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January 1986

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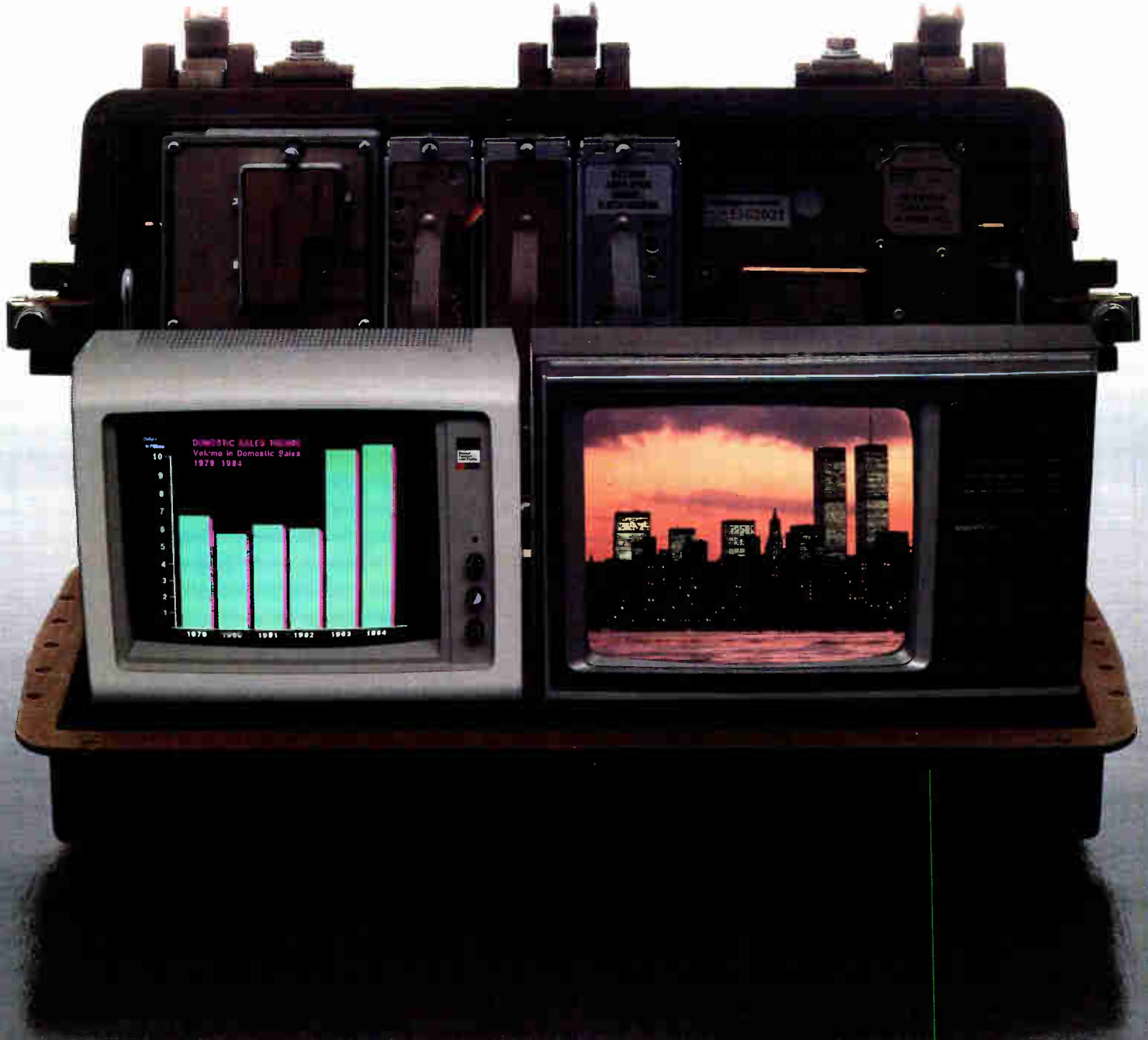

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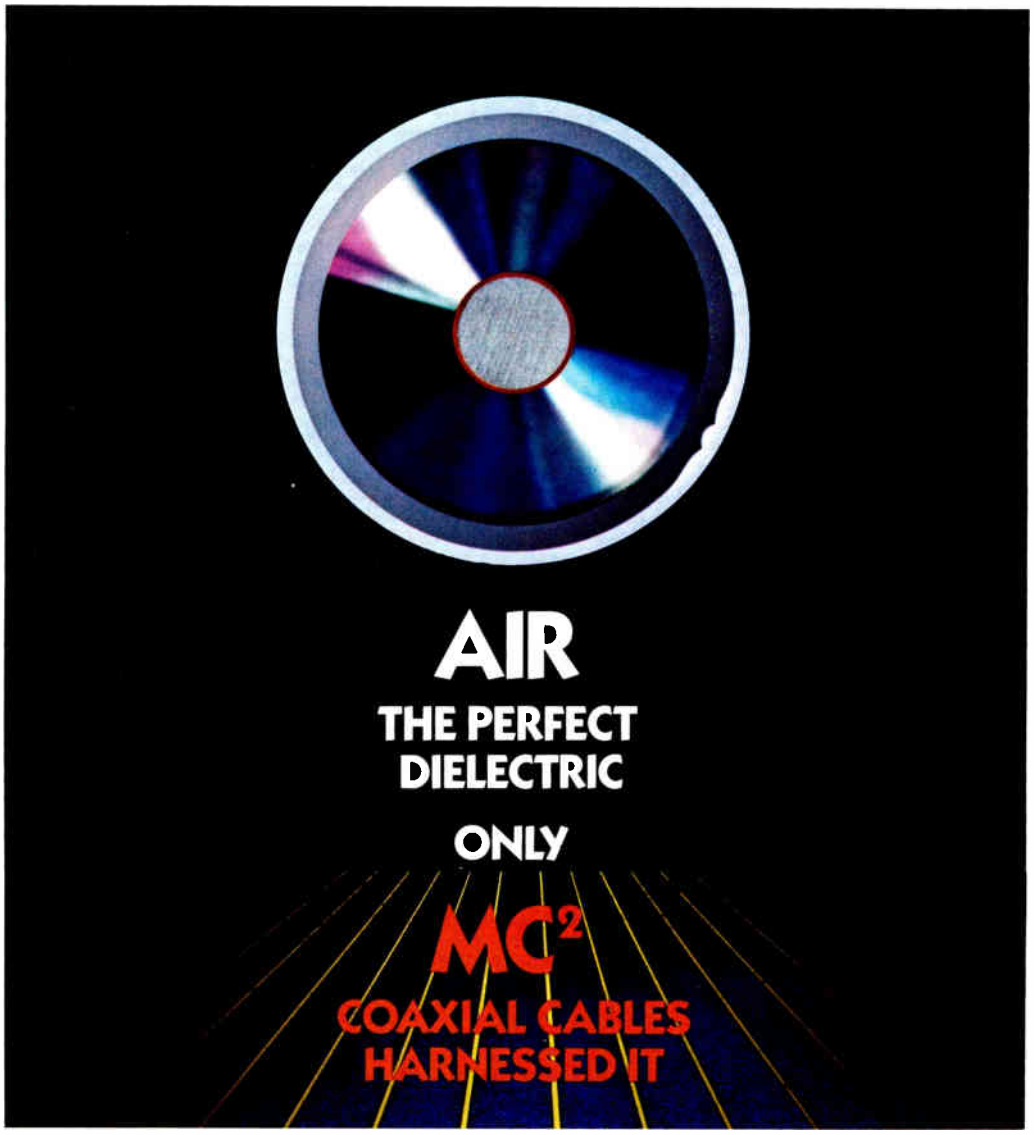

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CED™

January 1986

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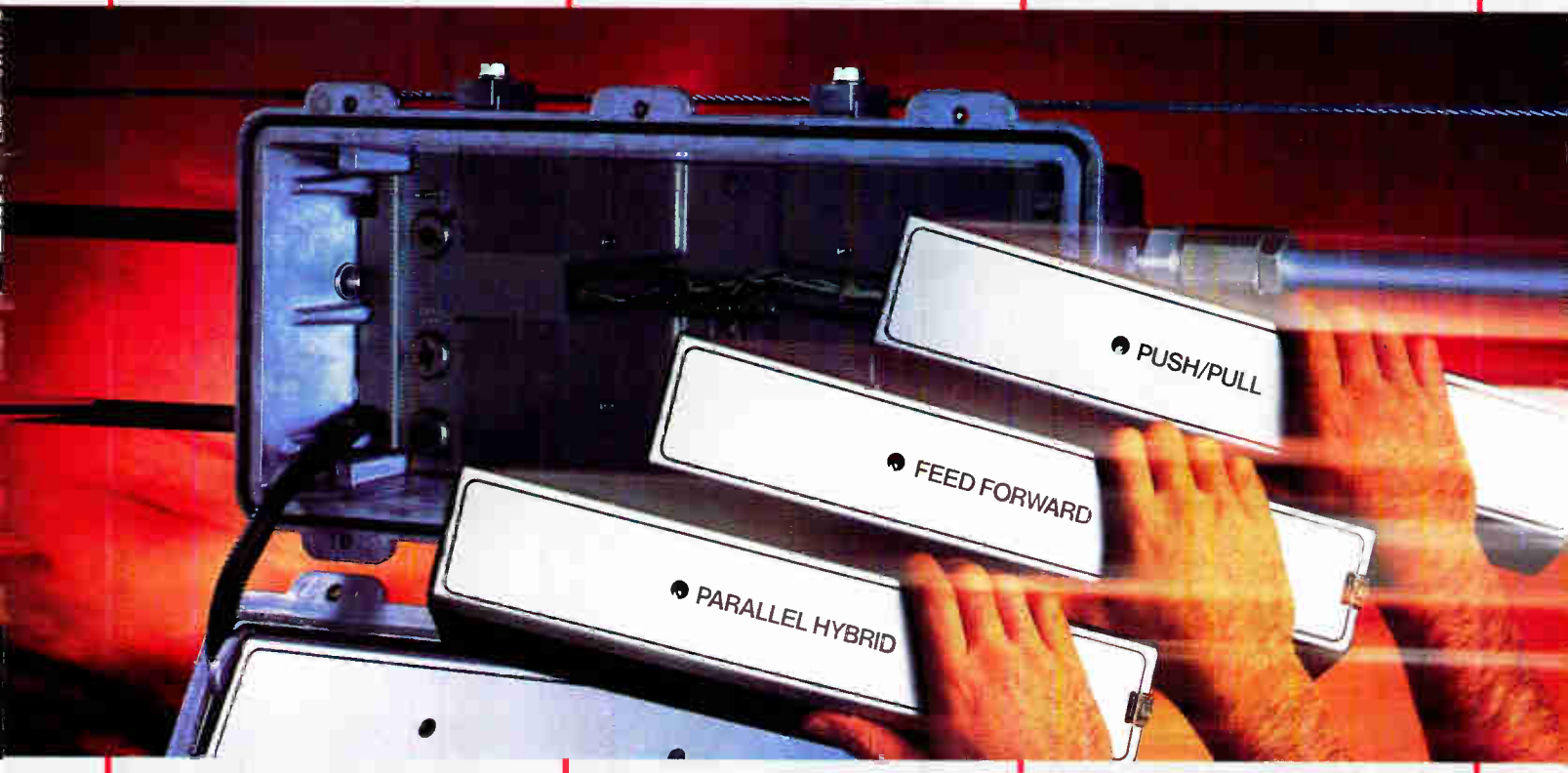

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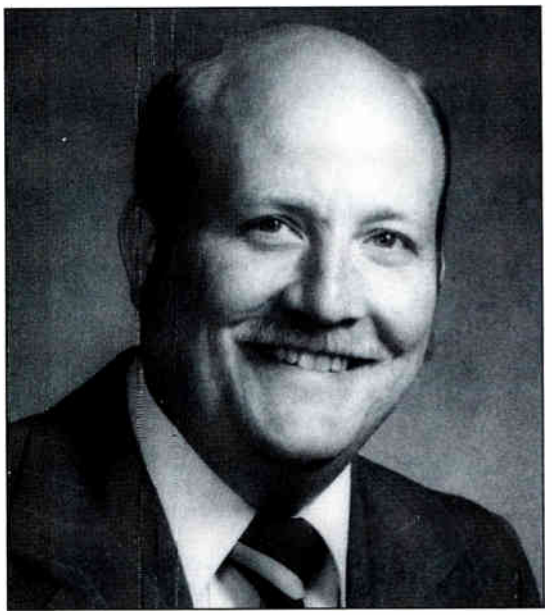

Clifford Schrock

The technology has been developed, the market is ready and the FCC's Commline decision has given the industry a qualified "go ahead." But cable operators still aren't chasing the market for data transmission over cable, says Cliff Schrock, president of Data Products at C-COR Electronics.

"By and large, cable operators are still burying their heads in the sand, saying, 'I'm not in the data business; I sell entertainment," Schrock asserts. But it is becoming obvious that entertainment television has some pretty fierce competition, with direct broadcast satellites, VCRs and video rentals.

"Five years ago, the cable industry wasn't the least bit worried about the growth of home video, and look what happened," Schrock warns. "The starting point for database services on cable is to approach people that have computers and offer them another outlet. Now, they can use their telephone and dial up a service, but that ties up their phone line, it's relatively expensive and fairly slow. Cable could make these services come up a lot faster."

There are close to 90 different database services now available in the United States. In order to access any of them by telephone, a customer must have a contract with the service. Schrock suggests that by putting the databases together in packages, cable operators could offer more utility, convenience and speed to their subscribers.

"I believe if only 10 percent of system's subscriber base took this data service, it could be economically viable," says Schrock. "There are a lot of converging technologies that will get us more comfortable with database services. It is only logical that they be available in the home on a pay-as-you-use basis. And if we don't do it, the telephone companies will. In fact, they are doing tests all the time on home transactional services."

But what about those subscribers who don't own computers? "Eventually," he predicts, "we will evolve into specialized terminals that won't intimidate homeowners. There may be a sort of keyboard on the cable's remote control unit. The set-top converter will probably look basically the same—but when you tune to a certain channel, your set becomes a computer."

The success of this type of service will depend on the number and variety of services offered. When people find out they can shop, place a classified ad, bet on the horses, throw away their phone books or make an airline reservation, their interest will grow. "And the more of these ancillary services you add, the more you start to pick up the little fringe markets. Until, finally, you reach the point where having a computer in the home is just an accepted part of life."

How much are people willing to pay for these database services? "Subscribers have a certain amount of money in their 'entertainment pockets.' If we offer database services, we are probably reaching into another 'pocket,' " one that, perhaps, not as many hands are reaching for.

Cable operators' reluctance to offer data services reminds Schrock of the initial reaction to pay cable. "At first, no operators wanted to carry HBO because they thought their customers didn't want anything like that. Then, HBO gave away 1,000 earth stations to cable operators. The next year, operators were buying earth stations like crazy. We may be on the verge of something like that happening again with the offering of database services," he warns.

Writing technical literature and flying his three antique airplanes keep Schrock busy during off-hours. So, if you ever see a World War II bomber flying close overhead, don't worry. It's just Cliff Schrock proving that all in the sky isn't blue.

—Lesley Dyson Camino

Optical and electrical power

By Archer Taylor,
Malarkey-Taylor Associates Inc.

Perhaps you have been as bewildered as I to read statements regarding fiber optics to the effect that: "One optical dB is equivalent to two electrical dBs."

As I have said on this page before, a decibel is no more and no less than the logarithmic expression for a power ratio. It makes no difference whether power is measured in watts, horsepower, Btu per minute, joules per second, lumens or whatever. The number of decibels is 10 times the logarithm of that ratio. The denominator of the ratio, or reference, may be understood or implied without being stated; and power may be defined under certain limiting conditions. But power is power, whether electrical or optical.

Although statements like the one above frequently are misleading, confusing and even mystifying, optical engineers certainly are not wrong. In spite of the seeming contradiction, there is an important physical reality which must be acknowledged in considering optical fiber systems.

In coaxial cable transmission, we are accustomed to dealing with linear power transfer devices. The carrier power out of such devices bears a constant ratio to the carrier power input. We call this constant ratio "gain" or "loss," depending on whether the device is an amplifier or an attenuator (e.g. a piece of cable). In all our experience, we assume (correctly for all practical purposes) that, at a single frequency, this gain or loss factor is constant—regardless of the power level at the input or output.

The devices that convert optical light intensity to electrical power and vice versa, sometimes called "optical transducers," are *not* linear with respect to power transfer. Optical system engineers tend to treat photodetectors as linear devices, however, because the electric current output usually is quite linear with respect to the intensity (or power) of the incident light. In fact, the photodetector actually has a square-law power transfer characteristic.

This can be shown as follows:

I = Output current of the photodetector
(OP) = Incident light intensity, or optical power
(EP) = Electrical power output of the photodetector
k = Responsivity of the photodetector; a constant characteristic of the device within the proper operating range, generally expressed in microamps per microwatt
R = Electrical load resistance, in Ohms

$$I = (EP)/R = k(OP)$$
$$(EP) = Rk^2(OP)^2$$

The power transfer characteristics of light sources are not so easily classified. The dynamic electrical load resistance of a light emitting diode (LED) is not necessarily constant, although the total instantaneous optical power output of some types is quite linear with respect to the instantaneous electrical current driving the device. Lasers (the rather strained acronym for "light amplification by stimulated emission radiation") are threshold devices whose optical power output tends to be more or less independent of the electrical current.

The square-law relationship between the electrical power output of a photodetector and the intensity (or power) of the incident light has some interesting consequences.

Suppose we couple an LED directly to a photodetector, with no fiber or losses other than the necessary coupling losses, and measure the electrical output of the photodetector in dBm. If an optical fiber, with 10 dB attenuation at a specific wavelength, were inserted between the LED and the photodetector, the optical power input to the photodetector would drop by a factor of 1/10, or -10 dB. However, the electrical power output of the photodetector would drop by a factor of $(1/10)^2$, or -20 dB.

Suppose, further, that the optical signal power at the sending end of the fiber were 0 dBm and that the optical noise power at the same point were -20 dBm. At the photodetector, the optical signal power would be -10 dBm; optical noise power, -30 dBm. The electrical signal power output of the photodetector would be 2 x (-10) + C dBm; and the electrical noise power output, 2 x (-30) + C dBm. (C is a constant involving the load resistance, responsivity and coupling loss.)

Thus, although the optical SNR is only 20 dB, the electrical SNR is 40 dB.

$$2x(-10) + C - 2x(-30) - C = 40\ dB$$

I am happy to report that optical power and electrical power still follow the same old laws of physics. The "2 for 1" decibel relationship is inherent in the square law power transfer characteristic of photodetectors. Just be careful not to mix electrical and optical power calculations or measurements without properly accounting for this fact of life. CED

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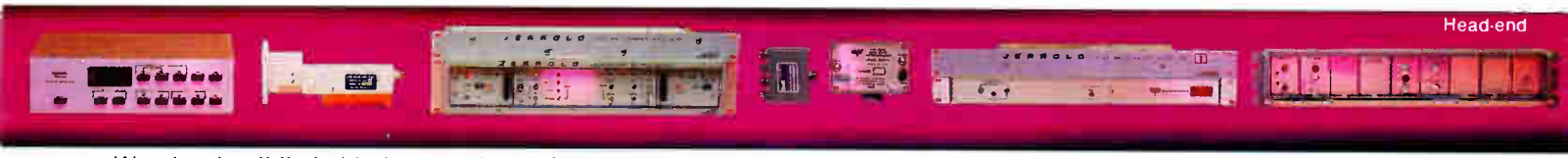

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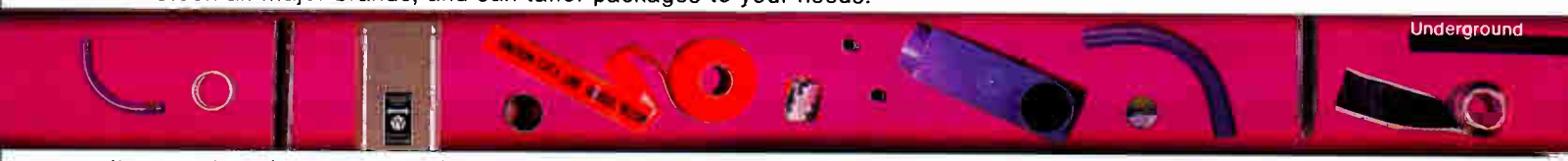

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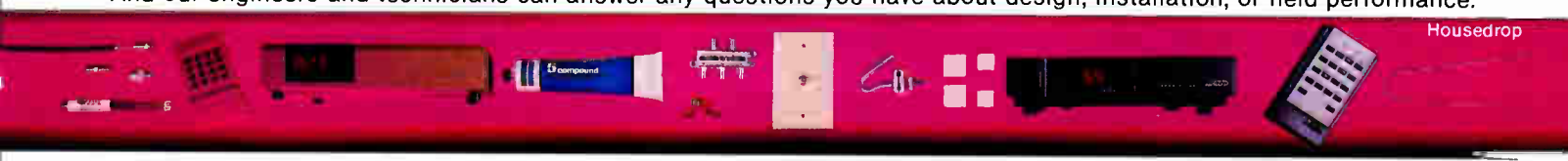

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Reader Service Number 5

Volume 12, No. 1

In Perspective

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Truth, sometimes, is windier than fiction

Being a referee and making a tough judgment call is difficult enough. Harder still, it seems, is making a call in an area like standby power for CATV, where standards of performance aren't easily set or measured. Be that as it may, we've had to make a call.

At issue is *CED*'s policy of refusing to run ads that are misleading or false. In this case, we've refused to run a particular ad with two claims in question. First is a claim of 98.5% reliability for a standby power supply. There's also an assertion of doubled battery life.

To help us, a meeting was held at the Western Cable Show, attended by: Fred Kaiser, President, Alpha Technologies; Tom Hunter, President, Data Transmission Devices; Marty de Alminana, Western Regional Sales Engineer, Lectro; Michael Filkins, General Manager, Lectro; Edward Harmon, Director of Marketing/Power Products, C-COR; Werner Krajicek, Cable Power; Charles Evans, President, Triple Crown Electronics; John James, Director of Engineering, Teledyne Battery Products; James Trenter, Test and Evaluation Lab Supervisor, GNB Batteries; Stan Johnson, Control Technology; John Dawson, Director of Engineering, Mile Hi Cablevision; Jay Staiger and Al Manchetti representing Magnavox.

The meeting lasted over two hours and had a single objective: to clarify the basis for each of the two claims in question.

What was never in question, never alleged or at issue here was the performance of the particular unit within a reasonable current range of industry performance. We were not trying to determine whether the unit worked or didn't work. We weren't running laboratory or field tests.

We were simply trying to verify the accuracy of two claims made in an advertisement intended for *CED*. Advertising truthfulness, not unit performance as such, was the issue. There is a difference.

We wouldn't have objected to a claim of performance "as good as" some others in the same market. We wouldn't have been unduly worried about claims that the unit is "better than some" in the market.

What sent up the red flag was Data Transmission Devices' claim of 98.5% reliability and doubling of battery life. As our discussants suggested, it's impossible to accurately measure reliability of standby power units on the poles. And here we ran into a terminological problem. Mr. Hunter answered, when asked, that the reliability claim refers to manufacturing reliability. That is to say, 1.5% of units made are returned to the factory as defective.

We have several problems with that answer. First, we think the average reader is going to assume that the reliability claim refers to operation on the poles when normal utility power is lost. Sure, manufacturing defects is one way to look at how good a product is. But it's one thing to say an item is made well. It's another to say how well it works.

Second, even if we take manufacturing reliability as a standard, it isn't clear that all defective units are always returned to the factory. Some defects aren't discovered for a long time because of operator error, while some units are repaired at the cable system level.

On the larger issue of reliability on the poles, several speakers pointed out that factors such as user maintenance and storage of batteries would affect "reliability" —actual performance under outage conditions—more than any single design element.

Also, nobody in the room disagreed about the difficulty of getting valid measurements of reliability for this product. "Even the best two-way, status-monitored systems don't know how well the units work. It's an unknown," said de Alminana.

But the dispute over reliability—what is to be measured and how can it be measured—didn't occupy most of our discussion time. The doubling of battery life

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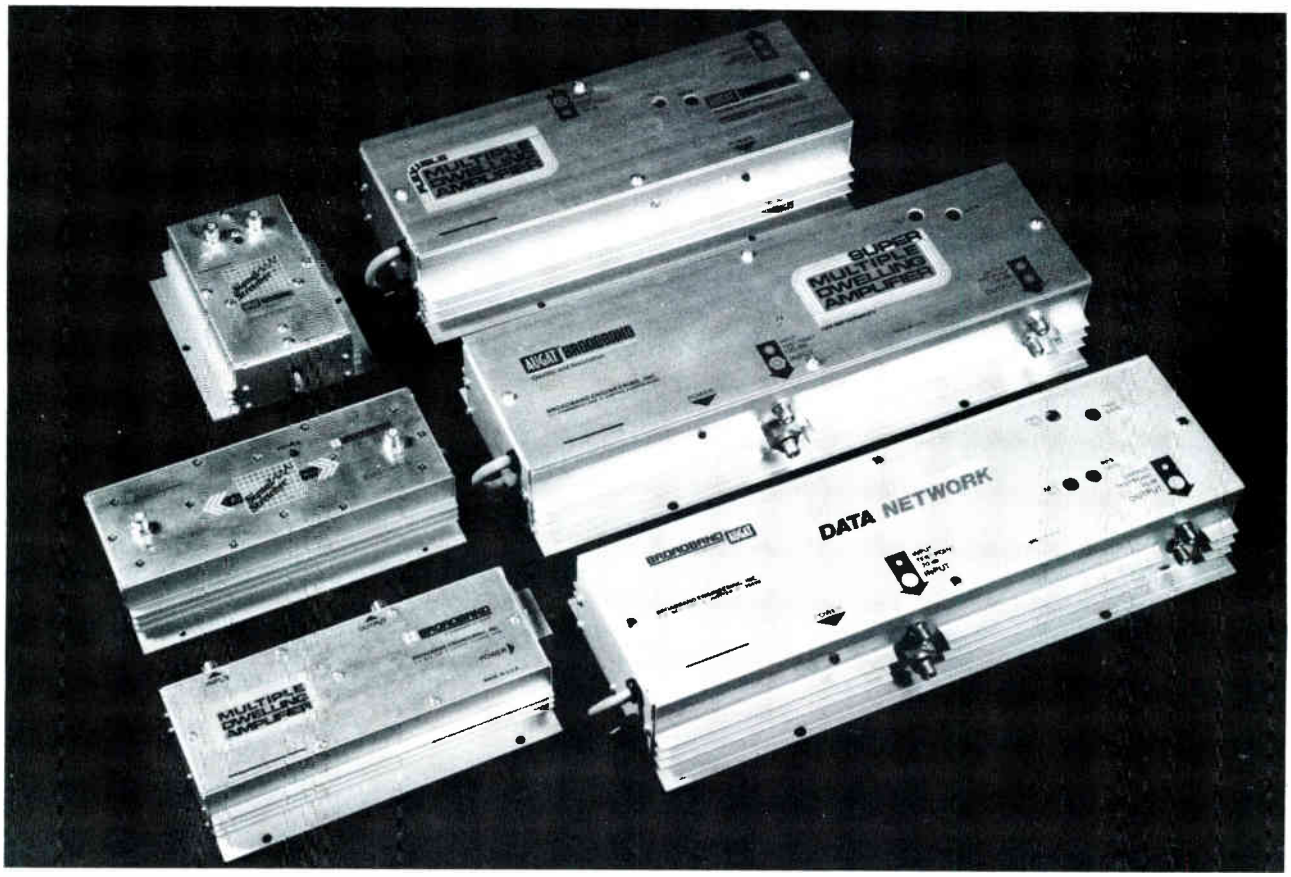

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Reader Service Number 7

Consumer electronics and cable

By Walter S. Ciciora, Ph.D.
Vice President, Research & Development
American Television & Communications

Consumer electronics is the mechanism by which subscribers experience cable service. Unfortunately, the cable/consumer electronics interface is presently confusing, complex and inconvenient. For the most part, it works against subscriber satisfaction with cable. But it doesn't have to be that way. The potential exists to make cable easy to use. If this is accomplished, the consumer electronics interface can be a powerful weapon against cable's competition.

The principal problems involving the interface of cable and consumer electronics are the "cable-ready TV" issue, VCR friendliness, BTSC stereo sound for television and remote control confusion. A "cable-ready TV" or VCR is compatible with cable if it can be connected to cable without any loss of functionality of either the cable service or the receiver's features.

There are only two requirements for compatibility. First, the receiver must be useable without the need for a converter or descrambler between it and the cable. Second, the receiver must not pick up broadcast signals directly with its internal circuits. This is called direct pick up (DPU), and the result is ghosts or interfering images on the screen. The first requirement can be satisfied if the cable system uses traps or if the subscriber is simply not interested in any of the scrambled signals. Alternatively, if a descrambler were available which plugged into the back of the TV or VCR and decoded the signals after the receiver's tuner and remote control system, true compatibility would exist.

The second requirement is met if the subscriber doesn't live close to the broadcast transmitter or if the receiver's circuits are well shielded. The subscriber who changes his mind and now wants scrambled premium signals may find that his cable-ready TV is no longer ready. Likewise, if the cable operator changes from traps to scrambling, suddenly, cable-ready TVs become incompatible. Similarly, the subscriber who had satisfactory performance from his TV and then moves closer to the transmitter may find he can only use cable with a converter ahead of his receiver. Of course, the subscriber's 35-channel cable-ready TV will be incompatible if he desires the new channels offered when the cable systems goes to 450 MHz.

Most VCRs have switches that introduce losses which reduce video quality. Additionally, most VCRs are even more susceptible to DPU than TV receivers. When the cable system employs scrambling, the subscriber needs two descramblers for maximum flexibility. This entails an extra outlet charge and is really necessary only in those rare instances of 100% scrambling. In the other cases, the cable operator must try to convince the subscriber that he is unlikely to need to record a scrambled signal while watching another scrambled signal.

Also bothersome is the fact that the VCR's timer does not control the converter's tuner. Thus, it is not possible to take advantage of the VCR's multi-event programming capability if the events are on different channels. A potential solution is the new remote controls or converters with built-in timers.

The current biggest headache is BTSC television stereo sound. The technical standard is extremely fragile, with stereo separation the first parameter to be degraded. An extreme shortage of equipment to generate and measure stereo signals has constrained cable engineers to theoretical studies and laboratory experiments. True field experience almost doesn't exist. Without measurements in the real world, we can't be sure. Best estimates are that BTSC can and will be made to work on cable; but it will be difficult, expensive—and the results will be satisfactory, but far from perfect. The only total disaster appears to be sine-wave suppressed sync scrambling. Pulse suppressed sync scrambling, the most common type of scrambling, appears to tolerate BTSC.

There is a question about the addition of sync jitter but reason to believe the problems will be minor. Old baseband boxes stop BTSC, but modification may be possible. New baseband boxes have been designed to accommodate stereo. Equipment to stereo encode satellite-delivered signals should begin to be available mid-first quarter of 1986.

A particularly unpleasant manifestation of consumer electronics difficulties is the need for several remote controls to handle products connected to cable. Help is on the horizon. Unified remote controls are becoming available which have mode switches to allow the same unit to control the TV receiver, the converter and even the VCR.

Standards

Cable must be active in the standards setting process. Generally speaking, the standards setting committees welcome constructive participation from cable representatives.

For example, the Electronic Industries Association and the NCTA have formed a Joint Engineering Committee to solve problems of common interest. A cable frequency channelization standard already has been issued, and an RF Cable Interface Standard is about to be issued. Shortly thereafter, a Decoder Interface Standard is expected. These standards will promote compatibility between cable and consumer electronics products of the future. While these standards can't solve problems with products already in subscribers' homes, they bring us closer to the day when subscribers will be able to buy electronics which will interface well with cable.

The RF Cable Interface Standard not only covers the prosaic issues of connectors and signal levels, it also deals with the controversial areas of DPU. Cable and consumer electronics representatives have struggled long and hard to reach agreement on a stiffer DPU standard which should solve 80% to 90% of DPU problems while being practical (though difficult) from a producibility standpoint.

The Decoder Interface Standard facilitates compatibility by obviating the need for a converter ahead of the receiver. The television's own tuner and remote control are used. A plug on the back of the set comes after these components and delivers scrambled signals to a decoder which returns them in clear form for display on the TV's screen. The subscriber's life is simplified, the TV retailer can promote top-of-the-line products without inviting later difficulties and the cable operator's capital investment is reduced since

Continued on page 36

VCRs: not a terminal condition

Connecting a new subscriber to a cable television system used to be a simple matter of a drop cable and a matching transformer. All of the operator's channels were carried in the clear (usually on standard VHF channels) on a single cable connecting to one television set. The FCC rules governed the quality and quantity of signals at the interface point with very little room for misinterpretation.

To put it mildly, things have changed! The cable television industry and the consumer electronics industry working independently have created a nightmare for our common customers. To mention just a few of the complications:

- Not only are cable operators using channels other than off-air channels, but three different channelizing schemes exist with ever increasing numbers of channels.
- Most operators scramble at least premium services; some scramble most or all channels.
- Some operators use more than one cable for entertainment programming.
- Premium control may be by scrambling (with or without addressability), positive or negative traps or off-premises converters.
- Converters and descramblers supplied by operators duplicate much of the cost and functions of modern television sets and render many of their features useless.

Into this already confusing scenario was introduced the VCR, whose popularity has grown so rapidly that in some systems VCR penetration is over 50% among basic subscribers. The problems for cable operators, as a result, have increased significantly:

- Since, in the usual connection, the VCR is placed just ahead of the TV, the signal loss through the VCR has become important. Some VCRs have losses in excess of 10 dB.
- VCRs have their own tuners, allowing independent selection of channels for watching and recording when connected to an antenna. If connected to the outlet of a set-top converter, however, that utility is lost.
- VCRs, in general, also have the capability for unattached recording of several programs on different channels at different times. When connected to a normal converter, however, that utility also is lost.

All of this is not to suggest that cable has nothing to offer a VCR owner. Quite to the contrary, the variety of programming (particularly commercial-free programming) that cable offers is attractive to many VCR users. Despite the technical problems, VCR penetration among cable subscribers is often higher than among non-subscribers. If cable is to remain attractive, however, it must find a way to be more customer-friendly.

Several inter-industry groups are working actively to reduce future interface problems. An EIA/NCTA Joint Committee has hammered out a comprehensive interface specification to supplement the FCC's original effort; another EIA group is defining a fundamentally different kind of premium decoder interface that could elimi-

Now subscribers can disappear for an evening and still use their VCR with Cable

Cable and VCRs. They are now trying to exist together in millions of subscribers' homes. And until now, taping cable programs with a VCR has been a costly and inconvenient chore for subscribers.

That's why we designed every BA-5000 addressable converter with a built-in VCR timer — not as an expensive add-on or ineffective timer in the remote. Even your subscribers without remotes can simply program their timer with the converter's set-top keypad.

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Call us toll-free at 800-421-6450 and we'll give you the 24 other reasons why the BA-5000 is the fastest growing addressable converter in the industry.

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Outside Ohio, 1-800-421-6450

Reader Service Number 9

nate many of the problems; and an NCTA Engineering Subcommittee is working to find ways of best dealing with currently installed consumer hardware. Many of these efforts will provide long term assistance. Meanwhile, operators will have to fend as best they can in dealing with hostile and/or confused customers.

This section of *CED* will deal with some solutions that are available today to help with those problems. The first set of solutions are the least inexpensive to install. They involve combinations of A-B switches and splitters arranged so as to restore some of the utility of VCRs and television sets. Depending upon the combination, they will allow independent selection of channels in recording and viewing, allow for direct access by the VCR or TV to unscrambled channels on the cable, allow for timed multi-channel recording sequences and allow for multi-set connections to cable and VCR.

A word or two of caution, however. First, any prospective diagram should be evaluated in terms of total signal loss to the recorder or TV. If your system levels are near 0 dBmV and a network using a four-way splitter is used, your customer will be getting snowy pictures. Second, the quality of A-B switches is paramount. In a typical situation with a cable, converter, VCR and TV, there will be three non-synchronous sources of channel 3 present. If the switches do not give at least 70 to 80 dB of isolation, co-channel bars will be visible under some conditions.

Perhaps the greatest limitation of these networks is the potential subscriber confusion. A network of several splitters and switches is not only messy, but very confusing to an untrained user. The best network for a given customer may not be the one with the greatest flexibility, but the simplest one that will suit that customer's needs.

One obvious solution to such confusion is to make the switching and splitting hardware available in a simple package. Such packages are now available on the consumer market in a wide variety of configurations. Unfortunately, many of those devices are sadly lacking in both isolation and shielding effectiveness.

Fortunately for the cable industry, there are suppliers of attractive, clearly labeled, quality switching networks in several configurations. The differences are in switching functions, in switch types (solid state versus mechanical), in losses and isolation. Amplified versions overcome the passive splitting losses—at the cost of another precious AC outlet behind the TV set and another power cord. Operators should carefully evaluate both the performance specifications and versatility of such devices.

Even integrated switching networks, however, do not answer all of the needs of the VCR/cable user. In general, for instance, such a user will still not have the ability to do a timed recording sequence involving two channels if one of them is scrambled, nor will he be able to record one scrambled channel while watching another. Finally, he likely will be faced with an array of remote controls for all of his video hardware.

The final category of solutions presented here addresses some of the residual problems not answered by switching networks. It includes devices that can cause converters to change channels on a timed schedule and a multifunction remote control that can control several pieces of video equipment.

An eventual solution to the questions of cable/consumer interfacing may be years away, if ever. Meanwhile, we hope the ideas and products that follow will make the connection a little easier for now.

David J. Large
Vice President Engineering
Gillcable

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117V apartment house amplifiers	D-501 distribution amplifier, E-417 one-way line extender
Standard 60/30VAC trunk stations for system rebuild, upgrade, expansion	T-500 series trunks, two-way in 54 to 220 MHz and up to 450 MHz pass bands. Choice of spacing
Long distance transport of signals from antenna site to hub, between hubs	Model T-063 long haul trunk station, operates at sub and low-band frequencies
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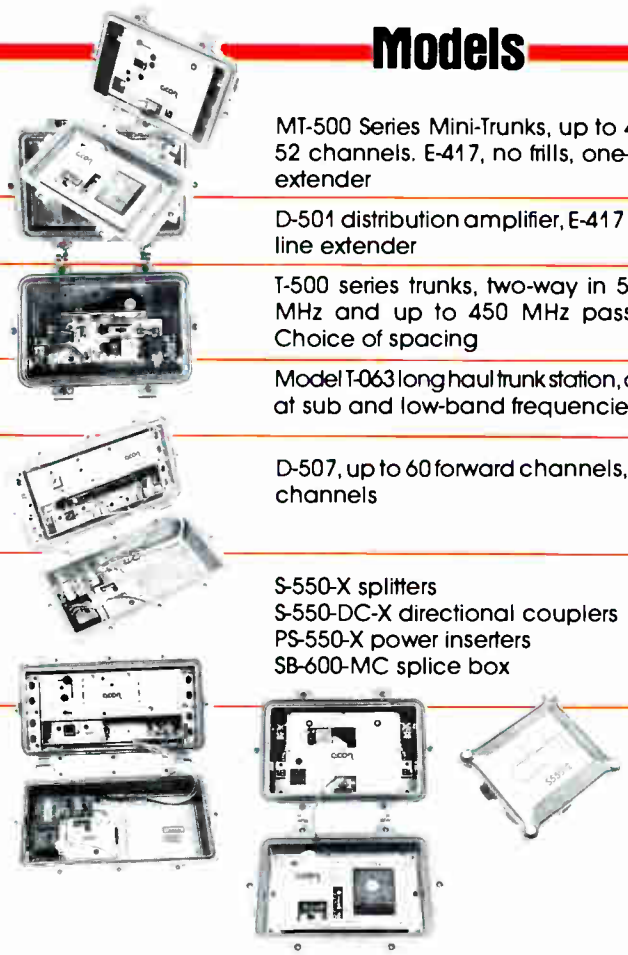
Main line passives for sub-low operation down to 5 MHz	S-550-X splitters S-550-DC-X directional couplers PS-550-X power inserters SB-600-MC splice box



These products are covered by C-COR's 3-year warranty.

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Reader Service Number 11

STOP MONKEYING WITH WIRES AND SWITCHES.

VCR & CATV. TOGETHER AT LAST.

Finally, there's a solution to VCR/CATV compatibility. It's called the Video Control Center, and it's made exclusively for the CATV industry by Qintar.

Qintar's Video Control Center will allow your customer to record a scrambled channel while at the same time be viewing an unscrambled channel (or visa versa).

The affordable Video Control Center is CATV designed to switch up to 4 Rf inputs for independent viewing/recording.

It also restores the remote control capabilities to your customer's TV set.

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Reader Service Number 12

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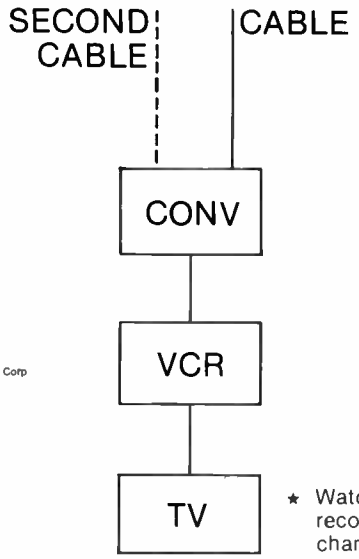
VCR/cable hook-up guide

Twenty-seven VCR/cable configurations with the viewing and recording options they provide.

Compiled by David Large, engineering vp, Gillcable; and Wendell Bailey, science and technology vp, NCTA.

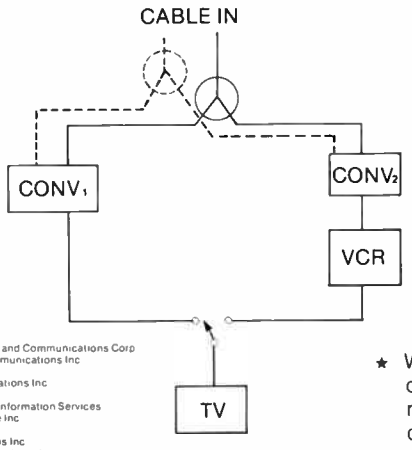
Diagram 1



Sources
American Television and Communications Corp
Comcast Cable Communications Inc
Group W Cable Inc
Heritage Communications Inc
Jones Intercable Inc
Maclean Hunter Cable TV
Media General Cable Inc
Prime Cable Corp
Rogers Cablesystems Inc
Sammons Communications Inc
Society of Cable Television Engineers
Storer Communications Inc
Superior
Times Fiber Communications Inc
Total TV Inc
Viacom Cable
Wayne

★ Watch and/or record a cable channel

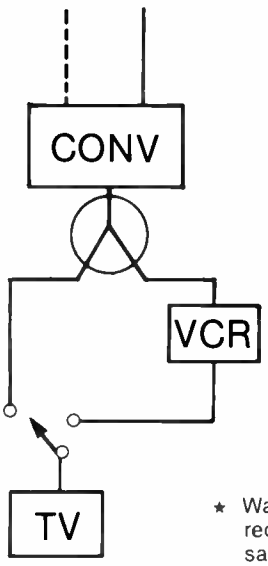
Diagram 2



Sources
American Television and Communications Corp
Comcast Cable Communications Inc
Group W Cable Inc
Heritage Communications Inc
Jones Intercable Inc
Luskin's Consumer Information Services
Media General Cable Inc
Prime Cable Corp
Rogers Cablesystems Inc
Sammons Communications Inc
Society of Cable Television Engineers
Storer Communications Inc
Superior
Times Fiber Communications Inc
Total TV Inc
Viacom Cable
Wayne

★ Watch a channel and record a different channel
★ Watch and/or record the same channel

Diagram 3

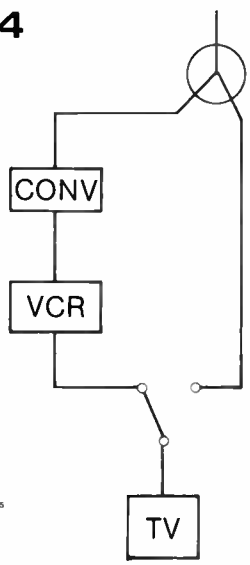


NOTE: For VCRs without bypass circuitry

Sources
Society of Cable Television Engineers
Times Fiber Communications Inc

★ Watch and/or record the same channel

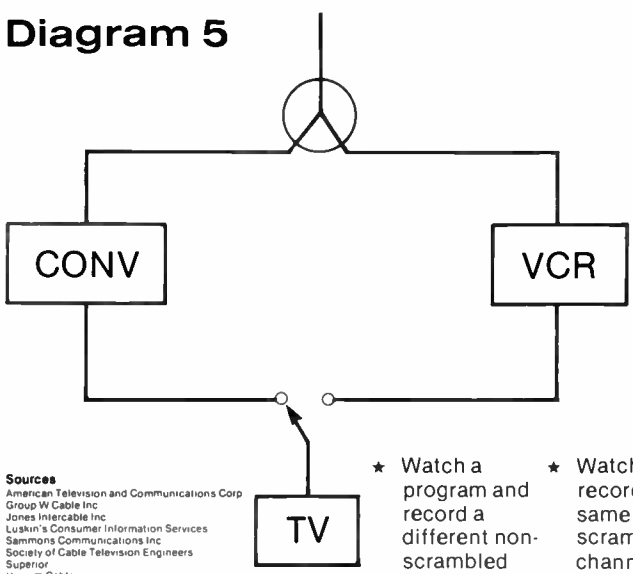
Diagram 4



Sources
Comcast Cable Communications Inc
Heritage Communications Inc
Jones Intercable Inc
Luskin's Consumer Information Services
Sammons Communications Inc
Society of Cable Television Engineers
Storer Communications Inc
Times Fiber Communications Inc
Total TV Inc
Viacom Cable

★ Watch a channel (if not scrambled) and record a different channel
★ Watch and record same channel (must use converter for channel selection)

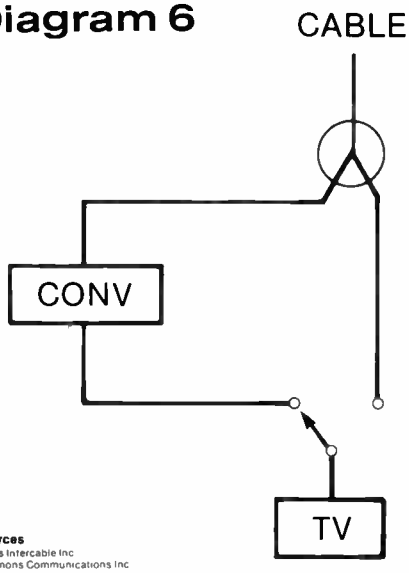
Diagram 5



Sources
American Television and Communications Corp
Group W Cable Inc
Jones Intercable Inc
Luskin's Consumer Information Services
Sammons Communications Inc
Society of Cable Television Engineers
Superior
Viacom Cable
Wayne

★ Watch a program and record a different non-scrambled channel
★ Watch and record same non-scrambled channel

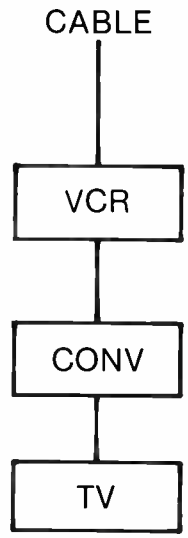
Diagram 6



- ★ Watch a non-scrambled channel using cable-ready options on TV
- ★ Watch a scrambled channel using converter for channel selection

Sources
Jones Intercable Inc
Sammons Communications Inc

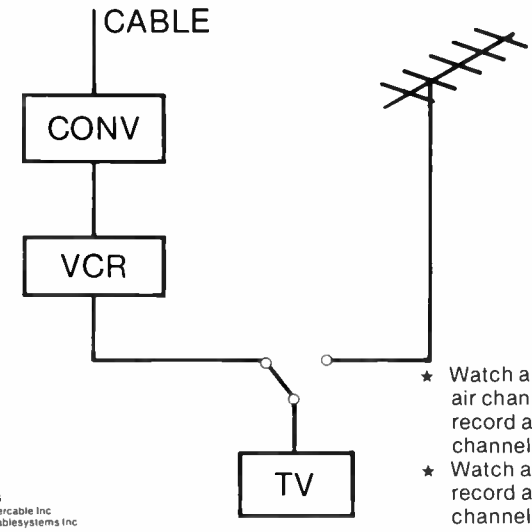
Diagram 7



- ★ Watch and record non-scrambled channels
- ★ Watch scrambled channels

Sources
American Television and Communications Corp
Comcast Cable Communications Inc
Heritage Communications Inc
Jones Intercable Inc
Society of Cable Television Engineers
United Artists Cablesystems Corp

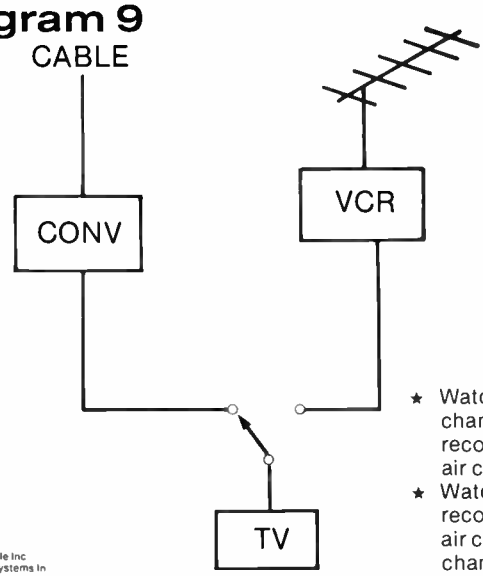
Diagram 8



- ★ Watch an off-air channel and record a cable channel
- ★ Watch and/or record a cable channel

Sources
Jones Intercable Inc
Rogers Cablesystems Inc

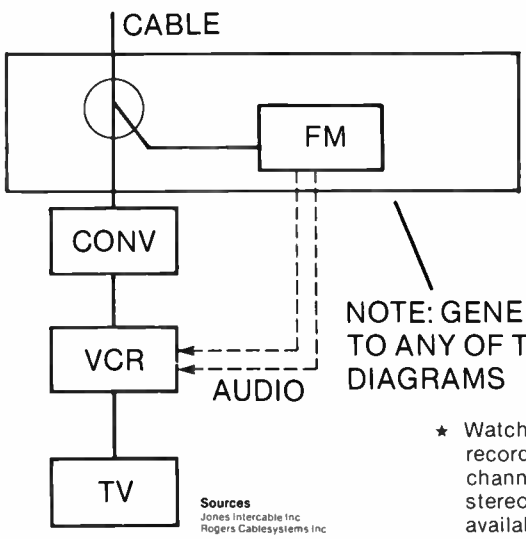
Diagram 9



- ★ Watch a cable channel and record an off-air channel
- ★ Watch and/or record an off-air cable channel

Sources
Jones Intercable Inc
Rogers Cablesystems In

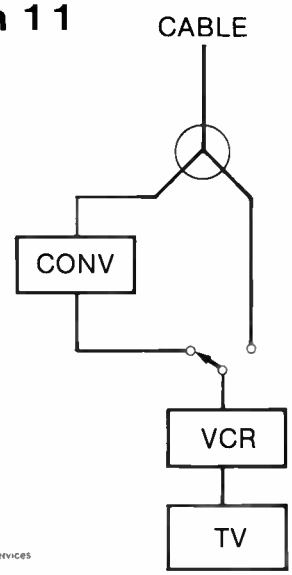
Diagram 10



- ★ Watch and/or record cable channel with stereo audio IF available

Sources
Jones Intercable Inc
Rogers Cablesystems Inc

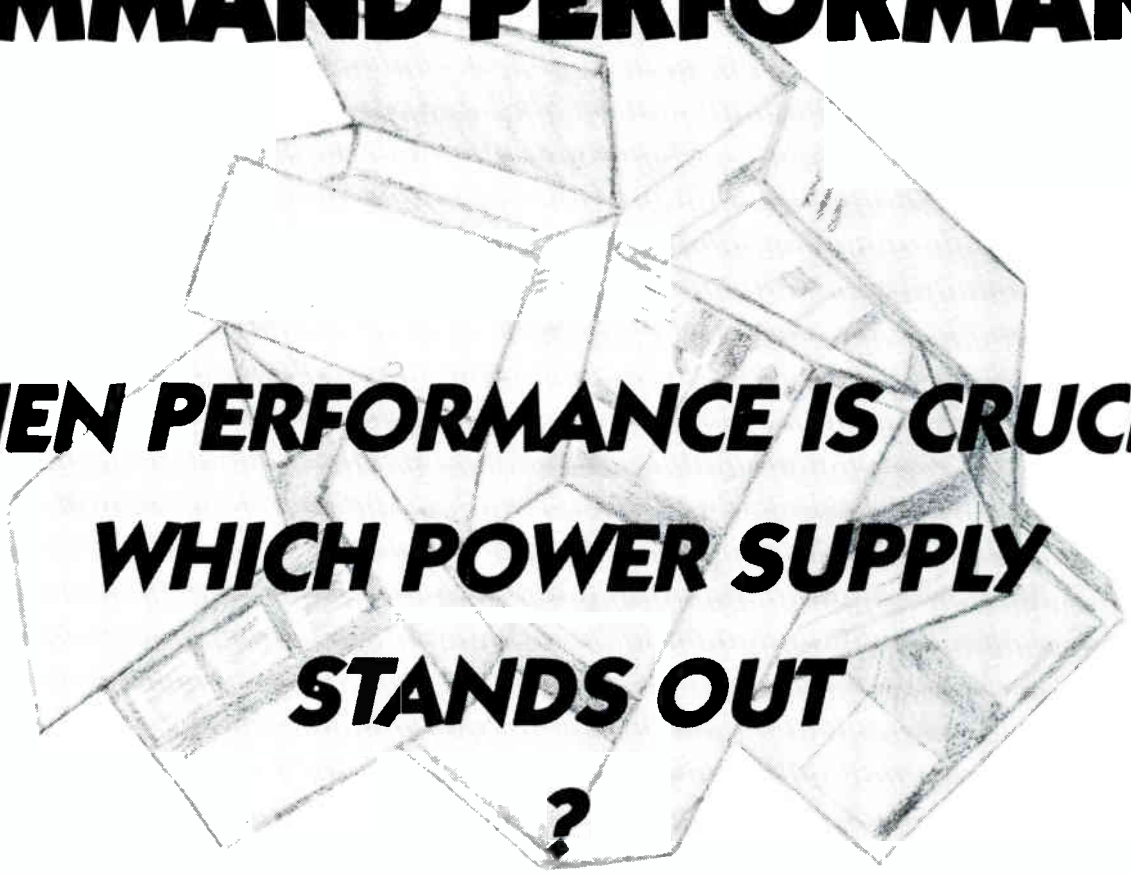
Diagram 11



- ★ Watch and/or record a non-scrambled channel using cable-ready features
- ★ Watch and/or record a cable channel

Sources
Jones Intercable Inc
Luskin's Consumer Information Services
Viacom Cable

COMMAND PERFORMANCE



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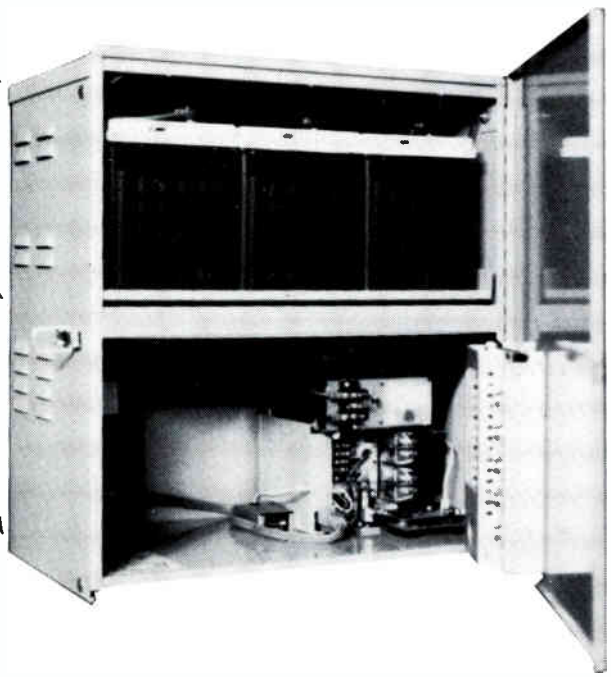

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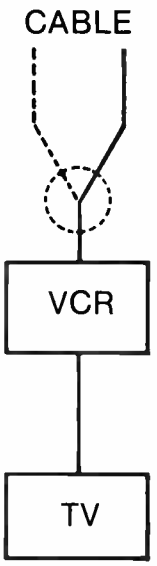
CALL CABLE POWER CUSTOMER SERVICE AT
(206) 882-2304 FOR FURTHER INFORMATION

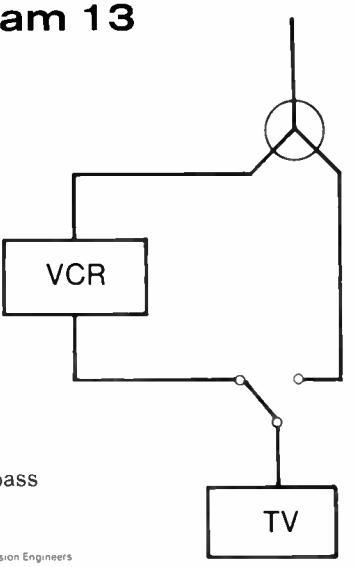
Diagram 12



★ Watch and/or record non-scrambled channel using cable-ready features

Sources
American Television and Communications Corp
Comcast Cable Communications Inc
Jones Intercable Inc
Society of Cable Television Engineers
United Artists Cablesystems Corp Viacom Cable

Diagram 13

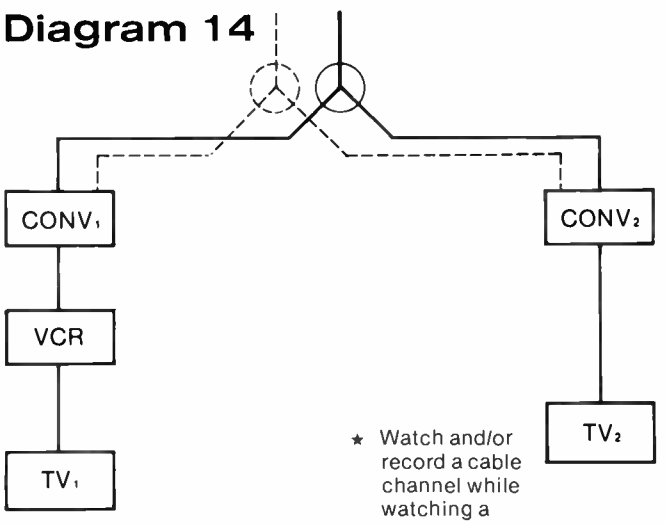


★ Watch and/or record non-scrambled cable channels using cable-ready features
★ Watch a cable channel and record a different cable channel using cable-ready features

NOTE: VCR without bypass option

Sources
Society of Cable Television Engineers
Viacom Cable

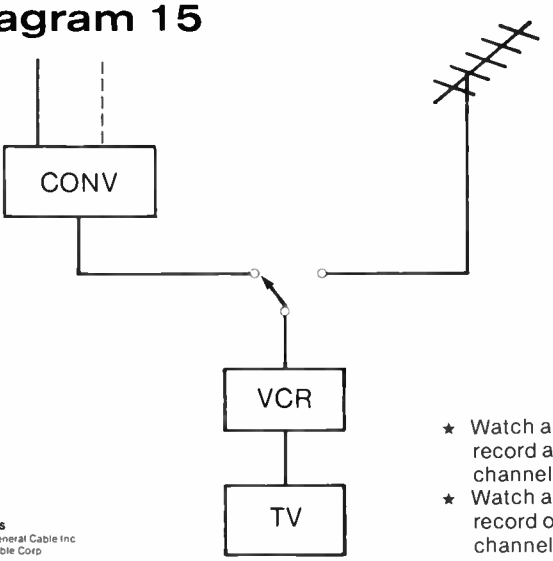
Diagram 14



★ Watch and/or record a cable channel while watching a different cable channel

Sources
Media General Cable Inc
Prime Cable Corp

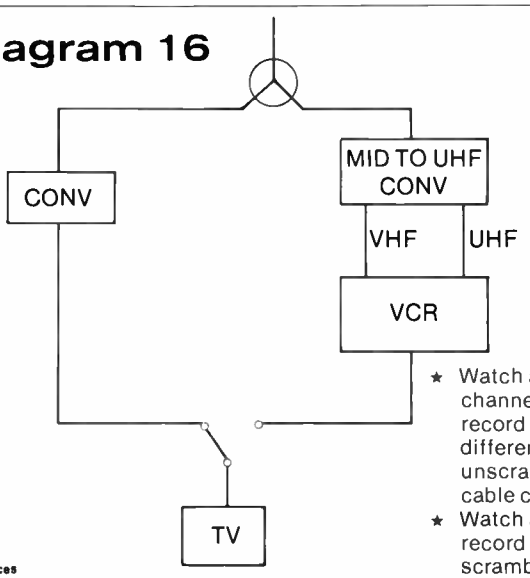
Diagram 15



★ Watch and/or record a cable channel
★ Watch and/or record off-air channel

Sources
Media General Cable Inc
Prime Cable Corp

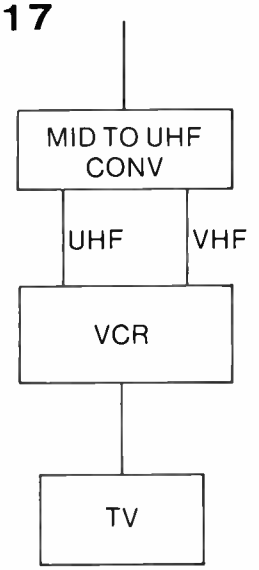
Diagram 16



★ Watch a cable channel and record a different, unscrambled cable channel
★ Watch and record a non-scrambled cable channel

Sources
Comcast Cable Communications Inc
Society of Cable Television Engineers

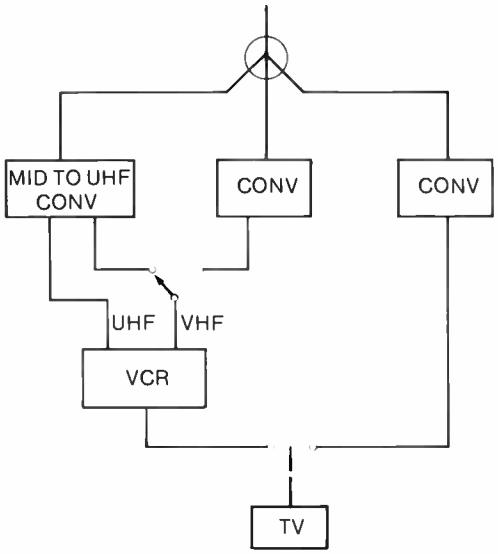
Diagram 17



★ Watch and/or record a non-scrambled cable channel

Sources
Comcast Cable Communications Inc
Society of Cable Television Engineers

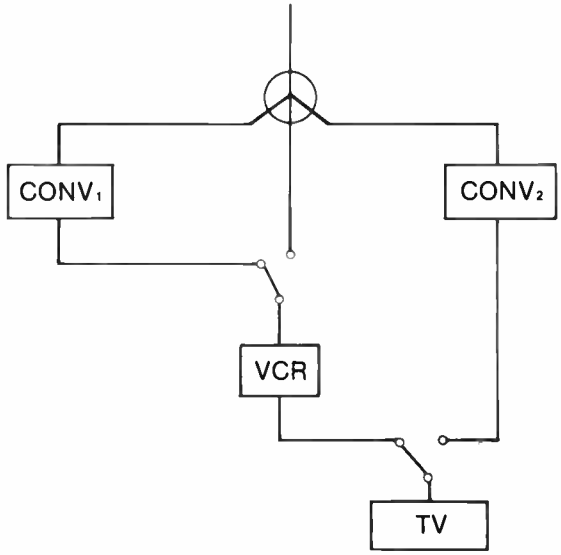
Diagram 18



★ Watch a cable channel and record a different cable channel
★ Watch and/or record a cable channel

Sources
Comcast Cable Communications Inc

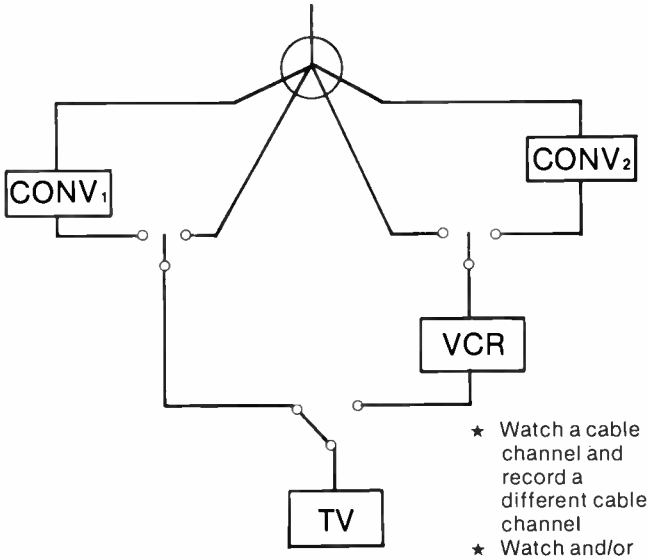
Diagram 19



★ Watch a cable channel and record a different cable channel
★ Watch and/or record a cable channel

Sources
Comcast Cable Communications Inc
Viacom Cable

Diagram 20

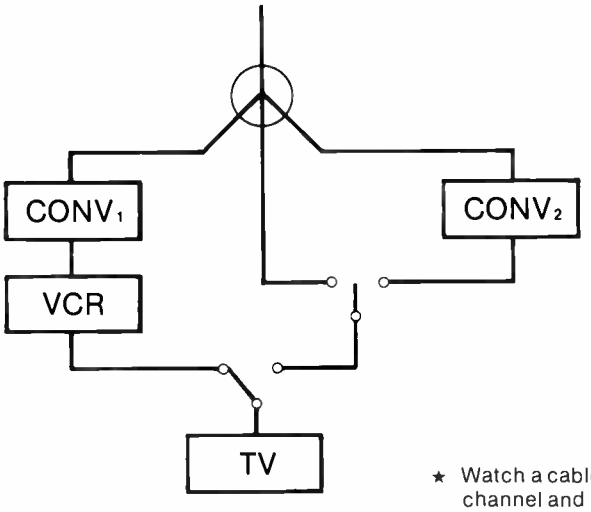


- ★ Watch a cable channel and record a different cable channel
- ★ Watch and/or record a cable channel

NOTE: Cable compatible features can be used on non-scrambled channels

Sources
Comcast Cable Communications Inc
Viacom Cable

Diagram 21



- ★ Watch a cable channel and record a different cable channel (cable compatible features can be used to watch non-scrambled channels)
- ★ Watch and/or record a cable channel

Sources
Comcast Cable Communications Inc
Viacom Cable

Scientific Atlanta

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The 8550 addressable set-top terminal is the latest in the successful Scientific-Atlanta series of CATV converters. It brings with it a well-earned reputation for superior reliability and enhanced capabilities that make it the best value in the business.

Hook up the 8550 set-top and right away you'll appreciate its worth. Its advanced microprocessor eliminates the need for a PROM and allows all programming information and authorizations to originate at the headend. As well as all *changes*. That saves on service calls and that saves money.

Addressed enabling/disabling of the remote control receiver, a function new with the 8550, adds to the savings by protecting a valuable source of revenue. Extensive self-diagnostic functions—simple codes that can isolate possible troublespots before the first service truck ever starts to roll—help reduce service expenses and save even more.

Signal security—always a concern—is virtually guaranteed with the 8550. Dynamic switched sync suppression has proven highly effective and will continue to be so in the new terminal. Furthermore, because all information, authorizations and changes are downloaded from the headend, *the* 8550 *need never be opened*. (An optional locking pin can even further enhance the physical security.)

Even if the set-top terminal is opened, internal electronic safeguards will keep the tampering from being successful. A refresh timing signal, default frequencies, even an addressed function that automatically disables illegal terminals, are all features designed into the 8550 to put a lock on signal security.

Increased security and enhanced capabilities add up to better control, system wide. And better control is better business. The 8550 from Scientific-Atlanta is very simply a superior converter. (It carries the industry's first *and only* 2-year warranty on an addressable terminal!)

To find out all the 8550 can do for you, call (404) 925-5057. Or, fill out and send in the coupon below.

Please send me more information on the 8550.

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Title_____

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City_____ State_____

Zip_____ Phone(_____)

☐ Have a sales representative contact me. **1/86 CED**

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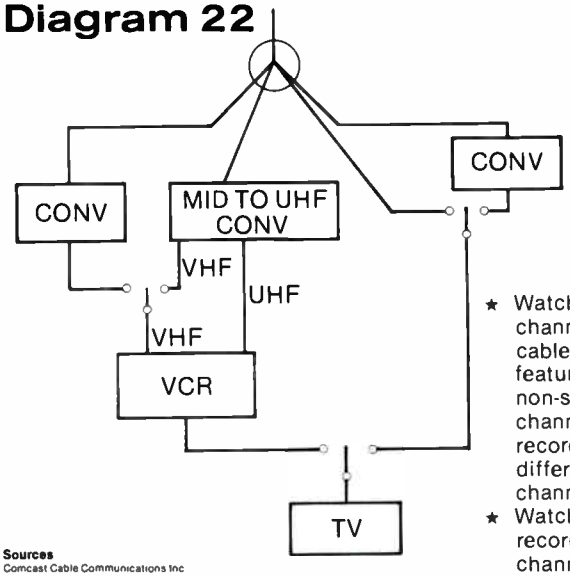
Reader Service Number 16

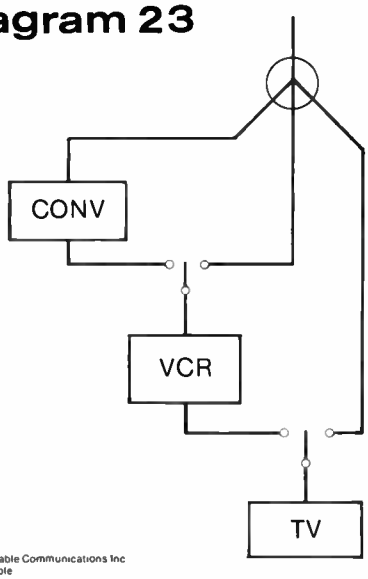
Diagram 22



★ Watch a cable channel (using cable-ready features on non-scrambled channels) and record a different channel
★ Watch and/or record a cable channel

Sources
Comcast Cable Communications Inc

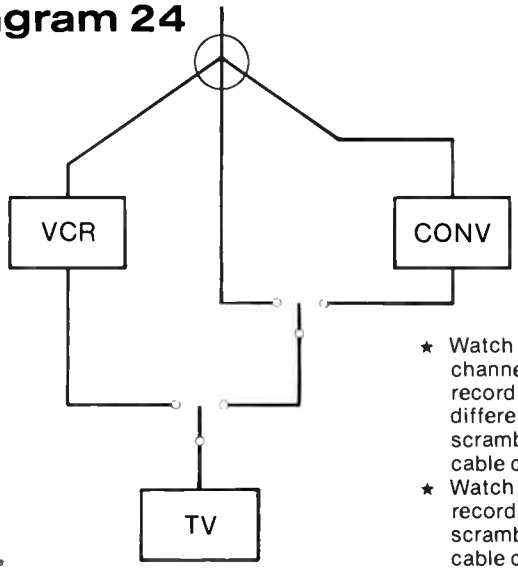
Diagram 23



★ Watch a non-scrambled cable channel using cable-compatible features and record a different channel
★ Watch and/or record a cable channel

Sources
Comcast Cable Communications Inc
Viacom Cable

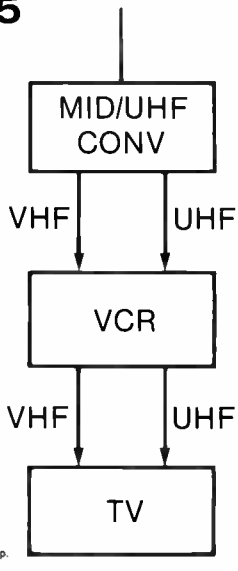
Diagram 24



★ Watch a cable channel and record a different non-scrambled cable channel
★ Watch and record a non-scrambled cable channel

Sources
Viacom Cable

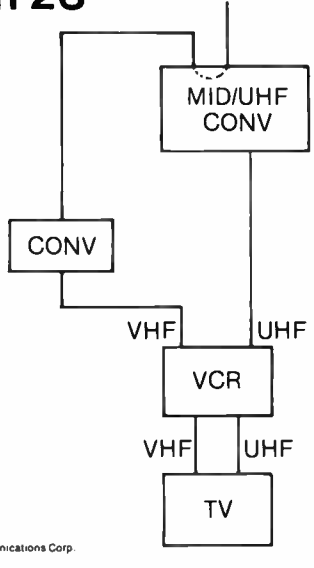
Diagram 25



★ Watch and/or record non-scrambled cable channels

Sources
American Television and Communications Corp.

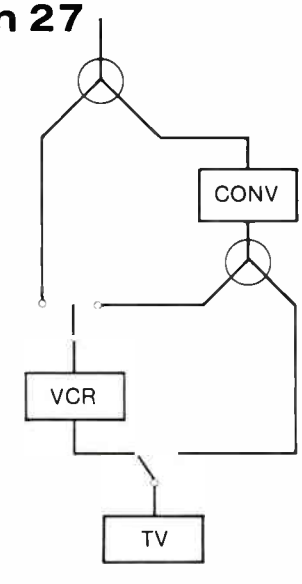
Diagram 26



★ Watch and/or record cable channels

Sources
American Television and Communications Corp.

Diagram 27



★ Watch a cable channel and record a non-scrambled cable channel
★ Watch and/or record a cable channel

Sources
Tele-Communications Inc

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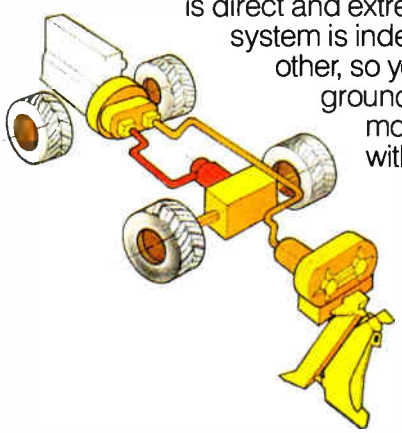
here's what you'll be missing.

Total control.

Case offers you standard dual hydrostatic drive — one to power attachments, one for ground drive. Power metering for both functions is direct and extremely precise. Each system is independent of the other, so you can vary ground speed to accommodate soil conditions without disturbing your plow or chainline speed — or vice versa.

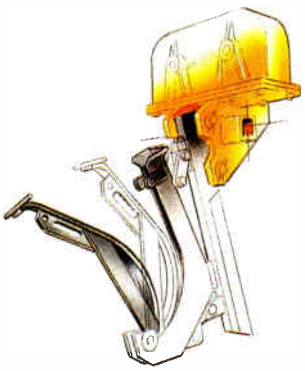


Hydraulically articulated steering lets you maneuver easily, too.

The other half of the warranty.

Most manufacturers back their trenchers with a ninety-day warranty on parts only. But the warranty on Case trenchers covers both parts *and* labor for six months. Your Case dealer also offers one-stop service.

Isolated plow vibration.



Our unique eight-point suspension and hinged drop chute with removable gate isolate vibration from the machine and cable. Service loops can be restrung without cutting or splicing. And only Case offers a front trencher, rear plow combination.

Underground versatility.

Your Case trencher is more than just a trencher with our backhoe, Hydra-borer® or cable layer attachments. Case versatility also lets you mount most of these primary tools front or back.

Maneuverability. Warranty. Faster restringing. Attachments. Four Case advantages.

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Reader Service Number 17

Remote Programmable Timers

Jerrold

The Jerrold Division of General Instrument announced an addressable converter option that permits time-controlled VCR recording of multiple cable channels.

The VCR option allows subscribers to program the STARCOM VI addressable converter to turn on and tune to specified channels for VCR recording at designated dates and times. The option permits unattended recording of up to four events over a 31-day period or up to four favorite programs on a daily basis.

In addition, a light can be plugged into an auxiliary outlet in the converter and programmed to turn on and off, providing the illusion of occupancy while subscribers are absent from home.

The timing clock parameters in the STARCOM VI VCR-compatible converter are resident in the data stream of the Jerrold AH-4 addressable control computer, requiring no action on the part of the cable operator.

For more information on the converter option, please contact Jerrold Division, General Instrument Corp., 2200 Byberry Road, Hatboro, Pa. 19040, (215) 674-4800.

Jnel Corp.

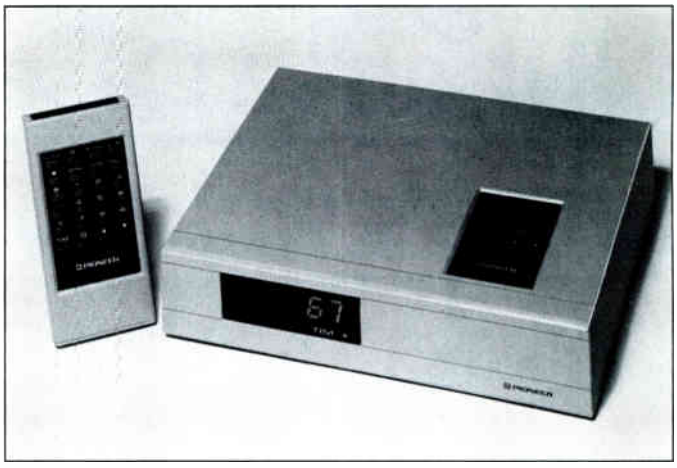
CableMaster from the Jnel Corp. permits cable subscribers to automatically record up to eight events over a 14-day period on different channels—even scrambled pay channels.

CableMaster controls converter boxes by sending infra-red commands, thereby eliminating the need for complicated, unsightly wiring. The same CableMaster unit can be used with many different converters (having infra-red remote capability) by changing one plug-in "personality" module. The retail price of the unit includes one "personality" module. Additional modules can be purchased for $29.95.

CableMaster features a quartz clock; displays week, day, time, channel and mode of operation, and requires no installation.

For more information on CableMaster, please contact Jnel Corp., 792 So. Main St., Mansfield, Mass. 02048, (617) 339-7155.

Jnel's CableMaster controls the converter with infra-red signals.



Pioneer's BA-5000 converter features a two-event VCR timer.

Oak

A programmable remote-control unit is available from Oak Industries for its Sigma line of addressable decoders. The unit allows subscribers to record up to 15 events in their absence and can be set to record programs up to one month in advance.

Oak's programmable RCU is designed to be user-friendly: A series of LEDs guides the user in selecting channel, date, time-on and time-off for each program to be recorded. If an error is made, the unit's correction function allows it to be corrected without reprogramming the entire event.

For more information about the RCU, please contact Oak Industries Inc., 16935 West Bernardo Dr., Rancho Bernardo, Calif. 92127, (619) 485-9300.

Pioneer

The BA-5000 addressable converter from Pioneer features a multi-program timer. This function enables the subscriber to record up to two events over a seven-day period or to program his television for morning wake-up and/or late night shut-off.

The converter can be programmed with the remote control unit or the converter's set-top keypad.

To ensure the timer in the converter is keeping accurate time, the headend sends out global time information that refreshes the clock approximately every 60 seconds.

The VCR timer is standard in every BA-5000 converter.

For more information on the BA-5000, please contact Pioneer Communications of America Inc., 2200 Dividend Dr., Columbus, Ohio 43228, (614) 876-0771.

Tocom

The 5503-VIP VCR-ready addressable baseband converter from Tocom comes equipped with a four-event, seven-day programmable timer for unattended VCR recording.

Tocom also offers a special VCR interconnect kit that utilizes the baseband outputs, an electronic A/B switch and a splitter. Installation of this special kit enables subscribers to connect the 5503-VIP converter to their VCRs.

For more information on the 5503-VIP, please contact Tocom Division,

The 5503-VIP converter from Tocom is VCR-ready.

General Instrument Corp., P.O. Box 75247, Dallas, Texas 75247 (214) 438-7691.

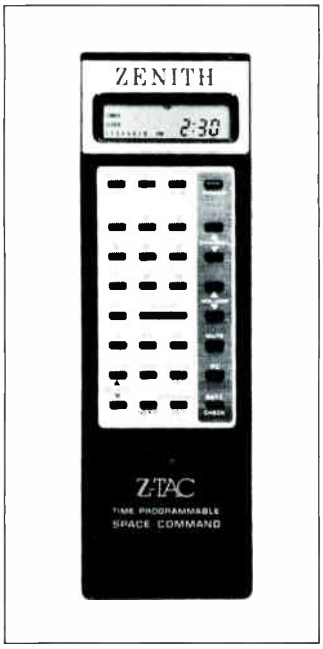
Zenith

The Zenith TAC-Timer allows cable subscribers to preprogram their Z-TAC decoder so their VCR can record programming on different channels.

The subscriber must program his VCR to record the Z-TAC output channel at the appropriate times, then program the TAC-Timer with the same timing information—specifying the channels to be recorded.

The TAC-Timer requires no modification to Z-TAC decoders and can be used with any programmable video recorder. The TAC-Timer can record up to eight events over a 14-day period and can also be programmed to turn a Zenith television on or off at any time. The TAC-Timer features an LCD display with clock, day and week indicator, channel indicator, full program indication, clock set button, timer set button, timer mode on/off switch and program clear button.

For more information on the TAC-Timer, please contact Zenith Electronics Corp., 1000 Milwaukee Ave., Glenview, Ill. 60025, (312) 699-2110.



The TAC-Timer programs Zenith's Z-TAC decoder for multiple channel VCR recording.

Switchers

Hamlin

The CR-6000 (and soon-to-be-released CR-6600 and CR-7000A) cordless remote converter from Hamlin helps solve the problem of living room clutter by featuring an internal A/B dual cable switch option. This permits the subscriber to watch any cable channel or view a tape from his VCR without complicated wiring.

For more information on the CR series, please contact Hamlin International Corp., 13610 First Ave. So., Seattle, Wash. 98168, (206) 246-9330.

Jerrold

The VCR Control Unit (VCU) from Jerrold provides a convenient way for subscribers to link their home video equipment to their cable system. The VCU is an electronic switching device that links a VCR, television and set-top descrambler. The unit features a signal booster for improved picture quality, overcoming signal losses introduced by the signal splitting network and the VCR itself. The electronic design of the VCU minimizes signal loss normally associated with mechanical video switchers.

Without changing the television tuner, subscribers using the VCU have the option of viewing any scrambled channel while recording any basic channel, viewing and recording the same scrambled channel, and viewing or recording only.

The compact, low-profile design of the VCU fits neatly under a converter. The unit is compatible with Jerrold—and all other—converters.

For more information on the VCR Control Unit, please contact Jerrold Division, General Instrument Corp., 2200 Byberry Road, Hatboro, Pa. 19040 (215) 674-4800.

Jerrold's VCR Control Unit is compatible with all converters.

Panasonic

The Model VCS-1 Video Control Switch from Panasonic switches between four RF viewing sources and up to two RF recording sources, independently. The VCS-1 also allows hookup of an external television antenna for use during system outages. The unit's switchable booster amp compensates for splitter losses.

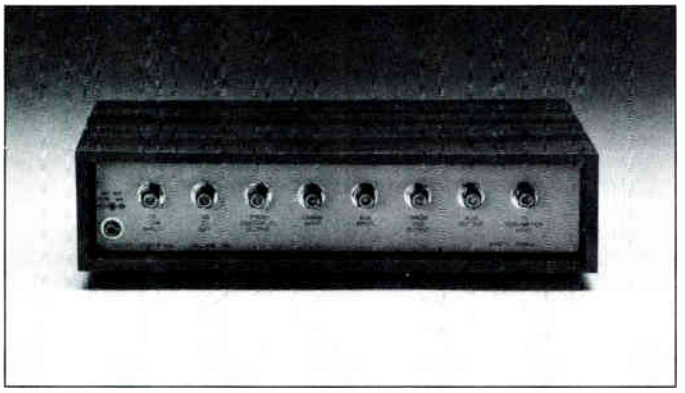
The VCS-1 Video Control Switch is compatible with all scrambled and one-way addressable systems. An unswitched AC outlet is provided on the back of the unit. The stackable VCS-1 also retains the switch position when switched off or unpowered.

For more information about the Video Control Switch, please contact Panasonic Industrial Co., One Panasonic Way, Secaucus, N.J. 07094, (201) 348-7000.

Pioneer

Pioneer's AVS-700 audio/video selector offers four input auxiliary plugs for cable, VCRs, video disks or other electronic components. The AVS-700 permits a cable subscriber to watch a scrambled channel while recording a non-scrambled channel, or vice versa, by simply pressing one of the four selector buttons. The other three selector buttons can be used for the subscriber's remaining video or audio components.

For more information on the AVS-700 audio/video



Private labeling is available on Qintar's line of Video Control Centers.

selector, please contact Pioneer Communications of America Inc., 2200 Dividend Dr., Columbus, Ohio 43228, (614) 876-0771.

Qintar

Qintar Inc. provides a line of video control switches that interface cable television and VCRs. The models 4004A, 4004B and 4005A each permit a subscriber to record a scrambled station while viewing a basic station or vice versa. Each switch also features an extra auxiliary port for a game, computer, satellite dish or other RF device.

The three switches feature a minimum of 70 dB of isolation between all input and output ports. The passive switches also offer low insertion loss, simulated wood housings and full 550 MHz bandwidth. The Model 4004A features a 3 dB of gain after internal splitting losses are overcome. The Model 4005A contains a high power transistor, allowing full 54 channels of operation with cross modulation below-60 dB.

For more information about the video control switches, please contact Qintar Inc., P.O. Box 6579, Westlake Village, Calif. 91359, (800) 252-7889.

S-A's VCR Switch gives the subscriber two options.

Scientific-Atlanta

The Model 8554-100 VCR Switch from Scientific-Atlanta is a 3.5 dB signal splitter that allows subscribers to interface their VCRs, televisions and set-top decoders to the cable and to each other, thereby eliminating the need to switch the cable between each device when particular configurations are needed.

The subscriber may choose between viewing what is being recorded and watching any channel while recording any basic channel. An RF switch on the front panel allows the subscriber to choose between configurations.

The Model 8554-100 is physically and visually compatible with the Series 8500 set-top converter from S-A.

For more information on the VCR Switch, please contact Scientific-Atlanta, Distribution, Data and Subscriber Products Division, Box 105027, Atlanta, Ga. 30348, (404) 441-4111.

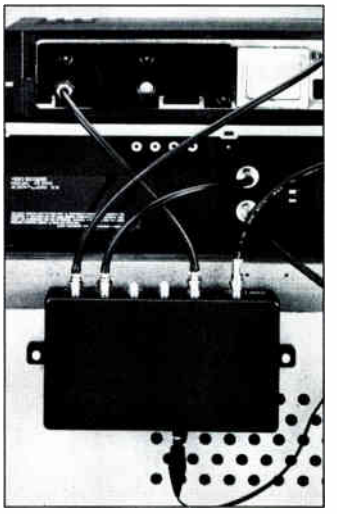
Tocom

The VCR Mates from Tocom allow RF switching between watching television or VCR with a Tocom remote unit.

The VCR Mate for the Tocom Model 5503A baseband converter includes: a splitter, all RF cable needed, baseband audio/video cable, an instruction manual and an electronic A/B switch operated by the remote unit.

The VCR Mates enable subscribers to watch one channel while recording another basic channel.

For more information on the VCR Mates, please contact Tocom Division, General Instrument Corp., P.O. Box 47066, Dallas, Texas 75247, (214) 438-7691.



Simple consumer installation is one feature of The VCR Interface from Zenith.

Zenith

The VCR Interface from Zenith brings new simplicity to cable television subscribers who want to watch one cable program and record another at the same time. The automatic switching device eliminates the need for complicated A/B switches, attaches simply to the back of the television and can be installed simply by the subscriber.

The VCR Interface works with any video cassette recorder and comes with complete instructions for consumer connection.

For more information about the VCR Interface, please contact Zenith Electronics Corp., 1000 Milwaukee Ave., Glenview, Ill. 60025, (312) 391-8181.

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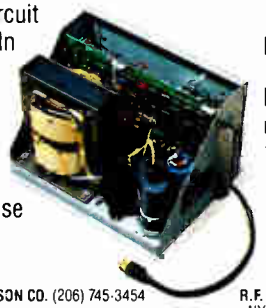
The battery driven inverter takes over from the downed line in the **primary** winding of the transformer, ensuring an unaltered output voltage and waveform. Overload and short-circuit handling characteristics remain unchanged. In addition this **same** transformer is used to charge the batteries, providing a **high** current recharge of the batteries after a power failure, a feature lacking in most competitive designs.



This concept needs fewer components which translates into **higher reliability**. Because the inverter cannot be activated, even with the line relay contact "stuck", this concept also gave us the fail-safe feature that helped us to obtain both **UL** and **CSA** approvals. And that gives a good product a good name.

Of course there are more reasons for Alpha's leadership and good name in Standby Power. Features such as **Temperature Compensated Charging** matched to the battery type and **Automatic Selftest** and **Equalizing**, to name just two.

Alpha was the **first** to offer **Remote Status Monitoring** for it's power supplies on a stand-alone basis.

And now Alpha has introduced two new State-of-the-Art Standby Power product lines. The **FT** series, a fast transfer type for critical loads up to 500VA, and the **APCG** series for true UPS performance up to 1500VA at Standby prices. Our ongoing efforts to give you the best engineered products will continue to give Standby Power a good name...**ALPHA.**

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Reader Service Number 18

GE's Control Central features a programmable microcomputer.

Misc.

General Electric

The Control Central remote control unit from General Electric is capable of controlling up to four different audio/video components. With a built-in programmable microcomputer, the Control Central system records the infrared control codes of each of four components. The original remote control units can still be used as "second" remotes.

Developed to end coffee-table clutter, the unit works with any brand or model year components—as long as they are infra-red remote. When placed "head-to-head" with the component's original remote control, Control Central's microcomputer learns the infra-red codes to command all of the component's features.

Control Central is equipped with a computerized memory and a liquid crystal display that shows the specific functions programmed into the memory as they are selected. The unit is easily reprogrammed so new electronic products can be added to a home entertainment system without losing the convenience of a single master control.

Control Central is available to cable operators wholesale.

For more information, please contact Judy Ziegler, General Electric, (804) 483-5062.

Continued from page 13

the decoder is expected to be less than half the cost of a full set-top unit.

The EIA Home Bus Committee is searching for standards to facilitate the interconnection of electronics and appliances in the home. Three approaches are being pursued. The in-the-room group is studying infrared remote control protocols, while the wired bus group is considering a home version of the local area network. The wireless group is seeking a standard which could be used in cable for residential security transducers.

Long-term trends in consumer electronics as they may affect cable are difficult to predict since things change so quickly in this industry. However, it is safe to project that the quantity of consumer electronic products will increase along with quality.

Cable will have to deal with the issue of multiple receivers in subscribers' homes. And it is very likely that the long term will see large flat-screen receivers on the wall. These devices probably will have a wide-screen format which will require significant enhancements of the NTSC television standard. Cable must ensure that this is done in a manner compatible with our technology.

The standard of audio quality will be raised to the level of the compact disk as subscribers become accustomed to low noise and high dynamic range, with broad frequency content. Cable will have to fit the standard.

Conclusion

Consumer electronics issues offer no simple, universal solutions. However, properly handled, the consumer electronics issues can be powerful weapons against cable's competition. In almost all cases, the competition will have a tougher time of it. And cable can enjoy a head start. CED

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No wonder more cable systems use Lectro for standby power than any other source. It pays off on the power line. And it pays off on your bottom line. Call Lectro at (404) 543-1904, or toll free (800) 551-3790. Now in stock at all Anixter distribution centers.

LECTRO

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Reader Service Number 21

Continued from page 10
was the prime focus of attention.

It was difficult. Even Hunter agreed that "a manufacturer has no control over a battery once it leaves the plant." And all concurred that a battery which isn't recharged and sits in a hot warehouse for nine months will suffer grievously in terms of performance. But that's not an issue of standby power unit reliability. It's an issue of operator battery maintenance.

Over and over, the question kept coming back: "Doubles battery life compared to what?" Were we talking about doubling an average industry battery life under ideal conditions of three to five years? We were talking about use of a particular type of battery? Were we discussing battery life in a particular unit compared to other early—but no longer made—units? Or were we looking at battery life in a unit compared to some—or all—other currently sold supplies?

We had to dig a bit. Both battery manufacturers insisted that three to five years was the upward limit. Kaiser reported that in the Pacific Northwest, with some of the most moderate weather on the continent, some batteries have lasted as long as six years.

And in any case, operator maintenance plays a big part in how long any battery can last. Said Harmon, "The biggest problem is an operator mentality of 'plug it in and forget it.' It's not that simple any more. You can't treat a standby power unit battery like the battery in your car." Johnson agreed. "Battery maintenance is the real culprit. If a battery isn't charged, it'll run down—regardless of anything you can do in the unit."

There was much discussion of the figure that can be assigned to maximum battery life, even assuming ideal maintenance. Trenter strongly disagreed that typical batteries sold to the CATV industry today could last longer than five years. "There isn't a battery today that will make six years, even assuming proper maintenance," he argued.

The issue here wasn't maximum life for any conceivable or existing battery. Batteries that last longer can be designed. "But the CATV industry wouldn't be willing to pay for the next five years of life," Trenter said.

He was joined in this opinion by James, who added, "Five years is a long time for the batteries now bought by the industry." The importance of the number? Ifthree to five years is an outside range for battery life, then a claim of doubling implies six to ten years life.

All speakers agreed that temperature dramatically affects batteries. Higher temperatures shorten useful life. The question is "how much?" At issue was whether any combination of design factors and a charging system could handle the life of any given battery.

Dawson asked a pointed question: "With a perfect power supply and a set of perfect batteries and assuming no maintenance effort whatsoever, how long would a battery last?" There was no disagreement from anyone about the answer? Three to five years.

He followed with another question: "With a perfect power supply, perfect batteries and an ideal maintenance program, how long could a battery last?" Again, there was no disagreement with the three to five year figure.

Then he asked Hunter how long a battery would last in DTD's supply if there was no maintenance. Five years was the answer. Dawson followed up: "How about a battery in your unit with a maintenance program?"

"About the same," Hunter replied.

But at other points Hunter argued that, "in some cases, our unit would last twice as long as others if the same batteries were used in the competing units under identical conditions." The extra life would come from a combination of the charging system and temperature reduction techniques,

he maintained.

Kaiser strongly disagreed. "Even with perfect charging, battery life can only be increased 10%." Trenter and James agreed, "You can't get more than five years life, no matter what you do."

Hunter maintained that batteries in his unit would last "more than five years in a test chamber at 77 degrees. In Denver, batteries in our units would last longer." He also claimed that his unit is "twice as good as some brands on the market" in this respect.

We have no doubt he believes this. But in fairness, Hunter only claims to have had units on poles for three years, so he's just now at the bottom of the three to five year range for optimum battery life under ideal maintenance conditions. Again, we have no idea how long the batteries might last. Nobody claimed a battery couldn't last five years. But Hunter claims more than five; and right now, nobody can have operational proof of this statement.

"The issue, said Evans, "is how much better Hunter's unit might be, not whether there are differences between units on the market." And that is precisely the point. It is the magnitude of the claim—doubling—that causes the disbelief. Several times, speakers suggested that even with optimal charging and temperature compensation, battery life could be extended only 10% to 20%.

Said Harmon, "We've had 900 units in four Tucson, Ariz., summers with 160 degrees Fahrenheit temperature compensation in the charger. It doesn't contribute that much to battery life."

Hunter disagreed. "Given proper temperature compensation in the charger, careful design and temperature control, you can double the life of the batteries over a unit that has no temperature-compensated charging, no ventilation and batteries sitting on top of power supply electronics."

Johnson objected. "I still haven't heard anybody say they can promise six to ten years battery life."

There was some confusion over what figure was being "doubled." At times, Hunter seemed to be referring to a one-and-a-half-year figure as a baseline. Yet, at other times, he argued that his unit would deliver battery life of better than five years.

So we can infer a line of reasoning that could reconcile the claim of doubling and the three to five year battery life range participants seemed to agree on. Hunter mentioned that in his market research, operators were mentioning battery lifetimes of "one-and-a-half to two years." Three to five years would represent doubling of that figure.

So much hinges on what figures are used for current industry standards for battery life: a maximum of two or three to five?

Trenter wasn't so sure it's accurate to use the lower figure any more. "Years ago, people paid for batteries sitting in warehouses. People simply didn't realize they were perishable. Today, everybody's educated that they're perishable items, so battery life has gone up in recent years."

"Time on the shelf isn't the issue," he added. "Battery life in the supply is the issue."

Hunter answered, "I'm willing to stand behind the ad." But he also added that "batteries in my unit won't last twice as long as everybody else in the world'ssupply."

So perhaps that is the key to this debate. If one assumes a current industry battery life of two years or less, then three to five years is a doubling. But it's also clear most of the participants consider three to five as the upper limit for normal battery life.

Conclusion? Hunter seemed to say his supply would deliver better battery life than some now on the market, but not all. He also wiggled on what span of time constituted "doubling." At times it seemed to be three, at others six.

We did clarify the fact that the 98.5%

Continued on page 58

Cable Classics

A series of reprints of definitive papers and articles on the technology of broadband communications.

Do you know what a neper is? Did you know that in a CATV trunk line, if all amplifiers are spaced for identical gain and all have the same noise figure and distortion characteristics, the individual amplifier gain resulting in the longest useable system is one neper (8.69 dB)? Or did you know that there is a theoretical foundation for the optimum gain of 20 dB or so commonly used in trunk amplifiers?

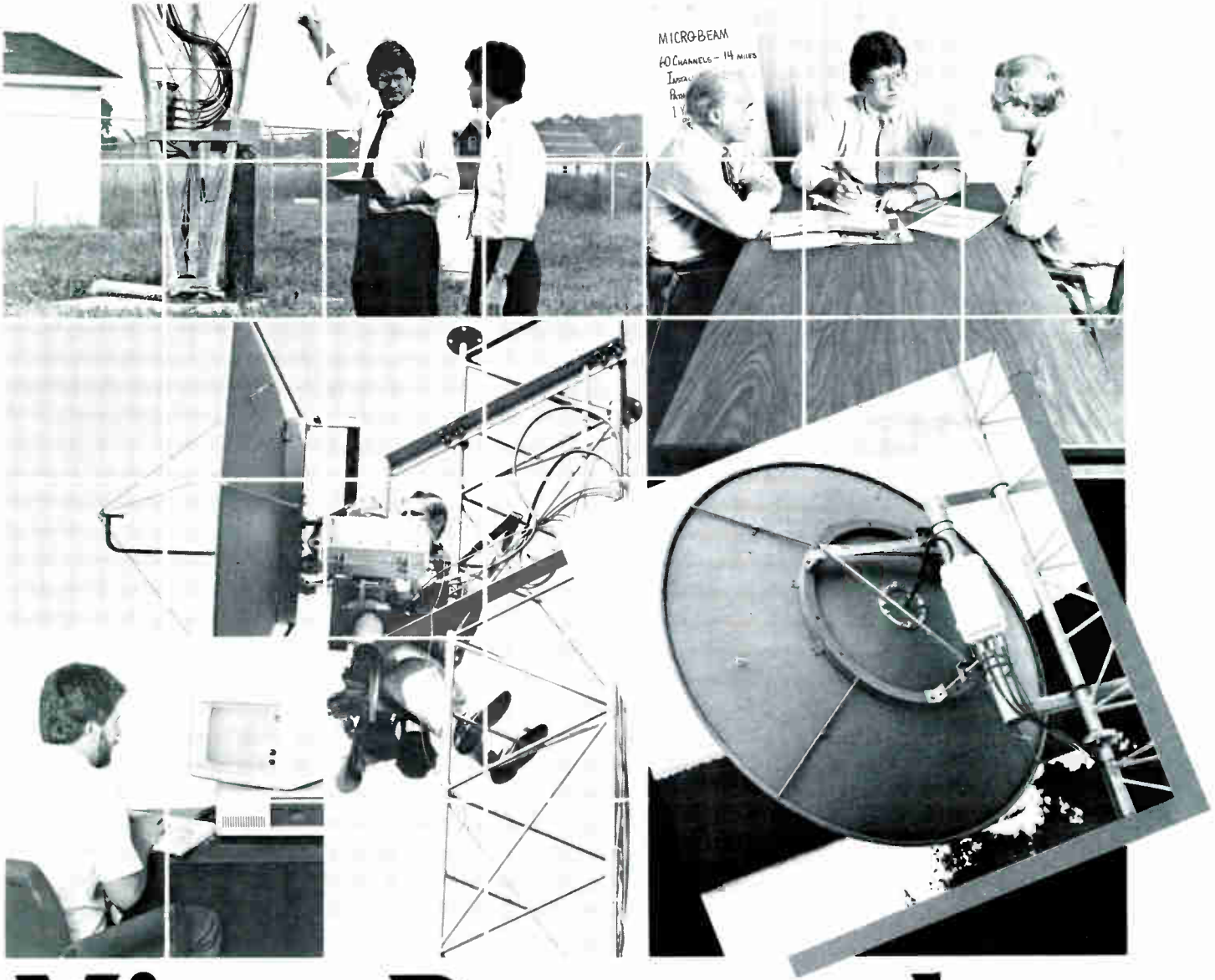
If your answer to these and similar questions is "Yes, that rings a bell but I don't quite remember where I read it," you will value this article and others like it in our series of reprints of "Cable Classic" papers and articles.

Ken Simons, the author of the paper reprinted on page 42, helped lay the theoretical groundwork for much of what we understand today about broadband signal distribution. His book, Technical Handbook for CATV Systems, *is familiar to countless engineers.*

Cable engineers and technicians are very familiar with sweeptesting of cable systems to optimum frequency response flatness. This paper gives insight into the importance of minimizing the uncertainty of amplifier signal levels when setting out to achieve the longest useable systems possible.

As originally published, the paper contained four appendices with rigorous mathematical development of the equations used in the text. The appendices are not reprinted here; the interested reader is referred to the original paper.

Graham S. Stubbs
Vice President, Science & Technology
Oak Communications Inc.



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Reader Service Number 25

Optimum gain for a CATV line amplifier

By Keneth A. Simons,
Member,
IEEE

Abstract—*It is well known that in a CATV trunk line, where all amplifiers are spaced for identical gain and all have the same noise figure and distortion characteristics, the individual amplifier gain resulting in the longest usable system is one naper (8.69 dB). The gain of amplifiers used in CATV today is usually near 20 dB. This paper attempts to develop two reasons why the optimum gain in a real situation is higher than the ideal number. 1) The operating levels in a real system have an inevitable uncertainty which increases with the number of amplifiers used. 2) The noise figure and distortion performance of real amplifiers are dependent on the gain, with higher gain amplifiers generally having better performance in these respects.*

A convenient parameter to describe the performance of either an amplifier intended for repeater service in a CATV system, or a complete trunk-line system, is its *tolerance*. This is defined as the difference, in decibels, between the lowest level at which it can be operated, without violating a given signal-to-distortion requirement, and the highest level at which it can be operated, without violating a given signal-to-noise requirement. The tolerance of a single amplifier is given by:

$$T_a = P_a - L - R - F_a - G_a = K - G_a \qquad (1)$$

(See list below for meaning of the symbols used.)

The tolerance of a complete trunk-line system of identical amplifiers is given by:

$$T_s = T_a - 20 \log_{10} n = K - G_a - 20 \log_{10} n. \qquad (2)$$

List of Symbols

L The power level of thermal noise (KTB) for a bandwidth of 4 MHz, expressed in dBmV (equal to -59.2 dBmV).
R The minimum allowable signal-to-noise ratio, expressed in decibels. (40 dB is used in numerical examples.)
T Tolerance, defined as the decibel difference between the maximum and the minimum allowable operating levels at a given point.
U The uncertainty, defined as the decrease in tolerance due to signal level variations.
$dBmV$ Power level, expressed in dB with reference to 1/75 microwatt (1 mV rms across 75 ohms).

Referring to Single Amplifiers

F_a The amplifier noise figure, in decibels.
G_a The amplifier gain, in decibels.
P_a The maximum amplifier output level, as determined by tolerable distortion, in dBmV.
K A constant characterizing the amplifier; $K = (P_a - F_a - R - L)$.
T_a The amplifier tolerance; $T_a = (K - G_a)$.
G_{opt} That amplifier gain which, for a given set of conditions, allows the longest usable system of amplifiers connected in tandem.
T_{opt} The tolerance of the amplifier when $G = G_{opt}$.
U_a The uncertainty per amplifier $U_a = U_s/n$.

Referring to a System of Amplifiers Connected in Tandem

n The total number of amplifiers in the system.
n_{max} The maximum number of amplifiers when $G = G_{opt}$.
G_s The total system gain (equal to nG_a). By definition this is numerically equal to the total loss of the cable in the system.
P_s The maximum system output, as determined by tolerable distortion at the last amplifier.
T_s The system tolerance.
U_s The system uncertainty.

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Equation (2) indicates that amplifier tolerance is, in a sense, "capital" which is "expended" as one proceeds along the trunk line. Thus, the higher the initial "investment" (T_i), the more one can spend (i.e., the more amplifiers of a given gain one can use) before running out of "funds" (i.e., before system tolerance reaches zero). It is well, therefore, before designing CATV amplifiers and systems, to consider the implications of each factor on the right-hand side of (1).

Thermal noise level (L) is a physical constant and, thus, invariable. The lowest permissible signal-to-noise ratio (R) is also fixed—by the subjective response of the viewer. Of the remaining three variables, it is clear by inspection that maximum amplifier tolerance is achieved by making the output capability (P_o) as high as is practicable and by minimizing the noise figure (F_i) and the gain (G_i).

Although lowering the gain always increases the tolerance of the individual amplifier, lowering it beyond a certain limit decreases the tolerance of a system which is held to a given length (i.e., a given total gain [nG_i]). If a very few high gain amplifiers are used, the system suffers from low amplifier tolerance (T_i is low, n is low); if a great many low gain amplifiers are used, it suffers from an excessive accumulation of noise and distortion (T_i is high, but so is n). Actually, for each set of conditions there is an optimum gain which gives the longest possible system. For the idealized case where all

Table I

System Parameters for the Ideal Amplifier with Various Degrees of Level Uncertainty (it is assumed that K = 60)

Amplifier uncertainty (dB)	Optimum gain (dB)	System loss (dB)	Maximum number of amplifiers	Amplifier tolerance (dB)	System level uncertainty
0.00	8.69	3195	368	51.3	0.0
0.01	10.9	2409	221	49.1	2.2
0.025	12.5	1910	153	47.5	3.8
0.05	14.1	1505	107	45.9	5.4
0.10	15.8	1127	71	44.1	7.1
0.25	18.4	719	39	41.6	9.8
0.50	20.4	490	24	39.6	12.0
1.00	23.1	323	14	36.9	14.0

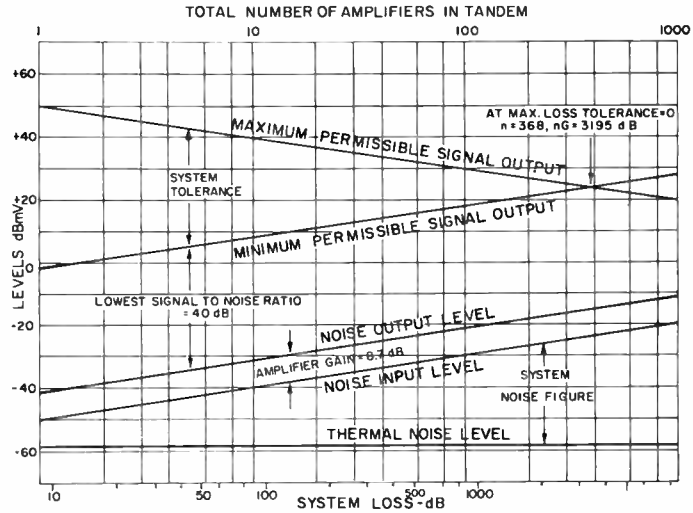
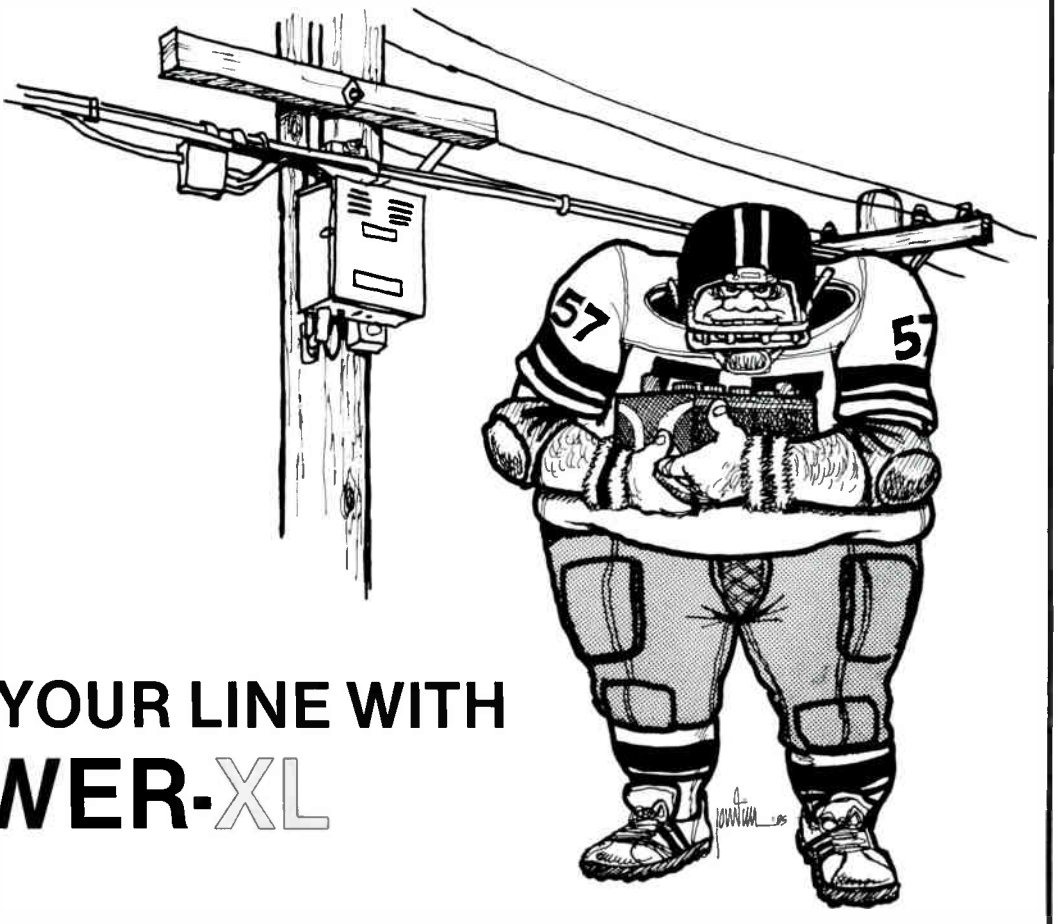


Figure 1. System level and tolerance diagram. Amplifier gain 8.69 dB. Output capability 50 dBmV. Noise figure 9.2 dB. Signal-to-noise ratio 40 dB.



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the parameters on the right-hand side of (1) except the gain (G_a) are fixed, the optimum gain is:

$$G_{opt} = 10 \log_{10} \epsilon = 8.69 \cdots \text{dB}$$

The maximum cable loss that can be overcome in such a system before running out of tolerance is:

$$G_{opt} \times n_{max} = 8.69 \times 10 \exp \frac{T_{opt}}{20}$$

Figure 1 illustrates a familiar way of showing these relationships. It shows, on semi-log paper, the signal and noise levels at various points in the system, plotted against the number of amplifiers in tandem.

Reasonable numbers for output capability (50 dBmV), noise figure (9.2 dB) and signal-to-noise ratio (40 dB) are assumed (i.e., $K = 50 - 9.2 - 40 + 59.2 = 60$), and the "optimum" gain of 8.69 dB is used. For these conditions a system loss of 3,195 dB or 368 amplifiers in tandem would be achieved at the point of zero tolerance.

A factor of great importance in the practical operation of systems which has not been taken into account in the preceding section is the variation of signal levels. If the frequency response of the system is not completely uniform, the highest allowable level is limited by the signal at the peak

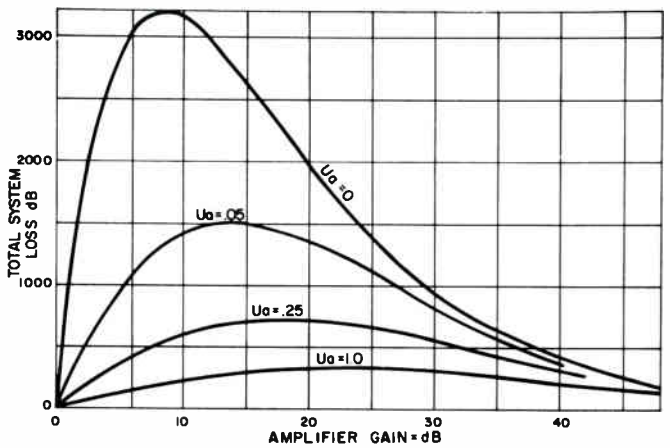

Figure 2. Achievable system loss versus amplifier gain for various "uncertainty" figures. The idealized amplifier has the same parameters as in Figure 1.

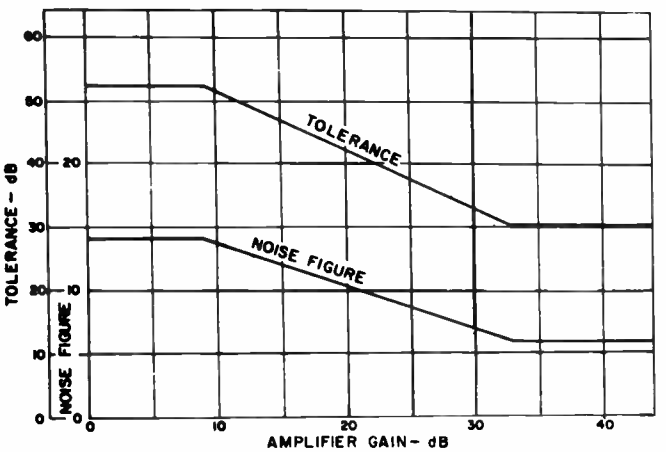

Figure 3. The assumed variation of noise figure with gain and the resulting variation in tolerance.

of the response curve, while the lowest allowable level is limited by the signal at the response minimum. Thus, any variation in system frequency response subtracts from system tolerance. If the thermal compensation of the system is not precise, so that the output levels are different at various temperatures, the system must be operated so it does not overload at the temperature where the output is the highest and so the noise does not become excessive at the temperature where the output is the lowest. Thus, any variation caused by temperature changes also substracts from the system tolerance. Variation in the output levels from the headend will have a similar effect.

The relationship between signal level variations and the resulting reduction in system tolerance actually is quite complex. Temperature variations, for example, generally will affect many channels in the same way, whereas frequency response ripples may cause compensating effects where the increase in level on one channel is offset by the decrease on some other channel. Since these effects would differ greatly from one system to another, it is possible to generalize only by lumping them together into one quantity which averages all the variables. This is done here by defining the uncertainty factor: "U." The system uncertainty (U_s) is defined as the net decrease in system tolerance due to signal level variations. This is roughly equal to, and certainly never greater than, the decibel difference between the highest and the lowest level found at that point in the system where this variation is the greatest, considering all causes of level change. The amplifier uncertainty (U_a) is found by dividing this by the total number of amplifiers: $U_a = U_s/n$.

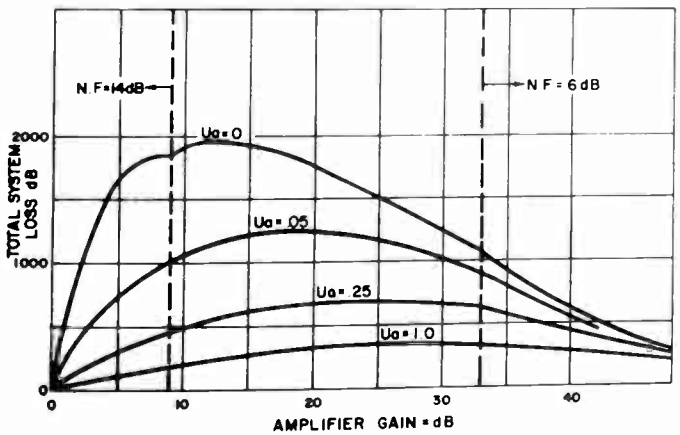

Figure 4. Achievable system loss versus amplifier gain for various "uncertainty" figures showing the effect of the assumed variation of noise figure with gain. Compare with Figure 2.

The optimum amplifier gain, when there is signal level uncertainty, is found by adding the system uncertainty to 8.69 dB, the gain that would be optimum without level variation, i.e.:

$$G_{opt} = 8.69 + U_s$$

Figure 2 illustrates the relationship between total system loss and amplifier gain, assuming the same amplifier "K" rating as in Figure 1, and for level uncertainties of 0 dB, 0.05 dB, 0.25 dB and 1.0 dB per amplifier. Inspection of these plots shows that, whereas the optimum gain is very critical when the uncertainty is zero (top curve), it becomes less and less so as the level uncertainty increases. An uncertainty of 0.25 dB per amplifier, for example, would allow varying the amplifier gain from about 14 dB to about 23 dB without a great effect on the length of the system.

The optimum gains and other parameters are show in Table

I for the same "K" rating used above. Notice the relatively great reduction in system length resulting from small uncertainties. An uncertainty of 0.1 dB, for example, reduces the length of the system by almost 3 times, and increases the optimum gain to almost 16 dB.

The foregoing section neglects another factor of great importance in the design of CATV line amplifiers. One aspect of Murphy's Law[1] dictates that, in a low-gain broadband amplifier stage, the condition for the best noise figure is

Table II

System Parameters for a "Realistic" Amplifier with Various Degrees of Level Uncertainty (output capability assumed equal to 50 dBmV)

Amplifier uncertainty dB	Optimum gain dB	Noise fig. dB	System loss dB	Max. # of amps	Amplifier tolerance (dB)	System level uncertainty
0.00	13.0	12.7	1953	150	43.5	0.0
0.01	14.8	12.1	1697	115	42.4	1.2
0.025	16.3	11.6	1467	90	41.3	2.3
0.05	18.2	10.9	1239	68	40.1	3.4
0.10	20.2	10.3	992	49	38.7	4.9
0.25	23.6	9.2	683	29	36.5	7.3
0.50	27.1	8.0	489	18	34.1	9.0
1.00	30.6	6.8	336	11	31.8	11.0

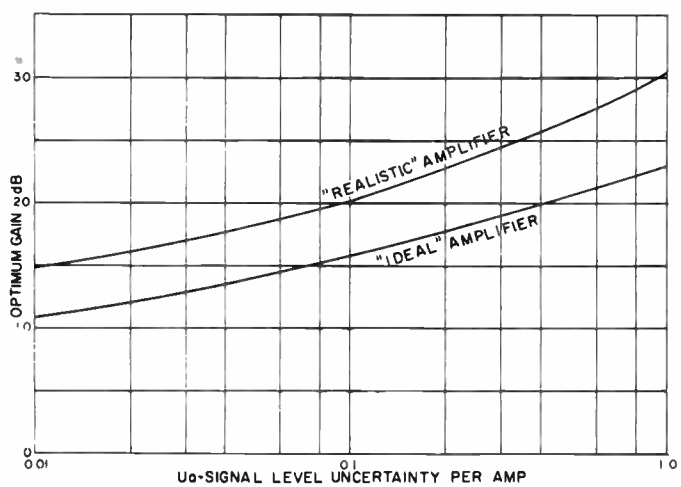

Figure 5. Variation of optimum gain with level uncertainty for the idealized amplifier and when the noise figure is a function of gain.

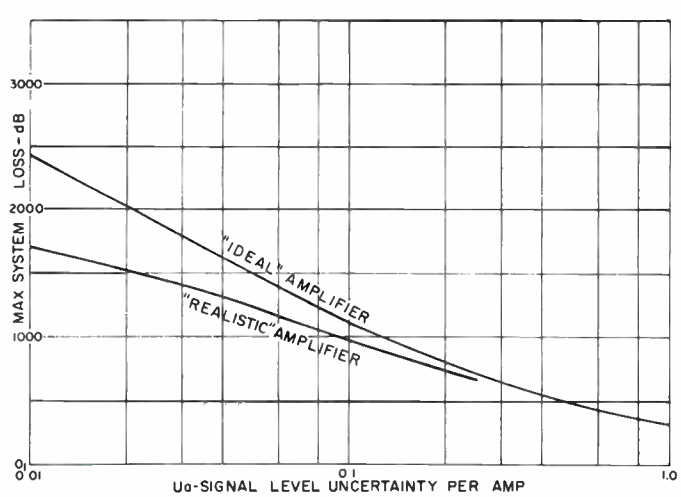

Figure 6. Variation of the maximum system loss with level uncertainty for the same conditions as in Figure 5.

neatly opposed to that for greatest output. Noise figure generally is optimized by using a small transistor with a low dc current, whereas greatest output is obtained by using a large stud-mounted transistor with very high dc current. When a low gain (e.g., 8.7 dB) amplifier is required, the designer must use a single stage, and he can design either for good noise figure or for high output, but not for both. The case is different in a high gain (e.g., 25 dB) amplifier, where three or four stages are used. The early stages can be designed for low noise and the later stages for high output. In a realistic attempt to determine the effect of gain on system performance, this additional factor must be taken into account.

There is obviously no precise relationship between noise figure, output capability and gain. For the purposes of this paper, a relationship was chosen which roughly approximates present practice. This relationship results in the noise figure and tolerance plotted in Figure 3 as a function of the gain for which the amplifier is designed. Using these data to describe the "realistic" amplifier results in the system performance listed in Table II, and plotted in Figures 4 through 6.

Comparing these with Table I and Figure 2, it can be seen that assuming a "realistic" amplifier considerably shortens the system and increases the optimum gain as compared with the "ideal" case. Although published specifications often give a limit of 0.25 dB for the response variation of an amplifier, it is not unreasonable to use a somewhat smaller number for the amplifier uncertainty in a system. "Mop-up" equalization, temperature controls and automatic gain control all act to hold the over-all variations below what might be expected from the amplifier characteristics. If we choose an uncertainty of 0.1 dB for the "realistic" amplifier, Table II shows the optimum gain to be just over 20 dB and allows a maximum system of 49 amplifiers in tandem. These results are in good agreement with today's practice. CED

References

D.L. Klipstein, "The contributions of Edsel Murphy to the understanding of the behavior of inanimate objects." *ELE*, Vol. 15, August, 1967.

K.A. Simons, "The decibel relationships between amplifier distortion products," *Proceedings of the IEEE: Special Issue on Cable Television*, Vol. 58, No. 7, July 1970, pp. 1071-1086.

Acknowledgment

The author would like to express appreciation to M. Jeffers, Vice-President of Engineering, Jerrold Electronics Corp., for patient counsel and for suggesting the importance of tolerance variation with gain.

For further reading

- ★ *Technical Handbook for CATV Systems*, Ken Simons, Jerrold Division, General Instrument Corp.
- ★ "Matching Repeater Amplifier Performance Characteristics to Cable Systems' Level Requirements," Gaylord Rogeness, *NCTA Convention Transcript*, 1970, pg. 59.
- ★ "Cascading of Intermodulation Distortion in Cable Television Systems," Daniel Lieberman, *NCTA Convention Transcript*, 1970, pg. 130.

About the author

At the time this article was written, Keneth Simons was employed by the Jerrold Electronics Corp. In 1971, Simons left his position as vice president, research and development, at Jerrold to do independent consulting within the cable industry. Blonder-Tongue and Wavetek were among his clients.

Several years ago, Simons turned his attention from cable to electronic applications within the medical field. Currently, he is working on an approach to NMR.

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Company	Product	Cost	IPPV Application
Business Systems Inc. (800) 424-0101 Jack Sunderman	Telephone Entry System	$9,000 and up ($9,000 if system uses BSI's billing)	TES consists of an audio response unit and a computer. Audio response unit is either a Digital DecTalk or a Perception Technologies unit. Computer is either a DEC PDP 11 or Micro II. Sub calls TES with a touchtone phone. TES interfaces with a billing computer and addressable converter controller. System can handle up to 200 phone lines. A realtime system.
CableData (916) 636-5800 Maggie Wilderotter	Phone Entry Processor	$5,000-$21,000	PEP is an audio response unit consisting of a router board and 16 phone boards. Sub calls PEP with a touchtone phone. PEP interfaces with CableData's on-line DDP software and most addressable converter controllers. A realtime system.
Cox Cable Communications (404) 843-5530 J. Michael Smith	Automated Order Taking System	Currently used only by Cox. Will probably make available to industry soon.	AOT consists of an audio response unit and a computer. The audio response unit is made by Perception Technologies. The computer is an IBM PC-AT. Sub calls AOT with a touchtone phone. AOT interfaces with billing computer and addressable converter controller. (Currently supports Jerrold DEC AH-4 and Oak IBM Series 1 converters.) Can handle 32 phone lines. A realtime system.
e-com Products Division, AM Cable TV Industries (215) 536-1354 Tom Saldi	Tier Guard	$85 for additional transponder in Tier Guard tap (shared by 8 subs) Plus $35 for transceiver and keyboard/display for home. Tier Guard costs about $50 per sub based on 50% penetration	Utilizes store and forward technology. A transceiver and keyboard/display are put into sub's home. Sub orders using transceiver. Feedback on display. System interfaces with addressable converter controller which, in turn, connects with the billing computer.
Interface Technology (314) 426-6880 Gary Lowe	TOES/350	$50,000	Using digitized human voice, TOES/350 guides sub thru event ordering process. Billing information captured and transmitted to billing computer on realtime or time available basis. TOES/350 also can authorize the addressable converter controller. Currently, interfaces with CableTEK and First Data Resources billing systems. Custom interfaces available.
Jerrold Division General Instrument Corp. (800) 523-6678 Pete Morse	STARVUE (two-way systems) STARFONE (one-way systems)	$45-$55 (not including Starcom converters) $35-$40 (not including Starcom converters	STARVUE and STARFONE both utilize store and forward technology. They are add-ons to Starcom 450 and Starcom VI converters. Sub authorizes event in home Converter is pre-loaded with credit purchases. Later, on a non-realtime basis, purchase information is polled, forwarded to addressable converter controller and then to billing computer. STARFONE is for one-way addressable systems and uses a telco return. STARVUE is for two-way addressable systems and uses cable's return spectrum to get the data.
Kanematsu-Gosho (201) 271-7544 Neil De Costanza	Sprucer	$180	IPPV built into the Sprucer converter. Sub orders using hand-held remote, entering personal 3-digit code. LED on converter confirms event authorization. A realtime system.
Melita Electronics Labs (404) 457-3700 Matthew Smith	Melita Link/ Melita 3000	$15,445	The Melita 3000 audio response unit is used in conjunction with the Melita Link. Sub uses a touchtone phone to call system. Melita interfaces with billing computer and addressable converter controller. Can handle four lines on one system. A realtime system.
The Microperipheral Corp. (206) 881-7544 Frank Johnson	Voicelink	$95,000-$200,000	Voicelink is an audio response system. Sub calls in on touchtone phone. Voicelink interfaces with billing computer, and billing computer authorizes the addressable converter controller. Can handle 48 lines. A realtime system.
Packet Technologies (408) 257-9963	PacketCable	To be announced	An off-premises addressable system. Sub pushes order key on set-top control unit. Off premises microprocessor can address converter after interfacing with billing computer at headend. Done in realtime.
Pioneer Communications of America (614) 876-0771 Tom Calabro	PULSE	$50-$60 (not including BA-5000 converter) Software upgrade required—about $10,000. Plus, if not already installed, Pioneer encoders needed for each PPV channel—$2,250 apiece.	The PULSE is an add-on to the BA-5000 converter. Utilizing store and forward technology, the operator can pre-load credit purchases in the converter. Sub authorizes the event in the home. Later, on a non-realtime basis, purchase info is polled, forwarded to the addressable converter controller and then to the computer. Info is forwarded via telco network.

Company	Product	Cost	IPPV Application
Portel Services Network (203) 847-3358 Mike Clark	Connections	To be determined	A terminal containing a modem and software is intalled in-house, and is attached to a phone jack. Sub uses hand-held terminal and order is transmitted to a DED VAX 11/750 a Portel communications center. From there order is transmitted to headend and addressable converter controller. For IPPV, this is done in realtime. Can handle 96 lines, minimal.
Scientific-Atlanta (404) 925-5510 Patra Evans	Add-on to 8550 converter	To be determined	Converter Model 8550 can store up to 20 PPV events in its memory. Space has been left in converter to add a module utilizing the store and forward technology. Module available as market conditions dictate.
Telease Inc. (213) 552-1055 Bob Block	Multiple Application Addressable Secure Television	$175-$200 (which is the cost of the MAAST converter)	Sub set-authorizes the MAAST converter for PPV. At end of billing cycle a payment due light goes on and the cost the sub owes is displayed. Sub pays that amount and when operator receives bill, he tells converter the amount received. If it matches, payment due light extinguishes and sub can continue to use converter. Otherwise converter will not decode. An adapter can be added for return via two-way cable or telephone.
Telescript Industries Corp. (818) 989-7979 Curt Howard	Electronic Ticket	Manufacturing cost per microchip: $1 to $1.50. Cost to operators to be determined.	Sub drops a decoding microchip into a small device hooked up before the decoder. Chip descrambles event and can be used without converters and in non-addressable systems. Operator must have Telescript decoder at headend.
Texscan (800) 528-4066 Raleigh Steele	Texscan Remote Addressable Converter System	$145 to $155 per sub based on 50% penetration	IPPV built into TRACS when used in two-way systems. Uses cable's return spectrum.
Times Fiber (203) 265-8643 Rick Kearns	Mini Hub II	$5,000 and up (for one-way systems-includes audio response unit and addressable controller) For two way systems, 2 cards at $11 per sub must be added. Mini Hub costs $135 to $145 per sub based on 50% penetration	Mini Hub II is an off premises addressable control system. For one-way systems, sub uses a touchtone phone and calls an audio response unit, either a DECTalk or a Black Box. The audio response unit interfaces with the addressable controller at the headend, which in turn connects with the billing computer. Handles 8 lines. A realtime system. For two-way systems, store and forward technology is used for billing.
Tocom Division General Instrument Corp. (214) 438-7691 John Fullingim	Dialer attachment	Under $30 (not including 5503 VIP converter)	A dialer attachment is available for the Tocom 5503 VIP model. The attachment utilizes store and forward technology. Sub authorizes event in home. Converter is pre-loaded with credit purchase. Later, on a non-realtime basis, purchase information is polled, forwarded to addressable converter controller, and then to billing computer. Uses a telco return.
Weststar Technologies, Inc. (916) 967-4723 Ray Matteson	CableComputer	$200 range (which is the cost of the Cable-Computer converter)	PPV schedule and ordering process appears on TV screen. Sub orders via a CableData PEP unit. Response from addressable controller seen on TV display screen. Done in realtime. For other than major movie and special event PPV (e.g., how-to-films, video games), sub can preorder, via PEP telco return, up to $10 worth of credits that are stored in converter and subtracted as PPV program is watched. The $10 is billed on Mastercharge or Visa via a tape sent to a clearinghouse and does not appear on the cable bill.
World Video Library Inc. (817) 831-3811 Wayne Burres	Impulser (available only with WVL's Home Video Club)	Three options: 1) $49.50 for each Impulser and operator splits receipts with WVL. 2) 80¢/month/Impulser for 60 months; operator splits receipts with WVL. 3) One-time leasing fee of $15 to $20 per Impulser; operator splits receipts with WVL.	WVL provides a total turnkey IPPV system featuring the Impulser for automated order entry (telephone upstream). The Command Center provides interface to existing addressable controller and billing system. The Home Video Club movie service with full marketing support is included.
Zenith Electronics Corp. (312) 391-7910 Vito Brugliera	Z-View (for two-way systems) Phonevision (for one-way systems) way systems)	Under $50 To be determined	Z-View is an add-on to the Z-TAC converter. Does realtime PPV authorization through return spectrum of cable. System utilizes Automatic Number identification technology. Sub uses phone (rotary and touchtone) and dials ANI for the event. Telco switch directs info to Phonevision unit at headend. Phonevision unit interfaces with billing system and addressable converter controller to authorize Z-TAC box. A realtime system.

NOTE: When audio response units are utilized, subs with rotary phones usually are switched over to CSRs. However, tone generators usually can be issued to subs if the operator so desires.

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Western Show wrap-up

Impulse pay-per-view systems, VCR-compatible products and consumer-friendly gear top product releases

Video switchers, smarter remotes, programmable remotes and converters, and converters with integral VCR timers were examples of new consumer-friendly products rolled out at the Western Cable Show. Two turnkey impulse pay-per-view packages as well as a new PPV system were announced, and IPPV enhancements to several converter products also were evident.

Multi-vendor compatibility was an important feature in several products. Pioneer, for example, was showing its BA-5000 addressable converter, now compatible with Oak, Jerrold and Hamlin scrambling modes. Jerrold's DRZ and Trimode scrambling methods, as well as Hamlin's modes are standard. Oak compatibility is an option.

Westinghouse and Sanyo's new VCM 2001 Video Control Module is a switcher with several interesting features. Designed for the casual VCR user, the unit's front panel displays a row of LEDs that indicate what settings are required at the TV, VCR and converter for a particular taping operation. Neat. The remote also is Jerrold and Scientific-Atlanta compatible. Data sets for control of both Jerrold and S-A boxes are transmitted simultaneously, so no reprogramming is required if the converters are switched. It addresses both the converter and the W&S stereo module simultaneously. It isn't a universal "smart" remote, but it cuts down the number of button-pushing operations considerably.

Scientific-Atlanta, meanwhile, introduced its Model 8526 programmable set-top for 550 MHz operation. As with the earlier Model 8525 for 450 MHz systems, the box can be configured in the field by infrared remote. No custom-configured PROM is needed.

The company also showed its new Model 8550-275 programmable remote. The device sets S-A's 8500 line of converters for unattended operation. Eight events over a 14-day period can be handled.

Unattended VCR recording of multiple programs is a feature incorporated in Tocom's new 5503-VIP converter. The internal timer controls up to four events over a seven-day period. A matching VCR-Mate switcher, stereo adapter and telephone dialer for IPPV are available as options. Volume control, mute and downloadable channel mapping are additional features.

Volume control with muting is a feature now available on Jerrold's Starcom VI Model DP5 converter as well. The 550 MHz set-top comes with diagnostics built in, channel mapping, IR enable/disable, last and favorite channel recall. The company says the new units will be ready for April 1986 shipment at a volume price of $110, including remote.

The company also showed its new Starcom VI Model DQ4 (450 MHz) and DQ5 (550 MHz) plain converters. Both offer favorite and last channel recall, parental control and accelerated scanning. Optional are a PROM for IR enable/disable, custom channel assignment and an internal A/B switch. Promised delivery is during first quarter 1986 at volume pricing of $53 with remote.

Kanematsu-Gosho, meanwhile, released a second-generation Sprucer converter. Chief among the refinements is an operator-selectable force-tune on power-up. The company suggests a pay-per-view preview channel might be appropriate. Also new is capacity of 900 IPPV events per channel. The IR remote can be disabled from the headend. In addition, the box footprint is 25 percent smaller.

Regency showed several new converters: the RE-1 and RE-2 plain converters, the RC32 addressable and the LC-32 Jerrold compatible.

The RE-1 features a two-speed up/down scan and optional remote. The RE-2 adds non-volatile memory, nine tuning standards, remote disable and parental control.

The LC-32 is available in 450 MHz and 550 MHz versions. An optional five-year warranty can be purchased, and the company says $85 unit prices are available in high volume.

The RC32 is a restyled RO32 box, featuring non-volatile memory, remote disable and lock-out of picture and sound. Favorite and last channel recall as well as scan features are available through the remote.

IPPV systems

Both Jerrold and Business Systems Inc. announced turnkey pay-per-view systems with, in essence, "no money down." Jerrold plans to offer operators store-and-forward technology sidecars at no obligation for four months.

BSI is offering operators the Telephone Entry System, an audio response technology. BSI also would provide movies and marketing as well as VTRs. A minimum 90-day commitment is necessary, with operator and BSI splitting the take.

Arvis, meanwhile, introduced its 8000 series PPV system that handles scheduling, logging and playing of movies. Assuming an operator has eight 3/4-inch VTRs, and assuming two VTRs per movie, the system handles three movies, leaving two tape decks for promotions or fillers.

Headend gear

Scientific-Atlanta introduced its Model 6680 receiver, a second-generation of the 6650 model. New are an improved RF converter, demodulator and tunable audio subcarrier demodulator. The 6680 is designed for use with S-A's Series 360 block converter.

The company also unveiled the Model 9630 receiver compatible with both C- and Ku-band signals. A 24-channel format is standard, but a 20-channel frequency programmable ability is offered as well.

Tocom showed its new remote hub controller, available with the company's Micro-ACS addressable control system. The standard configuration includes one floppy disk drive, an 8088 processor; a 2400 baud modem and 2 megabytes of RAM. Tocom plans to release software allowing control over 63 controllers.

Nexus Engineering was showing its new UV-5 crystal-controlled UHF-VHF converter and SR-5 satellite receiver.

Blonder-Tongue, meanwhile, intro-

duced two new headend combiners, the OCA-8, an active output combiner with eight broadband input ports. The companion OC-8 is a passive combiner with the same number of ports. The company also rolled out its SAVP SAW-filtered heterodyne processor.

Regency released two headend scramblers, the HES002 and HES003. The HES003 version includes addressability and audio jamming ability. The company also showed LOCAL, a system to override the billing or tiering computer in an emergency. LOCAL also can be used to audit transactions when the computer and data controller are cosited. The NIDC controller acts as a modem between the control computer and converters.

Distribution gear

Scientific-Atlanta introduced a new indoor amplifier. The Model 6825 is available in 15-, 22-, 30- and 32-dB versions. The company also showed its line of 600 MHz taps and passives, all featuring brass F ports with tin plating. At the same time, S-A unveiled its plenum-rated coaxial line, designed for use in structures where fire codes require flame resistance.

Magnavox CATV Systems featured its new line of distribution slope equalizers. The "8" series serves sub- and mid-split systems. Also new was a 110V powered amplifier, designed for use in apartment buildings, local area networks and other related settings.

IPPV tests

At the show, Jerrold reported buy rates exceeding 150% for a 90-day field trial of low-hurdle IPPV in Group W's Roseville, Minn., system. In the test, PPV programming was run on one channel, 12 hours a day, seven days a week. Some 300 homes were involved, including test sets of non-cable homes, basic-only, basic-and-one-pay and basic-and-multi-pay households. "Low hurdle" programming, priced between 49 cents and $3.99, was offered, consisting mostly of older movies.

The company also announced the consolidation of its Century III division within the Distribution Systems division. As a result, the Century III product line will be phased out.

Scientific-Atlanta reported a flawless record for its Series 6800 feedforward gain blocks, available in over 4,000 amps since June 1984.

RMT Engineering showed its 4-500 MHz and modified SAM I field strength meters, while Telecrafter Products spotlighted its new Fastac Clip Gun, a drop installation tool allowing one-handed fastening of cable to wood surfaces.

The Society of Cable Television Engineers took possession of a new training tape on choosing advanced amplifiers produced by Magnavox CATV. The SCTE also elevated the status of four meeting groups to chapters. The new chapters are the Chattahoochee Chapter, Atlanta, Ga.; Hudson Valley Chapter, Newburgh, N.Y.; and North Jersey Chapter, Wayne, N.J., and the Rocky Mountain Chapter, Denver, Colo.

The SCTE also announced availability of its new publication, *Graphic Symbols for Cable Television Systems*.

Among other business news, Centel Cablevision has picked Zenith Electronics' Phonevision PPV system for use in the company's Traverse City, Mich., system.

Magnavox CATV announced it has begun shipping equipment for two newbuilds in Puerto Rico and has reached agreement with Comcast Cable to supply distribution gear for a 750-mile upgrade of the Flint, Mich., system. Magnavox also is supplying equipment for local area networks in Kometh-Nuz (Zurich, Switzerland) and the Australian Parliament House (Canberra, Australia).

RCA American Communications is providing a C-band TVRO and LNA package to the first 100 cable systems applying that have more than 2,500 subscribers and don't now offer programming carried on the company's Satcom IV satellite.

M/A-COM released details about its central computer facility to be used by programmers using VideoCipher to serve the home TVRO market. The central facility will handle authorization/deauthorization only. Billing will be handled by each of the programmers. As many as 24 different business systems can be accommodated at the central facility, meaning that 24 programmers can be served.

Subscriber data will be partitioned so that no information about subscribers to one service will be available to any other service. Over 200 transponders can be handled on any combination of satellites.

Initially, the system will have the ability to address over one million subscribers.

Also, Pioneer Communications announced the sale of BA-5000 converters to Warner Amex for use in the Queens and Brooklyn boroughs of New York. Times Mirror also will be buying BA-5000s for its Southern California systems.

M/A-COM said it received an order for 10,000 InfoCipher Data Receivers from TCI, for use in the X*Press service roll out.

Cable TV Industries said United Cable has bought TVRO equipment as part of that MSO's upcoming tests of service to home TVRO subscribers.

—Gary Kim

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People

Douglas MacLeod joined Line Techs Inc. as vice president, engineering. MacLeod, formerly a senior staff engineer at Warner Amex Corp., brings 14 years of CATV system engineering and construction experience to Line Techs.

Sadelco Inc., celebrating the 25th anniversary of its founding, announced the appointment of **Joe Elliot Sadel** as director of research and development. Currently, Sadel is working on the application of microprocessor and chip technology for use in signal level meters and has developed several new products for future use by Sadelco.

Tele-Engineering Corp. welcomed **James Lyons** as operations manager of its product division, which provides customer support, installation, service and quality assurance testing for the company's commercial insertion and matrix switching equipment.

Pioneer Communications of America announced several promotions and additions to its ranks. **Dan Wiltshire** was appointed systems engineer in Pioneer's engineering department. An employee of Pioneer since early 1983, Wiltshire is responsible for the development of selected CATV products and lab and field testing of prototype CATV equipment.

David Borden also was appointed systems engineer. His duties will include conducting technical sessions to determine customer needs, writing equipment specs and testing prototype equipment. Prior to joining Pioneer, Borden owned his own technical consulting firm.

Glenn Sigler was promoted from sales engineer to field service supervisor in Pioneer's sales support department. Sigler has installed 90 percent of the addressable systems sold by Pioneer.

Tom Polis, current principal and executive vice president of RT/Katek Communications Group's communications construction division, was named corporate vice president of sales and engineering. Polis will be coordinating the company's national sales efforts and overseeing all engineering and telecommunications projects. An 18-year cable veteran, Polis is the current president of the SCTE.

Continued from page 39

figure for reliability refers to manufacturing of the unit, not life on the poles per se.

Again, the issue is not the unit performance itself, but the meaningfulness of advertising claims. That longer battery life is believed to be possible isn't the point. Based on discussion at the meeting, it isn't possible to say with confidence that battery life in any vendor's unit will last more than five years with regularity.

No vendors, save Hunter, claim this is possible; and DTD's units haven't been on enough poles long enough to test the assertion.

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—Gary Kim

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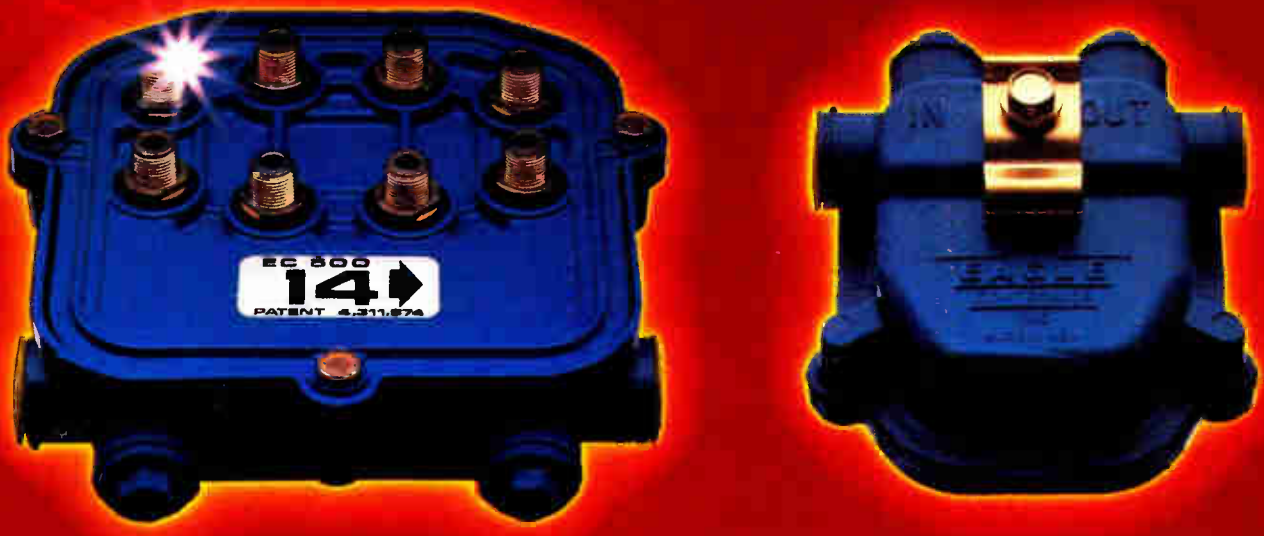

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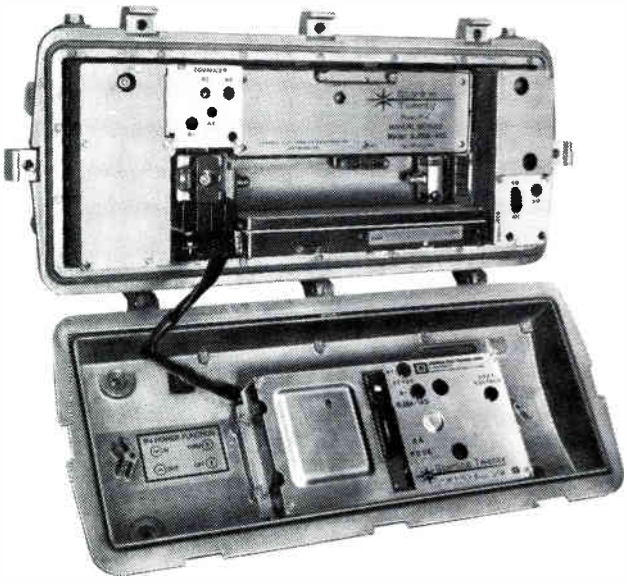

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