, no one could answer with a date, but said it would “happen someday.”

Wages averaged 100 yuan monthly—about $30. Top managers might earn double this amount, with fringe benefits limited to food and company vehicles. Bicycles and buses were the principal form of transportation to and from work. Automobiles, which were largely Japanese and new, were confined to business and government uses.

Housing was mostly government and averaged about $1 per month per family. In every city, construction of new apartment buildings lined the major streets right behind the old novelty being razed. Cranes criss-crossed the skies. Here and there one saw glimpses of brighter clothing, mostly on the children, but the universal costume was a dull colored hat, shirt, jacket and pants of the same cotton cloth.

Children were uniformly good natured, charming and attended with love by their parents. The child was always in physical contact with the parent or grandparent, either being carried or walking hand-in-hand. It was extremely rare to see a child running about without an adult hovering nearby. One child per couple is the official government decree and this restriction is almost always obeyed!

Our hosts were unceasingly polite, attentive and complimentary of our presentations. An interpreter was always present and language was not a barrier to communication.

The visit to a heavy machine manufacturing plant went like this. We were bused to a very large plant site employing at least 2,000 employees spread out among a dozen buildings of indeterminate origin. The grounds were minimally landscaped and marginally maintained, but generally clean. Gathered in a large second-story room, the management cordially greeted us. We sat down, about 30 all told, in a variety of chairs facing each other in a rectangle of tables on which hot tea in large, covered cups were set, ready for each of us. Then followed an hour of welcoming talks by the managers and local dignitaries; all, of course, were translated. Next, one of our group gave a prepared talk on a subject of possible interest to the particular industry we were visiting. A discussion period then followed.

I was never able to deliver my paper on our company’s experience with quality circles—it seems they were sick of hearing about the subject from the Japanese, and besides, labor was so abundant they didn’t concern themselves with its cost but rather the output! Then came a tour of the plant and a banquet lunch. Some of the enthusiasm in our presence may have been due to the resulting large budget for food!

Shipbuilding, turbine manufacturing, massive electrical transformers, giant castings, boiler-making, etc., were novel experiences for most of us. There was a universal desire to possess the latest machinery. Apparently, money was available to buy what was needed. I visited a modern color TV plant obtained from Toshiba that I, as an old TV engineer, found admirable in every aspect, with a superb TV signal center and mechanized conveyors. All of the workers were native Chinese who operated the most complex machinery with surety and lack of anxiety. There seemed to be no quality personnel and supervisors visible in the production areas. Indeed, I seldom saw a blueprint or a clipboard laden with papers.

Three weeks are hard to condense in a single page. Perhaps the best glimpse into the Communist world is this exchange I had with the manager of an electronics complex:

You’re A Professional…

Deal With A Professional

Stocking:

• Catel
• Monroe
• Cadco
• G.I. (VCII)
• ISS Engineering
• Triple Crown
• Power Technology
• Blonder-Tongue
• DX Communications
• Miritale

Donley International
7720 Blankenship • Houston, Texas 77055 • 713-956-2984 • 800-346-3759

Reader Service Number 10.
E=MC²: Einstein's deceptively simple equation changed the way we think about the universe.
Closer to home, Magnavox CATV had developed its own formula for excellence: Quality + Reliability + Service = Magnavox.

Magnavox manufactures only the highest quality products for use in your broadband network. We design them reliably and efficiently to improve system performance and save you money. And we provide a wide variety of services to help you keep pace with the expanding industry.

Quality + Reliability + Service: The Magnavox formula just might change the way you think about your broadband network.

See us at the Western Show, Booth 516.

Reader Service Number 11.

For more information talk to your Magnavox account representative, or call toll-free: 800/448-5171 in NY State 800/522-7464, Telex 937329 Fax. 315/682-9006.

A NORTH AMERICAN PHILIPS COMPANY
100 Fairgrounds Dr., Manlius, NY 13104
Double your productivity without leaving your seat.
It's hard to be productive when you're constantly changing seats. That's why Case makes trenchers that offer something you won't find anywhere else—single seat operation. A feature that helps you work faster and more effectively.

Case's low maintenance, hydrostatic ground drive gives you still another edge. With the single move of a lever, it lets you go from forward to reverse—without clutching—for unmatched productivity in either direction. What's more, you can vary ground speed to accommodate soil conditions. The result: you trench, backfill and plow at peak capacity. All the time.

To learn more about the trenchers that help you do more, visit your Case dealer today.

Reader Service Number 12.
Mutual effects of RF scrambling and BTSC stereo in the headend

By Steve Fox
Manager, Customer Applications, Wegener Communications

As you think about adding BTSC stereo to your cable system, several questions might come to mind: how BTSC works, what kind of signal quality can be expected and how to integrate the new equipment into your headend. Talking to technicians and engineers throughout the country, I found a major concern in adding BTSC is the effect on stereo quality and headend scramblers. In other words, when BTSC encoders are installed on a locally scrambled channel, will either the encoder or the scrambler "crash and burn?" Earlier this year, Wegener conducted a series of tests. The purpose of the testing was to find the pitfalls that might be encountered and to find solutions that would ensure acceptable stereo generation over cable, assuming, of course, that BTSC would operate over a scrambled channel at all. We found that very acceptable stereo could be derived, but that some problems did exist and needed to be addressed when installing the equipment.

The encoding process

Before discussing the tests, let’s first look at the BTSC encoding process. Figure 1 is a drawing of the BTSC signal. The L+R, or monaural portion of the signal, is identical to the mono signal you are presently generating. Frequency range is 50 Hz to 15 kHz, the audio signal includes 75 µsec pre-emphasis, and peak deviation is 25 kHz.

At this point, the similarity between mono and BTSC stereo ends, however. A pilot is located at 15.734 kHz (note that this is the same frequency as horizontal sync) and is peak-deviated at 5 kHz. The L-R, or stereo, subchannel is centered at twice the horizontal sync frequency and is deviated at 50 kHz peak. This is an AM double-sideband suppressed signal and includes a non-linear dbx compressor. These three components together make up the BTSC stereo signal. Total audio bandwidth is 53 kHz and total peak deviation is 55 kHz. (These numbers will take on greater significance when we discuss interfacing the BTSC encoder to the TV modulator.)

An additional component that may be added to the BTSC stereo signal is the SAP, or second audio program, channel. Although it will probably not be used in most cable applica-
Broadband: For the best in distribution amplifiers

Broadband Engineering offers a distribution amplifier for every application from the lowest cost to the highest performance CATV, MATV and SMATV installation.

Flexibility to meet demanding system requirements is our goal with:

- Bandwidths up to 550 MHz
- Gains from 14 to 50 dB
- One and two-way operation
- Sub, mid and high-split options
- Standard or power doubler hybrids

Extruded aluminum housings insure excellent heat transfer from active devices for long life and reliable service.

And we don’t forget maintenance either. Our hybrids are installed in sockets so that replacement is quick and easy and down time short.

We don’t cut corners in design, we engineer the best.

For more information, call Broadband Engineering at 800-327-6690 (305-747-5000 in Florida) or write us at 1311 Commerce Lane, Jupiter, Florida 33458.

For quality, performance and service, call Broadband

AUGAT® BROADBAND
Quality and Innovation

Reader Service Number 13.
tions, SAP is useful as a second language mono channel and will find other uses as well. The SAP channel provides a 50 Hz to 10 kHz audio bandwidth and is also dbx compressed. Use of SAP or additional BTSC components will add to the total audio bandwidth and deviation of the BTSC signal and add a potential degrading factor to overall signal quality. Therefore, SAP should only be used in headends where an additional alternate audio channel is desired.

As the results of the tests are discussed, the specification that will be emphasized will be stereo separation. This is because separation is the factor most degraded by anomalies in the stereo encoding process. The BTSC encoder requires three inputs: left channel audio, right channel audio and baseband video. The horizontal sync pulses from the video are used to generate a reference pilot for the BTSC decoder. (Again referring to Figure 1, note that all components of the BTSC signal are referenced to the pilot signal by the encoder.)

Left and right channel audio are used to generate the matrixed stereo output. Since the L+R and L-R subchannels are processed by entirely different methods, tracking the subchannels accurately during the encoding process is difficult to do. Tracking will not be linear through the audio output frequency range of 50 Hz to 12 or 14 kHz (specifications vary with manufacturers). Accurate gain and phase tracking of the subchannels is essential to maintain good stereo separation and, since this tracking is non-linear, separation will vary at various frequencies (Figure 2). As little as a 0.5 dB error in gain will limit theoretical maximum separation to about 28 dB. As little as a 5° error in phase tracking will limit theoretical separation to about 27 dB. RF scrambling also can affect the separation of the BTSC stereo signal.

Initial testing was performed without the scramblers installed to provide reference data and a basis of comparison when the scramblers were later added. Figure 3 is a basic diagram of the test system. A satellite feed was used for the video source, while the audio source was stereo audio during subjective testing and signal generated audio during objective testing. Measurements were taken using both a Belar BTSC reference decoder for commercial data and a Recoton

**Table 2: Separation with commercial decoder, sine wave sync suppression method**

<table>
<thead>
<tr>
<th>Separation</th>
<th>Scrambled</th>
<th>Non-scrambled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>18 dB @ 1 kHz</td>
<td>20 dB @ 1 kHz</td>
</tr>
<tr>
<td>High</td>
<td>31 dB @ 50 kHz</td>
<td>33 dB @ 50 kHz</td>
</tr>
<tr>
<td>Average</td>
<td>25 dB</td>
<td>25 dB</td>
</tr>
</tbody>
</table>

**Table 3: Separation with consumer decoder, sine wave sync suppression method**

<table>
<thead>
<tr>
<th>Separation</th>
<th>Scrambled</th>
<th>Non-scrambled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>16.5 dB @ 12 kHz</td>
<td>16 dB @ 12 kHz</td>
</tr>
<tr>
<td>High</td>
<td>32 dB @ 4 kHz</td>
<td>31.5 dB @ 4 kHz</td>
</tr>
<tr>
<td>Average</td>
<td>23 dB</td>
<td>23 dB</td>
</tr>
</tbody>
</table>

**Table 4: Separation with commercial decoder, gated sync suppression method**

<table>
<thead>
<tr>
<th>Separation</th>
<th>Scrambled</th>
<th>Non-scrambled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>13 dB @ 2 kHz</td>
<td>25 dB @ 2 kHz</td>
</tr>
<tr>
<td>High</td>
<td>26 dB @ 50 kHz</td>
<td>37 dB @ 4 kHz</td>
</tr>
<tr>
<td>Average</td>
<td>22 dB</td>
<td>33 dB</td>
</tr>
</tbody>
</table>

**Table 5: Separation with consumer decoder, gated sync suppression method**

<table>
<thead>
<tr>
<th>Separation</th>
<th>Scrambled</th>
<th>Non-scrambled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>15 dB @ 1 kHz</td>
<td>13 dB @ 12 kHz</td>
</tr>
<tr>
<td>High</td>
<td>22 dB @ 5 kHz</td>
<td>20 dB @ 4 kHz</td>
</tr>
<tr>
<td>Average</td>
<td>20 dB</td>
<td>19 dB</td>
</tr>
</tbody>
</table>
Fred II BTSC decoder for consumer data. It should be noted that results will vary somewhat depending upon the particular decoders used, but the variance will not be significant with quality components.

Figure 4 shows the results of initial testing. For the composite tests, the BTSC encoder was installed back-to-back with the Belar reference decoder with a baseband audio interface. Optimum results would be expected in this configuration, and the expected was attained. A second test was then made, again in a back-to-back configuration but with an interface at 4.5 MHz. As expected, separation decreased but not significantly (Table 1). A final test was then performed through a CATV modulator and converter, again interfaced at 4.5 MHz. Adding these components had very little effect on stereo performance.

Scrambling methods
The next phase of the testing program was to add the scramblers to the test configuration, as shown in Figure 5. Two types of scrambling methods were analyzed: sine wave sync suppression and gated sync suppression, and measurements were made in both the scrambled and non-scrambled modes. Sine wave sync suppression will be discussed first. An Oak Mark V scrambler and M35B converter were used for this test. To our surprise, this scrambling method had little effect on separation over the audio output frequency range with each BTSC decoder used and no effect on average separation at all.

There were some problems that became evident, however. For these tests, both the commercial and consumer decoders were used, and interfacing was at 4.5 MHz. Figure 6 and Table 2 show the separation using the Belar BTSC reference decoder. Figure 7 and Table 3 show the test results with the Recolon consumer BTSC decoder.

We concluded from these tests that as far as specifications of the resulting stereo signal, BTSC encoding is compatible with sine wave sync suppression scrambling; this scrambling method has very little detrimental effect on the BTSC signal. The same cannot be said, however, for the effect of BTSC encoding on the video. While no negative effect was found in the scrambling process itself, some audio components were observable in the resulting video output when using the consumer decoders.

---

**Gold & Silver**

"Now Approved For Your IRA"

Turn Your Investment Funds Into Gold You Can Hold

Come By Our Booth #716 & Let Us Show You How

CERTIFIED INVESTMENTS

223 South 6th Street
Griffin, GA 30223

Natl. Wats.
1-800-644-4949

Reader Service Number 15.
This was especially significant, considering that this decoder is representative of the type of decoder used by the subscriber. This degradation was most evident when a composite BTSC interface was used; that is, when video and BTSC audio were combined and modulated as a single signal onto a 4.5 MHz carrier. When separate interfaces were used (BTSC on a 4.5 MHz carrier and baseband video as a separate signal), audio/video interaction became imperceptible.

When gated sync suppression scramblers were installed in the test system, a completely different set of results were established. Systems from several manufacturers were evaluated and results varied somewhat from system to system. The results presented here are an average of the findings from systems provided by Pioneer and by Scientific-Atlanta. Again, testing was performed with commercial and consumer BTSC decoders and interfacing was at 4.5 MHz. As expected, this scrambling method caused degradation in BTSC performance, but performance remained within desired guidelines. The BTSC encoding process caused no detrimental effects on scrambler operation, however. Figure 8 and Table 4 show stereo separation with the commercial decoder; the effect on stereo separation using the consumer decoder is shown in Figure 9 and Table 5.

From the tests with gated sync suppression scramblers, it can be concluded that this scrambling method does affect BTSC stereo separation. The significant results, however, are those with the consumer decoder, again because this represents the signal quality that will be received by the subscriber. Average separation was affected adversely by only 1 dB and remained within the 18 dB average separation targeted for subscribers.

No perceptible video degradation was
evident with either BTSC decoder when the scramblers were installed, but sync buzz was evident in the audio. To pinpoint the cause of the buzz, the level was measured with the BTSC encoder installed and operating. The BTSC encoder was then removed from the test system and buzz level was again measured. The level did not change when the BTSC encoder was removed, indicating that the encoding process was not a factor to the sync buzz, but rather the buzz was produced by the scrambling process itself. Further testing verified that the buzz could be controlled and reduced to acceptable or non-evident levels by careful level setting of the headend components (a practice you should be using anyway).

BTSC Interfacing

A brief discussion of BTSC interfacing is in order. Remember in the discussion of sine wave sync suppression scrambling that some audio/video interaction was encountered with the consumer BTSC decoder, which was resolved by changing the interface used in the initial test. There are four ways to interface a BTSC encoder to a headend TV modulator, as shown in Figure 10. Keep in mind when evaluating your equipment requirements that not all interfaces (or other encoder features, for that matter) are offered as standard equipment by all manufacturers. Some may be optional, while others may not be available at all. You should look at all needed and desired features of a BTSC encoder before selecting the equipment for your particular headend requirements.

There are four ways to interface a BTSC encoder to your TV modulator, each with advantages and disadvantages over the others:

1) **Baseband audio interface**—BTSC is provided to the audio input of the TV modulator as baseband audio signal, while baseband video is provided to the video input as a separate signal. This method will provide the best performance if all TV modulator levels are optimized, but this is not always easy to do. A small error in audio deviation, for example, will severely restrict attainable stereo

---

**LAN FREQUENCY TRANSLATORS**

**CATV CHANNEL CONVERTERS**

**APPLICATIONS:**

- Broadband LAN Systems
  - Video, Data, Digital, and Analog Voice
- CATV Channel Conversions
- Security Systems
- Video Conferencing
- Switched R.F. Communications Systems

**Three Models**

**Priced Under $800.00**

- Maximum freedom in frequency planning and allocation — translates almost any 6 MHz band to any other frequency, up or down, from 6 MHz to 400 MHz. Includes 156.25 and 192.25 MHz offsets.
- Crystal referenced fundamental phase-locked local oscillators — crystal stability without spurious signals from crystal oscillators and multipliers.
- Field demonstrated LAN performance of $10^{-10}$ BER with 5 T1 carriers compressed into a 6 MHz channel.

**Reader Service Number 24.**

2706 National Circle  
Garland, Texas 75041  
Phone (214) 271-3651  
Ask for your FREE Catalog
emission is disabled and the audio section can process the 53 kHz bandwidth and 55 kHz deviation of the BTSC signal (remember, these numbers are greater if SAP is also used). Normal mono audio requires 15 kHz bandwidth and 25 kHz deviation and if the TV modulator is not BTSC-compatible, only the monaural portion of the BTSC signal will pass through the modulator. Therefore, if the TV modulator is not set up for the BTSC and you elect to use this interface, the modulator will need to be modified or replaced. For these reasons, the baseband audio interface is not recommended for use in BTSC applications.

2) 4.5 MHz composite video interface—In this case, the BTSC signal and video are combined and modulated onto a single 4.5 MHz carrier. This is the simplest interface to make, with the combined carrier sent to the video input of the TV modulator. The other advantage is that since the audio section of the TV modulator is completely bypassed, no modifications to the modulator are required. The drawback with this interface is that with some TV modulators, audio/video interaction may occur. If it does, the modulator can probably be modified locally to accommodate the next interface to be discussed.

3) 4.5 MHz BTSC and separate baseband video interface—This is the preferred BTSC interface. BTSC audio is modulated onto a 4.5 MHz carrier and input to the TV modulator. Baseband video is looped out of the BTSC encoder and provided to the TV modulator video input as a separate signal. Interfacing in this way reduces or eliminates audio/video interaction at this point in the equipment chain and bypasses the audio section of the TV modulator, eliminating the need for modifications. Configuring the TV modulator for dual inputs, if not already available, is easily done on most quality TV modulators.
Those Who Think They Can't Afford A Great Impulse PPV System Haven't Done Their Homework.

You might be surprised to learn that as well as offering the next generation of secure and reliable full-featured addressable converters, Zenith also offers the lowest cost impulse PPV system you can buy.

For around $40, you can own Zenith's PayMaster decoder. It works with Zenith's tested and proven Phomevision ANI one-way system. And as long as subscribers have a PayMaster decoder, a touchtone or rotary phone is all they need to order a PPV event.

For under $100 with remote, there's Zenith's rugged, PM-Pulse two-way store and forward decoder. And it gives subscribers more impulse PPV options than most other decoders.

So, if you didn't know Zenith impulse PPV systems are as affordable as they are dependable and profitable, look at it this way: You learn something new every day.

For more information, write Zenith CATV Sales, 1000 Milwaukee Avenue, Glenview, IL 60025. Or call 312-699-2110.

Reader Service Number 16.
4) **41.25 MHz IF interface**—Rather than using 4.5 MHz, a 41.25 MHz modulated carrier is used to interface with the TV modulator at intermediate frequency (IF). High stability of the 41.25 MHz carrier is required over time, with the possibility of audio/video interaction if the carrier drifts too far off frequency. Due to this possibility most manufacturers do not offer a 41.25 MHz interface and, although preferred over the baseband audio interface method, it is not generally recommended.

In summary, the results of these tests demonstrate that BTSC stereo encoding and RF scrambling are mutually compatible systems. Although some problems may be encountered when implementing the stereo system, they can be controlled and good quality audio signals will be the result. The key is simply proper equipment installation and good headend maintenance to deliver an exciting new sound to your subscriber.

---

**Figure 10:** BTSC interface methods

Diagram showing various BTSC interface methods including baseband video loop-thru, 4.5 MHz composite video interface, 4.5 MHz BTSC and separate baseband video interface, and 41.25 MHz IF BTSC and separate baseband video interface.
The right way for installers to figure out what's wrong.

The best time to discover a subscriber installation problem is at hook-up. Before you have to make an expensive service call.

That's why Wavetek developed MicroSAM, a new hand-held installer's meter that gives digital readouts of channel signal levels.

For instant troubleshooting.

If an installer discovers a problem, he can track it down simply by retracing his steps. Testing every point from the TV to the tap. Until he finds it.

An LCD display gives the exact signal level (without dummy lights or needles to read.)

At three frequencies, not just two. Frequencies you set, not the factory.

MicroSAM has programmable band ranges up to 550 MHz. At ±1 dB accuracy, with 0.1 dB resolution.

And a suggested list price of only $369.

MicroSAM gets rid of the guesswork. So you get it right the first time.

Call Wavetek at 1-800-622-5515 (in Indiana call 317-788-5965) for more information and the name of the nearest MicroSAM distributor.
You have just received your first BTSC encoder, and what do you do now? While it may seem complex at first, the installation and fire-up of a stereo TV encoder is not as difficult as it seems. The following guidelines apply to most well-designed stereo encoders from reputable manufacturers.

The installation of a BTSC encoder is comprised of three interface requirements. These are: input sources, video sample and modulator drive (see Figure 1). Each of these areas has its own particular set of potential interface difficulties, depending primarily on the available technical information about the headend system, and the degree of built-in flexibility in the encoder.

Input sources

The first step in installation is the provision and identification of input sources, with particular attention to type (balanced, unbalanced), impedance (high, 600 ohm) and content (discrete, matrix).

For most stereo applications, the source program will be obtained from one of the following: low-level subcarrier (via Wegener or Learning demodulator), high-level subcarrier (via satellite receiver or auxiliary demodulator), digital audio (via VideoCipher or digital B-Mac decoder) or local baseband sources (such as VCR, studio, compact disc, etc.). The sources may be balanced, unbalanced, high or low impedance. The primary areas of potential problems with source connection will be level and phase reversal.

*Balanced/unbalanced connections.* Most stereo encoders, as well as source devices that employ balanced inputs or outputs, will have terminals labeled + and -. This marking is to allow the maintenance of proper phase when interconnecting and has no DC relevance. When interconnecting the outputs of a balanced source to balanced inputs, attention to + and - signs as well as employing color-coded wire will prevent accidental phase reversal (Figure 2). The same caution applies when connecting an unbalanced source to a balanced input (Figure 3).

Note that active balanced inputs (transformerless) may have a specific input terminal...
EFFICIENCY EXPERT

New SUPER SENTRY Standby Power Is 92% Efficient

If an inefficient power supply has been robbing you of profits, it's time to call in the efficiency experts, LECTRO. The new SUPER SENTRY standby power supply operates at 92% efficiency in normal full load mode. And that can mean significant savings on your electric bill. As much as 10% over other power supplies.

The SUPER SENTRY is the newest innovation in Lectro's Super Line. To get all the facts about the Super Sentry, the Super Ferro, and the Super Brute, call 1-800-551-3790. Ask for the efficiency expert.

LECTRO
A Burnup & Sims Cable Products Group Company

Reader Service Number 18.
Unbalanced source appears as 150 ohm

Balanced load

Figure 4b

Load appears as short circuit

Figure 4c

situations, driving from an unbalanced source presents several other potential problems. In situations where the center tap of the input transformer is permanently grounded, the second winding must be left open (no connection, Figure 4b). This results in a load impedance reduction, which reduces the audio signal level. The alternative is to modify the input to remove the center tap ground (Figure 4a), and ground the second winding. Grounding both the center and one winding of the input will cause the other winding to appear as a short circuit (Figure 4c).

Source load impedance: While most stereo encoders will be equipped with 600-ohm balanced inputs, some source programs may be delivered as high impedance unbalanced outputs. Connecting these sources to a 600-ohm input will result in significant reduction in level, and may also result in distortion at the source due to having to overdrive the output amplifier in order to make up lost level. This will most likely occur if the source is recovered from VCRs or consumer-type decoders. While some stereo encoders incorporate high impedance input facilities, those that do not will probably require the use of a buffer amplifier between the source and load (Figure 5).

Matrixed inputs—in certain cases, the inputs to the stereo encoder may be delivered as matrixed (L+R, L-R) signals. Matrixed signals can tolerate very little phase or level imbalance without severely affecting the stereo recon-
Just like Santa, Nexus products deliver year after year. Our award-winning Series 5 head-end combines low price, small size and proven reliability. If you want to give your subscribers a gift they’ll treasure forever, use NEXUS headends.

From all the staff at NEXUS ENGINEERING CORP, we wish you a Merry Christmas and a Happy New Year.

NEXUS — First in Reliability.

TEL.: (206) 644-2371
BELLEVUE, WA.
(604) 420-5322
BURNABY, B.C.
FAX: (604) 420-5941

OR WRITE: NEXUS ENGINEERING CORP.
7000 LOUGHEED HWY.
BURNABY, B.C. V5A 4K4

TELEX: 961000
MAILBOX: XPI8348
Reader Service Number 20.
Figure 5

High Z source

Audio amplifier
high to low impedance
buffer
(may be incorporated in some
stereo encoders)

Load

Figure 6

Source

Video
low-pass
filter

Encoder sample
loop

To
encryption
and/or
modulator

Video sample
The second interface required for a BTSC encoder installation is a video sample for pilot timing. This normally involves merely looping the program video through the encoder on its way from the source to the modulator. There are, however, several potential problems, particularly with satellite video and encryption systems.

Satellite video—The video output of many satellite receivers may not be properly bandpass filtered. The lack of filtering may allow auxiliary subcarrier information to appear at the video sample detector of the stereo encoder. Depending on the number and level of subcarriers, the sync pulses may be masked and make phase-locking of the pilot erratic. This can result in intermittent pilot lock loss and buss or breakup of the sound. The normal cure for this effect is the installation of a video bandpass filter ahead of the encoder (Figure 6).

Encryption systems—The video sample must have sync pulses intact, and must therefore be derived before any baseband sync suppression encryption. While this is

Are You Ready To
UPGRADE? or REBUILD?

• Excess Inventory Sales
• Complete Bill of
  Materials
• Large Inventory
• QRF Upgrade Modules
• High Quality Test
  Equipment, DIX/Hill
  Matrix Generator
• Guaranteed to meet or
  exceed factory specs

We Specialize in
BUYING, REBUILDING & SELLING
CATV EQUIPMENT

CatV SERVICES

Outside California
800/227-1200.
Inside California
800/223-3152

90 DAY UNCONDITIONAL WARRANTY, PARTS & LABOR

2211 Warm Springs Court, Fremont CA 94539

What’s new
with
C-COR?

Stop by Booth 235.

60 Decibel Road, State College, PA 16801
(814) 238-2461

We're Out To Give You
The Best Reception In The Industry.

Reader Service Number 21.

Reader Service Number 22.
Viewsonics Lockinator™ Locking Terminator. Protects drops in the BATTLE ZONES and HIGH CRIME AREAS in more than 200 cities in the U.S., Canada and Puerto Rico.
normally no problem, it can be difficult if the final stereo encoder output is required as video/4.5 combined. In most encoders the same loop is employed for pilot sample and video/4.5 combining. These applications may require the use of external video/4.5 combiners (An example of this is shown in Figure 10.)

**Modulator interface**

There are two basic interface methods between stereo encoder and modulator, although there are many minor variations on these methods. The interface will be either baseband or modulated carrier.

**Baseband interface**—In cable TV applications, the baseband interface will rarely be employed, as very few existing CATV modulators have the ability to handle 48 kHz baseband signals. The baseband interface also presents calibration problems that most manufacturers have addressed through precision internal modulators (Figure 7).

The most common interface will involve modulated subcarrier, either at 4.5 or intermediate frequency (IF). This allows the manufacturer to provide a signal that has a proper preset deviation, as well as the necessary bandwidth to deliver the BTSC signal. This interface avoids most of the inherent BTSC problems of modulator capability and precision setup. The modulated subcarrier interface will interface in one of the following three methods (Figure 8). Each of these methods has its own advantages and disadvantages, of which a few are:

a) The video/4.5 combined input is the most commonly available 4.5 interface. The majority of these were, however, designed with the original 26 kHz deviation in mind and occasionally suffer bandwidth restrictions, as well as other limitations that can cause distortions in the wide deviation BTSC signal. Several unique problems also arise when baseband video encryption is employed (Figure 8a).

b) The separate video and 4.5 is probably the least difficult method, and presents less potential for signal degradation. Unfortunately, very few modulators have a separate 4.5 input facility. It is, however, a very simple modification to implement and most manufacturers have modification information available (Figure 8b).

c) The IF interface is very simple to implement provided the modulator employs dual IF loops. One major difficulty is that when IF interface is employed, the intercarrier frequency stability becomes a function of both the video oscillator in the modulator and the audio oscillator in the encoder. With a 4.5 interface, the intercarrier stability is solely a function of the encoder 4.5 MHz oscillator performance (Figure 8c).

**Some trickier interfaces**

The foregoing has outlined the interface requirements for most applications. Many systems, and in particular larger systems, may present more complex requirements. Among those that have come to light so far are commercial insertion, baseband encryption, slave headends, microwave links and combinations of these items. While not all of these problems can be addressed here, we can examine a few particular cases and offer certain suggestions.

Commercial insertion must occur prior to the encoder video pilot sample loop so that the relationship between video and stereo pilot phase be maintained. The commercial inserter also should have facility to switch the encoder to mono mode should the insertion source not.
The New, Undisputed Champion of RF Amplifiers

THE BEST GAIN IN TOWN

- LONG DROPS?
- MDU's?
- MULTIPLE OUTLETS?
- LOW SIGNAL LEVEL?

NO OPPONENT IS TOO TOUGH FOR THE "CHAMPLIFIER"!

15 MODELS from $16.95

AND .... with our unique new design you can use standard coaxial cable to connect the plug-in adaptor to the housing to power the amp. This virtually eliminates ingress and egress and permits installation in any convenient location, both in or out of doors.

See us at the Western Show, Booth 613. Reader Service Number 25.
be stereo (Figure 9). Remote headends that provide signals intended to be processed into stereo should have the encoding performed at the remote site. The BTSC can then be transported over microwave links or supertrunks as modulated subcarrier. Discrete left and right should not be transported as separate signals due to the potential for phase and level imbalance (Figure 10).

Some of the most commonly encountered problems with stereo encoder installation and some probable causes are:

Lack of separation
- Improper deviation setup
- Poor modulator audio frequency response
- Narrow or imbalanced 4.5 or audio IF filters
- Severe left vs. right input level or phase imbalance

Buzz
- Video overmodulation
- Poor modulator video spectrum filtering
- Video overshoot from alphanumeric generators
- Pilot lock errors due to interference on video sample
- Poor video sample clamping or stability
- Gated sync suppression encryption

Poor quality sound
- Phase reversal on left or right input
- Frequency response problems on left or right input
- Overdriving left or right inputs
- Modulator baseband frequency response problems

While it is not possible to cover all potential problems, the adherence to several basic recommendations will alleviate the majority of difficulties:
- Employ short, identical input connections, particularly with matrixed signals.
- Observe + and - phase markings.
- Ensure a clean, stable video sample.
- Employ video and separate 4.5 modulator interface if possible.
- Maintain modulation depth of all components including character generator over- and undershoots at 87.5 percent maximum. Reduce modulation depth slightly if required for buzz performance.
- Do not undertake arbitrary control adjustments unless proper measurement equipment is available.
Affordable Masterpiece

No specifications equal those of the Signal Vision Directional Tap. It is, mechanically and electronically speaking, a work of art.

High art commands a high price, right? Wrong. The price for this tap is a value any critic would admire.

So you don't have to be an art expert to make your own appraisal. The Signal Vision Directional Tap is nothing less than a masterpiece.

Call Signal Vision for price and information about our new Directional Tap or for a catalog of our entire product line.

We Make The Connection
Three Wrigley • Irvine, CA 92718
714 / 586-3196

2-WAY & 4-WAY OUT-PUT MULTI-TAPS

Features:
- True performance to 550 MHz and beyond
- Machined brass F ports
- Corrosion resistant 360 aluminum alloy housing and protective epoxy coating
- Aluminum gasket for maximum RF integrity
- Stainless steel spring loaded clutch
- Tapered entry for center conductor
- Neoprene weather-proof gasket
- Aerial or pedestal mounting without changing center seizure screws
- Center pin stop in seizure block
- Plastic PC board housing cover
- Excellent insertion loss to 550 MHz

Specifications:
- Bandwidth: 5-550 MHz
- Tap-to-Tap isolation: 30 dB
- Return loss: 20 dB minimum all ports
- Power passing: 18 dB 5 MHz tap port
- Tap loss: 1 dB of assigned value
- Impedance: 75 OHMS
- RFI: -100 dB
- Input/Output ports: 5/8 female
- Subscriber ports: F-Type female (brass)
To Follow the Leader in the Cable Industry... You Have to Have Good Directions

Attached is a Guide About Brad Cable — The Leader in the Cable Industry for Sales, Service and Expertise

Brad's Quality, Timely Service Helps You Get More Mileage Out of Your Product

Turn To BRAD For All Your Cable-Related Needs:

- Converter Sales
- Converter Service
- CATV Equipment Service
- Parts Sales
- Proprietary Equipment Sales
- OIC Simulator
- CAT System
- Outlet for Your Used and Excess Inventory
- Testing
- Manufacturing
- Research & Development
- Excellent Customer Service

Headquarters
Schenectady, NY • Cherokee, NC • Columbia, SC • Tampa, FL • Sarasota, FL • Fenton, MI • Fife, WA

Reader Service Number 28.
The Brad Cable Story

Brad Cable Electronics has been serving the cable television industry since 1977. Brad Cable has been serving the cable television industry since 1977. What started as a pick-up and delivery service for converter repairs has evolved into the premier cable television support company in the industry. Brad Cable's growth and success has been directly dependent on meeting the needs of a rapidly expanding market and providing quality, timely products and services at a competitive price.

Today, BRAD continues to closely monitor and evaluate the changing trends in the cable industry. Further expansion throughout the Midwest and West Coast will provide the cable operators of those regions the service and support other BRAD customers have come to trust and expect.

The Brad Cable Network

When time is important, it is vital to have access to a nationwide network of parts, and service. The array of products and services, coupled with strategic and ever expanding locations, make BRAD the premier support company in the cable industry today.

OFFICES:

Corporate Headquarters
1023 State Street
Schenectady, NY 12301
(518) 382-8000

1020 Highway 19, Old Route 99
Cherokee, NC 28719
(704) 493-5314

5906 Breckenridge Pkwy, Suite I
Tampa, FL 33610
(813) 623-1721

1255 Boston Avenue
West Columbia, SC 29169
(803) 794-3910

112 E. Ellen Street
Fenton, MI 48430
(313) 750-9341

5460 Pacific Highway East, Suite B-7
Fife, WA 98424
(206) 922-9011

The Converter Marketplace®
Where the Cable Industry turns for Equipment, Service, and Parts.

The Converter Marketplace®
BRAD's Product Line-Up

The CAT System and Other Proprietary Test Equipment

The CAT System (CATV Converter Testers). BRAD has developed a very sophisticated package of new equipment and software which is used to receive field-returned and returned field tested units to the laboratory for testing. CATV Converters are the heart of the Cable Industry. CATV equipment is the key to providing the best test and service system that a Cable TV System can have. CATV test equipment allows you to base your policies on your own needs.

Innovative Engineering

At Work

Real Cable is proud to employ a staff of technical personnel from software engineers to field technicians. Many of our employees have been with the company for over a decade. Each of our programs has been designed and written by our employees who are experts in their field. To make sure that you are safe, we offer our employees a competitive edge over our competitors. Each program is designed and written by our employees who understand the unique needs of our customers.

Committed To Excellence

Innovative Engineering

At Work

Real Cable is proud to employ a staff of technical personnel from software engineers to field technicians. Many of our employees have been with the company for over a decade. Each of our programs has been designed and written by our employees who are experts in their field. To make sure that you are safe, we offer our employees a competitive edge over our competitors. Each program is designed and written by our employees who understand the unique needs of our customers.

Innovative Engineering

At Work

Real Cable is proud to employ a staff of technical personnel from software engineers to field technicians. Many of our employees have been with the company for over a decade. Each of our programs has been designed and written by our employees who are experts in their field. To make sure that you are safe, we offer our employees a competitive edge over our competitors. Each program is designed and written by our employees who understand the unique needs of our customers.
"A CABLE CHRISTMAS TALE"
Adapted from: "'Twas The Night Before Christmas"

'Twas the night before Christmas and all through the house
Not a creature was stirring, except for the mouse,
It was chewing the cable, (strung with such care),
In through the window, to right over there.

The children were nestled all snug in their beds,
While reruns from Disney raced through their heads.
Mom in her nightgown, and I in my flaps,
Had just settled down to watch Cinemax.

All of a sudden, there arose such a clatter,
I ran to the set, Mom said, "What's the matter?"
No picture was there, none I could see
All the channels were out, even my MTV!

I dashed to the phone and as I was dialing,
I glanced back at Mom, why was she smiling?
"You'll never get service, it's too late at night."
"They won't come right out like they did for that fight!"

"They better," I fumed, "I pay for this service!"
Someone answered the phone, (she sounded nervous).

"Listen here," I said (in a threatening tone),
"You better send someone out here to my home!"
"He better come fast, and he better be able,
"'Cause if it's not fixed, you can cancel this cable!"

Sir...I've taken three calls from your neighborhood."
She asked if I'd hold, I told her I would.
In just a few seconds, she came back to say,
"I called a technician and he's on his way."

A little while later, (seemed only a minute),
A truck stopped out front, with a cable guy in it.
He opened the door and stepped into the street,
Then picked up his tool belt and a box from the seat.

All the while looking at the cable above,
He put on his hardhat, some hooks and his gloves.
Then he walked to the base of the pole and he stopped.
With a twinkle of his nose, he zoomed up to the top.

He opened the box that hung way up high,
And then checked with his meters and let out a sigh.
He quickly fixed something up there on the line,
The picture came on, and it looked just fine!

He buttoned it up and was down in a flash.
I reached for my wallet to give him some cash,
But, he got in his truck and as he drove out of sight,
"Merry Christmas," he yelled, "And to all a good night!"

Dave Shroeder  Concord TV Cable
Headend Technician  Concord, Calif.

Happy Holidays From C.T. Publications Corp.
Integrating BTSC into a cable system

By Kim Litchfield
Sales, Learning Industries

The biggest change in television transmission since color is now well under way: stereo TV audio. Decoding stereo in the home is a simple process and the addition of stereo to a cable headend should be painless. Consumer awareness of stereo is growing. With the advent of hi-fi VCRs, compact discs and now stereo TV, the public has been subject to a major stereo campaign. "In stereo where available"—sound like a familiar phrase? It is for many. In fact, as of September, over 90 percent of TV homes were within reach of broadcast stereo stations. The Electronics Industries Association (EIA) estimates that as of September, 7 percent of U.S. TV households had MTS (multichannel television sound) TVs. This proportion does not include those households with stand-alone decoders or VCRs with built-in decoders, both of which give the consumer MTS capability. EIA projects that by the end of 1987, 37 percent of color sets sold and 22 percent of VCRs sold will have stereo decoders built in.

For the consumer, adding stereo capability is a simple process, and many alternatives are available. A popular method is purchasing a television with a stereo decoder built-in. But if the consumer wishes to retain monaural television, stereo decoders are also available in newer model VCRs or as separate sidecar units. For added revenue and convenience to their subscribers, some cable systems offer such stand-alone devices to their subscribers to complement their stereo services.

In most cases, delivering stereo throughout the cable system is easily accomplished. In fact, with most applications, the only additional equipment needed is a BTSC stereo generator. One exception to this rule arises when the generator is interfaced to the channel modulator at composite baseband. In this case, a wideband audio modulator, or a few modifications to the existing channel modulator, may be necessary.

Satellite vs. off-air signals

When considering BTSC for the cable headend, the two main groups of signals that must be attended to are off-air and satellite-delivered. In most instances, off-air stereo signals will pass through the headend's signal processor and retain good stereo separation, although various techniques of signal processing are used and each affects the stereo signal differently. The most prevalent method is split-sound processing. Fortunately, stereo is virtually unaffected by this method, though slight degradation of stereo separation may occur. Another common type of signal processing used is the variable notch technique. This method is also compatible with stereo, but more degradation results when using these processors due to FM to AM conversion. A note of caution: If your processor converts the stereo signal to baseband, the signal will most likely be lost. If any difficulties are encountered when processing off-air signals, the processor manufacturer should be contacted.

Satellite-delivered services, on the other hand, require that a BTSC stereo generator be used to deliver BTSC stereo. A direct comparison is made when switching from an off-air stereo program to a pay service not delivered in stereo; subscribers not only see their stereo light extinguish, but more importantly, they also hear the separation disappear. As more and more local broadcasters go stereo, the demand for stereo on the cable channels increases. Since channel realignments and price hikes inevitably occur, many cable systems are incorporating the added value of stereo transmission to offset these changes.

Let's take a quick look at the BTSC signal. The main channel modulation consists of a L+R monaural channel, a pilot, and an L-R stereo difference channel. For the viewers who have not yet converted to stereo, the L+R sum channel is identical to the monaural baseband audio signal delivering strictly monaural programming. The pilot illuminates the stereo light on the consumer's decoding device and is phase-locked to the horizontal sync of the video. The L-R stereo difference channel is a modulated sideband suppressed carrier using dbx companding. The BTSC signal also may include a secondary audio program (SAP) channel and a professional channel (PC). The SAP channel is primarily intended for second language programming, but it could be used for any supplementary audio service. The PC channel is used primarily by broadcasters for voice or low-speed data.

A BTSC stereo generator accepts a left and a right channel of audio information and
Make no mistake—IPPV is big business. Even systems using phone ordering schemes have pulled in pay-per-view revenues of over $1 million in a single month. Now the equipment needed to fully tap this potential gold mine is at last available: Oak's Automatic Self Authorized Purchasing system—SIGMA ASAP.

DON'T ACT ON IMPULSE

'til you've seen SIGMA ASAP.

It's cable's hottest new IPPV system—and a whole lot more.

With SIGMA ASAP, all the elements are finally present to make IPPV a continuous contributor to your revenue stream:

INSTANT PURCHASING. Buy programs right up to the time they start, or even in progress.

ADVANCE ORDERING. Buy in advance from a menu of upcoming events, or use the SIGMA decoder's built-in programmable timer.

IMPULSE MADE EASY. As simple as pressing two buttons. No phone calls, no mail-ins, no hassles.

SUBSCRIBER SECURITY. At the subscriber's option, ASAP's user-selectable electronic PIN lets subs prevent unauthorized purchases. And SIGMA encryption keeps credit and billing information accurate and private.

COMPLETE HOME MERCHANDISING. With ASAP, Subscribers can "impulse buy" from home shopping services or automatically "sign up" for additional premium channels. You can even offer merchandise for sale yourself and let your subscribers order it automatically.

SUPERIOR STORE-AND-FORWARD TECHNOLOGY. Advance only as much credit as you want, individually, or use SIGMA's exclusive group addressing feature to match credit limits to system demographics.

GOT A SERVICE BOTTLENECK? Let your subs use ASAP to report trouble or request operator callbacks for service or billing questions.

FORGET ABOUT OBSOLESCENCE. SIGMA was designed to expand to meet new opportunities as they arise. Planning for two-way cable? ASAP can report over phone lines or upstream over two-way cable systems.

The cost of all this capability? Get ready for a surprise. Because ASAP builds on the flexibility and software-driven power of the Sigma baseband addressable system, no other supplier can deliver so much for so little. Check the math and you'll see why SIGMA ASAP is the best equipment value on the market.

Communications Inc.
16516 Via Esprillo, Rancho Bernardo, CA 92127 (619) 451-1500

Get a close look at SIGMA ASAP at the Western Show. Stop by and see us at Booth 201.

Reader Service Number 29.
encodes the signal into the BTSC format, which can then be distributed throughout the cable system. A monaural program also may be used as a source. A convenience that then proves to be useful is a built-in stereo synthesizer. With this feature, the ambience is not lost when the program or local ad source is providing mono.

Many of today's pay TV services are scrambled (encrypted), and the most prevalent method in use is the VideoCipher II (VCII). With this system, the headend descrambler provides left and right audio. With services delivered to the headend as subcarriers, a subcarrier demodulator must be used to obtain the left and right audio for the BTSC generator. Systems that now supply FM simulcast stereo signals to their subscribers will most likely have access to audio from existing subcarrier demodulators. Left and right channel information also may be obtained from a local origination source.

Many generator manufacturers provide a second input to be used as backup audio or for local ad insertion. With some generators, this second input is stereo (left and right inputs) rather than monaural. At present, most backup and local commercial audio is monaural. But, since the industry is moving toward stereo, the future should be considered when choosing a generator and its input configuration.

Modulator interface

Once the audio inputs are connected, the BTSC generator must be interfaced with the channel modulator. The generator is usually racked near the corresponding TV modulator. In fact, in many headends, the equipment for each service is grouped together (e.g., satellite receiver, VCII, BTSC stereo generator, scrambler and TV modulator). For this reason a fully self-contained compact generator is

Figure 5: Stereo audio (discrete subcarriers) and video transmission for remote headend

42 DECEMBER 1987 COMMUNICATIONS TECHNOLOGY
preferred. Or the signal may need to be transported (as explained later).

A variety of interconnections are possible. The generator may be interfaced with the TV modulator as BTSC composite baseband and video, as a video plus 4.5 MHz aural subcarrier, or as a 4.5 MHz aural subcarrier separate from video or as a 41.25 MHz intermediate frequency (IF) carrier. Each application has advantages as well as disadvantages. The specific interface chosen will depend on the individual components in the headend as well as personal preferences.

A particularly important adjustment is the audio deviation. To preserve the BTSC signal, accurate deviations of the main aural carrier must be maintained; that is, ±25 kHz for the monaural (L+R) channel, ±5 kHz for the pilot and ±50 kHz for the stereo difference (L-R) channel. If there is a deviation error between the generator and the decoder, the L-R signal will not be recovered properly. This will cause degradation of the separation between the left and right channels. For example, a 3 dB error limits the separation to about 15 dB. A 10 dB error limits the separation to less than 6 dB.

One of the preferred methods of interface is composite baseband. When interfacing at BTSC composite baseband, the modulator's audio pre-emphasis network must be disabled as pre-emphasis is included in the BTSC sum channel (as standard 75 µsec pre-emphasis) and in the L-R stereo difference channel (as an integral portion of the dbx companding system). Also, the modulator's audio bandwidth and deviation capability must be compatible with BTSC (i.e., 100 kHz bandwidth and ±75 kHz deviation). Your TV modulator manufacturer should be contacted to receive the most recent information regarding how you can modify your modulator. Also, many channel modulator manufacturers now offer audio modules that contain all the required modifications, and currently available modulators should come equipped with all the needed changes.

The BTSC composite baseband method of interface requires that the headend operator set and maintain the deviation level. Since this level cannot be accurately set with program audio, worry exists as to how accurate the setup will be. But if done properly, the deviation level may be set very precisely. The recommended procedure for deviation adjustment is to apply a Bessel null test tone (10.395 kHz) at a level that is to produce 100 percent modulation, monitor the output using a spectrum analyzer and null the carrier. This procedure will yield ±25 kHz deviation for the sum (L+R) channel, and the other required deviations will correspondingly follow.

This may sound complicated, but since some manufacturers provide a Bessel null test tone built into the generator, setting and maintaining accurate deviation levels is actually a simple process. If a spectrum analyzer is not available, the channel modulator's over-deviation light or deviation meter may be used, although this method is not as accurate. Once the modulator's deviation is set, however, it must not be casually read-

justed. For audio level adjustments, the level controls on the generator should be used.

When interfacing at either 4.5 MHz or 41.25 MHz, no modifications to the channel modulator are normally required. This is true because the RF bandwidth of the audio subcarrier path of most modulators (both old and new) is sufficiently wide to pass the stereo signal. When interfacing at a subcarrier or IF frequency, the generator includes its own modulator. Therefore, the generator can be shipped with the deviation accurately preset by the manufacturer.

When interfacing at 4.5 MHz, two possible interconnections exist. The modulator can be arranged to accept the 4.5 MHz aural carrier separately from the baseband video or it may accept the 4.5 MHz aural carrier combined with the baseband video. Many modulators must be modified to accept the two separately. In either case, the channel modulator's internal 4.5 MHz modulator must be disabled. If it is not, two 4.5 MHz subcarriers will be present, interfering with one another in your system.

The simplest and most convenient interface between the generator and the modulator is the 4.5 MHz aural carrier combined with video, due to the ease in its setup. With this method, however, there is a risk that the video might bleed into the audio when combined as a composite subcarrier, creating unwanted buzz. Therefore, the video source should be band-limited to 4.2 MHz. For this reason the method of interfacing with 4.5 MHz separate from video...
preferred. If the subcarrier and video are not combined before the channel modulator, the risk of audio contamination is reduced.

The other interface option that is available is at 41.25 MHz. This interconnection is recommended only when using a modulator that cannot accept a 4.5 MHz subcarrier.

Considering field results and the previous information, the following order of preference can be stated for the generator/TV modulator interface: 1) composite baseband provided that a Bessel null is performed to set the deviation, 2) a 4.5 MHz subcarrier separate from video, 3) video and the 4.5 MHz subcarrier combined and 4) a 41.25 MHz subcarrier combined with video.

**BTSC and scrambling**

At the onset of BTSC, concern existed as to whether or not the BTSC signal would survive scrambling. This concern has, in most cases, been put to rest. BTSC is up and running in headends across the country, most of which are using scrambling. The scrambling process may, however, cause slight degradation of the stereo signal or the video depending on several variables (e.g., type of scrambling, levels and transmission paths). Most scrambling systems presently being used in headends fall into one of two categories—gated sync suppression and sine wave sync suppression. Both scrambling processes have produced acceptable (sometimes even exceptional) results when used in conjunction with BTSC stereo.

According to field feedback, gated sync suppression scrambling works well with BTSC. Video is virtually unaffected by the combination of this type of scrambling with BTSC, but degradation can be noticed in the audio. It is primarily apparent as noise on the audio (increased sync buzz). Separation may also be reduced. However, the goal of the cable system should be to deliver approximately 20 dB of separation to the home. Studies have shown that separation greater than 17 dB is difficult to discern. Since most generators available deliver greater than 30 dB of separation across the band, a few dB can be spared to the scrambler.

Sine wave sync suppression, on the other hand, has very little effect on separation. In this case, it is the video signal that is altered; some audio components may be perceptible in the video. To reduce this video degradation, best results occur when the 4.5 MHz BTSC aural carrier and the video are applied separately to the modulator.

Provided that care is taken when setting levels, BTSC and scrambling can co-exist. Typical interfaces with the scrambling systems are shown in Figures 1 through 4.

Another consideration in the world of BTSC stereo is the type of converter used in your subscribers' homes. In general, RF converters should not seriously effect the BTSC signal. Baseband converters, on the other hand, can virtually destroy the stereo signal. Unfortunately, baseband converter manufacturers could not predict the stereo revolution and the resulting requirements of stereo. Baseband converters currently on the market, however, have sufficient bandwidth and are capable of passing the stereo signal. It is the volume control that now poses a threat. When the volume control is set too low, separation will be severely reduced, if not completely cancelled, along with the pilot. Therefore, it is important for the subscriber to leave the volume at a sufficient level so as to pass the BTSC signal. Over time, many cable systems are phasing out older converter boxes with newer, more compatible boxes; that is, they are replacing or modifying the converters as the subscribers become stereo capable.

**Transporting BTSC between hubs**

If the satellite receiver is not in the same location as the channel modulator or the signal has to be transported to several hub sites, a variety of options are available for transport of the signal.

The most preferred method of transportation is to ship the left and right audio signals as discrete subcarriers separate from the video as shown in Figure 5. With this method, the subcarriers are demodulated at the receive site yielding baseband left and right audio and then encoded into the BTSC format. The video also is demodulated at this receive site and it is looped through the BTSC generator.

This method, however, actually can be rather expensive, especially when transporting the signal to multiple sites. For every service
Beat the traffic.

M/A-COM opens up a new lane for cable operators with our new 18 GHz microwave system.

If you've been looking for an open frequency at 6 or 12 GHz, you're not alone. In many areas, they simply aren't available: there's too much traffic and not enough spectrum.

M/A-COM's new 18 GHz microwave system gives you another option: a wide-open band which the FCC has assigned to cable operators. It gives you 50% better link availability (or 40% longer range) than 23 GHz, and none of the congestion of the lower frequencies.

The MA-18CC is a fully-featured microwave system, designed to meet or exceed all RS-250B short-haul performance specifications. It is field tunable, and a single gunn oscillator covers a wide selection of frequencies so spare parts can be kept to a minimum.

For over 20 years M/A-COM MAC has specialized in providing microwave radio equipment to cable operators and broadcasters. Every unit with our name on it is built in our own factory, so we not only control the quality, but we know how to service it.

For more information on how you can streamline your microwave needs, contact M/A-COM MAC, Inc., 5 Omni Way, Chelmsford, MA 01824, (617) 272-3100.
Easy to replace external fuse

Video input is standard CATV "F" fitting

Pre-emphasis dial switch for use with stereo encoder

Massive overrated power transformer allows the unit to be UL approved for your protection and safety in any industrial application.

Separate audio/video modulators, instead of simple single consumer IC, assures proper operation with stereo encoders. Two saw filters provide a clean audio/video IF for use with scramblers.

Rack handles for ease of installation

UL approved utility outlet

Separate modulation/overmodulation indicators for fast, accurate indication without the need for switches.

Quality pots that are recessed to provide screwdriver adjustment of audio and video modulation.

Locking power switch to prevent accidental operation.

RF processor feature additional saw filter, water sealed mixers, face mount components for ruggedness and reliability.

ISS ENGGINEERING, INC.
104 Constitution Drive, #4
Menlo Park, CA 94025
ISS WEST (800) 227-6288 or ISS EAST (800) 351-4477

Video input is standard CATV "F" fitting

Pre-emphasis dial switch for use with stereo encoder
GL2610XT SERIES II FREQUENCY MODULATOR

with positive, negative and 0 offsets built in

Reader Service Number 33.
that is transported, each receive location needs to be equipped with a video demodulator, two audio demodulators, a BTSC stereo generator and a channel modulator.

Another method that should result in a quality stereo signal is transporting the BTSC signal as a 4.5 MHz subcarrier, as illustrated in Figure 6. In this case, the composite subcarrier signal from the BTSC stereo generator is first applied to the microwave modulator and transported. At the receive site, the demodulated video plus 4.5 MHz BTSC subcarrier signal can then be applied directly to the TV channel modulator. This method offers the cost-effective advantage of requiring only one BTSC stereo generator per service for multiple locations. It is also useful for systems that are near or at capacity and wish to avoid adding extra channels. However, this method is more susceptible to added buzz and reduced separation than the discrete subcarrier method. Also, it should not be used if a demod/remod (to baseband audio) process is involved.

With any of these methods, FMLs, FM fiber optics and AMLs can all be used successfully for transportation of the BTSC signal.

References
3) Rauch, K., technical guidance.
The Biggest Success in Pay-Per-View History...

Now Works With Major Credit Cards!

For Big Profits in Resort/Hotel/Motel Installations, Only the Sprucer 310 Provides PPV and IPPV Control with Credit Card Convenience

BY KG KANEMATSU-GOSHO (USA) INC. 400 COTTONTAIL LANE, SOMERSET, NJ 08873 (201) 271-7544/TWX 710-991-0048/FAX (201) 271-7370.

SPRUCER® Two-way interactive addressability that works.

Reader Service Number 35.
BTSC stereo in a digital audio system

By Bob Reiner
Supervisor of Technical Publications, Oak Communications

The Sigma baseband addressable system was designed to provide high security largely based upon the use of digitized and encrypted audio. Although stereo TVs were not yet on the market when it was developed, this digital technology readily lent itself to secure transmission of baseband stereo. With this system, two channels of baseband audio are first processed at the headend (digitized, encrypted and transmitted as part of the scrambled video signal). When the decoder receives the scrambled signal, it extracts and decrypts the signals, then restores them to analog form to produce right- and left-channel baseband audio for application directly to the subscriber's stereo amplifier.

With the adoption of the BTSC stereo format of multichannel television sound (MTS) as the industry standard, over-the-air transmission of stereo programming was begun and stereo TV receivers soon became widely available. For basic channels without scrambling, the Sigma decoder was already transparent to the BTSC audio. For premium channels, however, it became obvious that the system would have to be modified to deliver the BTSC format to subscribers with new stereo TVs. The challenge was to be able to output a BTSC signal on scrambled channels and remain compatible with existing Sigma products without compromising the system's high security or adding substantially to its cost.

Ultimately, the decision was made to provide two stereo decoder models. One decoder, the 3C, would continue to provide baseband audio. This box, based on the original Sigma stereo decoder, would be suitable for stereo enthusiasts who might prefer to hear stereo TV programming through their hi-fi systems or for subscribers who don't have an MTS receiver but still want stereo TV. The second stereo decoder, the 3D, would provide BTSC stereo for subscribers who have a stereo TV.

Baseband stereo operation
Before explaining how BTSC stereo was added to Sigma, it may help to describe how we initially provided baseband stereo signals. At the headend, the left and right audio signals

---

**Figure 1: Encoder before upgrade**

**Figure 2: Preliminary stereo decoder**
INTRODUCING
Royal™
AN EXCLUSIVE LINE OF PRODUCTS FROM Toner
2 Way - 4 Way - 8 Way 5-550 MHz multitaps

NOW IN STOCK AT Toner

• Coming soon — Line passives and converters •

CALL NOW FOR PRICES AND ORDERING INFORMATION

Toner
cable equipment, inc.

969 Horsham Rd. • Horsham, Pa. 19044-1278
Call Toll-free 800-523-5947
in Pa. 800-492-2512
FAX 215-675-7543

©1987 Toner Cable Equipment Inc.

Reader Service Number 36.
were applied to the encoder (Figure 1). The left and right audio signals were matrixed into separate sum (L+R) and difference (L-R) signals. The encoder added pre-emphasis to both signals, filtered and digitized them, then encrypted them using a time-varying key. The resulting signal was then combined with Sigma's scrambled video for upconversion and transmission.

When the decoder (Figure 2) received a scrambled signal, it first extracted the digitized audio from the video. The digitized audio was decrypted and converted from digital back to analog. The resulting sum and difference signals were dematrixed into left and right audio signals and de-emphasized.

All Sigma decoders are designed to be virtually transparent to unscrambled BTSC stereo. Incorporation of BTSC stereo into the scrambling format of digitized audio presented more of a challenge. The BTSC signal could not be directly digitized and delivered to the decoder because of its wide bandwidth and precise phase accuracy requirements. Providing circuitry to deal with these in every decoder would have been enormously expensive and would not have been compatible with existing products. Instead, it was determined that premium channel audio could be modified to accommodate the BTSC format, and remain compatible within Sigma's digitized encrypted format.

The most expensive signal processing necessitated by BTSC is dbx compression. This circuitry was designed into the encoder. The resulting encoder signal flow, shown in Figure 3, provides pre-emphasis of the audio sum and dbx compression of the audio difference signal. The remaining signal processing is unchanged from the original encoder design.

In the 3D decoder, two methods of audio processing are used, depending on whether the received signal is scrambled or transmitted "in the clear" (Figure 4). When BTSC stereo (without scrambling) is processed, the aural signal is simply demodulated so it can be passed through the decoder's volume control. The audio is then remodulated onto the output channel aural carrier for transmission to the stereo TV.

To handle scrambled stereo, a DSB (double sideband) modulator and circuitry to generate a pilot tone from the horizontal sync pulse were added to the 3D. The digitized audio is extracted from the video and decrypted, and the decrypted digital audio is restored to analog sum and difference signals. The resulting pre-emphasized sum signal and dbx compressed difference signal are applied to BTSC modulator where they are added to each other and to the decoder-generated pilot tone. The

(Continued on page 69)
We don't follow anybody's footsteps. We make 'em.

One of the ways we are leading the industry is in the production of high-quality components at truly competitive costs. Another is in providing a truly one-step answer to all your CATV, MATV or SMATV problems, ranging from individual components to complete systems.

We will customize your headend system, decision by decision. And in one week, you'll have a complete, easy-to-set-up package, at unbeatable cost efficiencies and not just pre-assembled, but practically pre-installed.

Take advantage of our years of experience in Cable TV, Master Antenna and Private Cable headend applications. Call us for a quote on your particular headend needs, or, for our free 750-item catalog. Toll-free (800) 252-7889. In California, (800) 572-6262 or (818) 706-1940. Or write P.O. Box 6579, Westlake Village, CA 91359-6579.
INTRODUCING

WHEN STANDARD JACKET IS TOO LITTLE PROTECTION AND ARMOR IS TOO MUCH.

Until now, if you needed extra protection for cable, you had only two choices. You could pay the price and buy armored cable. Or you could settle for less protection and buy standard jacketed cable.

New Cable Guard gives you a welcomed alternative—extra protection at an economical price.

Cable Guard starts out with the same fine electrical properties as all our cable. Then we add a flooding compound and a Linear Medium Density Polyethylene jacket. Next, we add 50 mil splines, angled at 60 degrees for extra resiliency. And finally, we encase it all in a second Linear Medium Density Polyethylene jacket.

How tough is new Cable Guard?

FLOW TIGHT is new Cable Guard?
Believe it or not, Cable Guard outperforms armored cable in most impact tests. Yet, it's as flexible as standard jacketed cable.

So, the next time you're running cable through rough terrain—under gardens and lawns, through roadside right-of-ways, or in tough urban environments—ask about Cable Guard.

It's a small price to pay for a lot of protection.

For more information, please contact your Comm/Scope Representative or call us direct at 800/982-1708 (800/222-6808 in NC).

COMM/SCOPE WITH YOU ALL THE WAY.

Comm/Scope Division, General Instrument Corporation, PO. Box 1729, Hickory, NC 28603, 800/982-1708, 800/222-6808 in NC. Telex: 810-916
**Figure 5: Sigma 3C audio path**

- **Cable RF/IF processor**
- **Aural demodulator**
- **Video demodulator**
- **BTSC decoder**
- **Decrypter and digital-to-analog converter**
- **dbx expander**
- **Standard**
- **Scrambled**
- **L+R**
- **L-R**
- **Matrix**
- **Volume control**
- **Baseband audio (left)**
- **Baseband audio (right)**
- **Subscriber stereo**
- **Standard L-R**
- **Scrambled L-R**
- **Standard L+R**
- **Scrambled L+R**
- **L**
- **R**

**Figure 6: Oak Sigma 3 system**

- **Video**
- **Left audio**
- **Right audio**
- **Encoder**
- **Modulator**
- **System combiner**
- **Sigma 3C decoder**
- **Sigma 3D decoder**
- **RF (Ch. 3/4) with monaural TV sound**
- **Left audio**
- **Right audio**
- **Ch. 3/4 with BTSC stereo audio**
- **Monaural TV**
- **Subscriber's stereo system**
- **BTSC stereo television**
resulting BTSC output signal is fed through the decoder's volume control circuitry and applied to the remodulator where it is modulated onto the video signal for output to the stereo TV on Channel 3 or 4.

The use of this configuration allowed another possibility. With the addition of a BTSC decoder to the 3C (Figure 5), BTSC stereo could be converted into baseband left and right audio signals. This allows subscribers to enjoy stereo programming as it should be heard—in stereo, even without a stereo TV.

When presented with a non-scrambled MTS stereo channel, the 3C demodulates it and applies it to the MTS decoder. The output of the decoder is a sum and difference signal. The difference signal is applied to a dbx expander. The L+R signal and the dbx-expanded L-R signal are dematrixed into baseband left and right audio signals. These signals are fed through the decoder volume control and passed through the decoder RCA phone-type output jacks to the subscribers stereo amplifier.

When a Sigma-scrambled channel is received, the 3C passes it through a video demodulator where the digitized audio is recovered. The data is then decrypted and the resultant digital audio is restored to analog sum and difference signals. The difference signal, previously compressed at the encoder, is passed through the dbx expander. The L+R signal and the dbx-expanded L-R signal are dematrixed into baseband left and right audio signals and passed through the volume control to the output jacks.

With this design, using one encoder per channel at the headend, subscribers need only specify which decoder they want according to their home equipment. The 3C provides baseband stereo audio, and the 3D provides BTSC stereo. With either decoder, the subscriber enjoys volume-controlled stereo audio in a consistent format on both clear and scrambled channels, received in-band, and with no add-on hardware cluttering up the living room.

**EIA multiport**

The recently adopted EIA standard IS-15 provides a baseband interface between the TV receiver and the descrambler. This interface feeds demodulated, baseband-scrambled video to the decoder descrambling circuitry, and accepts the baseband, descrambled video for reinsertion into the TV circuitry. The process minimizes the existing redundancy of RF circuitry; all descramblers must now contain a complete TV tuner that also is present and operating in the television itself.

The Sigma decoder supplied for multiport-compatible stereo TVs operates similarly to the 3C described previously. The decrypted sum channel is simply de-emphasized, and the difference channel dbx-expanded. The recovered sum and difference signals are then dematrixed to form the desired left and right channels and fed back to the TV via the multiport interface.

---

**Tower cable clips**

For proven quality and economy

Tower-leading in the industry

- Sure-fit for quick simple installation.
- Plated, hardened, flat-headed Steel masonry nails, pre-assembled ready to use.
- Sizes to fit all coaxial cables, including quad and double shielded, both single and dual systems. Available in black, white and grey.
- Write today for samples and literature.

Reader Service Number 40.
Satellite-delivered tag change system

By Andrew Ferraro

Since the launch of regularly scheduled satellite pay-per-view (PPV) on Nov. 27, 1985, many cable systems have discovered that their in-place hardware presents obstacles to full participation in this potentially profitable revenue stream. Specifically, their addressable hardware does not allow them to show multiple events in a 24-hour period.

The problem is this: Billing systems rely on a tag or address to identify a program service so the customer can be billed properly. With a monthly pay service, this is not a problem. In fact, tag levels were initially designed to work with monthly pay services.

It’s not so simple with PPV where each event must be considered a different service, and the tag or address must be changed for each. Otherwise, the customer would only be billed for one view but actually able to see the complete day’s programming. The challenge was clear: Simply change the tags before each event. The solution, however, was a little more difficult.

Changing tags manually

Before the satellite-delivered tag switching system was developed, some eager operators positioned an employee in the headend to manually change their tags for each event. But it was costly keeping employees on, day and night, to manually switch the tag levels. Showing less than a full schedule of movies was not the solution either because that resulted in few movies sold to subscribers.

Other operators preset different encoders to different tag levels and then switched them in line with a clock-controlled video switcher for each event. But that wasn’t cost-efficient either; each encoder cost up to $2,000. There was the cost of the video switcher as well; and in the end, this approach too was limited to only a few events.

A third route a system could take was to update to a new controller. However, it is hard to justify a $40,000 price tag just to bring PPV into the market when the older controller is already doing every other aspect of its job.

The answer was a separate system to do the switching, one that would be completely transparent to the cable operation. What components were needed? The first requirement was an intelligent device in each cable head-end. The device needed the ability to accept a serial data string and convert it to a parallel output. It also needed a non-volatile memory and be inexpensive and reliable.

A logical solution was the Commodore 64 computer. With the aid of the game cartridge port on the computer, a prom could be programmed with all the information and lookup charts needed as well as a self-boot program for outage problems, all without fear of accidental erasure.

A means of communicating with each site was needed. Telephone lines are too costly and a subcarrier on the satellite feed is not only an additional expense but takes time to implement, since each receive site needs a demodulator.

The VideoCipher II (VC II) scrambling system (Figure 1) equipped with its data channel provided an inexpensive path to each and every head-end. After testing, the data channel proved to be transparent under many adverse conditions, such as a high noise ratio and terrestrial interference. A simple RS422-to-TTL converter was built and communication with the receive site was established.

The satellite-delivered tag change system was being designed to be compatible with encoders of different manufacturers (Figure 2), and a simple means of communication was needed. Since each encoder uses a different means of changing tags, it was impossible to send the individual setup codes to each headend with 100 percent reliability. Instead, all of the setup information was stored within the receive site program. In this way, only a generic signal (Figure 3) needed to be sent. The generic signal would first identify a receive site and then instruct it to execute one stored tag.

The setup information stored represents the binary code for each tag and is arranged as a lookup table (Figure 4). The lookup table is arranged in order of use, with the first code being assigned to the first event, regardless of time of day.

Four sets of data

With this arrangement the host computer need only send four sets of data: first, a preamble so the receive site recognizes this as incoming data; second, ID codes so that each system recognizes particular commands; third, a setup command; and the fourth and final step has all systems execute the setup commands simultaneously. This final execution command, being separate of the setup procedure, allows the universe of sites to grow and still have them execute each command simultaneously. This also allows for expansion into other controlling areas.
The functional procedure is to send the setup code two minutes prior to the top of the hour, and to send the execution code at the top of the hour prior to the start of an event.

With this all firmly in place, a beta test was conducted. A Torrance, Calif., system was chosen as the test site. On Dec. 15, 1986, the equipment was installed and placed on-line. Some shortcomings in the program were discovered that would not allow it to send the commands on time. The program was revised and a retransmission of the last data option was added.

Another problem that appeared at the receive site was the accumulation of noise. The computer collected noise as though it were data and stored it until the buffer was full—and then bombed out. The receive site program was revised so it would ignore all but recognizable data.

With these revisions in place, the satellite-delivered tag change system was complete. The second generation of the tag switcher, which will be available in the first quarter of 1988, will operate primarily in the same fashion as the first.

Briefly, the host computer, located in Stamford, Conn., sends a data stream to the tag switches, located in the affiliates' headends, at the start of each event instructing them to switch the tag to a predetermined level. The next version also will send a command at the end of the movie to open breaks to all the systems subscribers. This will be accomplished by either sending a basic tag or closing set of contacts. The type of equipment in the headend will determine what is sent. One minute prior to the start of the event another command will allow the system to insert local how-to-order spots. It also can be used to switch in a single event from another source.

The Commodore computer will no longer be used. Instead, a CPU (central processing unit) of our own design will be housed in an enclosure that will be designed around our needs. It also will handle more than one channel. Finally, there will be an RS232 port for interfacing computers for the purpose of transferring data.

Acknowledgements: Many people have contributed to this project since its inception. The author wishes to acknowledge the contributions of James Schmeiser, David Rodriguez, Paul Swedberg and the cable operators who have worked with us with a spirit of cooperation.

Reprinted with permission and updated from the "1987 NCTA Technical Papers."
ANI as a PPV ordering tool

By Jeff Corbett
Software Engineering Manager, Business Systems Inc.

One aspect of pay-per-view (PPV) that gets a large amount of attention is the ordering method. The traditional methods that cable TV has used successfully for many years—door-to-door solicitation and the office visit—are not useful in the spur of the moment or impulsive order that puts the gleam in the marketing manager's eye. However, in the past four years many technologies were put to the task of taking a PPV order.

The most obvious method for subscribers is where they press a button on the converter (or remote) and an event is ordered. However, this requires special converter hardware, which is an additional expense for each converter. Also required is either two-way cable plant or connecting the converter to the subscriber's phone outlet if using telephone return path technology. Two-way plant is expensive and almost doubles the cost of plant maintenance. Some subscribers, with visions of CIA wiretaps in their heads, are wary about having things connected to their phone.

Several methods allowing subscribers to use the phone have been experimented with over the years: a person-to-person telephone call to a customer service representative (CSR), who places the order; a person-to-machine telephone call to an audio response unit (ARU), which accepts information by reading the touch-tone signals of an account number or similar identification and possibly the choice of event; and automatic number identification (ANI), where the telephone company's switching equipment intercepts and completes the call without completing a station-to-station telephone call.

As shown in Table 1, ANI has two advantages: speed and ease of use. An entire call takes less than 16 seconds from the moment the subscriber finishes dialing the number to the point the call is disconnected after completion of the message.

Order placement

When the subscriber calls the order number, the local switching device recognizes the dialed number as being one of a set of special numbers that require the caller's number to be transmitted along with the call. The switch then routes that call, including the caller's automatically identified number, to the central office (CO) containing the modular services node (MSN). The nearest CO to the cable office houses the MSN for this project. A leased communication line is connected from the CO to the cable office for communications between the MSN and the billing computer. The MSN takes the signal that a call has been placed to number X from number Y and sends this information across the leased line to the billing computer. The fact that the calling phone number is automatically captured by the phone company provides the billing computer with positive identification of the calling party. False identification of the account is not possible as long as the data base of subscriber phone numbers is kept accurate.

The billing computer checks the called number to ensure that it corresponds to a scheduled event and that the event is not almost over. It then verifies the phone number as belonging to a valid subscriber whose account is current and who has an addressable converter. In order to be accepted, the order must successfully complete each of these checks. To avoid unnecessary processing time, the call is rejected after the first failed check.

When these tests are complete, the billing computer replies to the MSN via the same leased-line circuit, indicating whether the call passed or failed these checks. All of this takes place in a fraction of a second, usually before the caller hears the very first ring. If everything was in order, the subscriber will be informed that the call was received and is thanked for calling; if not, the caller will be told that the call could not be completed and to contact a service representative for assistance. This ability to deliver differing messages is a relatively new

---

R.T.G. * VERSALIFTS - Ready for You - Right Now!

When you need a lift in a hurry, call your Versalift Distributor. He has fast access to our R.T.G. pool of complete, mounted Versalifts. No waiting because of long delivery on vehicles, manufacturing delays, or freight problems. Best of all, they're Versalifts, with job-proven reliability and industry-wide acceptance. And, since we're mounting them in quantity, the prices are right, too. Truck or van mounted, telescopic or "elbow" models, with working heights up to 55 feet, all ready to go to work — Now!

For the name of your Versalift Distributor, call:

TIME MANUFACTURING COMPANY
P.O. Box 20368
Waco, TX 76702-0368
(817) 776-0900

*Ready To Go
Mounted on current model chassis.

Reader Service Number 43.
"Our goal was simple: to create the most capable ad insertion tool ever devised. I don't mind saying, we've succeeded."

— Bill Killion, President, Channelmatic, Inc.

The ADCART 2+2
Random Access Ad Insertion System

★ Modular System Design Aids Trend Toward Interconnects
State of the art software running on state of the art hardware — ADCART 2+2 uses the latest 16-bit CMOS microprocessors and real-time, multi-tasking software developed by experts in advanced traffic and scheduling concepts. Open-ended modular system design enables operators to easily adapt system configuration to new requirements of a rapidly-evolving cable environment. ADCART 2+2 is already becoming the de facto standard in new interconnect designs.

★ ADCART 2+2 Benchmarks
★ Full stereo audio
★ New proprietary tape encoding technique allows full stereo even with current VCRs or allows full Sony® frame-code addressability
★ Compact size (3 1/2" rack height)
★ Front panel status display
★ All-channel CRT status display
★ Computer-adjusted audio levels
★ Full stereo audio/video preview bus
★ Memory backup without batteries
★ Latest A/V IC multiplexing and switching circuitry
★ Critical system configuration files stored in non-volatile RAM
★ User-friendly user interface
★ Full error reporting
★ Audio and video processing equipment inputs for TBC and stereo simulator
★ Unlimited system expansion capability
★ Extra auxiliary inputs for message generators, etc.
★ Lowest cost per benefits of any unit available

★ A Quantum Leap
We weren't looking for a few enhancements or improvements. We were aiming for a quantum leap. We wanted new hardware running new software that would redefine the way systems managed and executed their local ad sales programs. Above all, we wanted a system virtually anyone could set up and operate, and at a price less than any other full-featured random access system. From now on, when people define what a system should do for the insertion of ads into cable programming, they will point to the ADCART 2+2 system.

★ Vertically Integrated Software
With ADCART 2+2 everything you need to set-up and program a random-access schedule is integrated into the software system. Starting with the first screen you see on the CRT terminal, every step and function flows naturally from the previous step, guided by simple, plain English statements and headings. The step to our traffic and billing software package flows just as naturally and easily by virtue of system architecture that was designed from the outset to do exactly that.

★ Flexible Channel Assignment
Flexibility is the byword for ADCART 2+2 systems. Insert virtually any number of channels. Assign VCRs to fit your avail: two on two channels, four on one channel, or share four between two channels without overlapped avail.

CHANNELMATIC, INC.
821 Tavern Rd. Alpine, CA 92001
(800) 231-1618 or (619) 445-2691

The recognized leader in ad insertion.
More than 4500 channels in operation

Reader Service Number 44.
Table 1: Comparison of order methods involving subscriber-placed telephone calls

<table>
<thead>
<tr>
<th>Ordering Method</th>
<th>Call Duration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSR</td>
<td>3 to 5 minutes</td>
<td>Subscriber asks for schedule, opinions on events, discusses subjects unrelated to PPV order.</td>
</tr>
<tr>
<td>ARU</td>
<td>45 to 90 seconds</td>
<td>&quot;Unfriendly&quot; push-button interface; most require that the subscriber have a touch-tone phone.</td>
</tr>
<tr>
<td>ANI</td>
<td>16 seconds</td>
<td>As easy as dialing a (correct) phone number.</td>
</tr>
</tbody>
</table>

development for ANI and an important one as well. It immediately tells the subscriber whether or not to expect to receive the event.

If the call was rejected, it is filed away for later printing on a report, allowing the cable office to follow up with the caller. In this way, errors in the phone number data base or in the subscriber's interpretation of the instructions may be corrected so that the subscriber may place a successful order in the future.

If the call was accepted, however, the remaining steps are identical (or nearly so) to those required by either of the other two methods shown in Table 1. The system charges the subscriber's account for the event and sends commands (via the addressable transmitter, headend equipment and cable plant) to the converter located in the subscriber's home. These commands will activate the event associated with the phone number dialed at the appropriate time. They are repeatedly sent to the converter at varying intervals. This is done in order to avoid failure of the box to perform these functions due to temporary interruption of signal to the converter, whether incidental or deliberate.

One of the reasons some subscribers prefer the more automated ordering methods is the anonymity seemingly provided when ordering from a machine rather than a person. It is less embarrassing to order an R-rated movie by punching buttons than giving the order to a CSR. This sense of privacy has provided some unexpected benefits. Subscribers who are no longer active, yet were never physically disconnected, would never dream of calling a CSR to order. However, after they read the instructions on the Barker channel, they dial an order number. When these calls appear on the reject report and the accounts are checked, a technician can be sent to physically disconnect these subscribers. It is hoped that lack of free service will encourage these subscribers to reconnect and become paying subscribers who also will order events.

Another, more expected benefit is the increase in sales, due partially to the anonymity factor, but also to the increase in availability. Not only is this system available to take orders nearly 24 hours a day, it can take as many simultaneous calls as there are phone companies providing trunk lines to the MSN. This can be particularly important near the start of an event when many of the orders are placed. With a limited number of phone lines and CSRs, each taking three or more orders per minute, a busy signal is a real possibility during these peak calling times for a CSR system. An ARU system is better, but still is limited by the number of phone lines dedicated to the function of receiving PPV orders. Additionally, more than half of the orders are placed when there is no one in the office to manually take the call. Although manual orders must still be taken for those few subscribers who do not have home phones or insist on having a person take their order, these account for less than 6 percent of the total orders.

Now that ANI can provide immediate feedback to the subscriber, its speed, ease of use and positive identification of the caller make it a natural to ease the burden of overworked CSRs. A fast, efficient ordering service to sometimes impatient subscribers can furnish the cable system increased sales for PPV events.
It took "Eagle Innovation" to create a better trap

Introducing the Revolutionary 4-Pole E.T. Micro Trap!

Eagle has done it again! We've re-defined industry technology by creating a revolutionary new trap... the Eagle 4-Pole Trap (E.T.) Micro Series.


We didn't reduce the size by eliminating the qualities that made Eagle the industry standard. Just the opposite, the new E.T. Series is packed with new performance features far superior to anything else on the market.

- Smaller size allows extra units to be installed in pedestals or lock boxes.
- Blocking Capacitor to prevent theft of service.
- Reduced weight reduces shipping costs.
- Trap ends are rolled.
- Improved lower adjacent sound losses.
- Improved upper video loss.
- Improved out of band frequency response in the 500 to 600 Mhz range.
- Single PC board for better ground continuity & signal flow.
- Every mechanical ground point is soldered for continuity of the board to the shield to the case.
- Urethane potting increases stability, makes the entire trap shock resistant and minimizes water absorption.
- Temperature compensated.
- Double "O" rings seal the main body for superior weather resistance.
- Stamped exterior housing allows easy and permanent identification.

Special 8-Pole Units are available.

Eagle is #1 by always being first

- First with cylindrical metal housings
- First with brass housings
- First with nickel plating on housings
- First to include a blocking capacitor
- First with single board construction of four pole traps
- First with double "O" ring neoprene weather seals

Exactly what you'd expect from Eagle.

Eagle has always been the leader in trap technology. The E.T. Micro Series represents our latest advancement. For more information call our toll-free number and ask for complete specifications.

EAGLE COMTRONICS INC.

4562 Waterhouse Road, Clay, NY 13041 (315) 622-3402 TOLL FREE 800-448-7474
In Canada: Deskin Sales, Montreal • Toronto • Vancouver (416) 475-1412 155 Clayton Dr., Markham, Ontario L3R-5T9
Reader Service Number 47.
No cost overruns

If you want a system built on time, on budget, and fully guaranteed, call Cable Services. It's that simple.

Cable Services Company Inc.
2113 Marydale Avenue, Williamsport, PA 17701

Phone TOLL FREE: 800-233-8452 (In PA:) 800-332-8545

Reader Service Number 48.
RF vs. telephone for an impulse system

By Jeremy Rosenberg
Director of Operations

And Mei Yang
Financial Services
Cable Video Store, Jerrold Division/General Instrument Corp.

Historically, the biggest objection to two-way technology has been the cost of maintaining return path plant. In a real-time two-way system, this can be expensive because of the need to resolve trouble calls at night and on weekends on a real-time basis. Store-and-forward impulse systems allow return path maintenance to be performed as part of standard maintenance; therefore, a fault in the return path is not an emergency situation and can be handled during regular working hours. Various two-way plant managers have indicated that return path maintenance should be looked upon as part of regular plant maintenance, providing an early warning system for possible one-way signal distribution problems. However, some managers allocate no additional funds for return path maintenance over and above maintenance for the one-way system. Given that there is additional equipment involved with a return path, the model for determining the tradeoff between telephone and RF return incorporates a maintenance cost at 10 percent of equipment cost. Differences in investment per subscriber are broken down into two categories: equipment and installation. For this model, the difference in equipment cost of $5 per subscriber between the $20 cost of Jerrold's Starfone phone return path and the $15 cost of its Starvue RF return path is used. Additional equipment also is required to install a phone return. This is budgeted at $6 per subscriber (based on Cable Video Store's installation experience) and an additional time of 20 minutes per subscriber installation at $12 hourly rate. The difference in installation cost is $10 between a phone and RF return path. Totaling these differences yields a $15 greater investment in phone return path households. The primary difference in headend costs between a telephone return path and an RF return path is the additional number of phone modems needed for cable systems with more than 5,000 impulse subscribers. Each increment of 5,000 subs is budgeted to add one additional $850 modem. Part of the beauty of a two-way RF impulse system is that the cable operator has complete control of the system and incurs no additional operating cost. On the other hand, a telephone return path is budgeted to have a basic $6 monthly line charge to the telephone company. Industry estimates run from approximately $200 to $400 per mile for return path equipment. This model uses a figure of $300 per mile as an average.

Examining the tradeoffs

Given an understanding of the differences between maintenance cost, incremental investment in subscriber homes, headend cost and additional return path equipment required, we can now develop a model to examine the tradeoffs between phone and RF return for an impulse store-and-forward system. The critical variable in determining tradeoffs is the density of impulse subscribers in a cable system. Impulse sub density is referenced on a per-mile basis and can be articulated as a system's sub density per mile times the percentage of impulse subscribers in a system. The model has been run for cable systems with 750 or more impulse subscribers. There is very little sensitivity to the size of the cable system. This should not be surprising, since the only variable that changes with the size of a system is the number of telephone modems and lines needed at the cable system's headend. The figure of 22 impulse subscribers per mile will strike some as surprisingly low to justify a decision on an RF return path. There is, however, no mistake in the calculation; it rests upon a critical assumption that there is very little cost for return path maintenance. This is a reasonable assumption in a store-and-forward system that has been well maintained. Some may argue that their own physical plant is not tight enough to upgrade to an RF return path without considerable maintenance expense. While this may be true, such systems can benefit from such a cleanup regardless of whether there is consideration for an RF return path.

Base model of 40,000 subs operating for two years

<table>
<thead>
<tr>
<th>Phone return</th>
<th>RF return</th>
</tr>
</thead>
<tbody>
<tr>
<td>P = Equipment cost</td>
<td>T = Equipment cost</td>
</tr>
<tr>
<td>Q = Telephone connection</td>
<td>U = RF connection</td>
</tr>
<tr>
<td>R = Telephone operating</td>
<td>V = Return path equipment</td>
</tr>
<tr>
<td>W = Headend cost</td>
<td>X = Return path maintenance</td>
</tr>
<tr>
<td>D = sub density per mile</td>
<td>Y = Headend cost</td>
</tr>
<tr>
<td>S = basic sub</td>
<td>I = percent of impulse</td>
</tr>
</tbody>
</table>

Break-even formula:

Cost per impulse sub = \( P + Q + \frac{(R+W)}{(S \times I)} \)

Variables are assigned the following values:

| P = 20 | Q = 20 |
| R = 432 | W = 2,550 |
| T = 15 | U = 10 |
| V = 300 | X = 30 |
| Y = 3,000 |

Assuming:

I = 0.15

Cable system with basic sub count of 40,000

Solution:

This system would need a density of sub per mile of 147 with impulse sub density per mile of 22.
Minding the store-and-forward

By John Donahue
Director of Operations, Comcast Philadelphia

I can see you sitting there now. You’ve either already started or plan to begin installing addressable converters. All along the planning process you were thinking, “This is a perfect opening to launch pay-per-view, but is now the right time?” With all the talk in the recent past about the growing number of successful PPV projects and the refinement of the technology to support them, you’ve finally done it. You’ve made the decision to launch pay-per-view! Now what?

The decision you just made may very well be the easiest one of the whole project. Now you are facing with selecting technology that best serves your situation. Your overall goal is to generate incremental gross revenue that, in this project, is simply a function of buy rates, net product costs and operational expenses. The one area in that equation that you have the most control over is operational expenses.

So now you are confronted with the task of selecting the system that is not only easy to operate from a consumer standpoint and proven to be reliable, but also as minimally disruptive to your existing operations as possible during and after implementation. Herein lies the first and most important caution: If you start this project thinking that all you need to do is plug it in, walk away and collect the money, you are on a definite course of failure. Success can only be realized through a commitment of resources, planning, training and monitoring.

Preprocessing vs. store-and-forward

The technologies involved in the operation of PPV events are numerous but can generally be grouped into two classes. The first is preprocessing of all transactions and the second is store-and-forward. While it is true that both methods require processing of the customer request for the event, the distinction is when the processing takes place and the consumer inter-action. In preprocessing, subscribers must communicate their requests to the cable company before an event is delivered. The methods for this communication can be a phone call to a customer service rep or an automated machine, or a signal sent upstream on the cable system.

Regardless of the communications, a central computer must process the transaction and deliver a message down to an addressable converter to descramble the event. Even though different systems yield different processing times, the limitation is still, as it always will be, the ability to handle the last-minute ordering that is the true impulse market. Data indicates that if impulsive buyers encounter difficulty in ordering (like jammed phone lines or long waits on hold), they are not going to purchase. The obvious result in this situation is reduced buy rates from what you potentially could have had. The other major problem with preprocessing transactions is the potential for error. If you develop computer or phone problems, or if phone operators don’t show up, the result can be anything from a few lost orders up to cancellation of the entire event. This not only means lost revenue but it can ruin your credibility with your subscribers.

On the other hand, store-and-forward technology removes many of these obstacles. Consumers only have to communicate with their individual addressable converters. Because of this simple fact there is absolutely no limitation on the last-minute ordering surge, ensuring you the entirety of the impulse market. Data collection for billing purposes follows the event at the operator’s leisure. The potential for error also is reduced because the communications and processing for the delivery of the event are contained within the subscriber’s residence. Even with store-and-forward, you have a choice of the return path methods. You can either choose the upstream capacity of your cable system or the phone system.

As in the introduction of all new projects, there are unique considerations that must be made. The one we are probably least familiar with is in the connection to the existing phone system. Even though the facilities
on the customer side of the demarcation line (Demarc) were detariffed by the Federal Communications Commission on Jan. 1, 1987, rules remain governing the connection of third-party equipment.

Knowledge of the FCC’s rules and regulations, specifically Sections 68.104 and 68.213 (b), is a must before you attempt a connection to the phone system. The rules require all connections to be made through standard plugs and jacks on the customer’s side of the Demarc. In many cases, connection is made via a T connector to an existing active jack in close proximity to the converter location or to a clearly identified network interface installed by the phone company. The installation and connection are very straightforward. You will, however, run into situations where neither of these examples exist and the installer is confronted with a decision that, if made wrong, could have serious consequences. The answer, as it is in so much of our operations, is training and then more training.

Another important point to remember is that each state can add further clarifications to the rules you must know before you begin. As in the case of all aspects of a professional install the customer should be consulted before the install actually begins. The customer’s input is valuable in this area to gain knowledge of any security systems or business lines, which involves additional considerations to be made.

As should be the case in all the work functions we perform, the objective should be installs with “zero defects.” Obviously, training is the first requirement to meet this goal. In addition, installers need an efficient test by which they can quickly verify the proper working of the system they’ve just installed. We’ll divide this final test into two parts, each with its own objective. The first part is a simple phone call placed on the line just installed. All installers carry inexpensive portable phones perfectly suited for this purpose. The phone call is placed to our dispatch operations, which is a part of standard installation practices. A successful phone call obviously confirms the ability of the newly installed line to pass signal. An additional check should be made on an existing customer station to ensure that service had not been interrupted.

The second part of the test occurs after the successful phone call, initiated by the dispatch office, the PPV-equipped converter is commanded to contact the addressable computer. Once connected, data is exchanged and verified. The successful test indicates that the entire chain is working properly and is ready for operation. If it fails, it can be corrected before the installer leaves the home.

Once installed, ongoing maintenance of the system must be considered. This alone is one of the leading reasons to choose the phone system as the return path. That fact aside, you will still encounter incremental service calls solely due to the PPV system. As you might have expected, many of the calls are for the “traditional” things such as lack of education, VCR wiring and compatibility, etc. The balance of the calls, however, are genuinely due to PPV operations.

There are many other operational considerations that must be made for the successful launch of a PPV project. Just to mention a few:
1) Interfacing between the billing and addressable computer including uploads and downloads;
2) the frequency and time of data collections;
3) the responsibility of event scheduling;
4) allocating time and developing computer maintenance routines; and
5) The development and maintenance of credit policies including limits, attempts at illegal tampering or viewing and collection.

Only after these considerations are made can you begin to project the resources necessary to support a successful operation.

Ongoing commitment
The benefits of pay-per-view that have been reported are real and indications are that it will continue to grow. It won’t happen on its own, however. Success requires your ongoing commitment to resources, planning, training and monitoring. If you are not willing to make these commitments, the results could be worse than just an unsuccessful PPV project. You could place an extreme burden on your entire operation that will be extremely difficult to control. A successful launch, however, will enable you to receive the immense benefits of pay-per-view now, as well as place the foundation for exciting future services using interactive technology. The choice now is yours.

---

$"We are not selling, We are buying."$

RESOURCE RECOVERY SYSTEMS

Nationwide purchasers of scrap, wreckout and clean coax.

TOM WOOD, Sr., Marketing Mgr.
11373 Southon Rd.
San Antonio, Texas 78223
(512) 633-0630

TOM WOOD, Jr., Accounts Mgr.
14127 Langbourne
Houston, Texas 77077
(713) 493-5158

Reader Service Number 51.

---

It’s 2 a.m.
Do you know where your database is?

Plain Text

Encrypted Text

Jones Futurex DES Encryptor™ products provide:

- Secure Data Base
- Secure Communication Links

for the IBM PC or PC compatible devices

JONES FUTUREX™
3079 Kilgore Road
Rancho Cordova, CA 95670
800-251-5111 in California
800-251-5112 elsewhere
Reader Service Number 52.
Is amateur radio an asset to the cable industry?

By Dave Pangrac
Director, Engineering and Technology
American Television and Communications Corp.

Amateur radio—is it an asset to the cable industry? Yes, I strongly believe so. There are tensions between the two groups, but they can be corrected and the potential benefits outweigh the problems.

I have been an amateur radio operator for about as many years as I have been a cable TV engineer. Over the years, I have seen a wall built between amateur radio enthusiasts and cable operators because of signal leakage from the cable systems into amateur radio bands. The main culprit is Channel E, with its video carrier at 145.25 MHz, which is in the amateur radio two-meter band. With the rapid increase in two-meter FM amateur radio operations, and with the very sensitive receivers now available for this band at a relatively low cost, the problem has grown nationally by leaps and bounds.

In my travels to cable systems and attendance at numerous industry shows, I have had the opportunity to talk to a lot of people in cable, from service technicians to chief engineers. I am continually surprised to find that many people do not know about (or do not have the proper perspective on) the problem with Channel E. Some know it causes a problem with amateur radio, but feel it is not a cable problem because cable can carry all channels that are licensed by the FCC. They reason that since CATV is an operating business and amateur radio is a hobby, why then, cable has priority over the hams. Right?

Wrong! A self-righteous attitude is a poor attitude. It does not help cable's image in the community, nor is it the way to conduct a highly service-oriented business, which is what cable is all about. It is unfortunate that so many in the cable industry ignore amateur radio enthusiasts and, to put it mildly, tell them to "get lost."

Two sides of the issue

On the other hand, there are two sides to every story. There are also uncooperative ham operators. A while back, as an engineer at one of our cable systems, I had to deal with an amateur radio operator who was causing a problem to our system's operation. He was running a full kilowatt on six meters and a six-element beam not more than 80 feet from a main distribution trunk spliced near our system. The results were devastating. His six-meter rig was not very clean and when his beam pointed at our cable (in our 300 MHz system), to say the least, we were alarmed. Further, the ham had the same opinion about his rights as did some of our cable people about theirs—he told me to "get lost." With territorial attitudes on both sides, a lot of walls have been built and a lot of problems nurtured.

One day, an idea occurred to me. There is a lot of traffic between 0 to 300 MHz, and with cable operations up to 550 MHz, there are a lot of potential problems. Amateur radio operations alone include over 430,000 ham enthusiasts throughout the United States. It would be nice if the technicians who worked for me in the system had a better understanding of amateur radio and were more sensitive to interference issues in general. If I could get people involved in radio as a hobby, they would become more sensitive to plant leakage issues because they would experience the challenges and think about problems that could be caused by a cable system. I decided to set up an amateur radio club for the system we operated.

I was able to convince our general manager that spending the money to set up a station was a good investment for the system. He approved the funds (after a lot of discussion) and I purchased a used KWM 2-A and a three-element tri-band beam. (He didn't approve a lot of money!)

For security reasons, I installed the ham radio station in my office. Hoping to spark people's interest, I used the radio during working hours to talk to as many far away places as possible. It worked. Several of my staff became interested and after about a week we set up one of the first code classes. Learning Morse Code, which is not difficult, is one of the basic requirements to becoming a ham operator.

The results were great. Two years later, we had 38 hams in the company. There were many benefits. Besides the natural employee-management communications that were established (people had something in common to discuss that was not work related), we found that ham radio was the start of getting more people involved in overall radio training. The need to know more about electronics was driven by the desire to upgrade the "ham ticket." Employees that had rejected any type of classroom training were now requesting classes that would assist them in upgrading their licenses. To encourage this, I set up a program that provided a two-meter transceiver to each employee who obtained a technician's class ticket. The transceiver was used after work for fun and during work hours for locating system leakage.

The local ham clubs were having trouble learning that cable system people were actively involved in amateur radio. Nowadays, if they have a problem with our cable system's operation, they call one of our many hams (and not the FCC) to get the problem resolved. Also, members of our club have been popular during amateur radio field day events. Popularity and goodwill have increased with the 15 bucket trucks we use to help amateur radio enthusiasts set up their antennas.

Good citizens

Our cable people have become good citizens of the amateur radio community—understanding and participating, helping fellow hams solve system leakage problems and interference problems not related to the cable system, helping with antenna installations, providing speakers for club meetings, conducting frequency checks of mobile radio equipment, etc. Our newest contribution is our particularly proud of is offering code practice on the cable system at speeds from five to 35 words per minute. This code will be available to those hooked up to the cable system by tuning into a channel on FM radio. The text will be from Time magazine (Time Inc. is the major shareholder in ATC).

It should be clear by now that amateur radio can be an asset to cable TV, if you want it to be. Perhaps above all, it can be fun. Our system currently has five active high-frequency radio stations that have been supplied by the company and a host of two-meter radios used by employees. As a result of the tremendous success of the project and the extensive activities that developed, I had to move the first amateur radio setup out of my office, so I could get some of my other work done.
Standby power systems from Alpha Technologies. And Dynasty Gel/Cell batteries from Johnson Controls. That's some powerful combination.

We've recognized that the superior performance and service life of the Dynasty Gel/Cell matches well with the superior reliability and technology of the Alpha standby system. So we're getting together. You might say our relationship has gelled. And that means we can provide you with the finest products for the CATV standby market.

The Dynasty Gel/Cell is the battery of choice for those who want the most for their money. For example, the GC12V100 delivers more capacity, and up to 50% longer service life than previous batteries. Of course, the fact that the Dynasty Gel/Cell never needs maintenance is one of the main reasons for its popularity in the cost-conscious cable world.

New Alpha standby power supplies are equipped with the Dynasty Gel/Cell battery. And, you can order your replacement Dynasty Gel/Cell batteries directly from Alpha Technologies. Alphas' and Johnson Controls' reputation for service, support and technical assistance stand behind every Dynasty Gel/Cell battery and Alpha power supply.

Long life, maintenance-free batteries and the full support of the industry's technology leader. Dynasty Gel/Cell batteries from Johnson Controls and Alpha. That's powerful company.
ANCHORING

By David Chandler
President, Foresight Products Inc.

The important factors to be considered in the anchoring of utility poles and communications towers are the types of anchors to be used, the types of soils in which the anchors are installed, the equipment required for the installation, the labor force required to make the installation, the amount of time required to install each anchor and the location of anchor installation—backyard, busy street, alley, open country, etc.

There are three types of anchors in general use: auger or screw, expandable or plate, and drive. Auger or screw type anchors are screwed into the ground by digger derricks usually mounted on trucks. The cost of equipment can range from $50,000 to $150,000. The average amount of time spent installing this type of anchor is 20 to 30 minutes per anchor.

Expandable type anchors are placed in a pre-drilled or pre-dug hole in the ground. The blades of the anchor are then expanded by an expanding bar. The hole is refilled with dirt and tamped. The pre-drilling of the hole is done by a large power auger usually mounted on a truck or by hand, taking several hours of dig time. The cost of this equipment is the same as the cost of equipment needed to install auger type anchors, and two or more people are usually involved. Most utilities and contractors report that no more than two expandable type anchors can be installed per day, especially when holes are hand dug.

Drive type anchors are driven into the ground by one person using a hydraulic or pneumatic jackhammer at ground level. Once the ground they are rotated into a perpendicular load lock position by means of an anchor setting device that pulls up on the anchor rod, rotating the anchor into position underground. A gauge on the anchor setting device tells the installer how many pounds of holding capacity have been locked in. No large trucks or expensive augering equipment is needed. Since all utilities and all contractors have jackhammers and power sources

---

Soil classifications

<table>
<thead>
<tr>
<th>Soil class #</th>
<th>Description of soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bedrock</td>
</tr>
<tr>
<td>2</td>
<td>Hardpan: dense-very dense sand; compact gravel laminated rock; slate schist; sandstone</td>
</tr>
<tr>
<td>3</td>
<td>Hard clay; dense sand; shale; broken bedrock; compact clay gravel mixtures</td>
</tr>
<tr>
<td>4</td>
<td>Very stiff-hard clay; clay pan; medium-dense sand, gravel; compact gravel and sand</td>
</tr>
<tr>
<td>5</td>
<td>Very stiff clay; medium sand; loose sand and gravel</td>
</tr>
<tr>
<td>6</td>
<td>Stiff-very stiff clay; medium sand; clayey silt</td>
</tr>
<tr>
<td>7</td>
<td>Medium-stiff clay; loose sand; fill; silt</td>
</tr>
<tr>
<td>8</td>
<td>Very soft-soft clay; very loose sand; swamp; marsh; saturated silt; humus</td>
</tr>
</tbody>
</table>

---

5 Star General

MULTI-BEAM FEEDS

- Maximize your programming capability, by receiving Galaxy 1, Satcom III R, Telstar 303, Westar 5 and Spacenet with the use of one dish.
- Add to system revenues, through tier expansion.
- Eliminate additional land acquisition and the installation costs of multiple dishes, while increasing your earth station investment.

MULTI-DISH?
OR
MULTI-FEED?

The Rainbow Multi-Beam Feed allows you up to 5 prime focus feeds, depending on the size of your antenna.

For a complete list of antennas that can be retrofit fitted call or write:

RAINBOW SATELLITE COMMUNICATIONS

Attn: Brian Wilkes • 1015 Thomas Road
P.O. Box 395 Leesburg, FL 32748 • (904) 326-8030
Reader Service Number 72.

---

Telstar 303...Galaxy 3...What's Next??

SIMULSAT
UP TO 30 SATELLITES SIMULTANEOUSLY!

"We've noticed increased programming movement from one satellite to another... Each (Simulsat) takes about the same space as one-and-a-half earth stations... That makes it very cost-effective for us... we've been very pleased with Simulsats's performance."

David Willis
Director of Engineering
Tele-Communications, Inc.

1140 East Greenway Street, Suite #2
Mesa, Arizona 85203

See us at the Western Show, Booth 2001.
Reader Service Number 73.
DELIVER MORE RELIABILITY.

With the Panasonic TZ-PC130 and TZ-PC160 Series Converters.

Over the years, you’ve come to expect quality performance and reliability from Panasonic CATV converters. And now, we’re making it possible for you to deliver even more of this reliability to your subscribers—with our TZ-PC130 and TZ-PC160 series converters. They’re a full 40% smaller than previous models, which means your installers will be able to carry more converters and stack them more efficiently in service vehicles. Not to mention, all the room you’ll be saving in your warehouse.

We’ve decreased the size of our converters, but we certainly haven’t cut down on performance. Our TZ-PC130 and TZ-PC160 series offer a host of quality features designed for ease of operation and convenience. Like 68-channel capacity with direct access selection, up/down channel scan, channel recall, and an optional non-volatile parental guidance control.

In addition, each converter comes equipped with a full-function, wireless infrared remote control. The top of each converter incorporates a special docking bay for the remote, which permits convenient set-top use, and serves as a handy storage place to help prevent lost remotes.

For your subscribers who have stereo ready TVs, both the TZ-PC130 and TZ-PC160 have the ability to pass BTSC stereo signals without adaptors or add-on units. And for your subscribers who want volume control, the TZ-PC160 offers updown keys as well as a mute key.

The Panasonic TZ-PC130 and TZ-PC160 series converters. Small in size—but big on reliability.

For more information call:
East Coast: (201) 392-4109
West Coast: (415) 672-2592

Panasonic Industrial Company

Reader Service Number 56.
Old Convertors Never Die!
They’re Shelved Because:

They’re Scuffed, Cracked or Broken
Or... Cords are Cut, Parts Missing

MAKE YOUR TEN YEAR OLD
HAMLIN LIKE NEW! HERE’S
$10.31 IN COSMETIC PARTS FOR
ONLY $4.95.

Extend life of Hamlin Convertors. Cut out shelf time
with this easy-to-use kit. For only $4.95 you can replace the
remote control case, umbilical cord, bezel, channel selector knob and tuning knob on the MCC-2000, MCC-3000 or
MCC-4000 during this limited time sale. Save more than
50% off the total parts list price of $10.31! A similar kit is
available for the SPC Convertor series, also at only $4.95.

Hamlin Cosmetic Restoration Kits are available for
immediate delivery.

Genuine Hamlin Parts are Available for All Hamlin
Convertors Dating Back to 1966. Genuine Hamlin
Replacement Parts are Available Only From*

Hamlin®
Genuine Parts for Genuine Performance

*And Authorized Distributors

13610-1st Avenue South • P.O. Box 69710 • Seattle, WA 98168 • (206) 246-9330
Reader Service Number 57
Although various soil testing methods are available, there often is not enough time for soil testing in the field.

Soil types

Engineering students are taught that soil mechanics is not an exact science, and all engineers must face the reality that there is a limited dependability of results of soil investigations. They also learn that few soil analyses provide highly accurate results; most provide rough estimates at best. For example, in the case of analysis of seepage quantities, it is normal procedure to use a number of laboratory tests on samples of soil from the site. But often a few strata are more coarse than other strata in the area, and the coarse may cause much more seepage than the rest of the soil strata in that same area. In many cases these conditions are discovered only in the field during installation of anchors.

Soils can be classified into two broad categories: cohesive and non-cohesive. Fine grained soils such as clay are cohesive, and sand and coarse-grained soils are non-cohesive. Unfortunately for anchor installers, there are often different layers of soil types underground of different thicknesses. Difficulties occur when a soft soil layer is encountered between two hard soil layers, or vice versa, because anchors obviously achieve greater holding capacity in hard soils.

Although various soil testing methods are available, there often is not enough time for soil testing in the field. With auger and expandable type anchors the holding capacity achieved is often a matter of guesswork based on studies of soils conducted in the past in various regions of the country. An advantage of the drive type anchors is that the gauge on the anchor setting device tells exactly how many pounds of holding capacity have been locked in, regardless of the type of soil in which the anchor has been installed. All anchor holding capacities vary with the moisture content of the soil. Frozen soil provides a greater holding capacity than soil that is not frozen, and soil that has been subjected to spring thaws provides less holding capacity than dry soil. Anchor holding capacity decreases as moisture content of the soil increases. It must be noted that there are a number of types of anchor pull test rigs in existence to test the holding capacity of installed anchors, but these are not always convenient to use or available in the field.

Soil classifications

The various types of soil are given soil class numbers to identify soil hardness. Soil class numbers are determined in the following ways: from the soil description and standard penetrometer values (ASTM D-1586) if soil boring logs are available, continuous monitoring of installing torque during an anchor installation, pull testing anchors and visual inspection of augered holes.

In the soil class numbers on the accompanying table, soil class number 1 is solid rock. No anchor can penetrate solid rock unless a hole is first drilled through the rock. If there is no way to do this, a different anchoring site must be sought. Soil class numbers 2 through 7 are suitable for the power installation of all three types of anchors, although class 2 is very tough. All anchors will have greater holding capacity in the lower soil class numbers and less holding capacity in higher soil class numbers. In soil class number 8, it is usually necessary to install the anchor to a greater depth, hoping to reach a class 7 soil or better.

NEW FIBER OPTIC CABLE TEST SET

OFFERS HIGH PERFORMANCE AND VERSATILITY, AT A LOW COST

Laser Precision's new loss test set provides outstanding performance and capabilities for testing and optimizing fiber optic cable systems, at a very reasonable price.

The AM-3500 attenuation/power meter features 16 calibrated wavelengths, from 800 to 1550nM, selectable at a push of a button—so that the user can select the most precise wavelength for the application. During cable splicing, the AM-3500's built-in "tone" enables the user to accurately align the fiber core without having to look at the readout. For end-to-end tests of the link, the "stored reference" can be used to determine any variance in optical throughput, so that cable problems can quickly be noted. The AM-3500's readout is in watts, dBm, and dB-relative. Its range is from –65 to +5dBm, with 0.01dB resolution. Designed to go anywhere, the AM-3500 operates on rechargeable battery or 110/220 VAC.

If used for LAN applications, the loss test set includes: the AM-3500, built-in Silicon detector, rechargeable battery, AC adapter, earphone, choice of adapter for any multimode connector, and a bare fiber adapter, hardshell carrying case and soft packs, plus a AP-3200 LED 820nM hand held light source. The price for this complete test set is only $1,590.

For more information on the loss test set, or Laser Precision's state-of-the-art OTDR's, contact: LASER PRECISION CORPORATION, 1231 Hart St., Ullica, NY 13502, or call (315) 797-4449, or telex 646803.

Reader Service Number 58.
Track Down Tough To Find CATV, MATV, And RF Distribution Troubles

100% American Made
FS74 CHANNELIZER SR.™
TV-RF Signal Analyzer
$3,495 Patented

Tracking down and isolating RF distribution troubles quickly and accurately means getting home before sunset. It means keeping your subscribers happy. It means you are more productive, and able to handle more of the day-to-day business. Bottom line, it means your business is more profitable.

The FS74 CHANNELIZER SR. is built exclusively for this purpose.

Its all channel, digital tuner lets you dial in all off-air, cable and FM channels with – 46 dBMV sensitivity. Automatic or manual fine tuning reveals carriers that are shifted above or below FCC standards. Quick and automatic audio-to-video, signal-to-noise, and hum tests on in-use channels remove inaccurate interpretation in signal tests.

An exclusive wide-band monitor points you right to the source of interference or ghosting, quickly, and without guesswork.

The FS74 is easy to use, 100% portable, and built tough to track down those tough troubles — fast.

Next time, be prepared for that 5:00 p.m. phone call from your subscriber. Call 1-800-843-3338 and discover what 100% automatic testing can do for you.

Call 1-800-843-3338 today.
In Canada 1-800-851-8866.

Reader Service Number 59.
Cutting costs using your existing plant

By Norm Canfield
Regional Engineer, Cooke Cablevision

Do you have reverse capability in your cable system? Are you presently using telephone lines to transfer internal data? Perhaps you ought to look at using the reverse capability of your cable system to transfer data or voice communications from one point to another point on your cable system.

The cost of data or voice transfer using telephone lines can be quite expensive. If you have reverse capability it would be worthwhile to look at using your existing cable plant for data or voice transfer. For example, if you have hub sites you would like to link together or put on your central computer system, you could do so with your existing cable system. One of the methods used in this system is shown in the accompanying figure.

As shown in the figure all outside telephone lines enter the system at the headend, where they are routed to a PBX for switching and routing. All sites are connected to the headend via the cable system using voice modems. All upstream signals from the various sites may or may not be translated (upconverted in frequency) depending on the type of modem you use. Some modems have the capability to use a translator, but in order to achieve full duplex operation you will have to set the transmit frequency to a downstream frequency and the receive frequency to an upstream frequency for the modems at the headend and the opposite for the modems at the various sites.

If you decide you need to use a translator, the standard conversions are 156.25 MHz and 192.25 MHz. Typically the 156.25 MHz translator is used for sub-split cable systems and the 192.25 MHz translators are used for most mid-split and high-split cable systems. When you use a translator, be careful when picking your upstream frequencies to make sure when that upstream is upconverted the new converted frequency doesn’t fall on an existing channel you are using for video or data. Also before you order your modems, determine if you need a standard interface (such as RS232) or an optional interface.

Sweep both your forward and reverse lines before you start transmitting and receiving data, as this may uncover problems you did not know existed. Once this is done you should be able to connect your modems to the cable system and begin operation.

"Sweep both your forward and reverse lines before you start transmitting and receiving data."

Another use for data transfer on the cable system is to connect remote terminal units to the main computer via the cable system. This is more cost-effective when you have quite a few remote terminals. The faster the data speed needed to effectively communicate with a main computer, the more costly it is using telephone lines.

The speed, ease and reliability of using the cable system to transmit data may surprise you. You could start off by using your cable system as a back-up to telephone lines, but you may find your system is more reliable and faster. Sometimes it is difficult to convince plant management personnel of the benefits of using the cable system instead of using telephone lines, because they are confronted daily with the problems in the system and tend to feel that the cable system isn’t reliable enough to do the important things. However, when you look at the big picture you will probably see that most of the time the vast majority of the plant is operating quite well and could easily be used to transfer data.

---

WE HAVE JUST PUT YOU IN COMPLETE CONTROL.

Now you can have all the control you’ve ever wanted in the palm of your hand. Because Zenith has just introduced the Personal Control Center—A new multi-brand remote for under $25 that operates most VCRs, color TV’s, and even seven of our competitors’ converters. So call 312-699-2110 for more information. But hurry. Otherwise, you may find yourself out of control.

Reader Service Number 60.
More HDTV activity

By Lawrence W. Lockwood
President, TeleResources
East Coast Correspondent

This fall there was yet another burst of activity on the HDTV front in Washington, D.C. Each fall the IEEE Broadcast Technology Society holds its annual meeting in Washington, and this year one half-day was devoted to HDTV. A few weeks later in Congress, the House Subcommittee on Telecommunications and Finance held a hearing on, accompanied by a demonstration of, HDTV in the hearing room in the Rayburn House Office Building.

At the IEEE conference a technical presentation of three proposed HDTV transmission systems was made. A.G. Uyttendaele from ABC, the session chairman, gave a brief review of the MUSE system of NHK (Japan Broadcasting Corp.). A. Toth of North American Philips Labs described its system and R.J. Iredale from the Del Rey Group reviewed its proposal called HD-NTSC.

The atmosphere at the congressional hearing room was much more lively. The room was packed with congressmen and their staff, the witnesses and an overflowing audience—not to mention many HDTV display monitors. In the audience, aside from many interested government workers, it seemed the entire TV industry was represented. There were leaders from broadcast (National Association of Broadcasters, NBC, CBS, ABC, PBS, etc.), from cable (National Cable Television Association, various MSOs, etc.), from various manufacturers (Sony, North American Philips Corp., RCA/GE, etc.) and innumerable independent experts. The equipment demonstrated was the same NHK/MUSE system that had been demonstrated earlier in the year at the FCC (CT, March 1987, page 76). Thirteen witnesses that testified for the congressional committee were split about half and half between the administrative/political areas and the technical areas. NBC (S. Bonica, vice president of engineering) presented a brief review of the new NBC-GE-Sarnoff Labs proposed HDTV transmission system called ACTV (advanced compatible TV).

There was great emphasis from all the witnesses that the current receiver base of about 140 million TV receivers in this country should not be disenfranchised by any new HDTV transmission system that might be accepted; i.e., the system should be "compatible" with NTSC. (Compatibility as used here is defined: Any HDTV transmission scheme must produce at least one signal that can be received by a current NTSC standard TV receiver without modification or addition—i.e., with the TV receiver "as is").

"Unless some American interests...invest substantial funds—and soon—the United States may end up with the Japanese system by default."

---

**Table 1:**

<table>
<thead>
<tr>
<th>HDTV System</th>
<th>1,125 / 60 / 2:1 studio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lines per frame</td>
<td>1,125</td>
</tr>
<tr>
<td>Hertz field frequency</td>
<td>60</td>
</tr>
<tr>
<td>Interlace</td>
<td>2:1</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>16:9</td>
</tr>
<tr>
<td>Active lines</td>
<td>1,035</td>
</tr>
</tbody>
</table>

---

**Figure 1:** MUSE sampling pattern

<table>
<thead>
<tr>
<th></th>
<th>1,125 lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan lines</td>
<td>Even field</td>
</tr>
<tr>
<td></td>
<td>Odd field</td>
</tr>
</tbody>
</table>

- Scan lines
- Four fields required to transmit every sample

Sample transmission:
- ○ 4<sup>n</sup> field
- □ (4<sup>n</sup>+1)<sup>th</sup> field
- ● (4<sup>n</sup>+2)<sup>th</sup> field
- ■ (4<sup>n</sup>+3)<sup>th</sup> field

---

x ≈ 1/1,500 picture width
y ≈ 1/1,035 picture height

373 actual luminance samples transmitted each line

Four fields required to transmit every sample
The Sound Of Your Future. It's Hear Today!
The Leaming MTS-2B BTSC Stereo Generator

Simply The Best Value In Stereo TV Audio:

More Standard Features!
• Typical frequency response flat out to 15 KHz
• True Automatic Gain Control (AGC) eliminates routine level adjustments
• Stereo synthesizer for ad insertion or mono services
• Your choice of VU-type or LED metering
• Bessel-null test-tone for simple, accurate installation
• Baseband & 4.5 MHz outputs standard (41.25 MHz available)
• Typical stereo separation greater than 30 dB
• Compact, rack-mount design—Just 1.75 inches high
• dbx® licensed companding (true BTSC format)

Leaming: Cable Audio Specialists Since 1970.
Eighteen years of revolutionary advances, technological innovations, and superior craftsmanship have made Leaming the most respected name in cable audio.

Representing nearly two decades of research, development, and hands-on practical experience, the Leaming MTS-2B embodies our traditional dedication to electronic excellence.

Dollar for Dollar, Your Best Buy!
Compare our sound performance, features, and price. We think you’ll agree. Nothing else comes close.

For The Sound of the Future—Call (714) 979-4511 Today!

Leaming Industries
180 McCormick Avenue, Costa Mesa, CA 92626
Also Available Through Major Cable Distributors
dbx® is a registered trademark of dbx.

Reader Service Number 61.
Table 2: Comparison of NTSC and HDTV transmission methods

<table>
<thead>
<tr>
<th>Compatible?</th>
<th>Number of channels required</th>
<th>Bandwidth (MHz)</th>
<th>Resolution pixels/frame Vert.* Horiz.**</th>
<th>Number of scan lines/frame</th>
<th>Aspect ratio</th>
<th>Interlace***</th>
<th>Approx. Kell factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTSC</td>
<td>N/A</td>
<td>1</td>
<td>6</td>
<td>483 440</td>
<td>525</td>
<td>4:3</td>
<td>2:1</td>
</tr>
<tr>
<td>MUSE</td>
<td>No</td>
<td>2</td>
<td>8.1</td>
<td>1,035 1,496</td>
<td>1,125</td>
<td>16:9</td>
<td>2:1</td>
</tr>
<tr>
<td>North American Philips</td>
<td>Yes</td>
<td>2</td>
<td>9.5</td>
<td>483 853</td>
<td>525</td>
<td>16:9</td>
<td>Transmit 2:1</td>
</tr>
<tr>
<td>Del Rey Group</td>
<td>Yes</td>
<td>1</td>
<td>6</td>
<td>828 1,320</td>
<td>Transmit 525</td>
<td>Display 894</td>
<td>14:9</td>
</tr>
<tr>
<td>ACTV</td>
<td>Yes</td>
<td>1</td>
<td>6</td>
<td>483 747</td>
<td>Transmit 525</td>
<td>Display 1,050</td>
<td>16:9</td>
</tr>
</tbody>
</table>

*To get vertical resolution in TV lines, multiply by the Kell factor (its value varies with system claims from 0.7 to 1.0). The resultant is usually referred to as the resolution of the TV system.

**In this direction, pixel values are equivalent to TV lines.

***There has been considerable speculation that all HDTV displays will be produced with an interlace of 1:1. This will be possible, since each HDTV receiver will require a frame store.

To cap off the equipment demonstration, the first international satellite broadcast of HDTV was made from Canada (CBC) directly to the congressional hearing room.

Brief outline of HDTV systems operation
These brief descriptions are very brief indeed and thus may be regarded as more intuitive tutorials than as complete system descriptions.

The HDTV signal source specifications, before transmission by the proposed transmission systems, are shown in Table 1.

* In the MUSE (Multiple Sub-Nyquist Encoding) system the luminance and color difference signals are band limited and then digitized. The resulting data stream is "subsampled"—one of every four samples in each succeeding line for four consecutive fields (two frames) is transmitted and, after four fields, every sample will have been transmitted. This process, depicted in Figure 1, produces high-quality still pictures, but the resolution of objects in motion is lower than the resolution of stationary objects.

This system is not compatible—cannot be received on current NTSC receivers and the bandwidth required for this system is 8.1 MHz. Therefore it will require two standard TV broadcast channels.

* The North American Philips (NAP) approach is considerably different. In a much simplified description, it takes the HDTV signal, processes it and transmits it in two channels (see Figure 2). One channel has become a standard NTSC channel called "NTSC signal package" (NTSC-SP) and the other channel is called the "augmentation signal package" (A-Sp). In essence, one standard TV channel carries the center of the picture in a standard manner and another standard TV channel is required to carry the "side panels." Since in this technique the vertical scan rate is reduced from 1,125 to 525 the vertical resolution is decreased, but since the scan is progressive (interlace 1:1) the developers...
FIELD STRENGTH METER

COMSONICS, INC.
An Employee Owned Corporation
Toll Free (800) 336-9681, In VA (703) 434-5965

See us at the Western Show, Booth 1270.
Reader Service Number 62.
Our traps are skillfully engineered, efficiently manufactured, and tuned with pride in our craftsmanship. 100% quality check for lo. adj sound, hi video and pay video rejection.

Other state of the art products are: Encoders, decoders, band reject filters, multi channels traps, 100 db RFI passive, A/B switches, block converters etc. For further information or catalog write or call.

INTERCEPT COMMUNICATION PRODUCTS, INC.  
55 Fifth Avenue, Building 16  
Paterson, New Jersey 07524  

Reader Service Number 63.
Fiber Optics Seminar
Jan. 18-20, 1988
Hyatt Orlando Hotel

Agenda
Monday — Jan. 17, 1988
Fiber Basics — An Overview — AT&T
Fiber Cable — AT&T
Inter Connect Technology/Loss Balance — AMP
Splicing — AT&T
Aerial and Underground Construction Technique — AT&T
Questions and Answers (Panel)

Tuesday — Jan. 19, 1988
FM Modulation Techniques — Synchronous
Digital Modulation Technique — Stromberg Carlson
AM Modulation Techniques — ATC
Hands-on Demonstrations
Safety
Questions and Answers (Panel)

Wednesday — Jan. 20, 1988
User View — ATC
Future Technology — Bell Labs
Training — AT&T
Fiber to Home, Phone/Video/Data Interface — Northern Telecom
Hunter Creek, Operating Leaseback
Fiber to Home System — Bell South
Tour — Hunter Creek System — Bell South/AT&T (Optional-extra cost)

Registration Fee $150.00
Non-Member — $190.00 (Includes SCTE National Membership)

Registration Form
(Full registration packages will be mailed to all registrants)

Your Name: ____________________________  Nickname: ____________________________
Title: ____________________________  Tel. #: ____________________________
Company: ____________________________  Division: ____________________________
Address: ____________________________________________
Street / PO Box  City  State  Zip

Charge Card Information
Complete for Master Card/Visa below:

Name on Card: ____________________________  Exp. Date: ____________________________
Master Card #: ____________________________  ID #: ____________________________
Visa #: ____________________________
Signature for charge authority: ____________________________

Amount enclosed: $ ____________
(Total should include tour, if applicable)

Mail to:
SCTE Seminar
P.O. Box 7835
Sarasota, FL 34278

Reader Service Number 64.
dition, any HDTV transmission system must be subjected to extensive field testing. There are some apparent possible transmission problems that will have to be tested. As an example, in a two channel system that has the center and side panels sent on different channels, what effects can be expected if, say, the main channel, with the center of the picture, is sent on VHF and the side panels on a high UHF channel? How will different reflections, both permanent and transient, affect the picture? Will rain, snow, planes, etc., cause the sides of the picture to "flutter" at the viewer? There are many conceivable factors to be tested in each method and, if life and Murphy prove true to form, more will be found during the field testing.

Conclusions

It is of significant note that all the public demonstrations of HDTV (e.g., at the FCC, before Congress, etc.) have used the Japanese MUSE system. It is the only one ready for production. North American Philips has made one private demonstration of experimental equipment. The others (Del Rey Group and even the NBC system) have, at best, only been simulated by computer (no system hardware). Bonica said that the NBC system might be at the prototype stage some time next year—perhaps midyear. However, it is important to note that NHK has been at work on its HDTV for 17 years and has invested an estimated $300 million, and it is apparent it intends to invest much more. The Japanese Government Ministry of Posts and Telecommunications has plans for a fiber-optic link of 10 "high vision cities" to network HDTV theater centers. This will help promote HDTV in Japan, the first city in the network is planned for 1989 (either Tokyo or Osaka). The government is reported to be ready to aid this promotion financially by tax incentives.

It is certainly worth observing that "bottom line" mentality has resulted in no American-owned TV laboratories (with the exception of Zenith) left in this country—the originator of color TV, video recording and other fundamentals of present-day television. RCA labs were given away, CBS labs were closed, GE TV was sold and on it went until now there are none. Unless some American interests care enough to invest substantial funds—and soon—the United States may end up with the Japanese system by default. The Japanese are already selling HDTV studio equipment to a number of U.S. production houses and it will soon be (if not already) the de facto standard there. The Europeans have resolutely refused to adopt the Japanese standards and have embarked on a program called "Eureka," to develop their own system.

This is not a polemic on the Japanese but rather the voicing of a fond hope (I trust not a hopeless one) that the country that drove, both by development and production, the formation of TV as it is today will not give up on this new and huge area of the business. Rep. Don Ritter (R-Pa.), a member of the House committee that held the hearings, said, "We are talking about the next revolution in television and right now we are just not a player."

Looking toward the ideal HDTV transmission

---

**Figure 3: Del Rey Group sampling pattern**

- (a) Camera tube faceplate
- (b) Field 1, subpixel 1 scan
- (c) Field 2, subpixel 1 scan
- (d) Field 1, subpixel 2 scan
- (e) Field 2, subpixel 2 scan
- (f) Field 1, subpixel 3 scan
- (g) Field 2, subpixel 3 scan

**Figure 4a: Del Rey Group screen format**

- Vertical interval
- 42 lines
- 525 lines
- 35 lines
- 34 lines
- 635 μsec
- 11.1 μsec

**Figure 4b: 14:9 aspect ratio viewed on an NTSC receiver**

This white area represents an HD-NTSC picture being viewed on a conventional NTSC receiver. The dark bands at the top and bottom are due to the different aspect ratio. Because a typical receiver doesn't allow the entire NTSC image (due to overscan) the dark bands are actually rather small and unobtrusive.

Original 4:3 NTSC frame Typical NTSC viewable image New 14:9 HD-NTSC frame
system, the robustness of the current NTSC system should be held as a model. It was established over 40 years ago and has been flexible enough to accept such major modifications as color and stereo sound. Whatever HDTV transmission standard is finally accepted, even if it initially will not produce the full definition, aspect ratio, etc., of the HDTV source, the standard should be so conceived and developed that it has the flexibility and adaptability to accept upgrades to the system as they may be developed toward providing the truest HDTV transmission but without any changes required in the then-established HDTV receiver base. With the exception of the MUSE system, all the ones reviewed here make that claim. Of course, these claims must be subjected to rigorous analysis and testing.

The path to a higher definition TV is already ordained by the new VCRs (S-VHS and Sony EDTV) that produce over 50 percent more resolution in the current NTSC format on new available matching larger screen receivers. The resultant demand for sharper, larger pictures certainly will lay the groundwork that HDTV can satisfy.

Since Japanese manufacturers are set to produce HDTV receivers, HDTV VCRs and HDTV laser discs (they were all demonstrated at the FCC and before Congress), the timeframe to produce an American HDTV system shrinks.

**References**
Catalog

Cablewave Systems has issued its new 48-page catalog describing its rigid coaxial transmission lines, including hardware and installation accessories, custom assemblies, FM broadcast directional couplers, low pass filters and pressurization equipment. Also, the catalog includes performance curves, an installation section and an engineering data section.

For more details, contact Cablewave Systems, 60 Dodge Ave., North Haven, Conn. 06473, (203) 239-3311; or circle #104 on the reader service card.

Satellite receiver

Panasonic Industrial Company has introduced the compact CRD-4400 integrated receiver/descrambler (IRD) with built-in VideoCipher II. It also has an internal programmable antenna positioner with on-screen graphics and proprietary ambience audio circuitry, an external power supply with one-touch connection and a compact remote control unit.

For further information, contact Panasonic Industrial Co., 1 Panasonic Way, Secaucus, N.J. 07094, (201) 348-7183; or circle #135 on the reader service card.

Audio modulator

FM Systems announced its Model FMT631SAP second audio program modulator, designed to provide one new audio channel for each baseband-originated TV channel in the cable system. According to the company, audio service can be received by subscribers owning a stereo TV set, stereo VCR or TV stereo adapter. The channel can be applied to the company's Model FMT633S audio modulator or connected to monaural TV modulators directly.

For further information, contact FM Systems, 3877 S. Main St., Santa Ana, Calif. 92707, (714) 979-3355; or circle #99 on the reader service card.

Stereo generators

Learning announced that its MTS-2 series BTSC stereo generators now have LED bar graph metering and frequency response flat out to 15 kHz. These products encode satellite or local programming into the BTSC format using dbx companding, with a true AGC built in to reduce the need for audio level adjustment. A Bessel null test tone generator is included to set the deviation.

For more details, contact Learning Industries, 180 McCormick Ave., Costa Mesa, Calif. 92626, (714) 979-4511; or circle #138 on the reader service card.

the O.K. BULL CORRAL

YOUR MESSAGE HERE

THE LATEST IN "TECHTRUCKOLOGY"
UPGRADE NOW!

Courtesy Parallax

Reader Service Number 65.
W. B. Walton Enterprises, Inc.
P.O. Box 974
Riverside, CA 92502
(714) 683-0930

Reader Service Number 89.

DE-ICE
ENERGY COMPATIBLE
DOWN TIME INEXPENSIVE ESTHETICS

- Hot Air De-icing
- Worldwide
- 5m - 20m
- VSATs
- Transportables
FINAL CALL FOR PAPERS

Synopses for planned technical papers due by Jan. 1, 1988

NCTA, in preparing for the Cable '88 technical program, invites readers to submit synopses of planned technical papers -- on any communications engineering topic of interest to the cable television industry -- for consideration by the Cable '88 technical program selection subcommittee. Forty to fifty paper ideas will be selected on January 6th for placement in ten convention technical sessions. Judges look for reference value and originality (although updated works are acceptable) in the context of operations or design problem solving treatments. Product pitches will not be considered.

If your paper proposal is accepted, you must complete a camera-ready manuscript within six weeks for inclusion in the 1988 NCTA Technical Papers volume -- 29th in the NCTA conference proceedings series. Oral presentations, based on the papers, within the technical sessions will be limited to 15 minutes generally, but the manuscripts may be from three to 15 pages long. To qualify for the jurying process, send a synopsis to:

Katherine Rutkowski
Director, Technical Services
National Cable Television Association
1724 Massachusetts Avenue, NW
Washington, D.C. 20036
(Telecopier: 202-775-3604)

With your synopsis include complete name, job title, work address, and telephone number for the primary author and any co-authors: the paper synopsis should be from 200 to 300 words long. Provide the judges with enough specifics about your planned [not previously published] paper to show its reference value. Call Katherine Rutkowski at 202/775-3637 if you need further details.

Topics of particular interest= cable TV and: fiber optics, high definition television, customer service, signal leakage, PPV

Tap connectors

Gilbert Engineering announced availability of its Ethernet coaxial tap connectors. Two versions are available, one for standard Ethernet cabling and another for thin Ethernet cable. Both accept PVC- or pleurite-type cables and provide a BNC plug for transceiver connection. The tap system is a single unit crimping directly to the coax cable. In-line crimping eliminates accidental circuit interruption.

For further details, contact Gilbert Engineering, 5310 W. Camelback Rd., Glendale, Ariz. 85301, (602) 245-1050; or circle #141 on the reader service card.

Monitor

C-COR introduced its PSM power supply monitor hardware for single- and dual-cable broadband systems. The PSM integrates the monitoring and control of standby and redundant power supplies with its Quick Alert system. It can monitor a variety of parameters, depending upon the specific power supply such as battery voltage, battery lockout, output current, main/auxiliary status, fault status, standby status, input status and charger control. Specific units also can control features such as inverters, force to standby, main/auxiliary control and charge or float functions.

For further information, contact C-COR Electronics, 60 Decibel Rd., State College, Pa. 16801, (814) 238-2461; or circle #140 on the reader service card.

550 MHz taps

Toner Cable Equipment introduced its Royal 550 MHz multilts, which include two-way and four-way taps in small housing and an eight-way in larger housing. Both housings are of a precision die-cast aluminum with all surfaces covered by an electrically passive, electrochemical coating to improve conductivity and provide corrosion resistance; the final corrosion coating is an electrostatically applied paint.

The tap housing is designed for aerial strand mounting and underground cable applications using pedestals or vaults and has a stainless-steel strand clamp fastened with a 3/8-inch stainless-steel hex head bolt. All electronic circuitry are protected by a plastic cover located on the removable tap mounting plate. Connections for RF and power between the housing and tap plate is made by a pin and socket.

For additional information, contact Toner. 969 Horsesham Rd., Horsham, Pa. 19044, (800) 523-5947; or circle #122 on the reader service card.
Call
1-800-843-3338
and discover for yourself how to analyze and pinpoint any RF video trouble in any video distribution system, automatically to FCC specifications in half the time!
Or return this card for more information or a 10 Day Self Demo.
(See attached card for details!)

Call 1-800-843-3338 And Discover How To Cut Your System Analyzing Time In Half!

Check out the FS74's Exclusive Features:
- Exclusive on-channel automatic signal-to-noise ratio test. Read SNR on channel . . . to 900 MHz!
- Exclusive automatic FCC accurate Hum level test on channel. Eliminates down time!
- Exclusive automatic audio-to-video ratio test.
- Exclusive signal quality check. Analyze troubles with a 4 MHz wideband CRT monitor.
- Exclusive built-in autoranging AC/DC DVM and battery operation for true versatility.
- YES, please send me more information on Sencore's FS74 CHANNELIZER SR.
- CALL ME for a 10 Day Self Demo.

Name ____________________________
Address ____________________________
City ____________________________ State ______ ZIP ______
Signature ____________________________ Date ______

1. Are you a member of the SCTE (Society of Cable Television Engineers)?
   Yes ☐ No ☐
2. In the performance of my job, I authorize, specify or purchase products and/or services.
   Yes ☐ No ☐

3. Please check the category that best describes your firm's primary business (please check only one).
   1. Cable TV Systems Operations
      a. Independent Cable TV Systems
      b. MSO (two or more Cable TV Systems)
   2. Cable TV Contractor
   3. Cable TV Program Network
   4. SMATV or DBS Operator
   5. MDS, STV or LPTV Operator
   6. Microwave or Telephone Company
   7. Commercial Television Broadcasters
   8. Cable TV Component Manufacturer
   9. Cable TV Investor
   10. Financial Institution, Broker, Consultant
   11. Law Firm or Government Agency
   12. Program Producer or Distributor
   13. Advertising Agency
   14. Educational TV Station, School or Library
   15. Other ____________________________ (please describe)

Simply circle the number(s) below corresponding to products of interest!

<table>
<thead>
<tr>
<th>1 SCTE Cable-Tec Expo</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1h</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>2h</td>
<td>30</td>
<td>31</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
<td>39</td>
<td>40</td>
<td>41</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>3h</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>4h</td>
<td>56</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>60</td>
<td>61</td>
<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
<td>67</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>5h</td>
<td>69</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
<td>75</td>
<td>76</td>
<td>77</td>
<td>78</td>
<td>79</td>
<td>80</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>6h</td>
<td>82</td>
<td>83</td>
<td>84</td>
<td>85</td>
<td>86</td>
<td>87</td>
<td>88</td>
<td>89</td>
<td>90</td>
<td>91</td>
<td>92</td>
<td>93</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>7h</td>
<td>95</td>
<td>96</td>
<td>97</td>
<td>98</td>
<td>99</td>
<td>100</td>
<td>101</td>
<td>102</td>
<td>103</td>
<td>104</td>
<td>105</td>
<td>106</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>8h</td>
<td>108</td>
<td>109</td>
<td>110</td>
<td>111</td>
<td>112</td>
<td>113</td>
<td>114</td>
<td>115</td>
<td>116</td>
<td>117</td>
<td>118</td>
<td>119</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>9h</td>
<td>121</td>
<td>122</td>
<td>123</td>
<td>124</td>
<td>125</td>
<td>126</td>
<td>127</td>
<td>128</td>
<td>129</td>
<td>130</td>
<td>131</td>
<td>132</td>
<td>133</td>
<td></td>
</tr>
<tr>
<td>10h</td>
<td>134</td>
<td>135</td>
<td>136</td>
<td>137</td>
<td>138</td>
<td>139</td>
<td>140</td>
<td>141</td>
<td>142</td>
<td>143</td>
<td>144</td>
<td>145</td>
<td>146</td>
<td></td>
</tr>
</tbody>
</table>

FREE INFORMATION Reader Service Card
December 1987 (Valid until February 1988).
BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 1667 SIOUX FALLS, SD
POSTAGE WILL BE PAID BY ADDRESSEE

Sencore
3200 Sencore Drive
P.O. Box 5062
Sioux Falls, SD 57117-9949

Call
1-800-843-3338
And Discover
How To Cut
Your System
Analyzing Time
In Half
With The
FS74
CHANNELIZER SR.!

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 1571 ENGLEWOOD, CO
POSTAGE WILL BE PAID BY ADDRESSEE

CT PUBLICATIONS CORP.
P.O. Box 3208
Englewood, CO 80155

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 1571 ENGLEWOOD, CO
POSTAGE WILL BE PAID BY ADDRESSEE

CT PUBLICATIONS CORP.
P.O. Box 3208
Englewood, CO 80155

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES
There’s no end to the parts we supply daily. At Authorized Parts Company your repair and replacement needs are met within 24 hours. A faster turnaround increases your productivity and profits. And our extensive in-stock inventory means the best prices for you. Turn to Authorized Parts Company for all your converter supplies.

- Jerrold Bezels
- JSX Cases
- Hamlin Cases
- other cases available
- most cosmetic pieces
- semiconductors
- diodes • transistors
- capacitors

Authorized Parts Company
200 Berg Street • Algonquin, IL 60102
312-658-6900 • FAX 312-658-0582

For more information and our product catalog, call us at 518-374-1113 or 312-658-6900, or mail in the coupon below.

Please send me your catalog.
Name ____________________________
Title ____________________________
Company ____________________________
Address ____________________________
City __________________ State _______ Zip _______
Telephone ____________________________

Reader Service Number 69.
Enhance your drop cable investment by specifying the exclusive lifeTime™ cable from Times Fiber Communications. For as little as an additional 18¢ per subscriber*, lifeTime can "insure" maximum protection and offer 20–30% longer cable life.

lifeTime provides increased coverage against moisture — one of the major causes of premature cable failure, signal leakage and damaging corrosion. Let your customers become the beneficiaries of clear reception, decreased incidence of flashing and reduced subscriber outages.

lifeTime cable diminishes the need for expensive sealed connectors. Decreased frequency of connector replacement and the connector compatibility of this cable should dramatically reduce labor and maintenance costs.

Your most significant operating expense between the tap and the home is labor, not material. By specifying lifeTime drop cable, you can defer the labor costs, drop replacement and increase operating profits. Make lifeTime a part of your quality picture.

For a free benefit analysis contact: Times Fiber Communications, Inc. P.O. Box 384, Wallingford, CT 06492, (203) 265-8540 or 1-800-TFC-CATV.

*Average drop length 125 feet
**lifeTime is not recommended for indoor applications
Dispatch system

The Computer-Aided Radio Service Dispatch System (C-ARDS) from the Technical Products Division of CNG Energy uses digital communications to transmit information through radios between a dispatch center and mobile data terminals such as installer vehicles. The system consists of three components: a dispatch console with accompanying computer software, a station controller and mobile data terminals. The terminals enable field personnel to communicate with the dispatcher, send information and access data stored in the microcomputer or a host computer.

According to CNG, the system replaces voice communication with speed, accuracy, privacy and immediate information access with a complete system of hardware, software and support.

For more details, contact CNG Energy Co., Technical Products Division, P.O. Box 5759, Cleveland, Ohio 44101-0759, (216) 432-6676; or circle #133 on the reader service card.

Cable identifier

AEMC Corp. introduced Fibrotest 1, a continuity tester/cable identifier designed for installation and troubleshooting of fiber-optic cable. The product connects to the fiber under test with a built-in SMA connector and uses visible light to identify the fiber and check continuity. It can be used with all optical fibers and connector types.

For additional information, contact AEMC Corp., 99 Chauncy St., Boston, Mass. 02111, (617) 451-0227; or circle #130 on the reader service card.

Cable shielding

Schlegel Corp. introduced its EMI cable shielding that attenuates up to 100 dB for cables and cable harnesses of all configurations. According to Schlegel, the product provides highly effective shielding and is flexible, durable and corrosion resistant. It seals with fingertip pressure and can be opened and ressealed at any time with no loss of shielding integrity.

For further information, contact Schlegel Corp., Industrial Products Division, P.O. Box 23197, Rochester, N.Y. 14692, (716) 427-7200; or circle #136 on the reader service card.

Remote control tester

Available from Philips ECG, the RCT7501 remote control transmitter tester can be used to test both ultrasonic and infrared remote controls. It features an LED go/no-go test to detect transducer output directly without electrical connections as well as a frequency counter test jack.

For additional information, contact Philips ECG, 100 First Ave., Waltham, Mass. 02254, (617) 890-6107; or circle #137 on the reader service card.

Cable fault locator

The Biddle Instruments Model CFL510, a four-range, battery-powered, hand-held TDR (time domain reflector) cable fault locator, can provide a cable trace indicating faults up to 9.500 feet in length. The product user checks out the velocity of propagation, sets the range and moves the cursor to fault or discontinuity on the
trace. The instrument then automatically shows
distance to the fault.
The instrument is designed to identify and
locate opens, shorts, taps, splits and resplits,
and water saturation, as well as open concen-
tric neutrals and faults on aluminum conductors
in underground power cables.
For further information, contact Biddle Instru-
ments, 510 Township Line Rd., Blue Bell, Pa.
19422, (215) 646-9200; or circle #132 on the
reader service card.

Spectrum analyzer

The TR4131 Series general purpose spectrum
analyzer from Advantest America is designed
to cover a wide frequency range from 10 kHz
to 3.5 GHz in a single sweep. It is equipped with
digital memory and display functions. For ex-
ample, the digital memory can produce two
screen displays that permit simultaneous view-
ing of spectrum displays. Features include a
marker function for data readout, maximum
hold for measurement of frequency drift and
sweep, peak hold and a market-centering
function.
For more information, contact Advantest
America, 300 Knightsbridge Pkwy., Lincoln-
shire, Ill. 60069, (312) 634-2552; or circle #131
on the reader service card.

Circuit tester

Etcon announced its RL404 circuit tester
designed for AC voltages from 100 to 500V. The
plastic tester features a slim metal screwdriver
probe and a clip that permits it to be carried
in a shirt pocket.
For more details, contact Etcon Corp., 7750
Grant St., Burr Ridge, Ill. 60521, (312) 325-6100;
or circle #134 on the reader service card.

Hydraulic hammer

Allied's Model 350 X-Ram rotary hydraulic im-
pact hammer utilizes double eccentric design
for light breaking applications. Two counter-
balanced eccentric weights cause the hammers' house to oscillate and hit the chisel 1,200
times per minute. It is designed to be attached
to small backhoes, skid steer loaders or mini-
excavators to break concrete, pavement and
rock with chisel and conical point demolition
tools. Asphalt cutters and tamper tools are also
available.
For more information, contact Allied, 5800
Harper Rd., Solon, Ohio 44139, (216) 248-2600;
or circle #129 on the reader service card.

RF software

ComNet Engineering Co. is offering its Broad-
band System Engineering, a computer-aided
engineering software package that designs RF
broadband cable networks for both the LAN
and CATV industries. The PC software features
include: designs any kind of split or dual cable
from 1 to 600 MHz; automatically selects taps
by minimum drop level; change cable sizes
anytime; delete, insert or replace designed com-
ponents followed by an automatic recalculation
of the RF paths; a highly interactive user screen
interface; speed key commands, saves and
reloads design files, help screen; and prints bill
of materials used and RF design analysis to local
printer or ASCII text file.
For more information, contact ComNet
Engineering, 3310 Western Dr., Austin, Texas
78745, (512) 892-2085; or circle #98 on the
reader service card.

Optical power meter

Philips Telecom has produced the OPM-6
optical power meter for fiber-optic cable test-
ing. The product covers a wavelength range of
800 to 1,800 nm and is calibrated at three switch-
selectable standards (850, 1,300 and 1,550 nm)
with others optional. It features a large readable
LCD display, automatic display function test and
automatic switch-off.
For more information, contact Philips Telecom
Equity Corp., Test Equipment Division, 250
Federal Rd., Unit C22, Brookfield, Conn. 06804,
(203) 755-4401; or circle #139 on the reader
service card.
Your satellite receiver is the first link in the transmission chain. And one thing you can always count on—the head-end signal never gets better than it is at the receiver.

Which is a very good reason to specify Standard's Agile 40 C/K Satellite Receiver—but it's not the only reason.

The Agile 40 C/K was designed from the ground up solely for commercial applications. So it has all the features cable operators need most: rock-solid 100 kHz PLL tuning and total flexibility for the most accurate C/Ku-band operation; 70 MHz IF with a front-panel test point to minimize terrestrial interference; and a power supply built for the demands of 24-hour-a-day operation.

The Agile 40 C/K is also the receiver to have when you're expanding your headend. Because our internal 950-1450 MHz active loop-thru design eliminates signal splitters, so you can add up to 16 additional receivers on the same polarity—with no signal loss.

And because it draws only 32 watts maximum, the 40 C/K runs cooler, lasts longer, and saves money year after year. So you'll probably never need our five-year replacement/warranty program.

To get the best signal, start with the peace of mind that only quality equipment can give you. Link up with an Agile 40 C/K.

For pricing and specifications, contact the SATCOM Division for the Standard representative nearest you.
Cable Television Association’s Blue Ribbon Committee on High Definition Television (HDTV). The committee will consider from the cable industry’s perspective the policy and practical ramifications involved in the development of HDTV. Contact: 1724 Massachusetts Ave., N.W., Washington, D.C. 20036, (202) 775-3629.

James Crenca was promoted to executive vice president of Comsearch. He was formerly vice president of business development for Comsearch Applied Technology. Contact: 11720 Sunrise Valley Dr., Reston, Va. 22091, (703) 620-6300.

Richard Taylor was named national sales manager for C-COR Electronics. He was previously North Central regional account executive for the company. Contact: 60 Decibel Rd., State College, Pa. 16801, (814) 238-2461.

James Slade was named marketing manager for CATV products at Panasonic. Previously, he had marketing responsibilities for the company’s Matsushita Technology Center. Contact: 2 Panasonic Way, Secaucus, N.J. 07094, (201) 348-7000.

High Resolution Sciences named Denes Ilkovics senior vice president of technology and product development. Previously, he was chairman of ITT-Europe’s Intelligent Products Steering Group and director of ITT’s Information Systems Technology. Contact: 726 N. Cahuenga Blvd., Los Angeles, Calif. 90038, (213) 463-9000.

ADC Telecommunications appointed Thomas Stanley district manager for its Southeast district. Prior to joining ADC, he was national sales manager for Lear Siegler Sierra. Contact: 4900 W. 78th St., Minneapolis, Minn. 55435, (612) 835-6800.

BRING ON THE MONTHLY STATEMENTS

If you feel that you need the courage of a matador to face the monthly statement printing and mailing routine, then you need DYATRON. With powerful mainframe computers, state-of-the-art high-speed laser printers, and a fully equipped lettershop, DYATRON is a full service statement printing and mailing company.

Depend on DYATRON for speed and accuracy, month after month.

DYATRON

1-800-334-3471
IN ALABAMA CALL: 205/956-7802

Reader Service Number 75.
Your leading source for connectors and closures for the CATV and Telecommunications Industries.

Distributed By:
Signal Vision, Inc. - Irvine, CA
(714) 586-3196
John Weeks Enterprises -
Lawrenceville, GA
(800) 241-1232
D.F. Countryman, Co. - St. Paul,
MN (800) 328-6820
Midwest CATV - Virginia Beach,
VA (800) MID-CATV

Visit us at the Western Cable T.V. Show
Booth #134
PRODUCTS
Pole line hardware
Subscriber drop line hardware

SPECIALTY
Suspension, fastening, identifying and U/L approved grounding devices

BENEFITS
Cost efficiency with long lasting, labor saving, security designed, quality hardware.

CONSTANT SERVICE BACK UP

☐ Nation wide distribution
☐ Installation techniques seminar
☐ Customer support action line
☐ Customized marketing programs
☐ On site quality control programs

Call now for product catalog, distributor list, training seminar procedures, drop hardware evaluation criteria:
USA National Toll Free Line: 1-800-361-3685

...the better alternative! When support counts.

SACHS COMMUNICATIONS INC.
30 West Service Road
Champlain, N.Y. 12919-9703
1-800-361-3685

SACHS CANADA INC.
745 Avoca Ave.
Dorval, Q.C. H9P 1G4
1-514-636-6560

Reader Service Number 77.
December

Dec. 5: SCTE Cactus Chapter BCT/E review course and testing on Category IV-Distribution Systems. Contact Chris Radicke, (602) 938-0777.

Dec. 8: SCTE Central Illinois Meeting Group technical seminar, Bloomington Normal Sheraton Inn, Bloomington, Ill. Contact Tony Lasher, (800) 252-1101; or Ralph Duff, (217) 424-8478.


Dec. 9: SCTE Oklahoma Meeting Group technical seminar. Contact Herman Holland, (405) 353-2250.


Dec. 9-11: Center for Professional Development seminar on fiber-optic communications, Arizona State University, Tempe, Ariz. 85287. Contact (602) 965-1740.


Dec. 10: SCTE North Jersey Chapter technical seminar and BCT/E testing. Contact Virgie Conanan, (212) 512-5309.

Dec. 16: SCTE Great Lakes Chapter technical seminar. Contact Vic Gates, (313) 422-2814.

Dec. 29: SCTE Satellite TeleSeminar Program, "Performing measurements on basic test equipment." 12:1 p.m. ET on Transponder 7 of Satcom F3R. Contact (215) 363-6888.

January

Jan. 10-12: Caribbean Cable TV Association annual meeting, Frenchman's Reef Beach Resort, St. Thomas, U.S. Virgin Islands. Contact Andrea Martin, (809) 774-2080.


Jan. 18-20: SCTE Florida Chapter seminar on fiber optics, Hyatt Orlando Hotel, Orlando, Fla. Contact Dick Kern, (813) 294-8541; or Pat Luckett, (305) 660-5524.

Jan. 26: SCTE Satellite TeleSeminar Program on digital TDRs and Part II of "Signal processing centers." 12:1 p.m. ET on Transponder 7 of Satcom F3R. Contact (215) 363-6888.


February

Feb. 2-3: Arizona Cable Television Association annual meet-

Permatrap

Date Coding Stamped Into Metal Sleeve

- Nonremovable Crimped Sleeve.
- Passband Range Low Band, 450 MHz min.
- Passband Range All Others, 600 MHz min.
- RTV Instead of "O" Ring Sleeve Seal

Return Loss Typically 15 dB Min.
2 Elements More To Improve Return Loss.

- Rubber Connector Seal.
- Rubber Male Pin Seal.
- Improved Return Loss At All Frequencies To Improve Match And Ability To Use Several Traps Without Signal Loss.

100% Urethane Filled

- Superior Sleeve Seal With Moisture Cure Adhesive.
- Completely Shockproof.
- Superior Temperature Stability.

Trap Evaluation Laboratory
At The 1987 Eastern Show

- Bring your existing trap products to booth #417
- Testing Available
  1. Spectrum Analysis for electrical parameters.
  2. Temperature stability -40° to 140°F.
- Moisture Resistance Chamber
- Level of Security/Sleeve Removal Test

Northeast Filter Co., Inc.
14 Corporate Circle
East Syracuse, N.Y. 13057

PHONE: 315-437-7377
315-437-7378
FAX: 315-437-7879

Made in U.S.A.

Patent No. 4701726
Reader Service Number 78

See us at the Western Show, Booth 1903.
MLE
MAIN LINE EQUIPMENT, INC.
Suppliers to the industry of new and used Converter, Line gear, Headends
Remember us when you want to sell your surplus inventory.
1650 W. 180th Street
Gardena, California 90248
(213) 715-6518
1-800-444-2288

SIGNAL LEVEL METER REPAIR
Prompt, Professional Service at Reasonable Prices
JGL ELECTRONICS, INC.
4425 BLACKSTONE DRIVE
INDIANAPOLIS, INDIANA 46237
317/783-6130

TechNeTronics Inc.
192 Route 9W
New Windsor, N.Y. 12550
CONSTRUCTION (MDU, Aerial, Underground, LAN) ★ AUDITING MAPPING ★ ENGINEERING
CALL ANDREW HEALEY at (914) 561-7880
As always, the results of our work as well as the workmanship itself are fully 100% guaranteed by TechNeTronics-the name you can depend on.

Cable T.V. Training
At your own pace. In your own home.
Get training in:
- Construction
- Installation
- Maintenance
Of a cable T.V. system.
Box 1319 St. Charles, Mo. 63302

ENGLISH ENTERPRISES
P.O. Box 6494
Orlando, Florida 32853
1-305-898-7134
"SERVING THE INDUSTRY SINCE 1974"
Aerial Installs
Underground Installs
Drop Transfer
Commercial Development
Design
Tap Audits
Underground and Aerial Construction

EJB MANUFACTURING CO
- Foldup & Carry Cable Caddy
- Aluminum Cable Clips 7MM
- "Men Working" Signs
- Barricades

7900 CARNEAL ROAD • LIVERMORE, CA 94550
(415) 443-8619

Bigham
Cable Construction, Inc.
Complete CATV Construction
Specializing in Rebuilds
P.O. Box 903
Gulf Breeze, FL 32561

Lu Ann Curtis
Account Executive
COMMUNICATIONS TECHNOLOGY • CABLE STRATEGIES INSTALLER/TECHNICIAN
12200 E. Brianwood Ave. • Suite 250 • Englewood, Colo. 80112 • (303) 792-0023
Mailing Address: P.O. Box 3206 • Englewood, Colo. 80155
TELEFAX: (303) 792-5520

Reader Service Numbers:
79, 80, 81, 82, 83, 84, 85, 86.
Pay-Per-View is here and growing fast. Last year alone, the number of homes able to receive PPV service doubled and PPV revenues soared.

If you're considering Pay-Per-View but are puzzled about which technology is right for you, consider the benefits of Impulse Pay-Per-View with General Instrument's TOCOM 5503-VIP converter:

- TOCOM 5503-VIP addressable converters are impulse-ready NOW, eliminating converter obsolescence.
- Instant access to PPV programming via the TOCOM 5503-VIP remote gives subscribers the convenience of arm chair ordering, generating higher buy rates.
- The TOCOM 5503-VIP uses field-proven store-and-forward technology, providing last minute ordering capability without peak load constraints.
- TOCOM's fully integrated software and system support is compatible with most major billing systems, PPV programming services and PPV ordering methods.

Get in on PPV profits now with the TOCOM 5503-VIP — the Impulse converter that easily solves the Pay-Per-View puzzle.

TOCOM Impulse can be implemented in your system today! To find out how, contact your Jerrold Account Executive or call the General Instrument/TOCOM Marketing Department at 214/438-7691.
QUALITY RF SERVICES, INC.

COMPONENTS REPAIR PARTS

REPAIR FACILITY

UPGRADE MODULES

CATV AMPLIFIER SERVICE IS OUR TOP PRIORITY

(305) 747-4998
(800) 327-9767
(800) 433-0107 (in FL)

QUALITY R.F. SERVICES, INC.
850 PARK WAY
JUPITER, FL 33477

* Replacement Components *  * Upgrade Electronics *  * Repair Service *
System Name ___________________________ Address ___________________________
City/State ___________________________ ZIP ___________________________
Telephone ( ) ___________________________
Your Name ___________________________ Position ___________________________
Equipment Used in System ___________________________

Send Replacement Components Catalog
Send information on repair service.
Send information on Circuit Boards to increase your channel capacity.

Reader Service Number 88.
XMOD and CTB in a cable system

By Ron Hranac and Pam King
Jones Intercable Inc.

The formula to calculate the cross modulation (XMOD) or composite triple beat (CTB) ratio at the end of a cascade of identical amplifiers is:

\[ D_{\text{CASCADE}} = D_{\text{AMPLIFIER}} + 20 \log_{10}(N) \]  

(1)

where:
- \( D_{\text{CASCADE}} \) = CTB or XMOD (dB below video carriers) at the end of the cascade
- \( D_{\text{AMPLIFIER}} \) = corrected CTB or XMOD specification for a single amplifier (dB below video carrier)
- \( N \) = number of identical amplifiers in cascade

The formula to calculate the corrected XMOD or CTB specification for a single amplifier is:

\[ D_{\text{AMPLIFIER}} = D_{\text{SPEC}} + \Delta D_1 + \Delta D_2 \]  

(2)

where:
- \( D_{\text{AMPLIFIER}} \) = corrected CTB or XMOD specifications for a single amplifier
- \( D_{\text{SPEC}} \) = manufacturer's original CTB or XMOD specifications for a given output level and number of channels
- \( \Delta D_1 \) = correction if number of channels is different than manufacturer's CTB or XMOD specifications
- \( \Delta D_2 \) = correction if output level is different than manufacturer's CTB or XMOD specification

The formula to calculate how much a XMOD or CTB specification will change if the number of channels is increased or decreased is:

\[ \Delta D_1 = 20 \log_{10} \left( \frac{C_{\text{NEW}} - 1}{C_{\text{OLD}} - 1} \right) \]  

(3)

where:
- \( C_{\text{OLD}} \) = original number of channels
- \( C_{\text{NEW}} \) = new number of channels

If the new number of channels is less than the original manufacturer's CTB or XMOD specification, the correction is negative. If the new number of channels is greater than the original manufacturer's CTB or XMOD specification, the correction is positive.

Output level correction (\( \Delta D_2 \))

For each 1 dB increase in output, CTB and XMOD change by +2. For each 1 dB decrease in output, CTB and XMOD change by -2.

\( 20 \log_{10}(N) \) can be found by determining the base 10 logarithm of \( N \) then multiplying that answer by 20, or by referring to the following table:

<table>
<thead>
<tr>
<th>Number of amplifiers in cascade (N)</th>
<th>( 20 \log_{10}(N) )</th>
<th>Number of amplifiers in cascade (N)</th>
<th>( 20 \log_{10}(N) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>21</td>
<td>26.4444</td>
</tr>
<tr>
<td>2</td>
<td>6.0206</td>
<td>22</td>
<td>26.8485</td>
</tr>
<tr>
<td>3</td>
<td>9.5424</td>
<td>23</td>
<td>27.2348</td>
</tr>
<tr>
<td>4</td>
<td>12.0412</td>
<td>24</td>
<td>27.6042</td>
</tr>
<tr>
<td>5</td>
<td>13.9794</td>
<td>25</td>
<td>27.9588</td>
</tr>
<tr>
<td>6</td>
<td>15.6830</td>
<td>26</td>
<td>28.2995</td>
</tr>
<tr>
<td>7</td>
<td>16.9020</td>
<td>27</td>
<td>28.6273</td>
</tr>
<tr>
<td>8</td>
<td>18.0618</td>
<td>28</td>
<td>28.9432</td>
</tr>
<tr>
<td>9</td>
<td>19.0849</td>
<td>29</td>
<td>29.2480</td>
</tr>
<tr>
<td>10</td>
<td>20.0000</td>
<td>30</td>
<td>29.5424</td>
</tr>
<tr>
<td>11</td>
<td>20.8279</td>
<td>31</td>
<td>29.8272</td>
</tr>
<tr>
<td>12</td>
<td>21.5836</td>
<td>32</td>
<td>30.1030</td>
</tr>
<tr>
<td>13</td>
<td>22.2789</td>
<td>33</td>
<td>30.3703</td>
</tr>
<tr>
<td>14</td>
<td>22.9226</td>
<td>34</td>
<td>30.6296</td>
</tr>
<tr>
<td>15</td>
<td>23.5218</td>
<td>35</td>
<td>30.8814</td>
</tr>
<tr>
<td>16</td>
<td>24.0824</td>
<td>36</td>
<td>31.1261</td>
</tr>
<tr>
<td>17</td>
<td>24.6090</td>
<td>37</td>
<td>31.3640</td>
</tr>
<tr>
<td>18</td>
<td>25.1055</td>
<td>38</td>
<td>31.5957</td>
</tr>
<tr>
<td>19</td>
<td>25.751</td>
<td>39</td>
<td>31.8213</td>
</tr>
<tr>
<td>20</td>
<td>26.0206</td>
<td>40</td>
<td>32.0412</td>
</tr>
</tbody>
</table>
Examples

Problem
What will the CTB be at the end of a cascade of 22 identical trunk amplifiers, assuming the following?
Manufacturer’s specifications (single amplifier):
Number of channels: 60
Output level: +34 dBmV (flat)
CTB: −95
XMOD: −94
Operating conditions:
Number of channels: 60
Output level: +34 dBmV (flat)

Solution
Since the operating conditions are the same as the manufacturer’s specifications, corrections to $D_{\text{AMPLIFIER}}$ will not be necessary. For this situation Formula 1 is used.

$$D_{\text{AMPLIFIER}} = D_{\text{CASCADE}} + 20 \log_{10}(N) = -95 + 20 \log_{10}(22) = -95 + 26.8485 = -68.2$$

Problem
What will the CTB be at the end of the same cascade of 22 identical trunk amplifiers, but with the operating conditions changed to the following?
Number of channels: 52
Output level: +36 dBmV (flat)

Solution
Since the operating conditions are different than the manufacturing’s specifications, Formulas 1, 2, 3 and 4 are used. First, calculate the specification correction for the new number of channels, using Formula 3.

$$\Delta D_1 = 20 \log_{10} \left( \frac{C_{\text{NEW}} - 1}{C_{\text{OLD}} - 1} \right)$$

$$\Delta D_1 = 20 \log_{10} \left( \frac{52 - 1}{60 - 1} \right) = 20 \log_{10}(0.8644) = 20(-0.0633) = -1.2656$$

Next, calculate the specification correction for the new output level (Reference 4). Since the output has been increased by 2 dB, the CTB specification will change by +4. You can now calculate the total corrections with Formula 2.

$$D_{\text{AMPLIFIER}} = D_{\text{SPEC}} + \Delta D_1 + \Delta D_2 = -95 + (-1.2656) + (+4) = -92.2656$$

Finally, determine the CTB at the end of the cascade using Formula 1.

$$D_{\text{CASCADE}} = D_{\text{AMPLIFIER}} + 20 \log_{10}(N) = -92.2656 + 20 \log_{10}(22) = -92.2656 + 20(1.3424) = -92.2656 + 26.8485 = -67.4$$
Your best training isn’t across the country.
It’s across the hall.

You shouldn’t have to send your people on a four-day trip to get the training they need.
Now you don’t.
Announcing Wavetek’s Field Seminars for cable TV engineers and technicians. Definitive. Practical. Customized to your operation’s needs.
And taught by Wavetek experts at a site you choose.

You deserve the best hands-on training in the business.
Now, get it down the hall. From Wavetek.
To receive a complete Wavetek Field Training Menu, mail the attached reply coupon to Wavetek RF Products, Inc., 5808 Churchman Bypass, Indianapolis, Indiana 46203-6109. Or call 317-788-5965.

Reader Service Number 66.
<table>
<thead>
<tr>
<th>Company</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha Technologies Inc.</td>
<td>9 &amp; 81</td>
</tr>
<tr>
<td>Anixter</td>
<td>120</td>
</tr>
<tr>
<td>Antenna Technology Corp.</td>
<td>82</td>
</tr>
<tr>
<td>Applied Instruments</td>
<td>43</td>
</tr>
<tr>
<td>Authorized Parts</td>
<td>101</td>
</tr>
<tr>
<td>Ben Hughes</td>
<td>48</td>
</tr>
<tr>
<td>Bigham Construction</td>
<td>110</td>
</tr>
<tr>
<td>Brad Cable</td>
<td>8 &amp; 38</td>
</tr>
<tr>
<td>Broadband Engineering</td>
<td>17</td>
</tr>
<tr>
<td>Burnup &amp; Sims</td>
<td>29</td>
</tr>
<tr>
<td>Cable Security Systems</td>
<td>18</td>
</tr>
<tr>
<td>Cable Services Co.</td>
<td>76</td>
</tr>
<tr>
<td>CableTek Center Products</td>
<td>74</td>
</tr>
<tr>
<td>Cable TV Training</td>
<td>110</td>
</tr>
<tr>
<td>Cadco</td>
<td>23</td>
</tr>
<tr>
<td>Catel Communications</td>
<td>6</td>
</tr>
<tr>
<td>CATV Services</td>
<td>32</td>
</tr>
<tr>
<td>CATV Subscriber Services</td>
<td>71</td>
</tr>
<tr>
<td>C-COR Electronics</td>
<td>32</td>
</tr>
<tr>
<td>Certified Investments</td>
<td>19</td>
</tr>
<tr>
<td>Channelmatic</td>
<td>73</td>
</tr>
<tr>
<td>Comm/Scope</td>
<td>54 &amp; 67</td>
</tr>
<tr>
<td>ComSonics</td>
<td>91</td>
</tr>
<tr>
<td>Donley International</td>
<td>12</td>
</tr>
<tr>
<td>Dyatron</td>
<td>106</td>
</tr>
<tr>
<td>Eagle Comtronics</td>
<td>75</td>
</tr>
<tr>
<td>Ehlen Software</td>
<td>104</td>
</tr>
<tr>
<td>EJB Manufacturing</td>
<td>110</td>
</tr>
<tr>
<td>English Enterprises</td>
<td>110</td>
</tr>
<tr>
<td>Fike</td>
<td>119</td>
</tr>
<tr>
<td>General Instrument/TOCOM Division</td>
<td>111</td>
</tr>
<tr>
<td>GNB Batteries</td>
<td>117</td>
</tr>
<tr>
<td>Hamlin Corp.</td>
<td>84</td>
</tr>
<tr>
<td>Intercept Communication Products</td>
<td>92</td>
</tr>
<tr>
<td>Irwin Industries</td>
<td>74</td>
</tr>
<tr>
<td>ISS Engineering</td>
<td>46-47</td>
</tr>
<tr>
<td>Jensen Tools Inc.</td>
<td>80</td>
</tr>
<tr>
<td>Jerrold</td>
<td>5</td>
</tr>
<tr>
<td>JGL Electronics Inc.</td>
<td>110</td>
</tr>
<tr>
<td>JI Case</td>
<td>14-15</td>
</tr>
<tr>
<td>Jones Futurex</td>
<td>79</td>
</tr>
<tr>
<td>Kanematsu-Gosho</td>
<td>49</td>
</tr>
<tr>
<td>Laser Precision</td>
<td>85</td>
</tr>
<tr>
<td>Learning Industries</td>
<td>89</td>
</tr>
<tr>
<td>Lemco Tool Corp.</td>
<td>118</td>
</tr>
<tr>
<td>Lightning Deterrent Corp.</td>
<td>78</td>
</tr>
<tr>
<td>M/A-COM MAC Inc.</td>
<td>45</td>
</tr>
<tr>
<td>Magnavox</td>
<td>13</td>
</tr>
<tr>
<td>Main Line Equipment Inc.</td>
<td>110</td>
</tr>
<tr>
<td>Microflect</td>
<td>96</td>
</tr>
<tr>
<td>Moore Diversified Products</td>
<td>10</td>
</tr>
<tr>
<td>Mo. Ped. Manufacturing Co.</td>
<td>44</td>
</tr>
<tr>
<td>Multiink</td>
<td>11</td>
</tr>
<tr>
<td>NCTA</td>
<td>98</td>
</tr>
<tr>
<td>NCTI</td>
<td>78</td>
</tr>
<tr>
<td>Nexus Engineering</td>
<td>31</td>
</tr>
<tr>
<td>Northeast Filter</td>
<td>109</td>
</tr>
<tr>
<td>Oak Communications</td>
<td>41</td>
</tr>
<tr>
<td>Panasonic Industrial</td>
<td>83</td>
</tr>
<tr>
<td>Pico Macom</td>
<td>103</td>
</tr>
<tr>
<td>Pioneer Communications</td>
<td>2</td>
</tr>
<tr>
<td>PTS/Katek</td>
<td>69</td>
</tr>
<tr>
<td>Pyramid Industries</td>
<td>107</td>
</tr>
<tr>
<td>Qintar</td>
<td>53</td>
</tr>
<tr>
<td>QRF</td>
<td>112</td>
</tr>
<tr>
<td>Rainbow Satellite</td>
<td>82</td>
</tr>
<tr>
<td>Resource Recovery Systems</td>
<td>79</td>
</tr>
<tr>
<td>RMS Electronics Inc.</td>
<td>30</td>
</tr>
<tr>
<td>Sachs</td>
<td>108</td>
</tr>
<tr>
<td>Scientific-Atlanta</td>
<td>7</td>
</tr>
<tr>
<td>SCTE</td>
<td>93</td>
</tr>
<tr>
<td>Sencore</td>
<td>21 &amp; 86</td>
</tr>
<tr>
<td>Signal Vision</td>
<td>37</td>
</tr>
<tr>
<td>Sitco Antennas</td>
<td>98</td>
</tr>
<tr>
<td>Standard Communications</td>
<td>105</td>
</tr>
<tr>
<td>TechNeTronics</td>
<td>110</td>
</tr>
<tr>
<td>Time Manufacturing</td>
<td>72</td>
</tr>
<tr>
<td>Times Fiber</td>
<td>102</td>
</tr>
<tr>
<td>Toner Cable Equipment</td>
<td>51</td>
</tr>
<tr>
<td>Trilogy</td>
<td>3</td>
</tr>
<tr>
<td>Triple Crown Electronics</td>
<td>24</td>
</tr>
<tr>
<td>Viewsonics</td>
<td>33 &amp; 35</td>
</tr>
<tr>
<td>Wavetek</td>
<td>27</td>
</tr>
<tr>
<td>W.B. Walton Enterprises</td>
<td>97</td>
</tr>
<tr>
<td>Weldone Trading Co.</td>
<td>69</td>
</tr>
<tr>
<td>Western Towers</td>
<td>110</td>
</tr>
<tr>
<td>Zenith Cable Products</td>
<td>25 &amp; 87</td>
</tr>
</tbody>
</table>
Hi-tech deserves Hi-tech.

Watchman® II. Superior stand-by power battery.

Watchman® II is the technological leader in stand-by battery power, designed especially for CATV and other stand-by power applications. Watchman II is made of Duratrex™. This same tough material is used in GNB heavy-duty batteries which virtually eliminates breakage in the field. The bottom line is, it’s the top of the line.

No maintenance.

Watchman II’s Absolyte® sealed lead acid technology means no maintenance, and no maintenance cost. Watchman II never needs watering, there’s no acid spillage or corrosive fumes to damage expensive electronics. And because Watchman II is sealed, you can use it in any position, no matter how remote, even freezing will not damage it.

Premium performance.

Compatible with float service, and unlike most stand-by batteries, Watchman II can be cycled over 250 times. Give your Hi-tech equipment all the power it deserves. Watchman II stand-by power battery.

For more information, contact Jim Trenter, Technical Applications Manager, GNB Incorporated, P.O. Box 64140, St. Paul, MN 55164. (612) 681-5000.
B-ISDN and cable TV

By Walter S. Ciciora, Ph.D.

Last month we discussed the telephone industry's ISDN (integrated services digital network) and what it means for the cable TV industry. In short, ISDN is tele competition for cable's attempts at non-video services. These services include residential security, videotex, home shopping, home banking, etc. If telco's track record with these services duplicates cable's experience over the last decade or so, this form of competition will be no great loss for cable. However, if the telcos succeed at these endeavors, they will have captured business opportunities that could have been cable's.

B-ISDN is a broadband version of ISDN. As such, it is video-capable; this makes it of much higher concern to cable. B-ISDN is aimed at cable's core business—entertainment video. A mitigating factor in this concern is that B-ISDN must be delivered over fiber. The copper twisted pair will not practically support video bandwidths. This means that the B-ISDN evolution of the telco plant will require decades to carry out. This gives cable ample opportunity to develop an appropriate strategy.

Implementing B-ISDN is a two-step process. The first step is to digitize voice and develop the signaling protocols that implement the promised new features. The second step is to convert electrical signals to light impulses at one end of the fiber and convert them back again at the other end. ISDN paves the way for B-ISDN by accomplishing the first step.

There should be no mistaking the telco intent to move to B-ISDN as quickly as possible. The regular technical journals and trade magazines commonly carry papers and articles that clearly signal this intent. The IEEE Communications Magazine and Lightwave are just two examples of publications that almost monthly have related articles and occasionally special issues on the subject. In addition, special conferences focus on broadband delivery to the home.

Bellcore, the billion-dollar-a-year R&D organization of the Bell operating companies, has published a large number of quality papers outlining an evolution to video delivery. Most concentrate on technology, but some analyze the business of entertainment video. The subject of “video on demand” has received careful treatment. Bellcore's plans involve a 2.5 Gbps (gigabits per second) fiber path into the neighborhood and a 600 Mbps (megabits per second) fiber run to the home. The interface between these two types of fiber circuits occurs in a pedestal or underground vault called the RT for remote terminal. The RT is a mini-central office serving a neighbor-hood of several hundred homes. This plan is relatively conservative. The path to the home initially avoids expensive solid-state lasers. Much less expensive light-emitting diodes (LEDs) will do the job. The electronics is based on well-proven and cost-effective CMOS (complementary metal oxide semiconductor) technology commonly used in consumer electronics, computers and data communications circuits.

Years from now, when lasers become both inexpensive and reliable and solid-state electronics progresses to even higher speed capabilities, the electronics at the ends of the fiber can be upgraded to provide much higher data speeds.

But 600 Mbps is a very powerful data channel. Articles in this year’s Society of Motion Picture and Television Engineers’ SMPTE Journal by Bellcore scientists point the way. A rather straightforward video compres-sion scheme that carries today's NTSC video in 45 Mbps is described. A time-sharing approach more than doubles the video capacity of 45 Mbps data streams. Using these methods, a 600 Mbps fiber link can carry at least 25 NTSC video channels and more likely closer to 40. The RT is intended to include digital switches. These can dynamically select the channels simultaneously carried into the home from a much larger number supplied to the RT.

The story becomes more interesting when we consider HDTV (high-definition television). It is hard to say how much capacity is required to carry HDTV, since an HDTV transmission standard has not yet been established. But it has been estimated that HDTV can be carried in 100 to 145 Mbps. It has been reported that Bellcore and NHK, the Japanese public broadcasting agency that has developed the MUSE HDTV system for use in Japan's DBS (direct broadcast satellite) industry, are about to enter into a technology joint venture to develop a digitized version for fiber delivery to the home.

As stated earlier, B-ISDN requires fiber delivery to the home. How soon will that happen? The answer depends on the application. BellSouth believes it can now cost-justify the installation of fiber to the home in new construction in affluent developments. The need for the homes to be affluent is based on their likelihood of wanting more than one phone number per residence. This can be accomplished either by multiple twisted pairs to the home or by digitizing electronics applied to a single line. If a modest percentage of homes take two phone numbers, BellSouth believes a fiber approach breaks even, when compared to the multiple copper pair alternative. Illinois Bell is seeking deals with real estate contractors to share the added cost.

AT&T has developed a method for paving the way for the fiber future, with a line of products they call the "Fiber Way." Optical fibers are bundled in the same cable as are twisted copper pairs. The idea is based on the fact that most of the cost of installing lines to the home is in the labor. The addition of the fiber is a trivial percentage addition to the total costs. The fiber is left “dark” and only the twisted pair is initially used. Later, when the electronics become affordable, the fiber is activated. An attractive side benefit is that the in-home electronics can be powered by the twisted copper pair. This retains the traditional telephone role in emergencies where even the power may fail.

So what does this mean for cable? First, there will be a great deal of fiber experimentation over the next few years. But it will be at least five years before any commercially significant amount of fiber is installed to the home. It will be at least 10 years before fiber to the home is commonplace. And it will be at least 20 to 30 years before fiber to the home is pervasive. We must use that time wisely.
Have you been given the challenging responsibility of specifying a fire protection system for your company or client?

The alternatives are numerous. The decisions complex. The wrong choice can expose your company or client to enormous risks, risks involving substantial equipment damage, costly downtime and possible personal injury. At Fike we have the solutions to your problems. We are dedicated to providing our customers with the most effective “state of the art” fire protection systems available. Our detection and control packages offer advanced features such as “Verified Detection” and Class “A” wiring capabilities. This, coupled with agent storage containers ranging in size from 5 pounds to multiple 1000 pound configurations, enables us to satisfy our customers’ specific fire protection requirements. We offer a worldwide network of distribution that is professionally trained in hazard analysis, design, installation and servicing of our systems. These professionals stand ready to assist you with all of your fire protection needs.

Specify Fike—You’ll know you’ve made the right choice—because there is no equal

Call 1-816-229-3405 today!

Reader Service Number 92.
BELDEN's drop cable with DUOBOND PLUS shield is rated the most shield-effective cable in the CATV industry. And, it's now in stock at all Anixter communications locations.

Anixter's "Just In Time" delivery program puts Belden's drop cable at your job site where and when you need it. So, don't tie up your capital on cable — use Anixter's inventory for all your rebuild needs.