FEBRUARY 1987

COMMUNICATIONS ENGINEERING AND DESIGN
THE MAGAZINE OF BROADBAND TECHNOLOGY

CED

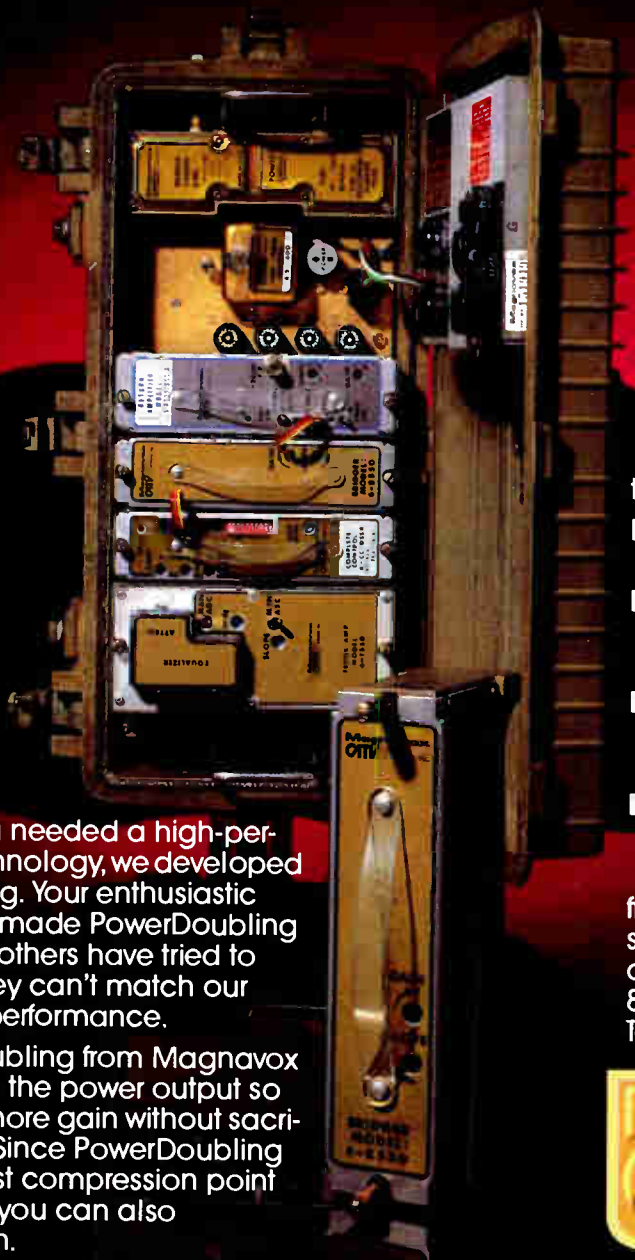
A/B switch analysis reveals compliance impossible

Mile Hi: experiment in friendliness

Construction survey of the South/Southeast

POWERDOUBLING FROM MAGNAVOX

First and still the best



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Reader Service Number 1

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Reader Service Number 2

CED

February 1987 Volume 13, Number 2

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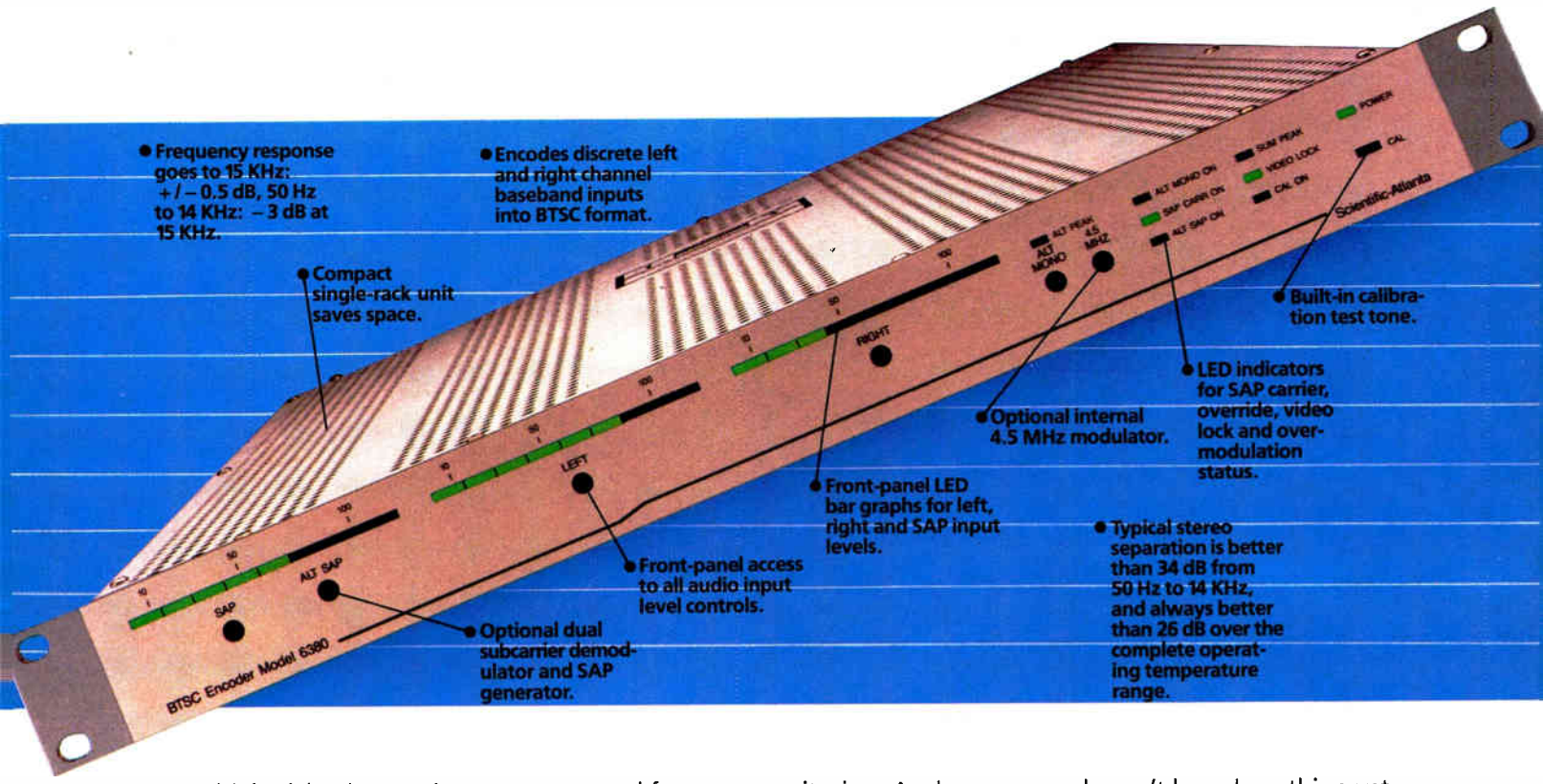
About the issue
Construction in the South and Southeast and a few surprises involved for 1987., at least according to the initial returns. Photo provided by Japan Creates/The Stock Solution .

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



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 calibration test tone allows you to adjust for maximum stereo separation without a lot of expensive test equipment.

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Scientific Atlanta

Tom Elliot

'Explosive' career sends Elliot to top of TCI research

Throughout his career, Tom Elliot has triggered "explosions" of one kind or another. From nuclear weapons to innovations in microwave signal delivery, Elliot has been at the forefront of research for more than 20 years. And now, as director of research and development at Tele-Communications Inc., he's triggered another kind of explosion—the current hot debate over the pros and cons of set-top addressability.

Elliot is the brainchild behind TCI's much-publicized "on-premise" (meaning attached physically to the outside of the home) control center. Consisting of "improved" positive trap technology, the approach eliminates addressability, at least for the time being, from TCI's agenda and instead concentrates on being friendly with consumer electronic gear. The goal is to significantly improve basic cable penetration in all the MSO's systems. Will it work? No one yet knows, but you can bet a lot of people are watching.

Elliot, a soft-spoken yet firmly committed man whose youthful image belies his salt and pepper hairstyle, spent his youth on a Montana ranch—an upbringing he says accounts for his interest in a wide range of topics. As he grew older, electronics seemed to hold his interest most and became the subject of his college studies in Denver.

After receiving an associates degree in electronics engineering from Colorado Technical Institute in 1962, Elliot began research work for a nuclear instrumentation firm in Las Vegas. As part of its work, the company blew up nuclear bombs and tested nuclear rockets and airplanes. "I really did enjoy that," he recalls.

But a desire to return to Montana resulted in his move to Bozeman as assistant chief engineer of Western Microwave, a firm co-owned by Bob Magness (who later founded TCI). Two years later, as chief engineer, he took the operational reins for three years after the company moved its headquarters to Denver. In 1969, he too moved to Denver as general manager of Mountain Microwave, a division of Western Microwave. In 1971 he added the title of technical director of the parent company to his business card.

At that time, Western Microwave became involved in signal delivery that called for 99.99 percent reliability and became an alternative to the Bell System. The first non-Bell transmission of network television signals was over Western's network from Denver to Salt Lake City. "That was a major breakthrough for the communications business," says Elliot.

The pressure surrounding the reliable carriage of signals resulted in Elliot working closely with suppliers, a practice he continues today with cable equipment vendors. The self-described perfectionist applied plenty of pressure to get high-quality equipment and refused to tolerate mediocrity. He admits that TCI's stature in cable allows him to continue that practice, and makes no apologies for it. "We've worked hard to get ourselves in that position," he says.

His efforts paid off. Western, in its role as a carrier's carrier, became a long-haul contractor to MCI and Southern Pacific. It also did some government contract work in fiberoptics at NORAD and built the first transportable C-band uplink.

Elliot came to TCI in 1980 and his first goal was to build a high-quality working two-way cable system. Taking advantage of TCI's close working relationship with Scientific-Atlanta, the Lakewood, Colo., system was used for the project. Technically, the test was a success, but valuable economic lessons were learned. According to Elliot, the price of maintaining the plant could not be offset by revenue because penetration levels were too low. Elliot doubts that two-way systems will make a substantial comeback because to be economically viable, people would have to use more interactive services like home banking, opinion polling, etc. and significant sociological change will have to occur first, he says.

A couple of years later, Elliot began writing comprehensive specifications for cable, drop cable, F connectors and other supplies that have become unofficial industry standards. Prior to that, TCI had used specs given to them by the supplier. "That was OK, but the problem you ran into was that what one company called half-inch cable and what another company called half-inch cable weren't necessarily the same thing." Elliot consulted several vendors and worked up a set of specifications that must be met.

"The biggest problems in the industry today, looking at it from our consumers' standpoint and not including some other issues, is really these mechanical interfaces," says Elliot. "People don't care why their picture quality is bad, they just know it is. We need to focus on these mechanical interfaces—improve them as we can—and improve the way we install them."

But the thing Elliot may end up being mostly remembered for is taking hardware out of the home. His on-premise box project, which is designed to be a point of demarcation between the operator and subscriber, has involved substantial research unlike anything the industry has seen in recent years.

Elliot has placed his suppliers under tremendous pressure to complete the project, waving a purchase order for several hundred thousand units as an incentive. And while the approach signals TCI's commitment to a return to trap technology, Elliot thinks there is room for an addressable version, and will support it when it is deemed "economically responsible."

—Roger Brown

HOW TO TAKE THE RECALL OUT OF THE INSTALL

Belden's drop cable with DUOBOND PLUS™ shield helps you prevent costly call-backs. It's also the most shield-effective drop cable in the CATV industry.

Easier termination for maximum shielding integrity.

The DUOBOND PLUS shield features a foil/braid/foil construction with a shorting fold in the outermost foil which provides superior shielding effectiveness to typical 4-layer shield constructions. The transfer impedance graph demonstrates this effectiveness.

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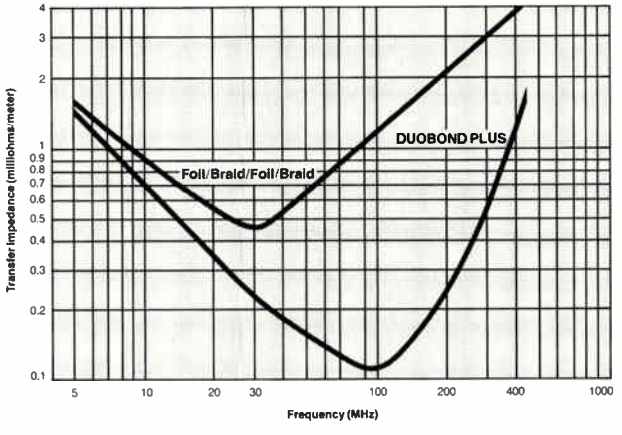
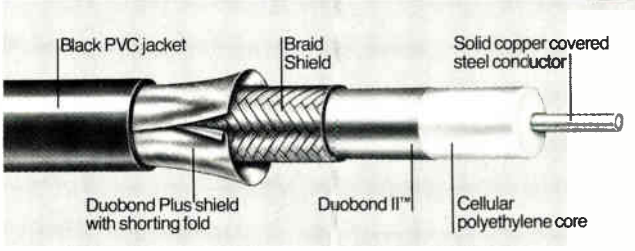
Cables with the DUOBOND PLUS shield require only half the steps for termination than 4-shield cables. Because it's less bulky, more flexible and its outer foil is bonded to the jacket, stripping and connectorizing are much simpler tasks. You can minimize your connector inventory to one size connector and one crimp tool.



Belden's unique shield protection.



The inner foil of the DUOBOND PLUS shield is bonded *directly* to the core. Foil pushback and signal leakage problems are eliminated. Protection from shielding degradation is eliminated during installation–where most shielding problems occur.

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Reader Service Number 4

COOPER INDUSTRIES **BELDEN**

An essay on accuracy

As engineers, physicists, or technologists, we all want to be accurate. How accurate? What is "accuracy"?

The Coast and Geodetic Survey has computed the airline (great circle) distance between New York and Los Angeles to be 2571 statute miles, with a "degree of accuracy... within a small fraction of a mile." That is an accuracy of plus or minus about 0.01 percent; approximately 120 parts per million. This is equivalent to measuring the distance between two utility poles to within about 3/16 of an inch. For strand maps, such accuracy is not necessary; in fact, 2 percent (or about 2 to 3 feet per span) is usually considered acceptable.

Even the Coast and Geodetic Survey deliberately used an *approximate* technique for calculating great circle distances, "...recognizing the fact that distances which are correct to the nearest mile would be *adequate for most purposes*." Yet, the one-mile accuracy for the 35-mile distance between Washington, D.C., and Baltimore is a whopping 3 percent. This raises the question whether anyone really needs to know the distance between New York and Los Angeles to the nearest mile. Any number between 2500 and 2650 (plus or minus 2 percent) would have been more accurate than the 35 mile calculation.

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

It is good engineering practice to match the degree of accuracy of a measurement or calculation to various practical considerations such as the requirements of the particular situation and the cost in terms of time and money to achieve greater accuracy. In general, the accuracy of measurements and computations should exceed the minimum requirements; but excessive accuracy is wasteful. Slightly better than "good enough" is a reasonable objective; perfection is unrealistic and unachieveable. Nevertheless, it may be necessary to strive for perfection in order to be merely "good enough."

An often overlooked consideration in making calculations is the accuracy of the underlying data. For example, a PC or hand calculator may indicate that 29,127 feet is equivalent to 5.516477273 miles. This would only be true for 29,127.00000 feet, if measured to the nearest ten-thousandth of an inch. If 29,127 feet is the length of a trunk run, measured to within plus or minus 2 percent (582 feet), then it is really equivalent to 5.52 miles, plus or minus 2 percent (0.11 miles). The computer cannot improve the accuracy of the underlying data, merely by indicating more decimal places. In this case, only the first two decimal places have any real significance. As a matter of fact, the length of the trunk run in the example above could be stated more properly (and just as accurately) as 29,000 feet, or 5.5 miles.

This leads to consideration of "significant digits." Back in the dark ages, B.C. (before calculators/computers), engineers used a device variably known as "Napier's bones," or "slip-stick," or "slide-rule." Since a slide-rule was graduated in equal logarithmic increments, the division markings were not uniformly spaced. At the left end of a 10-inch slide-rule, numbers between 1 and 2 could be read to the nearest 1/100th; and estimated to about 2/100ths. Between 2 and 4, numbers could be read to the nearest 2/100ths; and estimated to about 5/1000ths. Between 4 and 10, however, numbers could be read only to the nearest 5/100ths; and estimated to about 1/100th. For example, you could read 1.51, 2.34, or 7.65; but you would have to estimate 1.514, 2.335, or 7.67. It is simply impossible even to guess more than 3 or 4 digits on the slide rule. Although the computer shows 11.61238000 as the product of 1.514 and 7.67, only the four digits, 11.61 as read on the slide rule, are significant. The number to eight decimal places is no more accurate than the number rounded off to two decimal places.

The number of significant digits in the product of multiplying (or dividing) two numbers is generally no greater than that of the least accurate components; or, in certain cases, only one greater. The slide rule made this determination almost automatically. With a computer or calculator, you have to use your own mental skills to round off properly the indicated answers.

Ciphers (zeroes) immediately to the right of the decimal, between the decimal and other non-zero digits, are not counted as significant, if the number is less than one. Ciphers immediately to the right of the decimal point, but not followed by non-zero digits, are counted as significant, and should not be written unless intended to be significant. The numbers 0.00012 and 2.0 both have two significant digits, while 0.03528, 0.0003528, and 41.30 each has four. Ciphers to the left of the decimal point may or may not be significant. The number 120,000 may have only two significant digits, if it means something between 115,000 and 125,000; but four, if it means something between 119,950 and 120,050. In this case, however, it would be better to write 120.0×10^3, or 120,000 plus or minus 50. Similarly, the number 0.000120 may properly be considered to have three significant figures. The number of 120,032 has six significant figures, although you could reasonably wonder whether it is really that accurate. If exactly 32 new units were added to the original 120,000, the total could correctly be called 120,032 only if both counts were accurate to the nearest whole unit. Normally, however, adding 32 units to approximately 120,000 units would still amount to a total of only 120,000 units, within the accuracy of the underlying data.

The slide rule never places the decimal point for you; that requires

Continued on page 62

MOST FOLLOW STANDARDS...

...A VERY FEW SET THEM.

In every industry there are leaders who are innovative and dedicated to producing the highest quality product. The vision of these leaders fuels progress; they forge ahead and bring new solutions to the marketplace. Most of all, these leaders listen to their customers and translate their needs into products and services of the highest standard.

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Reader Service Number 5

Mile Hi thrust into experimental limelight

Mile Hi Cablevision in Denver has been a technical experiment of sorts for the past three years, being one of the few, if not the only, CATV systems in the country to run its programming with full scrambling and full addressability to every house. The company initially used that technological possibility to design a complex system of programming tiers. Unfortunately, the bewildering variety of choices seemed to confuse customers, resulting in a vast simplification of options by Mile Hi. But further, more sweeping changes are on the way.

Those changes, which will make Mile Hi another, even more closely watched experiment, illustrate just how much industry thinking about technology and subscriber satisfaction has changed in three years. At the outset, Mile Hi chose full addressability and full scrambling, at least in part, to meet a perceived customer demand. It seemed at the time that customers wanted the sort of customized menus—the ability to receive packages of off-airs and basic satellite services only, for example—that addressability makes possible. And, three years ago, addressability seemed to be the way the industry was heading. But VCR and cable-compatible TV set penetration, stereo, digital TVs, the growth of the cassette rental business and a growing sophistication among consumers about their video entertainment options have changed Mile Hi's thinking.

Where Mile Hi once considered full addressability and scrambling an advantage in meeting customer desires, it now considers full scrambling an impediment; addressability a mixed blessing. It's possible, even likely, that the unfriendliness caused by full scrambling has contributed to Mile Hi's low penetration. That has to change, and soon. So the company has come to the conclusion that a friendlier technological posture is necessary.

At the heart of the matter is benefit: does the consumer benefit from the state-of-the-art technology Mile Hi now uses? Or is the technology mostly a benefit to Mile Hi? What's the appropriate level and type of technology required to satisfy subscriber desires? And how can the company most cost effectively move from where it is now to a friendlier position?

As it has weighed the options, the company has considered everything from dropping scrambling on basic services to going with addressable taps; using traps, timers and VCR interfaces; going with a hybrid system: partly addressable, partly not. It has considered video switchers and the IS-15 interface. Each of these steps would necessarily entail a major switch in technology and the company's already taken the first public step. Mile Hi's recent channel reorganization, for example, makes possible a variety of technical options ranging from trap or tap control to partial descrambling, interdiction or mixed addressability.

Roger Brown's story (*See page 36*) in this issue outlines Mile Hi's thinking in initial form. Granted, Mile Hi is an extreme case. But the technology issues it's facing are germane for the entire industry.

In essence, Mile Hi is grappling with three related sets of issues: scrambling, addressability and consumer friendliness. And it will be trying to come up with answers for all three this spring. We'd lay money on the shape of the final decisions, which will undoubtedly include descrambling of basic services; movement to a hybrid addressable system and service to the house, not the outlet. The aim will be a flexible response to providing the consumer with a signal, an attitude of "let's not mess with what the subscriber does to the signal once it gets into the house."

If this sounds like the current telephone company approach to customer premises equipment, it is. Something to watch in this regard: what happens to leakage when customers start hooking up their own equipment inside the house? Today, what customers do with the signal inside their homes isn't a major contributor to leakage that adversely affects CLI, for example. But that could change under a "do whatever you want with the signal once it's in your house" approach. The experiment bears close scrutiny.

Also in this issue are the results of our construction survey of cable systems in the states of the Mid-Atlanic region and South.

The general pattern of findings, based on an initial 33 percent return, tend to indicate that our optimism about 1987 hardware activity in the industry is justified. Although we expected less construction activity in the South and Southeast, it appears that activity will hold up roughly comparable to the results from the Northeast. We were in particular struck by the activity in addressability and pay-per-view plans, both of which were stronger than we anticipated.

What's clear in this region is system upgrades to 34 channels. Also, although there are fewer addressable systems in this region than in the Northeast we find that interest in pay-per-view is just as high as in the Northeast, at least on a percentage basis. Again, these results are preliminary based on our initial reading of the 33 percent of the returns.

Also, the SCTE has a new home. Its address is: 669 Exton Commons, in Exton, Pa.

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GENERAL INSTRUMENT

Reader Service Number 6

S-1879

The promise of fiber optics

As CATV engineers, it's increasingly important that we develop our understanding of fiber optic technology, both in the roles it can play for us today in video and data supertrunks, and in its future implications for us and for potential competitors.

Why has there been so much hoopla about fiber optics in general, and in particular, with regard to our industry by Irving Kahn and others? Fiber's most intriguing property is its potential bandwidth. For example, if we examine the use of low-loss, low-dispersion single-mode fiber across the wavelength region from 1325 to 1335 nanometers, we find that the available spectrum is 1700 GHz wide! Even if this were practically limited to a few tens or hundreds of GHz, it dwarfs CATV's current ⅓ to ½ GHz of spectrum.

Thus, there is enormous potential to transport video or other information on a single fiber. As a bonus, today's single-mode fibers have very low loss—a few tenths of a dB per kilometer—and are physically small and rugged, are immune to RFI or leakage, and are non-conductive.

What's the catch? Why are we still using coaxial cables at all? A friend in the business points out that CATV engineers are almost totally focused on bandwidth as a measure of capacity, but in reality, both bandwidth and system linearity determine the information carrying capability of a transmission system. Current fiber systems are, alas, fairly nonlinear. While there will be significant improvements, there may be physical limits, at least with today's approaches.

Examining some of the video modulation systems available to us in a fiber environment, we find vestigal-sideband amplitude modulation (today's TV broadcast standard) almost exquisitely bandwidth-efficient and TV-set compatible, but quite fragile with regard to noise and the intermodulation products generated in a nonlinear transmission system. An illustration is the extremely tough specification we are forced to place on CATV amplifiers' nonlinearities as they are reflected in cross-modulation and composite triple beat. While fiber systems are capable of heavily compromised video transmission in this format, VSB-AM has exactly the wrong characteristics to play to fiber's strengths.

Frequency modulation's noise improvement and ability to employ very wide deviation to lend a degree of intermodulation immunity, makes it a viable means of transporting a number of channels on today's fiber supertrunks, albeit with some limitations. It also has the overwhelming advantage of being very cost-efficient with off-the-shelf equipment.

Digitized video seems ideal in terms of fiber's technical capabilities. A laser diode can be directly modulated with a very high-speed, on/off data stream. System nonlinearities are relatively insignificant and, while digitized video is bandwidth inefficient, that fits fiber perfectly. We're not far from the time when the new high-speed Gallium Arsenide family of logic chips will be able to drive lasers at speeds of exceeding 1 Giga-bit/sec, high enough to carry 10 to 20 digital video signals.

Another limitation of fiber systems affects the network architecture that can be used. While transmission losses are exceedingly low, the law of conservation of energy dictates that at least 3 dB of power is lost each time there is a split; thus, in a tree and branch system with power budget of 20 to 25 dB, splitting losses limit the number of branches. While improved detector technology now on the horizon promises as much as 20 dB more sensitivity, tree and branch design has severe limits without cheap repeaters or optical amplifiers.

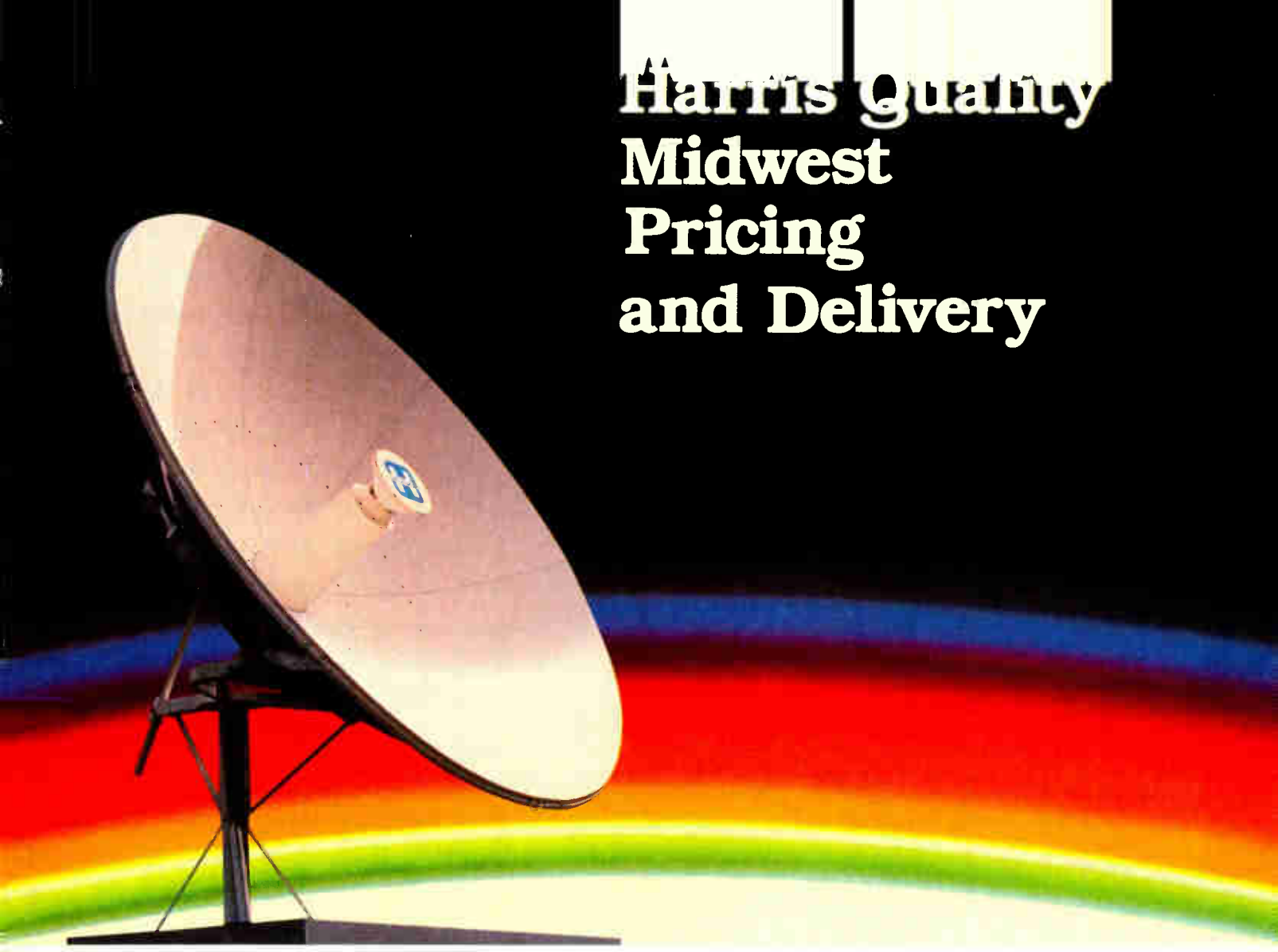
The ideal fiber transmission system would probably have many modulated optical carriers spread across the available spectrum and would be capable of carrying a huge amount of information. Today's fiber systems, by comparison, are analogous in an RF world to coupling a single very broadly tuned spark gap providing some other form of fairly crude modulation—it would work, but what a waste!

It's useful to use other RF analogies in thinking about fiber. After all, both coaxial cable and a strand of optical fiber transport enclosed electromagnetic fields; fiber merely works at much higher frequencies (shorter wavelengths). If we draw this parallel, fiber technology is missing some critical elements. Today's laser and photodiode technology can be compared to fairly poor oscillators and untuned detectors, respectively, optical amplifiers and mixers are still in the developmental stage, and filters have exceedingly poor "Qs".

While there is still far to go in realizing fiber's potential, a great deal of energy is being focused, and advances are coming quickly. It's possible to envision a day when light amplifiers would enable an economical tree and branch system to homes and businesses to provide much of the community's entertainment and communication needs. Another vision is the telco model with one fiber from each user to an area central office. This "switched star" architecture would be substantially more expensive.

My own vision of fiber for our industry starts with today's point-to-point supertrunks, with a few branches, which have established a small but definite role. In the next few years, it may very well make sense to construct fiber backbones with a very limited number of repeaters feeding neighborhood RF broadband hubs, economically providing much-improved signal quality and reliability. By reducing the cascade to any subscriber to a few amplifiers, such an approach could also prove to be an effective way of increasing channel capacity while retaining much of the expensive distribution cable and support hardware in existing plant.

—Jim Chiddix, Vice President, Technology and Engineering, ATC



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Reader Service Number 7

Impact of A/B switches on signal leakage...

The following study was conducted by David Large to assess the possible impact on signal leakage of the A/B switch portion of the Federal Communications Commission's must-carry ruling. While it was not prepared in a normal format for publication, the editors felt the issues raised were so vital that it should be presented to the industry in as timely a manner as possible. —Editor

...in light of the recent must-carry ruling by the Federal Communications Commission.

The new must-carry rules for cable television operators[1] specify that, for new installations, switches must be installed at every TV set to allow selection between cable and antenna inputs and that cable systems must try to pursuade existing customers to either take a free switch for do-it-yourself installation or pay the cable system's labor cost for installing one.

By David Large, Vice President, Engineering, Gillcable

Should this customer education effort be successful, the result will be that virtually all cable-served television sets will be switchable between cable and antenna signals, thereby assuring maximum programming choice for consumers. The necessary byproduct is that, in every cable home, an efficient radiating and receiving element will be brought into close electrical and physical proximity to the cable. Furthermore, a significant percentage of these switches may be installed by technically unsophisticated cable customers.

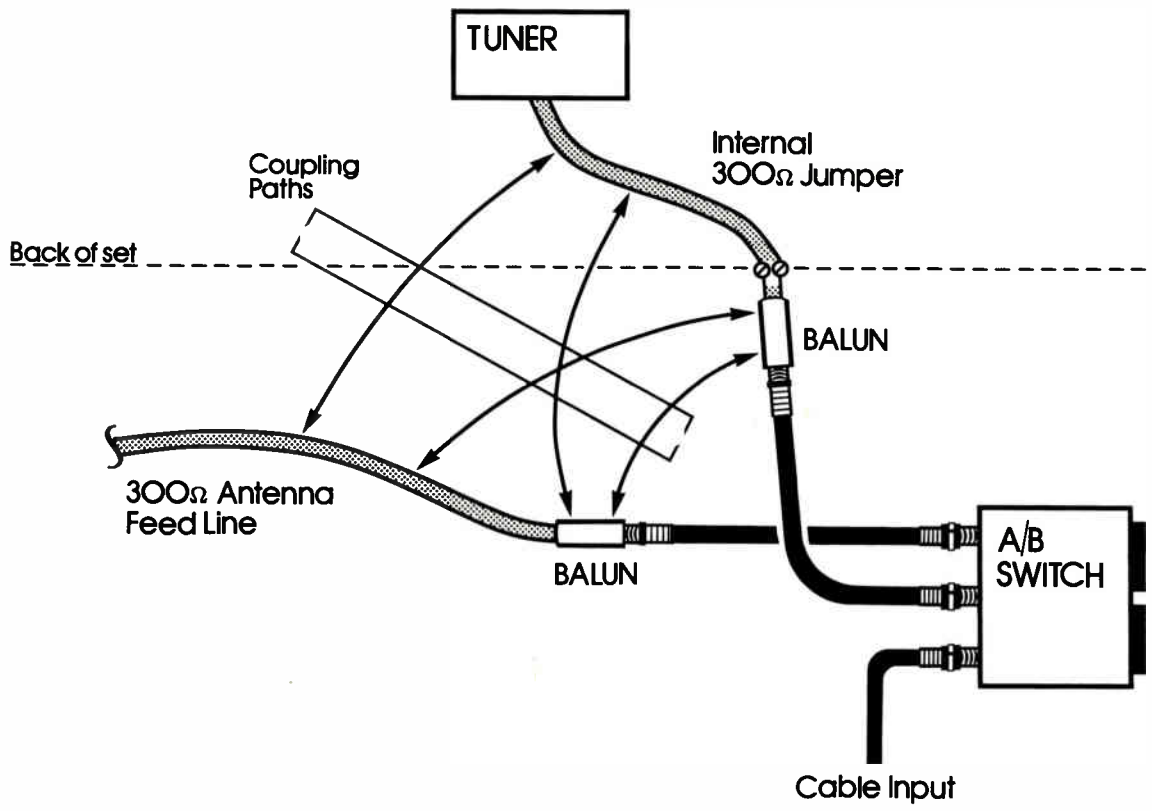
The purpose of this study is:

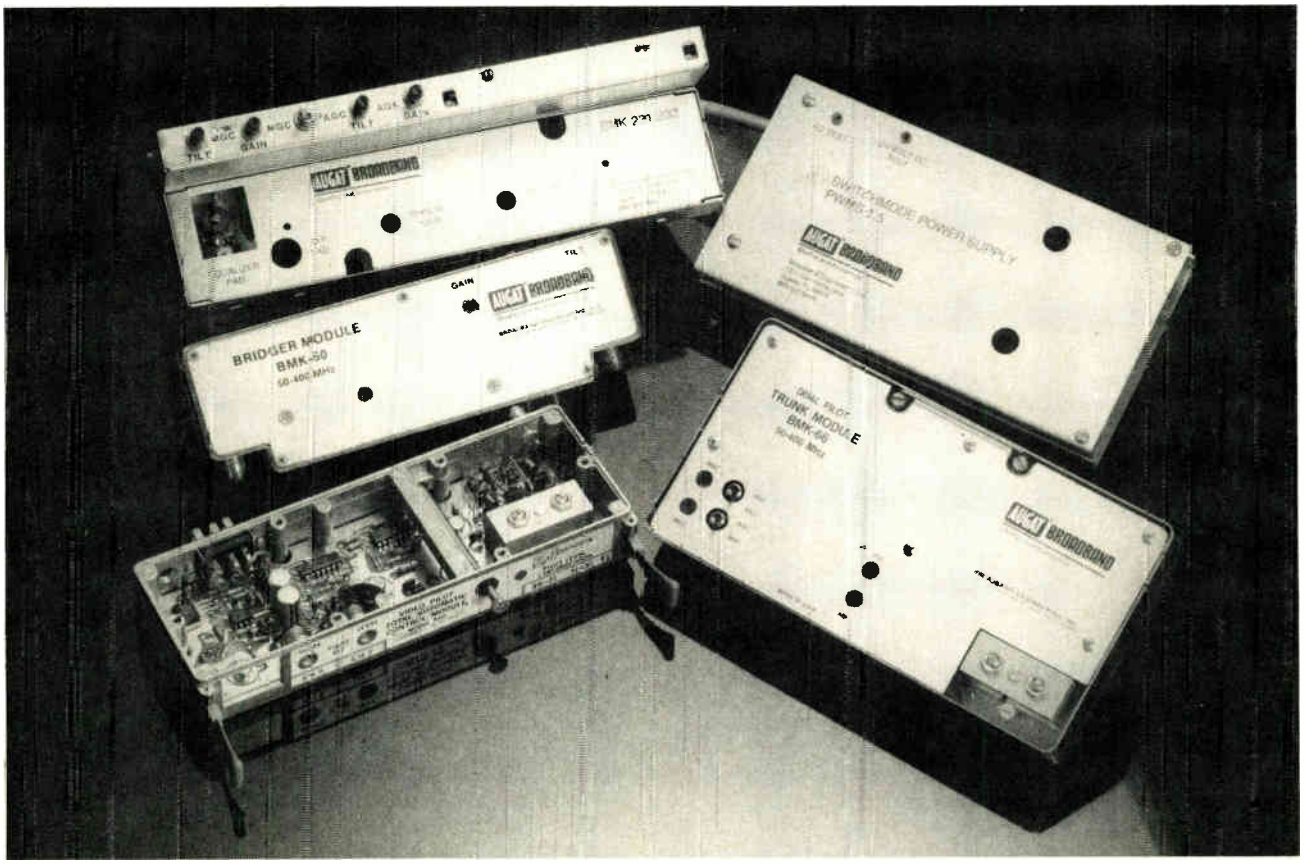
1. To determine the effect of such installations on cable operator's obligations to control leakage of their signals into the atmosphere and, coincidently, the potential impact on other radio services.

2. To determine the degree to which such installations may adversely effect the quality of reception afforded customers because of antenna-received local television signals causing co-channel interference with cable signals.

The various technical and practical results of limited cable-antenna isolation will be examined and, in each case, a minimum required isolation will be calculated. Then, several typical installations using a variety of hardware and configurations will be measured to determine actual isolation achievable in practice. This data, com-

FIGURE 1





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Reader Service Number 8

Limited antenna-cable isolation results in both egress of cable signals and ingress of off-air signals.

bined with statistical data on the relative quantities of various types of hardware in use will be used to predict the relative difficulty of meeting the derived minimum required isolation. Although the data used will apply directly to the Gill cable system in San Jose, Calif., note will be made of situations unique to Gill so that equivalent models may be derived for other systems.

Required isolation

Limited antenna-cable isolation results in both egress of cable signals and ingress of off-air signals. The practical results of excessive egress are:

1. Interference (caused primarily by individual leaks) to other radio services using portions of the spectrum other than the VHF broadcast television channels.
2. Co-channel and/or "ghost" interference to non-subscribers, again primarily caused by individual leaks.
3. Interference to aircraft navigation and communications systems caused by the aggregate effects of many small leaks in the airspace above cable systems.

Excessive ingress results in co-channel and/or "ghosting" interference to subscribers on VHF channels 2-13 and various forms of picture impairment from other radio services on mid- and super-band channels.

FCC rules spell out limits on both individual leaks and the cumulative effects of total system leakage. Part 15.606(a) specifies the required isolation of antenna selector switches, Part 76.605(a)(11) specifies the maximum allowable individual leak magnitude, Part 76.611 specifies the maximum total system leakage (CLI) and Part 76.613 contains the general definition forbidding any leakage that "...seriously degrades, obstructs or repeatedly dinterrupts..." other communications.

Isolation requirements of Part 15:

The rules specify that the switch must have sufficient isolation that the signal fed back into the antenna used is ??0.346 ??R microvolts where R is the impedance of the antenna lead. In a 75 ohm system, the maximum voltage is 2.9964 microvolts (twice that in a 300 ohm system) and the resultant power level is 1.1972×10^{-10}mW = -50.468 dBmV[2].

It is important to note that the language of Part 15 does not apply to the switch as an isolated element, but to the switch as part of the total system, since the required switch isolation is obviously a function of input signal level.

Assuming that the level of cable input signals can vary from 0 to +15 dBmV, the cable system will have to be isolated from the antenna by 65 dB to meet this criterion.

Gill feels that the adequacy of these rules as applied to cable-antenna switching should be examined. The situation is significantly different from that which was contemplated when the Part 15 rules were drawn up. In a typical application for an "antenna selector" switch, the device used (whether VCR, computer or video game) is a single channel device operating on a low-band VHF channel that is not used in the local area for off-air reception. Both ingress and egress interference is minimal as there is no common channel. Cumulative effects are minimized by:

1. The low population density of such devices
2. Their occasional, rather than continuous, use
3. The energy dispersal caused by loose frequency tolerances.

In the cable situation, almost the entire VHF spectrum is used simultaneously and continuously including off-air occupied frequencies. Furthermore, the density of possible efficient radiating elements in a community is very high, being the product of television set density and cable penetration. Finally, all the radiating elements are fed from a single coherent source. Thus, both individual and cumulative effects of small leakages is likely to be more severe.

Isolation requirements of Part 76.605:

The measured field strength from a transmitting dipole antenna may be calculated as:

$$E = 137.6\ P \quad [1]$$

where: E is the measured field strength in mV/m at 1 mile
P is the transmitted power in KW[3]

Since field strength varies inversly with distance, this may be scaled and restated as:

$$E = (137.6/D)\ P \quad [2]$$

where: E is the measured field strength in V/m
D is the distance in miles
P is the transmitted power in mW

Part 76.605(a)(11) of the Commission's rules require that the field strength of individual leaks of cable signals (in the range of 54-216 MHz) be below 20 V/m measured at a distance of 10 feet from the "system component." As Gill has pointed out in previous correspondence with the Commission, the rules are not clearcut with respect to cable system generated signals that are radiated from subscriber owned equipment. Regardless of the ultimate responsibility for eliminating such leaks, however, the limits of the rule presumedly apply.

If the radiator has dipole efficiency, we may use equation (2) to calculate the power necessary to reach that field

TABLE 1

Off-air channel	Level	Cable channel	Attenuation necessary
2, San Francisco	+12	2A-same video	46 dB
2, San Francisco	+12	2B-different	56 dB
4, San Francisco	+5	4A-same video	40 dB
4, San Francisco	+5	4B-different	44 dB
5, San Francisco	+10.5	5A-same video	48 dB
5, San Francisco	+10.5	5B-different	55 dB
7, San Francisco	+17	7A-same video	49 dB
7, San Francisco	+17	7B-different	57 dB
8, San Jose	+25.5	8A-different	80 dB
8, San Jose	+25.5	8B-same video	80 dB
9, San Francisco	+15	9A-different	48 dB
9, San Francisco	+15	9B-same video	46 dB

Of equal interest is the effect of many small leaks on the CLI of entire cable systems.

strength:

$$P = \left[\frac{20\mu V/m}{137.6}\left(\frac{1}{528}\right)\right]^2$$

$= 7.58 \times 10^{-8}$ mW =
-22.5 dBmV

In the more typical case of a rooftop antenna with 10 dB gain, the input power would have to be limited to -32.5 dBmV to avoid a violation. Given a maximum cable signal level of +15 dBmV, the isolation required is 47.5 dB.

Isolation requirements to meet CLI:

Of equal interest is the effect of many small leaks on the cumulative leakage (CLI) of entire cable systems. We may approach this problem theoretically as follows:

1. Calculate the average transmitted power density (due to limited isolation) per square mile of the system.

2. Calculate, for an airplane passing over the center of the system at a height of 450 meters, the measured field strength due to the radiated power from an incremental portion of the system.

3. Integrate this effect over the entire system, adding on a power rather than a voltage basis[4].

Where: R is the system radius in miles
H is the airplane height in miles
D is the distance from an incremental source to the measurement

$$\text{point} = H^2 + r^2$$

P_r is the incremental power radiated

$$P_d = P_r r$$

where: P_d is the average transmitted power density in mW/mi^2
r is the distance from the center of the system to the incremental source in miles.

Then, from equation (2) above, $E_r = (137.6/D)\ P$ where E_r is the measured field strength, measured in V/m, due to the incremental source P_r.

In order to integrate the effect with power rather than voltage addition, we need to add the power effect of the individual voltages, i.e.:

$$E_{ttl} = \sqrt{\sum (E_{r_n})^2}$$

or, in the limiting case:

$$E_{ttl} = \sqrt{\int_0^{2\pi}\int_0^{R} \frac{(137.6)^2}{D^2} P_r}$$

$$= \sqrt{\int_0^{2\pi}\int_0^{R} \frac{(137.6)^2}{(H^2+r^2)} P_d\, r\, dr\, d\theta}$$

$$= 137.6 \sqrt{P_d \int_0^{2\pi}\int_0^{R} \frac{r}{H^2+r^2} dr\, d\theta}$$

$$= 243.9 \sqrt{P_d \ln\left(1+\frac{R^2}{H^2}\right)}$$

Customer antenna leakage represents a heretofor minor re-radiation mechanism.

Where E_{ttl} is the total resultant measured field strength in V/m due to a uniformly distributed field of dipole radiators fed with an average power density of Pd mW/mi^2 if the measuring point is located H miles above the center of a system of radius R miles.

For the Gill system, the average number of homes per square mile, including non-residential areas, is about 3014. With a system penetration ratio of 50 percent, this gives 1507 serviced residences per square mile. Approximately 20 percent of these residences have more than one set on service, so the number of radiating sources per square mile is 1.2 X 1507 = 1808. Thus, the average power density will be 1808 X P_c where P_c is the average leakage level from an individual set.

The system radius is approximately 5 miles = R, so that the total number of potential radiating sources is 1808 X X (5)^2 142,000.

The height of the airspace measurement for CLI is 450 meters above average terrain level so H = 0.280 miles.

For this H value, equation (3) reduces to:

$$E_{ttl} = 243.9\sqrt{P_d \ln\left(1+\frac{R^2}{0.078}\right)}$$

Customer antenna leakage represents a heretofor minor re-radiation mechanism. In order that this new source of leakage not add significantly to the total system leakage, it should not exceed 10 percent of the total allowable field measurement (10 V/m) or 1 V/m.

Solving equation (4) for P_d we get:

$$P_d = \left[\frac{E_{ttl}}{243.9}\right]^2 \left[\frac{1}{\ln\left(1+\frac{R^2}{0.078}\right)}\right]$$

Using the numbers for the Gill system, we can calculate the maximum allowable power density:

P_d = 2.912 X 10^{-6} mW/mi^2

Given a radiator density of 1808/mi^2, the average power delivered to each radiator cannot exceed 1.61 X 10^{-9}mW = -39.2 dBmV. If the average drop level is +5 dBmV, then the average isolation required is 44.2 dB between cable signals and antenna lead.

Effect of random wiring errors

Given that customers will be given the option of installing their own switches or paying Gill to install them (our average loaded labor cost per trouble call is over $30), we have to consider the probability of wiring errors. For example, of the six possible ways to install a high-isolation A/B switch (having three female type-F coaxial connectors), four result in a direct cable-antenna connection in one switch position. Additionally, some homeowners may "simplify" the installation by connecting the antenna leads directly across the TV set terminals in parallel with the cable input. While a good subscriber education program should minimize the number of such errors, it is worthwhile to know what error rate is possible without seriously affecting CLI.

We can calculate the percentage of such errors that would have to happen to create a serious CLI situation as follows:

From (6) above, the maximum allowable power density is 2.912 X 10^{-6}mW/mi^2.

The radiated power for a single leak of +5 dBmV level is 4.22 X 10^{-5}mW (resulting in a 472 V/m field strength ground-based measurement at 10 ft distance), so that the average number of leaks must be below

(2.912 X 10^{-6})/(4.22 X 10^{-5}) = 0.069 leaks/mi^2

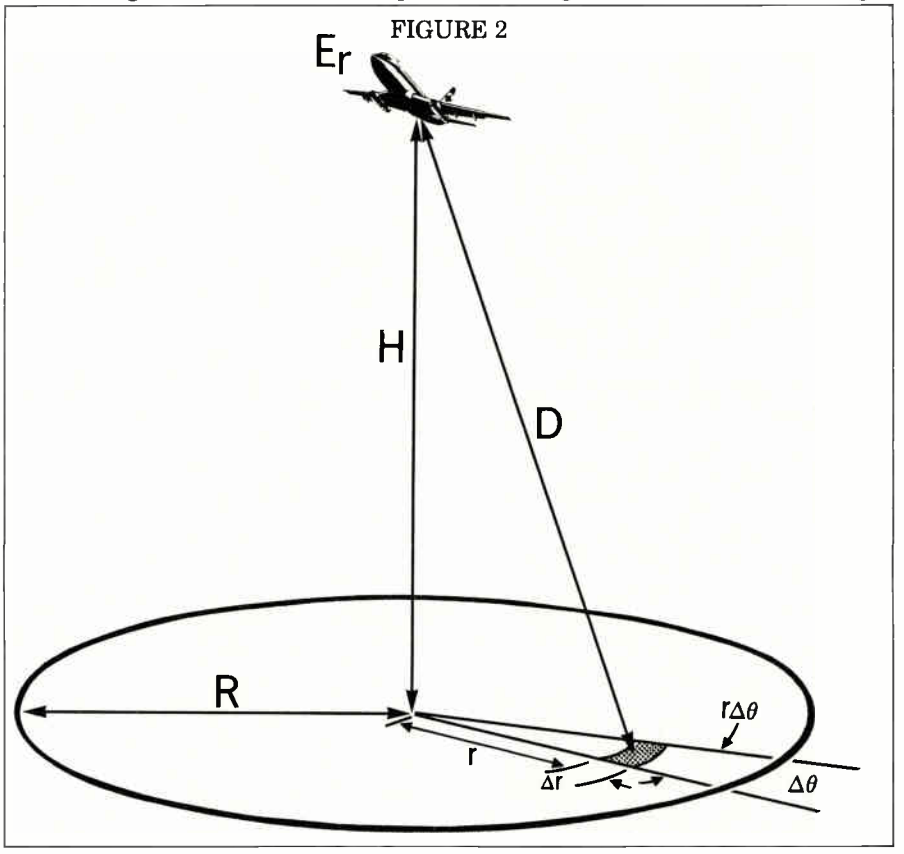
Given the radiator density of 1808/mi^2, the maximum percentage wiring error is

(0.069)/(1808) = 0.0038 percent

or 5.5 out of Gill's potential 142,000 radiating sources.[5]

Even if customer's antenna radia-

FIGURE 2



THE LITTLE FARMER & THE GIANTS

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Once upon a time, in a not-so-far-off land, the grain the people used to make their daily bread was grown by four huge giants–and one small independent farmer. For years, all five grain producers co-existed peacefully, in an atmosphere of healthy competition.

But then one day, the four giants entered into a battle for control of the grain market. When the battle ended and the dust cleared, only two giants were left. And, of course, the little independent farmer.

Then a strange thing happened. Overnight, the competitive situation changed. And the people began to worry. "Now that there are only two giants," one person said, "what's to stop them from charging higher prices for their grain?" "If they do, we won't be able to make as much bread as before," cried another.

But the little farmer overheard the people talking. And he cleared his throat and took a step forward. "My friends," he said, "you're forgetting about me." "You," snorted a man at the front of the crowd, "what can you

do against such giants?" "I can do just what I've always done," the farmer replied, "supply the finest grain and the best service in the land–at a very competitive price. As long as I'm around the giants can't take complete control of the grain industry–if you'll all think of me and include me in your business."

There was a general chorus of "that's right," "we didn't think about the little farmer." And so, after the farmer pledged to maintain his independence and to remain in the land for many years to come, the people went back to baking their bread, greatly relieved. And they all lived happily, and competitively, ever after.

Customers will be given the option of installing their own switches or paying Gill to install them.

TABLE 2

		Isolation	
		100-150 MHz	200-400 MHz
TV#1,Switch #1,	leads carefully separated	47 dB	34 dB
TV#1,Switch #1,	leads parallel to floor (3')	49 dB	24 dB
TV#1,Switch #1,	leads loosely twisted for 3'	40 dB	26 dB
TV#1,Switch #3,	leads carefully separated	54 dB	40 dB
TV#1,Switch #3,	leads parallel to floor (3')	40 dB	36 dB
TV#1,Switch #3,	leads loosely twisted for 3'	43 dB	34 dB
TV#1,Switch #2,	leads carefully separated	60 dB	50 dB
TV#1,Switch #2,	leads parallel to floor (3')	47 dB	28 dB
TV#1,Switch #2,	leads loosely twisted for 3'	42 dB	32 dB
TV#1,Switch #2,	as above with 1 loose balun lead	28 dB	28 dB
TV#2,Switch #3,	using coaxial input, leads parallel to floor	30 dB	36 dB
TV#2,Switch #3,	As above but with external balun	22 dB	12 dB
TV#3,Switch #3,	using coaxial input, leads parallel to floor	‹75 dB	70 dB
TV#3,Switch #3,	As above but using external balun and plug-on transformer	50 dB	45 dB[9]

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Reader Service Number 12

The visible effects of ingress co-channel interference may be reduced in some case.

tion were allowed to contribute 1/3 of the total allowable field strength, the number of allowable errors would only increase tenfold to 55 or 0.69/mi^2. An error rate of 0.38 percent will result in a CLI violation from customer antenna radiation alone.

It should be noted that at the maximum drop level of +15 dBmV, the ground-based measurement at 10 ft would yield a field strength of 1492 V/m from a dipole radiator or 4718 V/m from a 10 dB gain rooftop antenna-sufficient to cause significant disruptions to other users of the spectrum and serious non-subscriber co-channel interference over a wide area.

Desired/undesired signal ratio

Key to determining the degree of isolation necessary to assure that the visible effects of ingress and egress are acceptable is the determination of the minimum desired/undesired carrier level.

Part 76.605(a)(8) of the rules for off-air co-channel specified a carrier ratio of 36 dB. That limit, however was predicated on the precise 10 kHz and 20 kHz offsets that are used in broadcast frequency allocations precisely to limit the visible effects of interference. Aside from that, the rules specify a maximum tolerable situation as opposed to a situation of no noticeable degradation. Finally, the threshold of visibility has decreased in recent years with improvements in television sets and larger screen sizes. In comparison to the off-air situation, cable frequencies may vary from nominal assignments due to frequency tolerance and stability by as much as ±25 kHz as specified in Part 76.605(a)(2).

The visible effects of ingress co-channel interference may be reduced in some cases by phase-locking the processors and modulators in a cable system to the local off-air stations. Many operators do this to avoid complaints due to direct pickup of strong station signals in the internal wiring of TV sets. Although Gill has this option, it should be pointed out that systems using HRC and IRC channelization schemes do not have that freedom as all of their channels are locked to a single frequency reference.

Gill has conducted tests to determine the threshold of visibility of an interfering carrier in the past. If the frequency of the interfering carrier is allowed to vary to the point of greatest interference, it will be visible down to a level of 60-65 dB below the desired video programming.

Tests were also conducted in which the actual off-air signals were combined in controlled levels with cable programming to determine the threshold of visibility under various condi-

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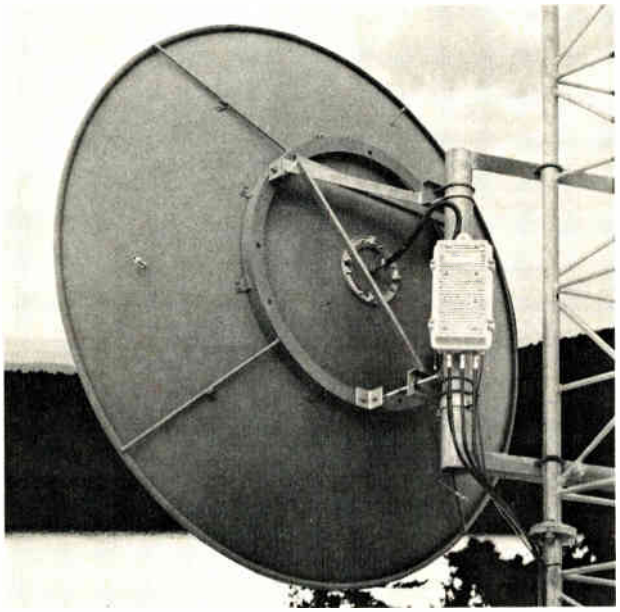

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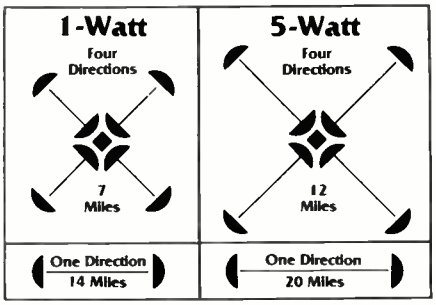

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Reader Service Number 14

An attenuation of nearly 60 dB is necessary to protect against the San Francisco stations.

tions with the following results, expressed as the maximum carrier ratio in dB for which co-channel beats were clearly visible:

A. Same video, carriers phase locked together 34-41 dB

B. Same video, carriers not locked together 58-‹60 dB

C. Different video, carriers phase locked together 36-48 dB

D. Different video, carriers not locked together all‹60 dB

Which confirms a minimum necessary carrier ratio of 60 dB in non-locked situations and 40-45 dB with phase-locked RF carriers.

In an area with strong local TV signals, the antenna downlead signal strength can easily be +20 dBmV[6]. If the cable signals can vary down to 0 dBmV, then a switch isolation of 80 dB would be required to keep afntefnna-fconducted co-channel signals 60 dB below cable signals.

As a practical check on the isolation necessary in practice, Gill measured the antenna signal level from a typical rooftop antenna and the attenuation necessary to eliminate visible interference when combined with 0 dBmV cable signals (all carriers were phase-locked to respective off-air carriers). See Table 1.

Thus in the Gill system, an attenuation of nearly 60 dB is necessary to protect against the San Francisco stations over 40 miles away, even with carriers phase-locked.

This data also confirms our field experience with so-called video switching networks which perform the necessary RF switching with a converter and VCR. In that case, the RF signal levels are similar, but carriers are not locked. We have found that isolations of 70-80 dB are essential to avoid subscriber complaints with those devices.

To the extent that cable signals re-radiate, they not only cause technical violations of the Commission's rules, but may interfere with other radio services and non-subscriber's tele-television reception.

The Commission has defined the Grade-B limit field strength of a TV station as 225 V/m for channels 2-6 and 560 V/m for channel 7-13. To avoid visible co-channel interference, therefore, the field strength of the re-radiated cable signals as received at the non-subscriber's antenna would have to be no greater than 0.225 V/m for channels 2-6 and 0.56 V/m for channels 7-13, based on a required 60 dB level difference.

The most serious potential non-subscriber interference situation results when the radiating source is between the non-subscriber's antenna and the station. For single family residences (typically built on 60 X 100 ft lots in the Gill system), I have assumed an antenna-to-radiating source spacing of 100 ft. In San Jose, local

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Reader Service Number 16

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stations are located to the North, East and South of the system so it is quite possible for the rooftop antenna of the interfering source to be aimed directly into the major lobe of the non-customer's antenna.[7] Given the limited directivity of most home antennas, it is certainly not unreasonable to assume at least dipole gain in the direction of the non-subscriber's antenna.

In that case, we can use equation (2) to solve for the maximum allowable radiated power that will not cause visible co-channel interference with worst-case frequency offsets as follows:

For channel 2: P =

$$\left[\frac{0.225\mu V/m}{137.6}\left(\frac{1}{52.8}\right)\right]^2$$

$= 9.59 \times 10^{-10}$ mW = -41.4 dBmV

For channel 13:P =

$$\left[\frac{0.56\mu V/m}{137.6}\left(\frac{1}{52.8}\right)\right]^2$$

$= 5.94 \times 10^{-9}$ mW = -33.5 dBmV

Thus, to avoid such interference to a low-band station with a maximum drop level of +15 dBmV, an isolation of 56.4 dB will be required. With an average drop level of +5 dBmV, the required isolation is 46.4 dB.

Summary of isolation requirements

In summary, then, if the result of a large percentage of our customers having rooftop or "rabbit ear" type antennas connected via switches to their TV sets is not to make a significant increase in our leakage problems, the following numbers must be maintained:

1. Isolation to meet Part 15.606 @max drop level: 65 dB @average drop level: 55 dB
2. Isolation to meet Part 76.605 @max drop level: 47.5 dB @average drop level: 37.5 dB
3. Average Isolation for 10 percent CLI contribution: 44.2 dB
4. Percentage "wiring errors" for 10 percent CLI contribution: 0.0038 percent
5. Isolation necessary to avoid in-

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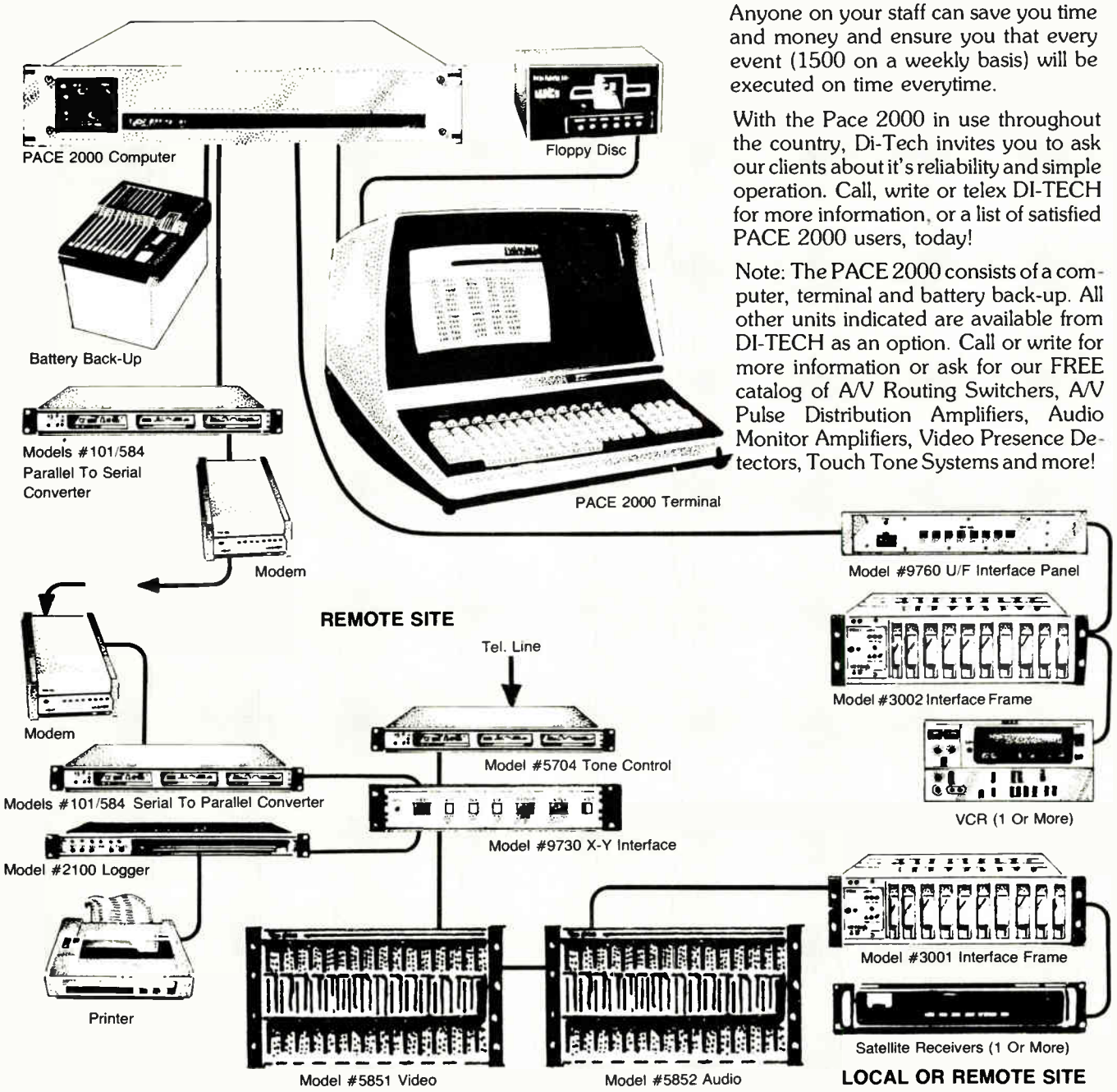

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Either of the high quality coaxial switches are capable of achieving the isolation required.

gress co-channel interference from local VHF's @min drop level: 80 dB @average drop level: 75 dB

6. Isolation necessary to avoid causing co-channel interference to Grade-B lo-band channel at non-subscriber @max drop level: 56.4 dB @average drop level: 46.5 dB

Laboratory tests

In order to evaluate the difficulty of meeting these isolation criteria, the Gill R&D lab conducted tests on connection permutations typical of various home TV situations. The test equipment used was a Wavetek 1801A sweep/signal generator and a Tektronix 7L13 Spectrum analyzer. Except as noted, all cables were terminated in their proper impedance and cables were widely separated to minimize incidental coupling.

For these tests, a signal was applied to one input of the switch under test, the armature was terminated and the signal level was measured at the other input port. Where impedance matching was required for 300 ohm terminals, a CATV Services model TK-55 matching transformer was used.

Tested switches were:

1. Pfantone TV-SW300 Cable/Antenna Selector Switch with 300 ohm antenna and TV terminals and 75 ohm coaxial cable connector.
2. EIE/RCA AB7-75 A/B switch with three F-female connectors
3. Arvin Systems Model 600B A/B switch with three F-female connectors

The results were as follows:

1. Pfantone TV-SW300, 50 dB at 100-150 MHz and 43 dB at 200-400 MHz
2. EIE/RCA AB7-75 ‹90 dB at 100-150 MHz and ‹90 dB at 200-400 MHz
3. Arvin Model 600B ‹90 dB at 100-150 MHz and 87 dB at 200-400 MHz

It thus appears that either of the high quality coaxial switches are capable of achieving the isolation required.

Situational testing

In a practical installation, the total isolation between the cable input and customer's antenna is a function of the switch used, external components (matching transformers, connectors, cables, etc) and the TV set itself. To assess the contribution of these external components, Gill examined the isolation of various actual installation configurations.

Three TV sets were tested:

1 WMT153SAVE with 300 ohm screw antenna terminals, representative of many older sets in our system in that it has an internal 300 ohm twinlead jumper from the pressboard back cover to the tuner.

2. A Sony Model CVM1250 which differs from the above in that it has

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Reader Service Number 21

It is unrealistic to expect customer's antennas to be isolated from cable signals by more than 30-35 dB.

both 75 ohm coaxial and 300 ohm screw terminals available. Internally, a twinlead jumper is still used.

3. A Sony Model KV-1976R which has only coaxial input terminals and is furnished with a plug-on balun for 300 ohm feedlines.

In all cases, the input signal was generated by the Wavetek generator and connected via coaxial cable to the switch. The antenna lead was a 10 foot section of 300 ohm twinlead, routed away from the set and terminated with a matching transformer into the Tektronix analyzer. If necessary, a matching transformer was used at the switch as would be used in a normal installation. See Table 2.

Summary of test data

From the above it appears that it is unrealistic to expect customer's antennas to be isolated from cable signals (and vice-versa) by more than 30-35 dB average, except in the case of all-coax sets. In the latter case, 45-50 dB may be achieved with baluns and 70 dB with direct connections. The use of high quality switches of 90 dB isolation helps, but does not solve the problem in most configurations because of the coupling of external components.

A preliminary survey of a sample of Gill subscriber's sets has shown that 19 percent had only 300 ohm terminals, 30 percent had both and 51 percent had only coaxial input terminals. Thus, approximately half of the sets in use in our system apparently lack the shielding necessary to allow reasonable cable-antenna isolation. The bulk of the remaining sets are capable of achieving reasonable isolation if matching transformers are removed.

Causes of low isolation

First, most older sets were designed for connection to a 300 ohm feedline from an external antenna. Since shielding against re-radiation of antenna-conducted signals was of no concern, the back of the sets weroe non-metallic and an additional piece of twin lead was used to connect the screw terminals to the tuner.

Second, most TV tuners exhibit an approximate impedance match to the antenna feedline at only the station currently tuned. At all other frequencies the lead is severely mismatched.

Third, the external antenna feedline would exhibit reasonably low radiation characteristics if properly matched and if operated under ideal conditions, however it:

1. Is imperfectly terminated at both antenna and matching transformer
2. Is not straight
3. Is not spaced away from other objects
4. Is very close to other radiating elements near the TV set.

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Reader Service Number 23

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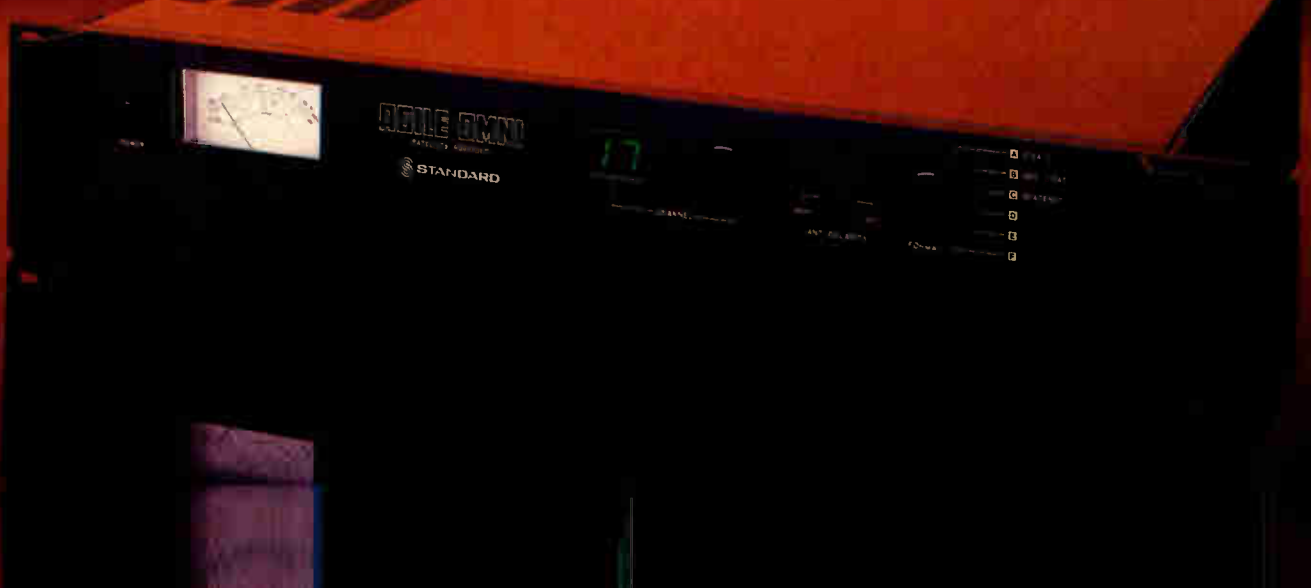

The addition of an antenna selector switch and connection of an antenna will result in only 30-35 dB of isolation.

Fourth, the matching transformers are designed for low cost mass production and are neither truly balanced nor well shielded.

Finally, minor errors such as loose or broken balun leads cause only minor picture impairments (particularly if drop signal levels are high), yet cause serious mismatches and consequently high radiation.

Implications of test results

Our test results have shown that in roughly half of our cable installations, the addition of an antenna selector switch and connection of an antenna will result in only 30-35 dB of isolation. In the majority of the remaining cases, we would expect 45-50 dB of isolation and, in a few cases of all-coaxial installations without matching transformers, we may achieve 70 dB.

In some cable systems, the low isolation will not be such a major factor because some or all installations require the use of a converter or descrambler ahead of the television set so that the full cable spectrum is not delivered to the antenna terminals. In Gill's case, however, about ⅔ of our customers opt for basic service only and directly connect to television sets and VCR's. Even in the case of premium customers, Gill, along with many others in the industry, provides a switching device to allow direct broadband connection of the cable to the television set in an effort to be "friendly." The result is that, at any one time, the vast majority of television sets in the Gill system are directly connected to the cable input despite the fact that Gill uses advanced addressable technology.

The implications of the achievable isolation are:

1. That we will be unable, as a practical matter to meet the requirements of Part 15.606 except in direct coaxial connection situations.

2. That average leakage levels of approximately 20 V/m (the limit of Part 76.605(a)(11)) will routinely occur with +5 dBmV drop levels for about half of our sets in use.

3. That the CLI contribution *from customer antenna radiation alone* will result in aircraft monitored levels of approximately 2 V/m, independent of any wiring errors, loose fittings, failed switches or other abnormal conditions.[9]

4. That a very small percentage of wiring errors that result in direct antenna-cable connections will cause a significant increase in total system radiation, leading to potential aircraft radio interference. The gradual infusion of better shielded television sets into the system will not improve this situation.

In addition to their effect on CLI, such errors and failures will cause major violations of Part 76 leakage

Continued on page 65

Mile Hi struggles to be friendly

Between a rock and a hard place. That's where many cable operators are finding themselves these days, trying to find the proper mix of addressability, scrambling and consumer friendliness with regard to interfacing to consumer electronic hardware. Depending upon the technology already in place and the amount of capital invested, the answer isn't necessarily simple.

A case in point is Mile Hi Cablevision of Denver, owned by managing partner ATC, TCI and Daniels, along with some local investors. Here is a state-of-the-art 60-channel system, launched in 1983, consisting of 1,226 miles of plant passing 216,000 homes. Zenith Base-TAC addressable terminals are located in every subscriber's home and every channel emanating from the headend is scrambled, which puts Mile Hi into a class by itself. And because of all that scrambling, interfacing with consumer gear—namely VCRs—is difficult in that a subscriber cannot watch one channel and record another unless he uses two converters.

Acknowledging that the system carries perhaps too much technology, and faced with a disappointingly low 26 percent basic penetration rate, Mile Hi's executives are in the process of determining what steps to take that will ultimately make the system more friendly to the most people in the least objectionable way, while protecting their capital investment. But first, some historical background information is in order.

At the time of Mile Hi's design, there was no question it had to be an addressable system, according to system Vice President of Engineering John Dawson. In the early 1980s, industry forecasters were predicting that someday every system nationwide would be addressable. With addressability, benefits included the ability to offer a number of service tiers at differing price structures, easy service changes (upgrades, downgrades and disconnects/reconnects) and pro rated billing, among others.

At the time, pay services like HBO and Showtime were hot, so every pay channel available at the time, excluding one, was included in the lineup. The thinking here was that the more you could offer, the more you'd sell,

Finding the proper mix of addressability, consumer friendliness and scrambling can be difficult.

says Dan Smith, Mile Hi's vice president of marketing.

And finally, concern over security and eliminating theft of service drove Mile Hi to scramble each and every channel. Piracy was the great revenue-stealer of the time and this was seen as a way to battle those losses.

But about the time Mile Hi actually launched, change in the marketplace was also taking place, said Steve Kniffen, system general manager. The Denver franchising process had taken so long to complete that many consumers decided that cable may never come, so they went out and bought "cable-ready" TVs and VCRs. After cable did come, subscribers no longer saw the converter as an enhancement, but a hindrance, to their equipment and recording/tuning capability. And with all the extra tuning built in to their television, consumers now wanted access to the full channel lineup, not just tiers.

"We designed an operation to fit the market as it was seen to be, and to meet every need of every person who raised their hand," said Smith. "Today, the marketplace has changed, and changed dramatically."

Today, in practice, the disadvantages of full scrambling and full addressability have outnumbered the advantages. To Mile Hi, addressable boxes are costly; full recovery of units in the field is difficult to achieve; repair

If Mile Hi has made a definite decision yet, they're playing it close to the vest.

expense is high, even with low failure rates; reliability concerns resulting from ingress causing the boxes to deauthorize have cropped up; and subscribers have on occasion tampered with the equipment. For subscribers, full-blown addressability and scrambling cause all the well-known interfacing problems with TVs, VCRs, stereo TVs and VCRs, remote control duplication and time shift recording.

"By having a very complex (tier) structure, you could actually pick and choose which (level of service you wanted) and make your own pie, so to speak," said Dawson. "We give you the ingredients, you put it together and we bake the pie and deliver it to you. Now the consumers may still want that to some degree, they also like to have the flexibility of using their own equipment to its fullest extent. You start restricting the use of their home equipment and you run into problems and that's what has happened to us."

The decline in popularity of pay services only exacerbated the problem. Consumers decided that only one or two pays were enough for them, eliminating the need for an extensive array of tiers.

"What we had was a giant river, and on one bank we had the cable TV industry," said Dawson, "and on the other was the consumer electronics industry. Both of these guys were running at 120 miles per hour down both sides of the river bank and when we got to the very end, we had no bridge. What we have to do is find a way of bridging the technology between the two."

Dawson acknowledges that multiport (the EIA's IS-15 interface device) was designed to answer exactly these concerns, but doubts he could take the heat from subscribers and management for as long as it will take for the device to become pervasive in the market.

So, what lies ahead for Mile Hi?

Some change has already occurred and more is expected within 60 days. But the exact nature of the change remains unclear, at this point. If Mile Hi management has made a definitive decision yet, they're playing it close to the vest.

Early in January, Mile Hi shuffled its channel lineup, moving USA Network, ESPN, Home Shopping Network and CNN down low, adjacent to network channels 4, 7 and 9 and indie Channel 2. In addition, it clustered channels with similar viewership profiles together, so that viewers looking for music, news, sports or family entertainment would know where to look. Secondly, all tiers were collapsed into a single basic offering, and the price of that service was lowered $1 to $13.95.

In both cases, Mile Hi was prepared

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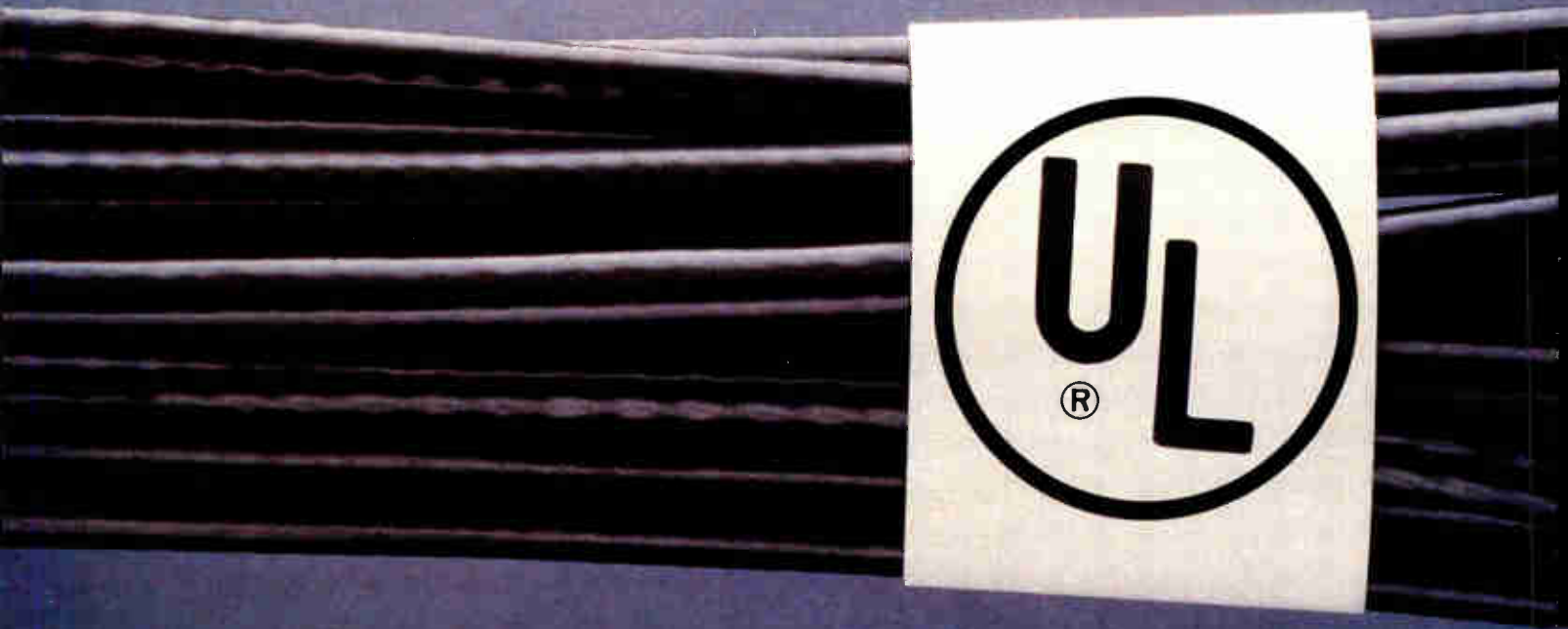

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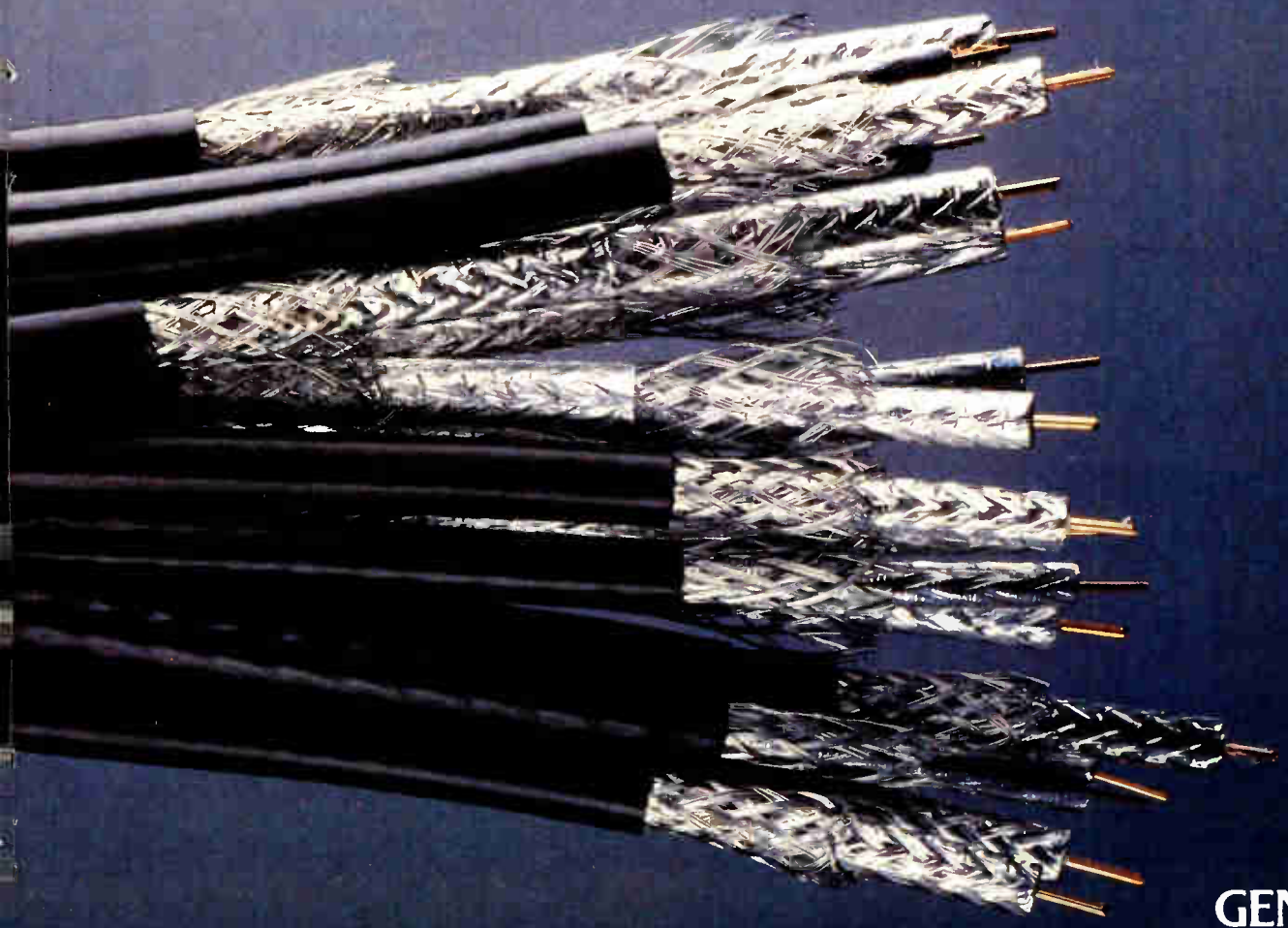

GENERAL INSTRUMENT

Reader Service Number 27

So the likely scenario has Mile Hi unscrambling its 54-channel basic service.

to take a lot of heat from the Denver subscribers and both times they met with little or no criticism, said Smith. Although the decision-making so far seems to be in the spirit of what the marketplace demands, Smith said future changes will be undertaken in a similar step-by-step manner.

Dawson has explored the full range of options open to him technologically. He could junk the whole addressable system and go back to traps or insert an interdiction system. Or addressability can be salvaged with addressable taps. And while each of those alternatives provides consumers with more flexibility, they're flawed, as well. Traps are labor-intensive, interdiction is unproven and would cause code violations in the present configuration and taps expose active devices to harsh weather.

So the likely scenario has Mile Hi unscrambling its 54-channel basic service and turning to some sort of hybrid configuration. Whether that means

John Dawson

removing converters from homes that don't need one or leaving them installed and providing VCR switchers or TAC-Timers to subs requesting them depends on if Mile Hi wants to maintain full addressability. If not, plain vanilla converters could be purchased for subscribers with older TVs.

"I'm not sure hybrids do not work and work well," said Dawson. "In some cases, you get the best of both worlds. What you really come down to, you basically start talking about how to integrate technologies until you use a combination of both. In the future, the technology we end up putting in the home will depend on what they (subscribers) have purchased and what services they have."

The decisions Mile Hi makes will no doubt be watched by others in similar situations. A lot of thinking about addressability and its applications is taking place now and the outcome of the Mile Hi situation may be seen as a precedent regarding what level of technology is appropriate to provide subscribers the maximum viewing and recording flexibility.

With the lifting of scrambling, Dawson hopes to find a little more room to maneuver between that rock and that hard place.

—Roger Brown

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Reader Service Number 29

Construction survey of the South and Southeast

Here is an initial look at construction and addressability plans for cable systems in the states of New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Kentucky, and Louisiana. The results that follow are based on our initial tabulation of returns from 33 percent of 1,275 systems. The research was conducted by our own staff during the last three months, using two survey mailings followed by phone interviews where needed. The data on construction mileage—aerial, underground, newbuilds and rebuilds—has been gathered on a "number of systems in a range" basis. For example, in the category "aerial newbuild 0 to 20 miles," we report the number of systems with activity planned in that range. We do not think a median of 10 miles can be assumed in this case. We caution our readers not to do so for other similar fields. When actually interviewing cable systems, we found most respondents unable to give an exact number. Since many know an approximation, our survey was based on that type response. However, many of the approximations were on the low end of the scale.

Construction activity

Summary:

Miles	Newbuild aerial	Newbuild underground
0-20	173	140
21-50	36	25
51-100	14	5
100+	8	6

Miles	Rebuild aerial	Rebuild underground
0-20	53	37
21-50	20	15
51-100	25	8
100+	31	11

Channel Upgrades
# of systems = 103
10-34 channels = 55
35-37 channels = 22
40-47 channels = 8
50-56 channels = 8
60-80 channels = 2

Currently addressable systems
# of systems = 125
# of subs = 1,182,061

Systems going addressable in 1987
# of systems = 16
Anticipated new subs = 116,428

Alabama:

Miles	Newbuild aerial	Newbuild underground
0-20	16	10
21-50	0	0
51-100	1	0
100+	1	0

Miles	Rebuild aerial	Rebuild underground
0-20	2	0
21-50	1	2
51-100	0	1
100+	3	1

Channel Upgrades
# of systems = 8
10-34 channels = 4
35-37 channels = 3
40-47 channels = 1
50-56 channels = 0
60-80 channels = 0

Currently addressable systems
# of systems = 5
# of subs = 20,039
Systems going addressable in 1987
# of systems = 0
Anticipated new subs = NA

Delaware:

Miles	Newbuild aerial	Newbuild underground
0-20	3	1
21-50	0	1
51-100	0	0
100+	1	0

Miles	Rebuild aerial	Rebuild underground
0-20	2	1
21-50	1	0
51-100	0	0
100+	0	0

Channel Upgrades
# of systems 0
10-34 channels
35-37 channeles
40-47 channels
50-56 channels
60-80 channels

Currently addressable systems
# of systems = 0
# of subs = NA
Systems going addressable in 1987
# of systems = 0
Anticipated new subs = NA

Florida:

Miles	Newbuild aerial	Newbuild underground
0-20	15	19
21-50	4	6
51-100	3	0
100+	0	3

Miles	Rebuild aerial	Rebuild underground
0-20	5	5
21-50	1	1
51-100	1	1
100+	1	3

Channel Upgrades
# of systems = 13
10-34 channels = 7
35-37 channels = 2
40-47 channels = 0
50-56 channels = 3
60-80 channels = 1

Currently addressable systems
# of systems = 16
# of subs = 158,029

Systems going addressable in 1987
# of systems = 3
Anticipated new subs = 81,500

Georgia:

Miles	Newbuild aerial	Newbuild underground
0-20	14	11
21-50	5	1
51-100	2	1
100+	1	1

Miles	Rebuild aerial	Rebuild underground
0-20	6	4
21-50	2	1
51-100	3	0
100+	2	0

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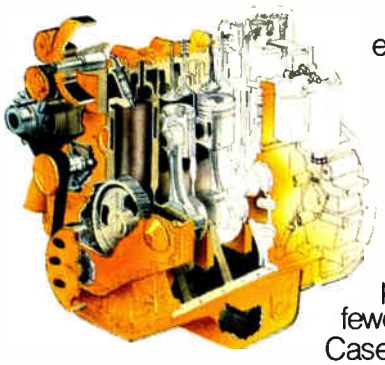

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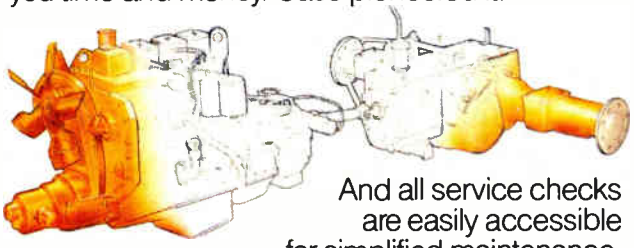

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Reader Service Number 30

construction survey

Channel Upgrades
# of systems = 7
10-34 channels = 5
35-37 channels = 1
40-47 channels = 1
50-56 channels = 0
60-80 channels = 0

Currently addressable systems
# of systems = 10
# of subs = 127,468

Systems going addressable in 1987
# of systems = 2
Anticipated new subs = 10,000

Kentucky:

Miles	Newbuild aerial	Newbuild underground
0-20	8	3
21-50	0	0
51-100	0	0
100+	0	0

Miles	Rebuild aerial	Rebuild underground
0-20	5	1
21-50	3	0
51-100	0	0
100+	1	0

Channel Upgrades
# of systems = 6
10-34 channels = 5
35-37 channels = 1
40-47 channels = 0
50-56 channels = 0
60-80 channels = 0

Currently addressable systems
# of systems = 7
# of subs = 13,407

Systems going addressable in 1987
# of systems = 0
Anticipated new subs = NA

Louisiana:

Miles	Newbuild aerial	Newbuild underground
0-20	8	7
21-50	1	0
51-100	0	0
100+	0	0

Miles	Rebuild aerial	Rebuild underground
0-20	0	0
21-50	0	1
51-100	2	0
100+	1	0

Channel Upgrades
# of systems = 3
10-34 channels = 3
35-37 channels = 0
40-47 channels = 0
50-56 channels = 0
60-80 channels = 0

Currently addressable systems
# of systems = 8
# of subs = 58,197

Systems going addressable in 1987
# of systems = 1
Anticipated new subs = UKN

Maryland:

Miles	Newbuild aerial	Newbuild underground
0-20	5	7
21-50	2	3
51-100	1	0
100+	1	0

Miles	Rebuild aerial	Rebuild underground
0-20	4	0
21-50	0	1
51-100	0	1
100+	0	0

Channel Upgrades
# of systems = 5
10-34 channels = 1
35-37 channels = 2
40-47 channels = 2

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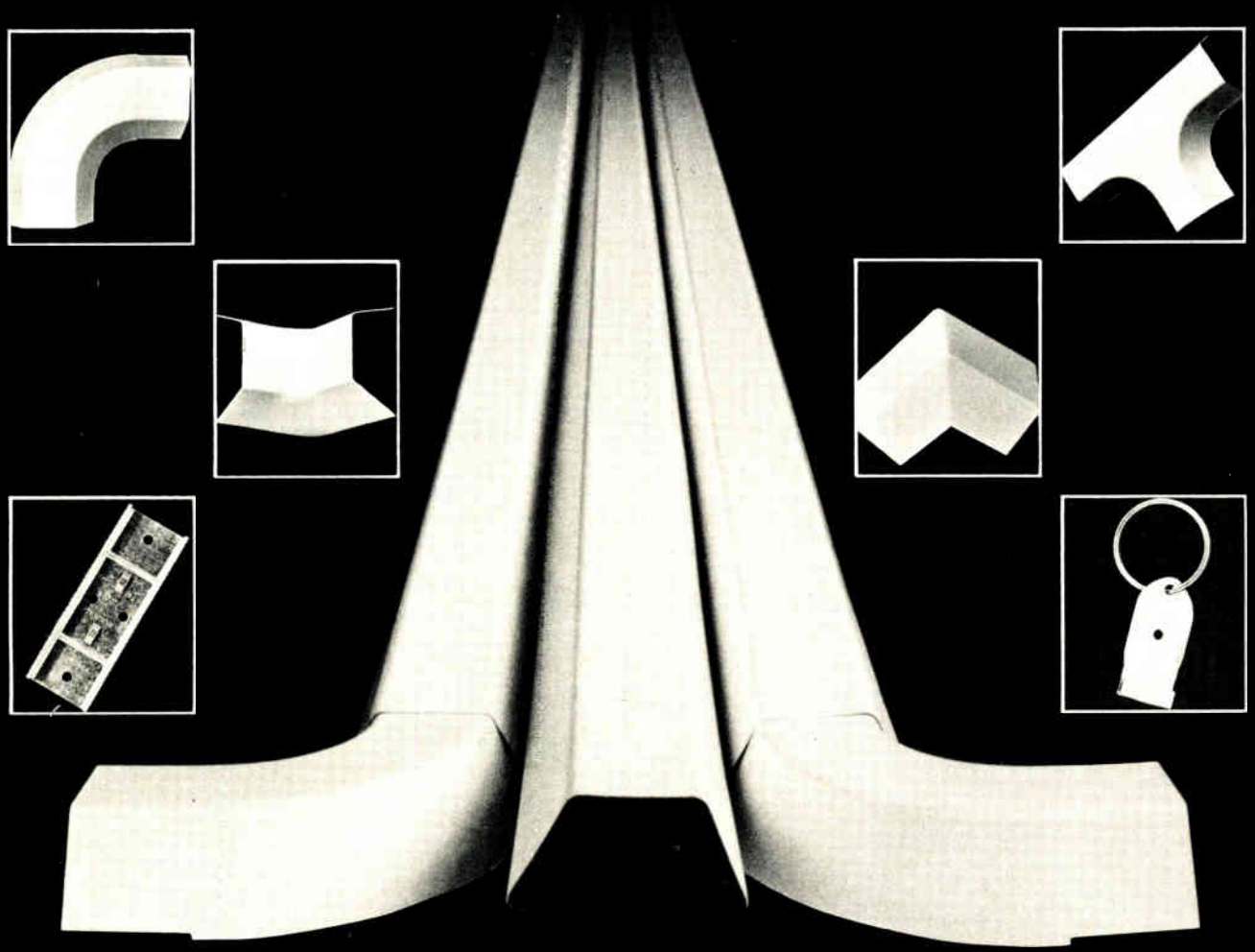

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Reader Service Number 33

50-56 channels = 0
60-80 channels = 0

Currently addressable systems
# of systems = 2
# of subs = 36,200

Systems going addressable in 1987
# of systems = 0
Anticipated new subs = NA

New Jersey:

Miles	Newbuild aerial	Newbuild underground
0-20	7	0
21-50	2	3
51-100	2	1
100+	0	1

Miles	Rebuild aerial	Rebuild underground
0-20	0	1
21-50	1	2
51-100	2	1
100+	2	1

Channel Upgrades
# of systems = 6
10-34 channels = 0
35-37 channels = 2
40-47 channels = 1
50-56 channels = 0
60-80 channels = 3

Currently addressable systems
# of systems = 10
# of subs = 147,329

Systems going addressable in 1987
# of systems = 2
Anticipated new subs = 5,876

North Carolina:

Miles	Newbuild aerial	Newbuild underground
0-20	20	24
21-50	4	2
51-100	2	1
100+	0	0

Miles	Rebuild aerial	Rebuild underground
0-20	4	6
21-50	0	1
51-100	4	1

100+ 2 1

Channel Upgrades
# of systems = 8
10-34 channels = 6
35-37 channels = 2
40-47 channels = 0
50-56 channels = 0
60-80 channels = 0

construction survey

Currently addressable systems
# of systems = 8
# of subs = 75,738

Systems going addressable in 1987
# of systems = 1
Anticipated new subs = 3,992

Pennsylvania:

Miles	Newbuild aerial	Newbuild underground
0-20	24	19
21-50	10	1
51-100	0	3
100+	2	0

Miles	Rebuild aerial	Rebuild underground
0-2-	12	10
21-50	6	4
51-100	1	2
100+	14	3

Channel Upgrades
# of systems = 13
10-34 channels = 3
35-37 channels = 5
40-47 channels = 0
50-56 channels = 4
60-80 channels = 1

Currently addressable systems
# of systems = 22
# of subs = 144,228

Systems going addressable in 1987
# of systems = 3
Anticipated new subs = 7,451

South Carolina:

Miles	Newbuild aerial	Newbuild underground
0-20	8	10
21-50	4	4
51-100	1	0
100+	0	0

Miles	Rebuild aerial	Rebuild underground
0-20	1	0
21-50	0	0
51-100	1	0
100+	0	1

Channel Upgrades
# of systems = 4
10-34 channels = 4
35-37 channels = 0
40-47 channels = 0
50-56 channels = 0
60-80 channels = 0

Currently addressable systems
# of systems = 9
# of subs = 50,238

construction survey

Systems going addressable in 1987
# of systems = 0
Anticipated new subs = NA

Tennessee:

Miles	Newbuild aerial	Newbuild underground
0-20	26	10
21-50	2	0
51-100	1	0
100+	1	1

Miles	Rebuild aerial	Rebuild underground
0-20	7	4
21-50	0	1
51-100	6	1
100+	3	1

Channel Upgrades
# of systems = 17
10-34 channels = 9
35-37 channels = 3
40-47 channels = 3
50-56 channels = 0
60-80 channels = 2

Currently addressable systems
# of systems = 12
# of subs = 151,250

Systems going addressable in 1987
# of systems = 2
Anticipated new subs = UKN

Virginia:

Miles	Newbuild aerial	Newbuild underground
0-20	18	10
21-50	2	4
51-100	1	1
100+	1	0

Miles	Rebuild aerial	Rebuild underground
0-20	5	5
21-50	4	1
51-100	1	0
100+	0	0

Channel Upgrades
# of systems = 9
10-34 channels = 4

construction survey

35-37 channels = 3
40-47 channels = 2
50-56 channels = 0
60-80 channels = 0

Currently addressable systems
# of systems = 16
# of subs = 186,113

Systems going addressable in 1987
# of systems = 0
Anticipated new subs = NA

West Virginia:

Miles	Newbuild aerial	Newbuild underground
0-20	10	2
21-50	2	1
51-100	0	0
100+	0	0

Miles	Rebuild aerial	Rebuild underground
0-20	5	4
21-50	2	0
51-100	1	0
100+	2	0

Channel Upgrades
# of systems = 8
10-34 channels = 7
35-37 channels = 1
40-47 channels = 0
50-56 channels = 0
60-80 channels = 0

Currently addressable systems
# of systems = 3
# of subs = 13,225

Systems going addressable in 1987
# of systems = 1
Anticipated new subs = 309

For results on pay-per-view plans in this region,contact Linda Johnson, production editor: 600 Grant St., Denver, CO 80203, or call (303) 860-0111.

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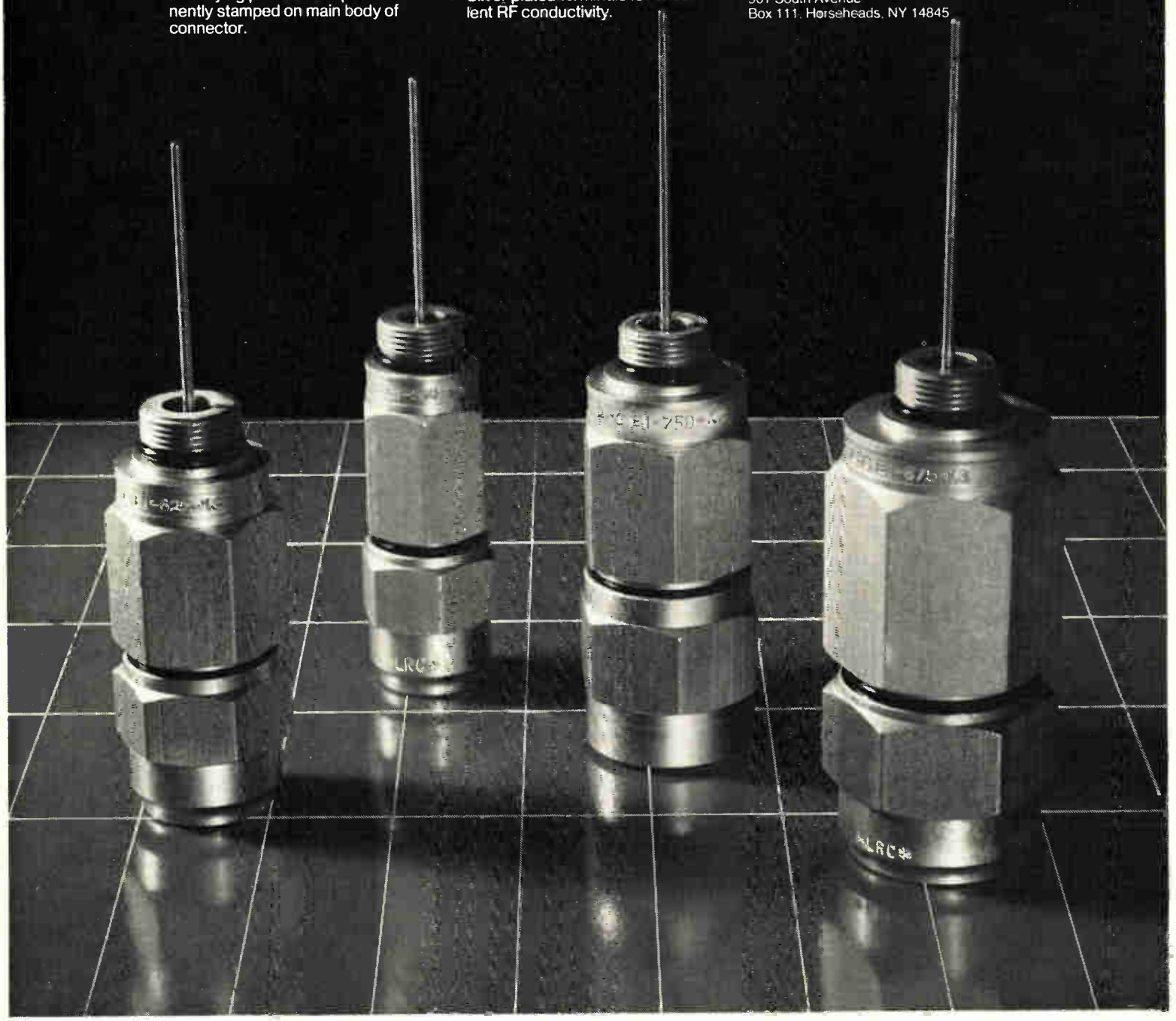


Reader Service Number 38

Suppliers taking steps toward PPV pay-off

Pay-per-view has a long way to go before it begins to pay off in a big way, but, as one supplier put it, 1987 will be the year when operators stop discussing its potential and start implementing it.

Tests and experiments, though limited so far, are already supplying bullish operators, like Viacom, United and Rogers, with important data about equipment, programming, billing and marketing options. What remains to be seen is how all those variables are mixed to provide the greatest revenue.

Hoping to cash in on the choices the operators have to make to bring PPV to their subscribers are the hardware suppliers, some of whom announced major additions to their product lineups at December's Western Cable Show. Among the most important are new products from Business Systems Inc., Melita Electronic Labs, Scientific-Atlanta and Zenith.

BSI's new CableTALK voice recognition system joins a line of standard touch-tone phone dependent ARUs and is integrated into its cable management system as a front-end device tied to the billing system. Non-BSI affiliates can purchase CableTALK as a standalone unit, also. Subscribers who call hear a human voice requesting information and, instead of punching telephone numbers, respond verbally. The advantage to this type of technology is that it is not dependent upon touch-tone telephones.

> 1987 may be the year when operators start implementing pay-per-view.

CableTALK will enable subscribers to order PPV events, purchase items shown on home shopping channels and order cable service. The operator can also use the system for technician tracking, company officials said. CableTALK hasn't yet been implemented anywhere, but is being tested at BSI. Because the system is voice sensitive, it has to be trained to recognize different inflections and accents for use around the country. Larry Edwards of BSI said tests have shown a recognition factor of between 85 percent and 90 percent. A stepped approach upon implementation would allow a CSR to step in if the system was unable to accept the order.

At Melita, the attention has been shifted from inbound to outbound calling to reduce the chances for ordering bottlenecks and increase buy rates. The Bi-Directional Pay-Per-View ordering system allows operators to identify and automatically phone regular PPV users, offer them program options and process orders several days in advance of the event. Designed as a standalone or to work in tandem with the Melita 3000 subservicer, the 4000-DVD (digital voice and data) units also allows subs to use a touch-tone phone to place last-minute orders.

Linked to the system's database, the ordering mechanism checks the status of each account, approves or disapproves the order and advises the sub his order has been confirmed. All inbound and outbound calls can be performed without CSR intervention, freeing up personnel to handle service interruptions and other business. The unit is being installed at McCaw Cable in Tucson, New Channel Cable in New York and Centel Cable in Houston, among other sites.

Scientific-Atlanta, after mentioning parenthetically that its boxes were PPV capable for two years, finally announced it plans to make the operator-installable, store-and-forward modules

Suppliers cashing in on PPV

AM Cable TV Industries

The Tier Guard from AM Communications is an off-premises addressable system that utilizes Store-and-Forward technology. A transceiver and keyboard/display unit are placed in the subscriber's home. Pay-per-view events are ordered via the transceiver, and feedback appears on the display. The system interfaces with the addressable converter controller which, in turn, connects with the billing computer.

For more information, contact Phil Verruto, (215) 536-1354.

Business Systems Inc.

To facilitate the ordering of pay-per-view events, as well as other applications, Business Systems Inc. has introduced CableTALK. A Voice Recognition System integrated into BSI's Cable Television Management System (CTMS), CableTALK permits the subscriber to speak interactively with the answering computer which actually recognizes the words spoken by the caller and responds accordingly.

The CableTALK feature permits subscriber interaction with the headend for pay-per-view ordering, shop-at-home, technician tracking, and subscription orders and questions. In addition, CableTALK provides all the benefits of audio response/touch-tone type technology, without limiting itself to only customers with touch-tone phones.

For more information, contact Janet Ratts, (803) 297-9290.

CMS

System 1 from Creative Management Systems is a full-featured billing system capable of interfacing with a variety of pay-per-view order processing alternatives including: Store-and-Forward, Voice Response, IPPV and ANI. The system is matrix-based and, therefore, can be programmed to interface with an unlimited number of polling computers and addressable devices.

CMS' System 1 stores PPV history information indefinitely at no extra charge and is capable of generating a variety of custom reports for analysis and comparison.

For more information, contact Gil Jacobs, (201) 341-6165.

CableData

The Phone Entry Processor, or PEP, unit from CableData is capable of handling last-minute pay-per-view orders up to approximately 2,000 calls per hour. With CableData's addressable interface and DDP software, PEP processes special event orders automatically with no CSR intervention, unless

Continued on page 56

At Zenith, the emphasis has been on lowering the cost of in-home equipment.

for its model 8550 and new 8580 converters. The module contains circuitry to store programming credits, tune to barker channels, conduct and record purchases and report purchases via telephone to the system controller.

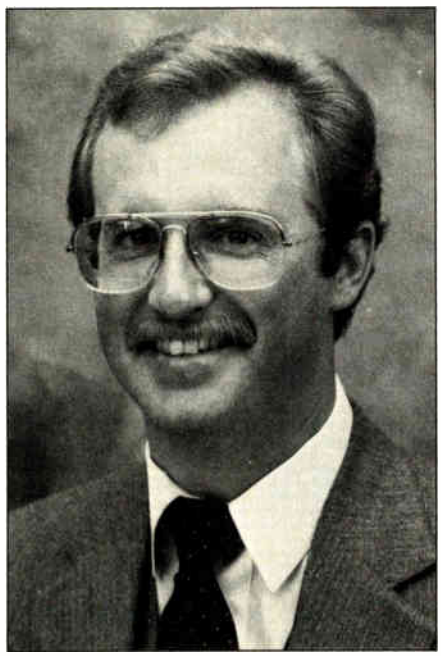
The modular approach allows operators to purchase only as many as they need, said Andy Meyer, market specialist at S-A. Operating parameters are determined by the operator, offering still more flexibility, Meyer said. If the module is low on credits and a sub requests another event, the module automatically dials the control computer and asks for more credits, which can be downloaded almost immediately, if the request is approved.

At Zenith, a company with extensive experience in offering PPV over two-way cable and through store-and-forward techniques, the emphasis has been on lowering the cost of in-home equipment. Early in 1986, Zenith entered the RF converter market with its highly-secure PM system. At the Western Show that line was extended with PM-Pulse, a system offering two-way capability built into the converter for less than $100 per box.

According to company officials, a sub can order a PPV event instantly by entering a code on the system's remote control unit. The program is unscrambled immediately. Unlike Z-View, Zenith's IPPV system for two-way plant that is based on a contention system, PM's controller polls each box searching for ordering data. Because it can poll up to 100,000 decoders per hour, the system is close to real time.

At the operator's discretion, the ecrypted data can be used in either telephone or two-way return paths. The upstream data channel is BiPhase Shift Keyed, said Vito Brugliera, Zenith's vice president of marketing and product planning for cable products. This method provides enhanced signal reliability and ruggedness despite noise and ingress that may appear in the system. The company claims return data throughputs of 100 percent at 18 dB C/N; better than 90 percent throughput at 12 dB C/N; and 50 percent throughput at 6 dB C/N.

Telstar Channels' purchase of World Video Library was a new development relating to previously announced auto dialer hardware and software technology. Previously known as the Impulser, Telstar is now aggressively marketing the device as the Zapper and will give free Zappers to 20 percent of an affiliate's addressable subscriber base if the affiliate has at least a million addressable subs in its universe. Additional Zappers will be made available at no up-front cost to Telstar-exclusive systems to other affiliates. So far, affiliates representing 1.3 million subs have signed a letter of intent to go with the technology.



Dave Archer

The largely-unimplemented Zapper technology consists of a hand-held keypad that plugs into a subscriber's phone jack. Upon ordering, the system controller is automatically called, the caller is identified and his account is checked and billed, all within eight to 10 seconds. Red, green and yellow lights on the Zapper keypad indicate acceptance of the order or problems, providing the subscriber with information concerning the status of his order. The Zapper technology has been tested

A simple and reliable ordering process is key to making any PPV project work.

in several arenas and Zappers are being put into systems in Staten Island and Kennewick, Wash.

Techniques to make the ordering process as simple and reliable as possible are a key ingredient to making a PPV project work, according to Dave Archer, Viacom Cable's director of new business development. Viacom presently has automatic number identification trials underway in the suburbs of Milwaukee and San Francisco and uses CableData's PEP phone ordering unit in Nashville.

"When you launch initially, you have to be very careful you don't turn people off to the service," by losing their order, presenting them with busy phone lines or other aggravating glitches, reported Archer. "In Milwaukee, we were able to handle every call from the very first day."

The result has meant success for Viacom. Although Archer declined to specify the monthly buy rates achieved in the ANI locales, he termed them "well in excess" of those expected in one-way systems and "close to what two-way systems do." Typically, one-way systems achieve monthly buy-rates of between 20 percent and 25 percent, with two-way systems getting double that amount.

Of all currently available technology, the ANI approach appeals most to Archer because it is fast, easy for the sub to operate and requires little capital investment. No hardware is added in the home and phone line bottlenecks are virtually eliminated because calls are routed outside the normal phone network. And because it's easy to operate, Archer said buy-rates continue to increase monthly.

"I think there is a correlation between the ease of ordering and buy rates," said Archer. "At the high end, you've got store-and-forward and two-way, where you press a button and that's it, you get it. At the other end (using CSRs or response units), the customer has to go over, make a phone call and go through some sort of transaction... and then hang up." Viacom wanted to see where on that spectrum ANI fell. Archer discovered it was close to the two-way and store-and-forward numbers without the expense or need for a phone jack near the converter.

One of the obstacles yet to be overcome with ANI continues to be the high cost per transaction charged by the telephone company. In some areas, as much as 25 cents per transaction is charged for the service. Archer says getting that cost lowered will remain a point of negotiation, ultimately falling between a nickel and a quarter.

Although Archer is keen on ANI technology, he admits it cannot always be used. In Cleveland, where Viacom manages the system for North Coast Cable, two-way boxes are being considered for a test later this year. Cost reductions in boxes, like the breakthrough made by Zenith, make two-way more attractive, he said.

Others using two-way technology without problems include New York Times Cable in Cherry Hills, N.J., (using Sprucer 300 boxes) and Rogers Cablesystems in San Antonio (using Zenith Z-TAC with Z-View add-on units). Both are achieving high buy rates, with NYT regularly recording rates averaging in the high 70s. But two-way cable remains an extreme example because of the low numbers of active two-way systems.

Jerrold has created considerable excitement with its successful Cable Video Store programming service tied to

United is starting a two-year roll-out of addressability and PPV capability in all its systems.

its Starvue (for two-way cable plant) and Starfone (telephone return path) converter sidecars. With trials underway now in 10 sites, CVS programming and Jerrold hardware has created a number of believers.

Bullish attitude

An example is United Cable, which is beginning a two-year roll-out of addressability and PPV capability in all its systems, using primarily Jerrold gear. Convinced that PPV can pay off for it, United has taken a very bullish attitude toward the concept—so much so that some urban builds may even go with full two-way technology when addressability is added, said Sheri Herman, United's director of programming and new products.

For other operators, the ability to add IPPV capability along with other operational functions is seen as the way to go. Interface Technologies' TOES 350 unit can be used for tech call-ins and other functions besides PPV. So far,

Oceanic Cable in Honolulu, Gill Cable in San Jose and Warner in Houston have TOES up and running with few if any complaints. The unit presently interfaces with CableTEK, CableData and First Data Resources billing systems.

Although the rap against ARU technology revolves around response time, Dave Young, sales manager at IT, said operators have used the Hot Order function to speed the process. This feature allows the operator to select a specific event and highlight it in the recorded message. If, for example, an operator expects heavy traffic for a special one-time event, the message can be changed to direct callers requesting that event to press the number one on the phone, then hang up. Transaction time can be cut to 15 seconds in this manner, Young said.

Another feature, called Ticket Window, allows subscribers to order the next PPV show without the sub having to know the event's code. For each PPV channel, a different message is recorded and played to the caller. If the caller wants the next movie, he simply touches one number and hangs up. By eliminating steps, response time is lowered and last-minute ordering crunches are avoided.

Although CableData and BSI are billing and management information companies that have developed hardware as well, other billing firms have taken a different approach. CableTEK, CMS and FDR all state they are in position to provide interfacing software for any technology currently available.

Among FDR's users, the most popular technology has been ARUs. But preliminary software design for ANI has been completed and if a subscribing system chose the ANI option, FDR could be processing ANI-originated orders before the end of the second quarter this year, said Stan Durey,

With ever more technology being introduced, it looks as though the face of IPPV may change many times.

marketing manager. Similarly, design work for store-and-forward has been completed and could be implemented within the same time frame. Durey said a Zenith Z-View interface will be installed this quarter and FDR expects a go-ahead from systems using Jerrold impulse gear.

At CMS, the story is pretty much the same. According to Gil Jacobs, CMS stands poised to move but is waiting for its customers to request new software. Jacobs said his firm has had discussions with New Jersey Bell regarding their ANI system, but is waiting for its clients to make the first move. Jacobs added that some of CMS' customers are using the built-in PPV function that is part of the company's customer service capability, but none have chosen an IPPV vendor or approach.

With ever more technology being introduced, and as operators select approaches and work to improve the technology, it looks as though the face of IPPV will change many times, and often. Because the industry has widely varying needs, a wide range of gear will find its way off the shelf and into use. To watch and witness the evolution of a brand-new service will likely be one of the most interesting stories the latter part of this decade will have to tell.

—Roger Brown

Continued from page 52

necessary. As PPV events are sold, PEP checks the subscriber's credit, interfaces with the headend to authorize the subscriber's terminal and charges the customer's account.

PEP also is designed to help subscribers attain information on their accounts, and PEP works with technicians in the field to simplify various check-in and reauthorization procedures.

For more information, contact Nancy Frank, (916) 636-5800.

CableTEK

CableTEK's pay-per-view module currently supports PPV operations with a simplified order entry/addressable controller interface. Compatible with automatic voice response or store-and-forward technology, CableTEK offers a variety of computer configurations to accommodate cable systems from several thousand subscribers to 200,000 plus.

Major features of CableTEK's pay-per-view software include:

- Event Scheduling Review which enables CSR's to display programming by date or by event.
- Escalating Rate Structure, featuring up to eight different rates, can be used to encourage early ordering or payment, or ordering via a voice response unit to promote subscriber acceptance of the technology.
- Subscriber Credit Parameters are checked by the unit prior to authorizing the event, and a CSR will intervene if necessary.

For more information, contact John Telech, (606) 259-1366.

Dialogic Communications

The TeleClerk Interactive Voice Processor from Dialogic Communications Corp. appears to the subscriber as a talking computer. It speaks in a digitally recorded human voice and can be programmed to accept orders for pay-per-view events without the need for live CSR's.

TeleClerk asks the subscriber to enter his/her account number, personal ID number and event number. The TeleClerk unit then communicates this order information to the billing system, which in turn communicates the order to the headend to authorize viewing.

For more information, contact Phil Suiter, (615) 790-2882.

First Data Resources

First Data Resources offers a generic Voice Response interface, as well as interfaces with two-way and store-and-forward technology. In addition, the

First Data Response offers a generic voice response interface with two way and store-and-forward technology.

company is ready with preliminary software for use with ANI-originated ordering schemes. FDR's approach allows subscribers to order pay-per-view events, check their account balance or request converter reauthorization. Technician check-in and activation of work orders are additional system applications that are available.

For more information, contact Stan Durey, (402) 399-7000.

Interface Technology

The TOES/350 from Interface Technology is a voice response system activated by touch-tone phone that transmits pay-per-view orders directly to the addressable control computer as they occur to assure immediate fulfillment and maximum subscriber satisfaction. Billing information is transmitted to the billing system on a time-available basis prior to billing, not prior to the event. Because of this pass-thru-design, the TOES/350 does not require a billing computer upgrade to handle peak load of impulse PPV ordering.

In addition, the TOES/350 can be expanded to handle other cable applications such as: service switches and adds, converter reauthorization, technician check-in and account balance information.

CED readers who would like an instant demonstration of the TOES/350 may call 1-800-325-1559 and enter account number 490100 when prompted.

For more information, contact David Young, (314) 426-7633.

International TeleSystems

The Electronic Ticket system from International TeleSystems Inc. consists of an encoder which scrambles a signal, a passive electronic receptacle and a filter (the Electronic Ticket) which, when inserted into the receptacle, descrambles the signal.

To implement the system, a cable operator will distribute scrambled pay signals to all subscribers. Every pay-cable home will be equipped with a passive electronic receptacle which will cost approximately $5. If the subscriber wants to subscribe to a pay service, he informs the operator who mails an Electronic Ticket corresponding to the pay service requested to the subscriber. The sub inserts the Electronic Ticket into the receptacle, and the signal is received.

Electronic Ticket provides pay-per-view cabability utilizing the same procedure: an unused channel is selected over which a scrambled program is distributed. Subscribers in possession of the corresponding Electronic Ticket activate the system and receive the

The impulse PPV package offered by Jerrold is known as the 'Jerrold Jukebox.'

desired event. Those who do not use their Electronic Ticket corresponding to the event continue to receive a scrambled signal and are not charged for the event.

Subscribers are sent a packet of Electronic Tickets with their monthly statements for pay-per-view events coming up in the next month. They have the opportunity at that time to look through the upcoming program guide and decide which pay-per-view events they wish to see in the next weeks. Any or all Electronic Tickets which are not wanted are simply mailed back to the cable system, and no charge is accrued.

Along with presenting subscribers with this "negative choice" purchasing strategy, the Electronic Ticket concept comes complete with a full marketing and promotional campaign and incentive programs.

For more information, contact Larry Shultz, (213) 274-7411.

Jerrold

The impulse pay-per-view package offered by Jerrold Division of General Instrument Corp. is known as the "Jerrold Jukebox." So dubbed by the company to increase subscriber awareness, understanding and identification of the equipment package, the Jerrold Jukebox consists of a Starcom converter with either a Starfone or Starvue sidecar to facilitate purchasing of PPV events on impulse.

Compatible with either one- or two-way addressable systems, Jerrold Jukebox is based on a store-and-forward system design and can accommodate a high volume of last-minute orders.

Also from Jerrold is the Cable Video Store, a unique concept in PPV programming that offers 60 titles each month on a 24-hour basis. Costs per event range from 99 cents to $3.99. The Cable Video Store is satellite-delivered and also features movie previews and a monthly event guide.

For more information, contact Skip Litz, (215) 674-4800.

Kanematsu-Gosho (USA)

The Sprucer 300 from Kanematsu-Gosho is a full-featured, two-way interactive addressable converter offering impulse ordering for pay-per-view events on any channel. The Sprucer 310 also features complete IPPV ordering capability with credit card billing for hotel/resort use or home shopping applications.

For more information, contact Neil De Constanza, (201) 271-7544.

MAAST Inc.

The impulse pay-per-view feature of the MAAST Comprehensive System permits subscribers to order events at the time of transmission without the need for pre-ordering. Neither two-way cable nor a telephone connection is necessary, although the system is entirely compatible with two-way interactive systems.

To purchase a PPV program, subscribers need only to press the "accept" key on the MAAST decoder terminal or on the remote control unit. The "accept" key must be pressed twice to avoid errors, and then the program is automatically unscrambled if the subscriber is authorized. Both the charge for the event and a viewing record are updated in the decoder, and the event will be automatically billed to the computer. When the bill is due, the decoder unit itself will electronically communicate the amount due and due date directly to the subscriber, thereby eliminating the need for paper and postage.

For more information, contact Bob Black, (213) 207-5310.

Melita

Melita Electronic Labs Inc. has developed a patented bi-directional PPV ordering system. Designed to work with the Melita 3000 Subservicer and the Melita 4000-DVD (Digital Voice and Data), Bi-Directional PPV enables cable operators to automatically phone regular users of PPV and offer program options in advance of the event itself. It also allows PPV customers to call in and place last-minute orders. Calls to and from subs can be handled by the Melita equipment, without the intervention of a CSR.

Using the Melita 3000 Subservicer or the 4000-DVD, subs can place PPV orders via a touch-tone phone. Linked by Melita software to a database, the system can check the status of each account, approve or disapprove the order and let the sub know if the order is confirmed.

The Melita 4000-DVD expands on PPV ordering. Typical system configuration uses eight to 12 phone lines and is expandable to 64 lines. The Melita 4000-DVD PPV ordering system will directly interface with, and control, virtually all converter-controller systems and on-line billing systems.

For more information, contact John Zarek, (404) 457-3700.

Microperipheral Corp.

The Voicelink System from the Microperipheral Corp. is a full-featured voice response unit capable of accepting pay-per-view orders. Voicelink features a digitized human voice and interfaces with the cable system's billing system and addressable controller.

In addition to its PPV capabilities, voicelink also offers a full range of outbound applications in telemarketing, promoting customer awareness of special offers and "free" viewing periods, service call verification and overdue account collections.

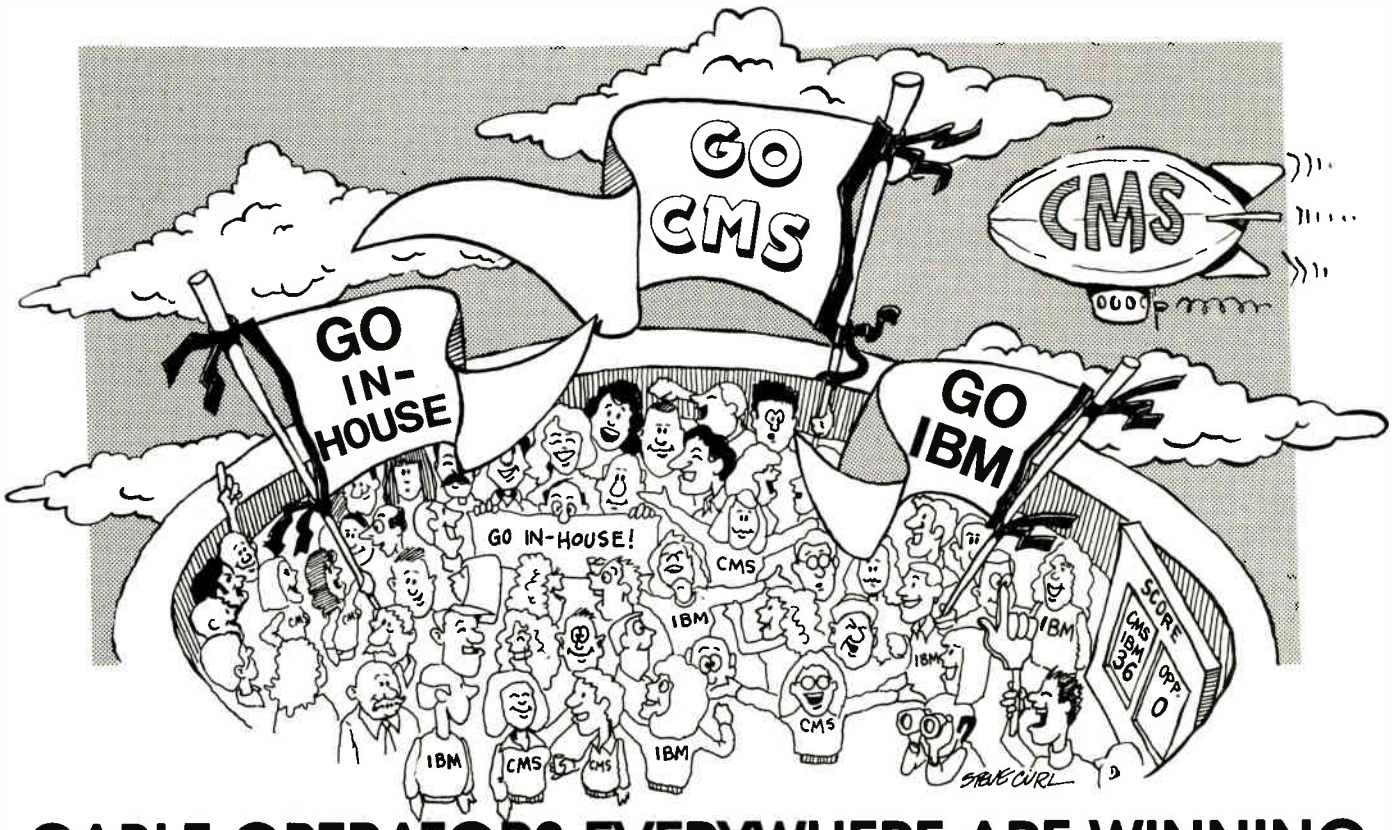
For more information, contact Frank Johnson, (206) 881-7544.

Pioneer Communications

Pioneer's BA-5000 addressable converter enables customers to order pay-per-view events in one of several ways, at the discretion of the operator. Orders may be placed with CSRs in the traditional manner or an automated voice response unit may be employed by the operator. However, Pioneer's PULSE module facilitates impulse ordering without CSR or ARU intervention.

Released in late 1985, the PULSE add-on module attaches to the BA-5000 addressable converter and a subscriber's phone line. With PULSE, the BA-5000 offers IPPV capabilities via either cable or telephone return. PULSE can "store and forward" up to 20 purchased events to the cable operator's headend.

By simply pressing the authoriza-



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Reader Service Number 44

Zenith offers the broadest range of IPPV options to the cable industry.

tion button on the set-top converter or remote control unit, the desired PPV event is immediately authorized and stored in the PULSE unit. The operator's headend automatically polls each subscriber's PULSE unit to retrieve ordering data, which then is used for billing purposes.

For more information, contact Mike Hayashi, (800) 421-6450.

Scientific-Atlanta

The MASTERWORKS IPPV System from Scientific-Atlanta is based on store-and-forward architecture. The IPPV modules fit inside S-A's 8550 and 8580 set-top terminals and store programming credits, record buying activity and report purchases to the Masterworks Control Computer via a telephone line, which remains hooked up to the set-top at all times.

The Masterworks IPPV System allows the system operator to determine credit limits, value of credit units, event fees, the number of pay channels and whether to offer free preview viewing. The set-top terminals's LED presents the pertinent buying information, which can be entered on either the unit's keypad or via remote control. This LED flashes to warn the subscriber that a purchase is about to be made or that a purchased event is about to begin. Entry into S-A's IPPV system is denied unless the subscriber's control code is entered, thus assuring a degree of parental control.

If the IPPV module is low on credits and the customer still wishes to make a purchase, the module will automatically dial the control computer and request more credits.

For more information, contact Steve Necessary, (404) 441-4100.

Telecorp Systems

The System 6000 from Telecorp Systems Inc. is a voice response system that permits cable subscribers to order pay-per-view events via their touch-tone phones. Other applications such as account balance inquiries, converter reauthorization, technician check-in, service call resolution and routing of other incoming calls also are possible with the System 6000.

For more information, call Dana Webster, (800) 334-9907 or (404) 449-6991.

Telstar Channels

The "Zapper!" unit from Telstar is an ancillary addressable unit that gives upstream capability to all current addressable cable converters. The "Zapper!" is subscriber installable on any single phone line and features a built-in autodial modem and a non-volative memory.

"Zapper!" is a hand-held unit that plugs into any modular telephone jack aond does noto connect wioth the set-top converter. Subscriber orders can be placed automatically at anytime without the need for additional personnel at the cable system. The unit responds immediately to subscribers via red, green and yellow lights, which indicate acceptance or problems. In this way, the subscriber knows instantly whether his order is confirmed or an error or credit problem exists.

The "Zapper!" works by utilizing a proprietary microchip that automatically communicates with the Telstar Command Center, identifies the customer and processes the pay-per-view order instantly. Through proprietary software, the command center interfaces with existing cable systems, authorizing the addressable controller to allow only authorized subs to view the movie they have ordered.

Concurrently, the command center records the order and processes the charges. Telstar's system produces the PPV billing information for existing cable systems and provides the PPV audit trail required by program suppliers. The subscriber may be billed directly or combined with the system's current billing system.

For more information, contact Joe Sigler, (213) 556-5650.

TOCOM

TOCOM's ITM-100 is a telephone dialer/modem that allows a TOCOM 5503-VIP converter to support store-and-forward impulse pay-per-view in a one-way cable system. The limitation of last-minute authorization with a PPV event is solved by the VIP's ability to locally authorize the event for credit-worthy subscribers and forward the information to the headend at a later time.

The ITM-100 plugs into the expansion jack on the back of the 5503-VIP and a standard RJ-11 telephone jack. It may be installed by the suscriber, provided a telephone jack is nearby. The ITM-100 is powered by the 5503-VIP and is active only when it has been instructed to telephone the headend by the Micro-ACS computer. The unit fits beneath or behind the 5503-VIP and requires no adjustments.

For more information, contact Bonnie Bratby, (214) 438-7691.

Zenith Electronics

Zenith now offers the broadest range of IPPV options to the cable industry including: the new PM-Pulse, a two-way store-and-forward system; Phonevision, Zenith's telephone Automatic Number Identification (ANI) system; and Z-View, which upgrades the Z-TAC to a two-way system.

PM-Pulse is a store-and-forward system that enables subscribers to place an IPPV order moments before the event by entering a code on the PM decoder's remote control unit. Unscrambling occurs immediately. The program-ordering data is stored in the decoder's microprocessor, which is signaled by the headend at a rate of 100,000 per hour to transmit the encrypted ordering data to the operator's billing system.

All PM decoders feature built-in store-and-forward capability. PM-Pulse is one option for data retrieval. For PM decoders without the Pulse circuitry, operators can still offer impulse PPV to their subscribers.

Also from Zenith, Z-View permits Z-TAC to act as a two-way system capable of impulse ordering of PPV programs. Z-VIEW can be installed by the subscriber by connecting it to their Z-TAC decoder. Events then can be ordered via the set-top unit or the remote control device.

For more information on the IPPV options available from Zenith, contact Vito Brugliera, (312) 699-2110.

—Lesley Dyson

A·N·N·O·U·N·C·I·N·G

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Reader Service Number 45

If you measure a pole span 10 or 20 or 100 times, you will almost certainly record a series of different values.

Continued from page 8

mental exercise. Multiplying 2 by 7.2 is easy; but properly placing the decimal point when using a slide rule to multiply 0.0014 percent by 349.24 MHz takes a little more effort (the answer is: 4.89 kHz; not 4.889360 kHz). Computers and calculators (almost) always do exactly what you tell them. It is a wise person who checks the answers with a rough mental calculation. One might check the foregoing calculation this way; 1 percent of 350 MHz is 3.5 MHz; one one-thousandth of 1 percent would be 0.0035 MHz, or 3.5 kHz. The tolerance of 0.0014 percent should be slightly higher. Thus, 4.89 kHz is a reasonable answer. If you simply multiplied 349.24 by 0.0014 in your calculator, you would get 0.4889360 MHz. This is obviously an incorrect answer, because the "percent" was ignored. Even computers and calculators need to be checked for incorrect input (gigo; garbage in, garbage out).

Consider another example. The fundamental frequency for HRC systems, as specified by FCC, is 6.00300 MHz, plus or minus 1 Hz. That number has 7 significant figures. Even the zeros are significant. The authorized frequency is between 6.000299 and 6.000301 MHz. If you dropped the zeros at the end, the number 6.0003 would have only 5 significant figures, indicating a frequency between 6.00025 and 6.00035 MHz; a tolerance of ± 50 Hz.

Ciphers following the decimal are sometimes significant. 6.000 is not the same as 6 MHz, or even 6.0 MHz. 6.000 MHz means a frequency between 5.9995 and 6.0005 MHz. 6 MHz is between 5.5 and 6.5 MHz. The final significant digit means that the value is closer to that digit than to the next lower or higher digit.

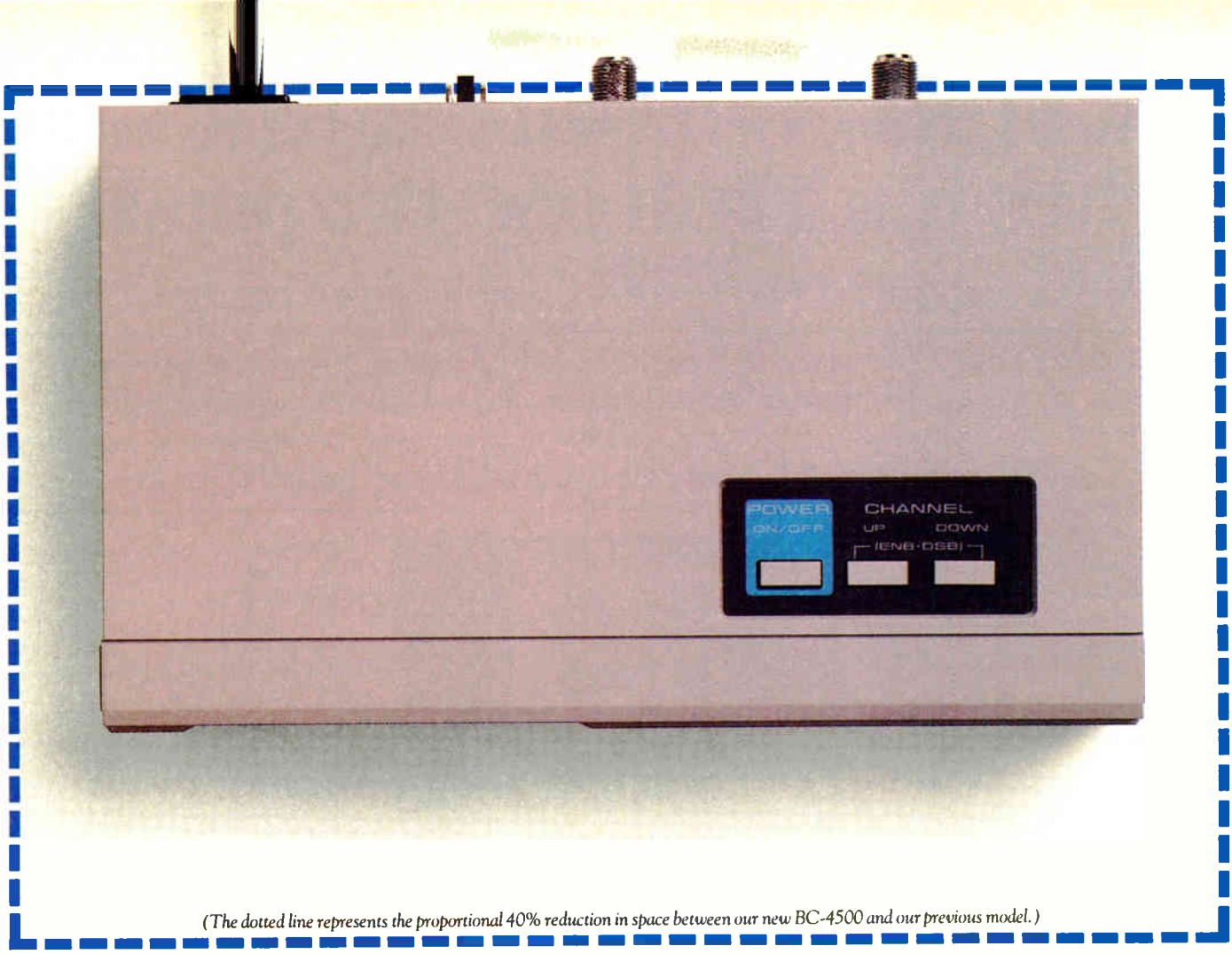
Incidentally, whenever you write a number less than one, it is a good idea to write a zero to the left of the decimal. It is not as easy to make mistakes if the number is written "0.53872" rather than ".53872." Was that spot ahead of the first digit only a fly-speck, or an imperfection in the paper, or is it a decimal? If the decimal did not print (on the computer print-out or copier), you may wonder why it reads 53872 instead of a number approximately equal to 1/2.

If you measure a pole span 10 or 20 or 100 times, you will almost certainly record a series of different values. If you then list the different measurements in order of length and throw out the lowest 25 percent (quartile) and the highest 25 percent (quartile) you will then have a range of values around the average (mean) that is professionally designated the "probable error." This may be expressed in terms of plus or minus values or percentages around the average. It means that you could expect half of a series of measurements to be within the "probable error."

If you throw out the lowest and highest 5 percent, you will have a range of values encompassing 90 percent of all measurements. This range is called the "90 percent confidence limits," and means that, to the extent the variations are attributable to random measurement error and not a consistent bias of some sort, you have 90 percent confidence that the true value lies between the stated limits.

Opinion poll reports sometimes indicate a "sample error" of 3 or 4 or 5 percentage points. If the persons interviewed represent a truly random sample of all persons in a particular category, then the "sampling error" usually means 95 percent confidence that if all members of the designated category were interviewed, the results would agree with the sampling results within the stated "sampling error." A truly random sample means that every person in the category is equally likely to be selected for the sample.

It is sometimes useful to make confidence level judgments without the luxury of statistical sampling procedures and measurements. After making a measurement or calculation, experience may suggest that the actual value is about as likely to be within certain limits of the calculated or measured value, as outside. Those limits would be called the "probable error." If there are limits beyond which the actual value is not at all likely to go, those limits may be expressed as 90 percent or 95 percent confidence limits. The only matters in which 100 percent certainty, or confidence, exists are death, taxes, and the operation of Murphy's Law (if anything can go wrong, it will!). ■



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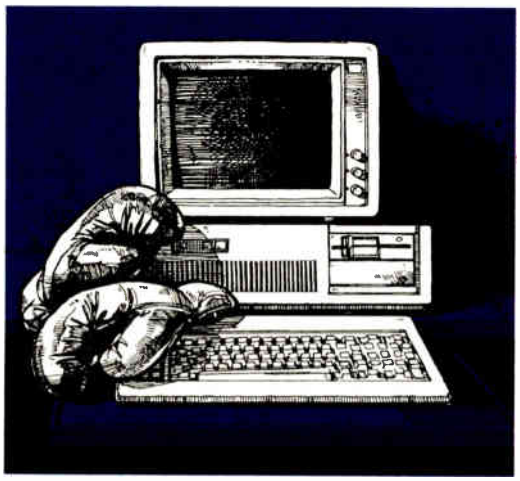

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Imposition of A/B switch installation will result in reduced levels of service.

Continued from page 35

specifications, widespread co-channel interference to non-subscribers and interference to other radio services.

5. That visible ingress co-channel interference will occur with antenna-received signals as low as -25 dBmV in roughly half of our serviced TV sets. In other words, virtually all signals of usable signal strength will cause picture impairment to subscribers trying to view cable signals.

6. That even average drop level installations may cause co-channel interference to nearby non-subscribers viewing stations near their grade B signal limits unless the subscriber has a highly shielded coaxial installation.

Summary and technical proposal

An analysis of the isolation required to maintain high quality subscriber reception and acceptable levels of signal leakage shows that it is inconsistent with the practically achievable results. Imposition of universal A/B switch installation will result in a reduced level of service to subscribers and non-subscribers alike and the likelihood of an unmanageable interference level to other radio services, including those with direct ties to public safety.

The Commission's intent in promoting freedom of choice and diversity of programming for the viewing public is laudable. The wholesale installation of antenna switching devices, however, is inconsistent with Commission efforts to control leakage of cable signals.

We have doubts that it is possible to keep the incidence of wiring errors and equipment failures to an acceptable level. If switches must be installed, however, we would suggest the following:

1. That all equipment that may be attached to a cable system be required to meet the signal leakage requirements of Part 76.605(a)(11). The Commission has before it now the *Further Notice of Proposed Rulemaking* in Gen. Docket No. 85-301 which specifically addresses that subject.

2. That cable operators be required to offer to install antenna selector switches at cost on all new installations if the equipment meets the criteria above and if the customer's antenna is equip-ped with a 75 ohm coaxial downlead of a quality at least equivalent to one of the medium CATV grades.

3. That all switches used for antenna selection, whether built into consumer equipment or external accessories, be required to meet an isolation specification of 80 dB from 54-550 MHz. Such switches should be provided with coaxial connections only (to discourage installations in which external coupling limits the effective switch isolation.)

4. In recognition of their lower radiating efficiencies and shorter feedlines, that "rabbit ear" antennas be allowed to be connected to switches as an alternative to external antennas with shielded transmission lines.

5. That cable operators inform existing subscribers of the availability and reasons for using selector switches and install them on request and for reasonable fees provided that the customer's equipment and antenna meet the same requirements as for a new installation.

This will assure that the Commission's goals for diversity are met without causing degraded reception for any viewers or undesirable interference levels, at least at initial installation.

While it is hoped that professional installation of antenna selector switches on well-shielded equipment will result in a manageable leakage situation, we would recommend that the Commission continue to review consumer antenna leakage to detect any dangerous increases resulting from the new switch installation.

David Large is vice president, engineering for Gill Cable TV, San Jose, Calif.

The foregoing was prepared by me. To the extent that it relies on experimental data, that data was taken by persons under my direction.

[1]Amendment of Part 76 of the Commission's Rules Concerning Carriage of Televisoion Broadcast Signals by Cable Television Systems, MM Docket No.

We have doubts that it is possible to keep the incidence of wiring errors to an acceptable level.

85-349 Released: November 28, 1986.

[2]The exact meaning of this specification is not clear in a broad-spectrum application. I have assumed for this analysis that the maximum voltage specification applies to each individual carrier rather than to the total rms voltage at the antenna feedline.

[3]Frederick Terman, *Electronic and Radio Engineering*, 1955

[4]The rationale for this is discussed in the *Final Report to the Federal Communications Commission* by the Advisory Committee on Signal Leakage and is based on the random phasing of received signals.

[5]As a check on the above calculations, we can use equation [2] and assume all radiated power is fed to one antenna and calculate the distance required to create a field of 1 V/m:

$D = (137.6/E)\ P$ where P

$= (4.22 \times 10^{-5})(5.5)$

$= 2.29 \times 10^{-4}$ mW

= 2.08 miles or roughly half the system radius, a very reasonable result.

[6]In urban areas such as San Francisco, levels as high as +40 dBmV are not uncommon.

[7]Given that the measured signal from a dipole is V(uuV) = E(V/m)/.021F(MHz), we can calculate the total path loss between two subscriber antennas as: Loss(dB) = $10 \log(1750D^2F^2) - G_1 - G_2$ where D is the distance in miles, F is the frequency in MHz and G_1 and G_2 are the antenna gains in dB. Thus the total path loss for two 10 dB gain antennas facing each other at 100 feet distance is only 12.9 dB at channel 2!

[8]In the case of Gillcable, it has been standard practice for several years to use 300 ohm terminals when available (even if that requires two baluns) in order to reduce the shock hazard to our employees and customers in the event of an electrical failure in the set. The result is that very few sets in the Gill system are installed without matching transformers.

[9]Calculated by assuming dipole efficiency radiation in the vertical direction for half of the serviced sets. To the extent that rooftop antennas with significant gain are in use, the vertical radiation will presumedly be less; on the other hand, since a significant majority of off-air programming watched originates from a single point in San Francisco (Sutro tower contains all three networks and the leading independent station), an even higher field strength may occur in the air over the Northern part of the system. ■

Advertisers' Index

Jack be nimble...

Jumping candlesticks is a trick many companies in CATV are learning these days as once sizzling markets cool off. Growth, even survival, now depends on the ability to find new markets and restructure product lines. It's one of the toughest assignments a company can ever have. Ask Videophile, the Denver-based local area network firm. Founded in 1980 primarily to install satellite receive equipment for videoconferencing, Videophile in 1985 began to cast about for new markets as dish installations clearly had slowed. Quickly—Videophile's last dish project ended in mid-1986—the company settled on local area network installation, initially broadband, now any medium.

Videophile now has three divisions, offering system design (using a CAD/CAM system), installation and system maintenance, and consulting. The company's past jobs include 6-, 8- and 17-story Mountain Bell facilities in Salt Lake City, Fitzsimmons Army Post extension in Denver, and the Mountain Bell Zuni Street extension and training center in Denver, among others.

Many companies with experience in CATV construction or installation also are thinking about the LAN business. So what makes Videophile different?

When its initial business started south, Videophile deftly sidestepped into the LAN arena.

"We don't subcontract anything," says company Vice President Stephen Barber. "It's crucial in this business to maintain quality and you can't do that unless you control the jobs closely." At first glance, this might not seem so critical. But customers who've had LANs installed, as International Thomson Communications, the parent of *CED*, recently did, have occasionally found out first-hand that even a contract installer with a good reputation can run into problems when it goes to subcontractors. In ITCI's case, Videophile was called in to correct a subcontractor's mistakes.

Customer consciousness and aesthetics are two additional important concerns. "Even if an installer has lots of experience, we won't hire him if he's unsightly or abusive," Barber says. "You just can't afford sloppy people in direct contact with the customer. We look for people with good personalities, who can think, who are reasonably presentable." Of course, they also need to know splicing, how to use a SAM III and conduct a sweep. Preferably, they've also got knowledge of construction.

Above-average wages are the reward, however. Right now, Videophile has 11 full-time employees, all based in Denver. Because it never was a heavy construction company, Videophile probably found it easier to adopt a strong emphasis on cosmetics—from cabling to amplifier boards and headend racks. The network can't look like it is meant to be hung from poles. "When two cables come out of the ceiling, for example, they ought to look like conduit," Barber says.

Videophile is a Wang Communications-approved installer and also has done a lot of work for Sytek, the Mountain View, Calif., supplier of broadband LANs. The Fitzsimmons job was for Kee Inc., a Beltsville, Md., LAN company specializing in government jobs. In the baseband area, Videophile can handle twisted pair, patch panels, Novell networks, token ring, RS-232, anything using BNC connectors and RG-59 cabling, in fact, any kind of cabling. Barber sees a big business in Manufacturing Automation Protocol (MAP) networks, the broadband factory network standard now spearheaded by General Motors Corp. So much so that Videophile is considering opening a branch office in Ohio.

Five years down the road, the firm envisions itself as a leader in the design and installation of full turnkey LANs, although it doesn't want to be a system integrator and work with modems. It may, however, want to be manufacturing some associated products for the trunk and distribution system. Fasteners, perhaps.

The design and installation of "smart building" networks also is a company goal. Basically, Videophile would install all of the cabling needed to support power, communications and security in a building. And as it becomes feasible, the company wants to take on more maintenance jobs.

On a bit shorter time frame, Videophile is marketing a status monitoring system adapted for LANs, reading high and low pilots and monitoring the actual data transmission, not just RF levels. It should be on the market within nine months.

—Gary Kim

Pictured here, from left to right, are Tom Becker, Stephen Barber and Eric Lins of Videophile.

classifieds

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A/B switch rule to be reconsidered

Don't make out those high isolation A/B switch purchase orders just yet. The Federal Communications Commission, in a move that pleasantly surprised many commission-watchers, has agreed to hear again arguments on its recent must-carry proposal. The rule is controversial because it requires mandatory installation of A/B switches for all new CATV subscribers until 1992 and was originally set to take effect Jan. 15. But until the commission issues a final ruling, cable operators are relieved of the obligation to install the switches. It's expected that full reconsideration of the entire ruling will take two to three months at minimum, meaning it would be April—at the very earliest—before any final decision would take effect.

The commission's reaction was something of a surprise because there were early indications that the FCC was committed to the ruling. Jim Mc Kinney, FCC mass media bureau chief, said at the December Western Cable Show that the ruling was "firm and final." There was, however, also some speculation that the rule could be overturned in court. And although NCTA, CATA and the National Association of Broadcasters filed for a delay in implementation as well as reconsideration of the rules, the commission acted on its own motion in ordering the delay and reconsideration.

Earlier, we'd have guessed the rule would stick. Now, the odds have dropped to 50/50.

We made a mistake in our January issue regarding Reliable Electric's new line of Super Safe enclosures and existing line of low-profile pedestals. The Super Safe boxes, which come in 10 sizes, range from 8 by 8 by 6 inches to 18 by 24 by 8 inches. They are made of 14 guage steel and feature knockouts, but not concentric knockouts. The company's family of low-profile pedestals—the highest of which is 17 inches—is made of 16 guage steel, not 14 guage as we reported. Our apologies to Reliable Electric.

Also, we want to clarify a point about the FM Systems FMT633S stereo generator. The FMT633S generates a signal which can be read by BTSC decoders. But the actual signal format is not BTSC. The companding system, for example, isn't dbx; it's Dynamic Noise Reduction by National Semiconductor Corp. dbx uses an RMS detector; DNR uses an average detector. The FMT633S is BTSC-compatible.

For system operators looking for really low-cost, character generator only ad insertion, Abiqua International has something for you: the UB1/A controller and Atari/Cable Graphic Sciences character generator. The controller uses a DTMF four-tone sequence decoder, initiates a six to eight second delay after detection, and switches to the local ad source. Return to satellite audio and video comes with the next tone group, or after 130 seconds as a default if no tone group is detected. The generator features 120 pages of memory and 128 colors. A complete system is now available for a total price of $975. Contact Abiqua International, (800) 992-8459. Stu Rasmussen, who developed the controller, also is operations manager of Abiqua Cablevision, a 900-subscriber system in Silverton, Ore.

Getting ready for the upcoming move of Viacom Networks services to Telstar 303? Rainbow Satellite Communications has an add-on for existing dual beam feeds made by Scientific-Atlanta. The add-on makes possible reception of Galaxy I, Satcom F3R and Telstar 303. Rainbow says the modification can be made without disrupting existing service. Call (904) 326-8030.

Three reports now are available from Magnavox CATV Systems. "Report of Thermal Chamber Test Results" describes a test of a 20-amp cascade of 550 MHz gear. "Design Specifications for LAN Taps" details Magnavox tap specs. The "CONKIT/Alpha Manual" explains how to install the Magnavox CONKIT to monitor Alpha standby power supplies. Call (800) 448-5171 for copies.

—Gary Kim

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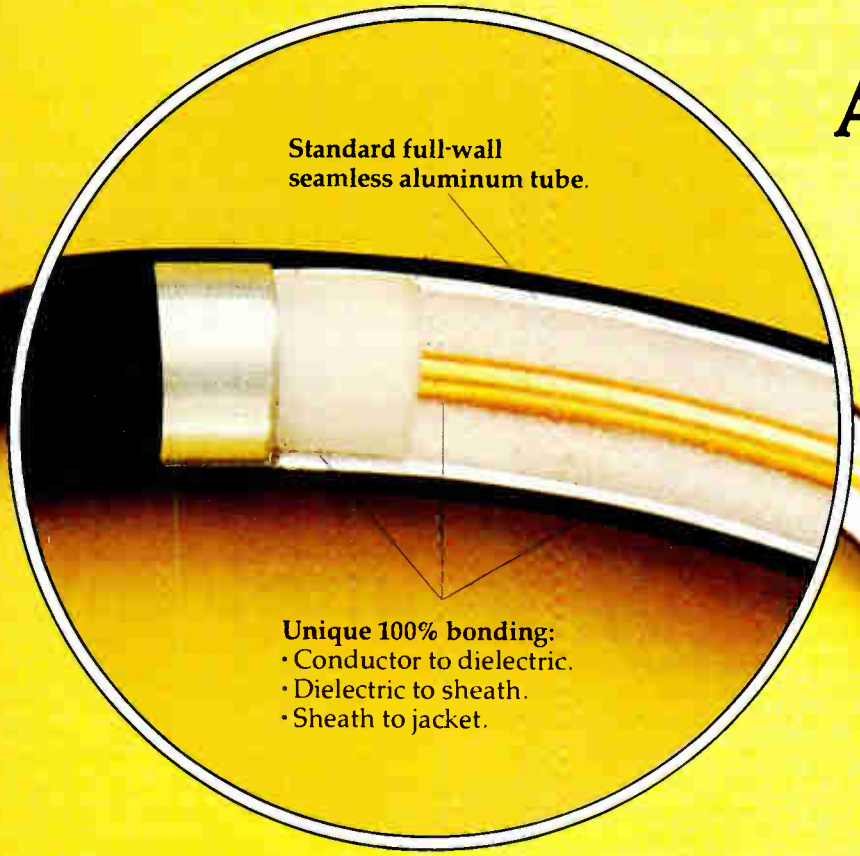

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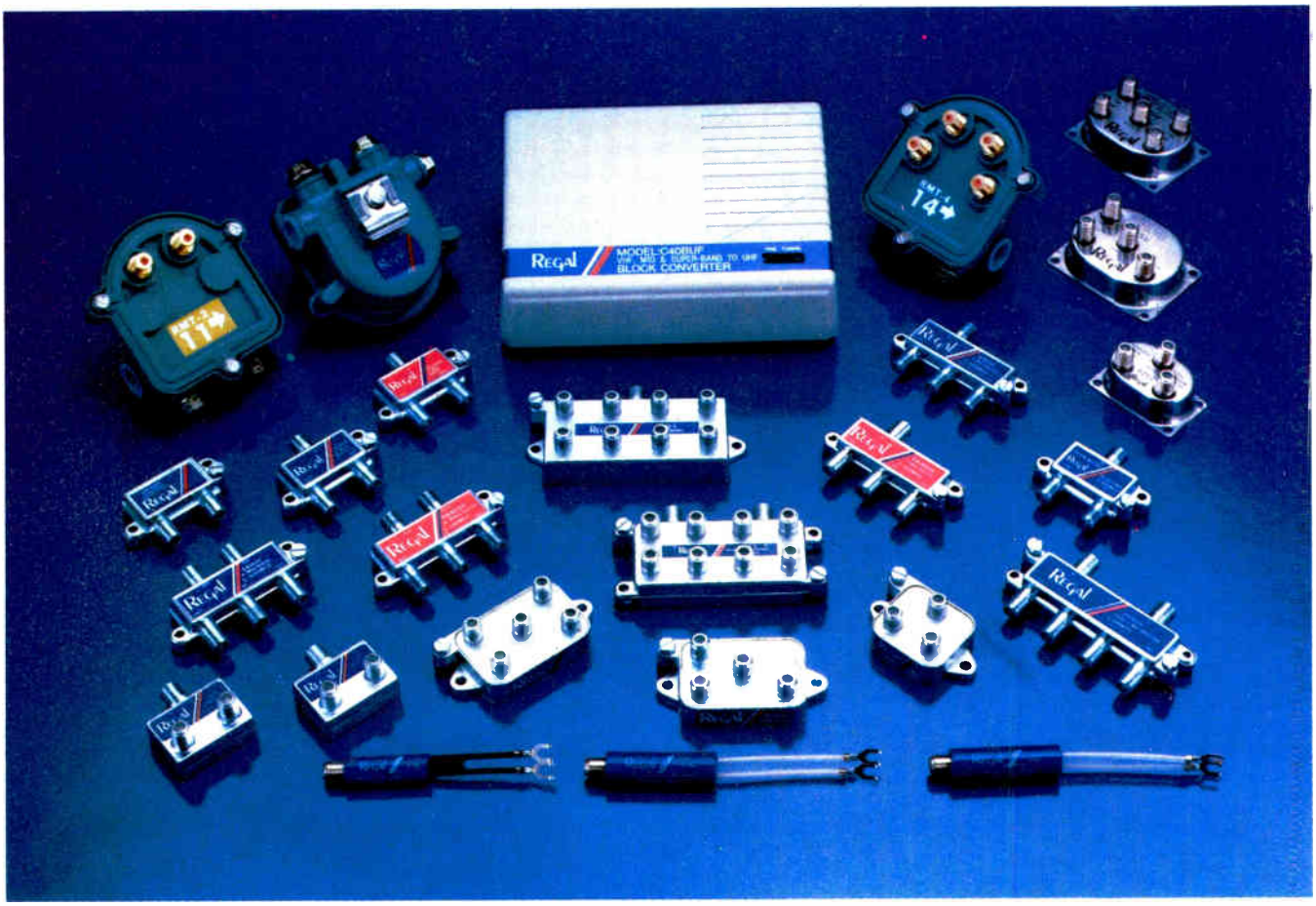

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