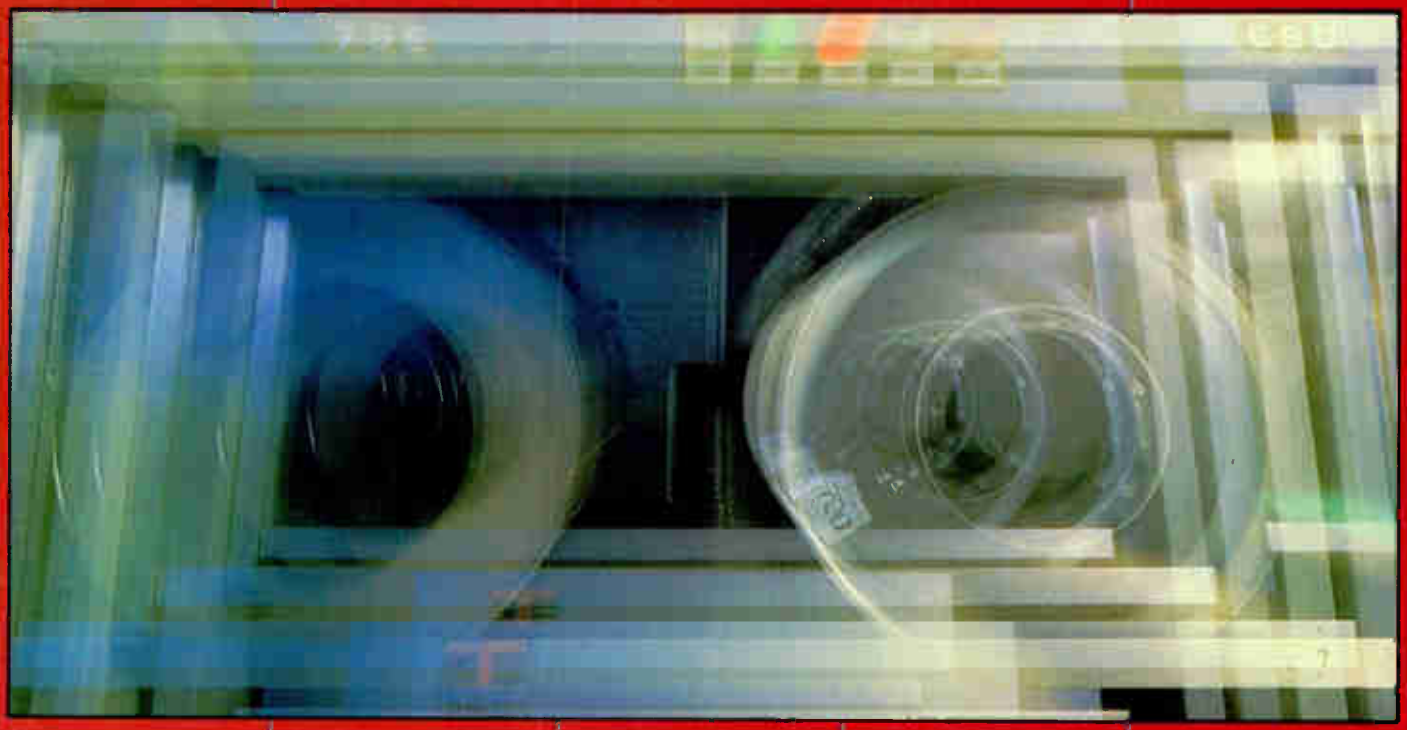
COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers



Data: Cable's baud new world
Page 13

'In the spotlight' at the Eastern Show
Page 9

August 1985

for broadband network interface...

ZETA OFFERS THE INDUSTRY'S MOST COMPREHENSIVE FAMILY OF FREQUENCY AGILE MODEMS FOR COAXIAL CABLE DATA COMMUNICATIONS!

Model ZR8 rack mount with Z19 modems installed. Model ZP6 plug-in power supply also available.

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Model Z19. 19.2 KBPS Modem with 120 switch-selectable subchannels.

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So for pedestals that offer spacious design—as well as solid construction, security and convenience—specify Reliable Electric/Utility Products' closures.

For more information, phone or write Reliable Electric/Utility Products or our nearest authorized distributor today.

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RELIANCE COMM/TEC

Reader Service Number 3.

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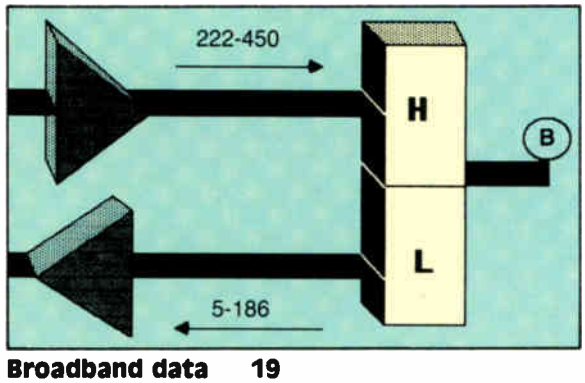

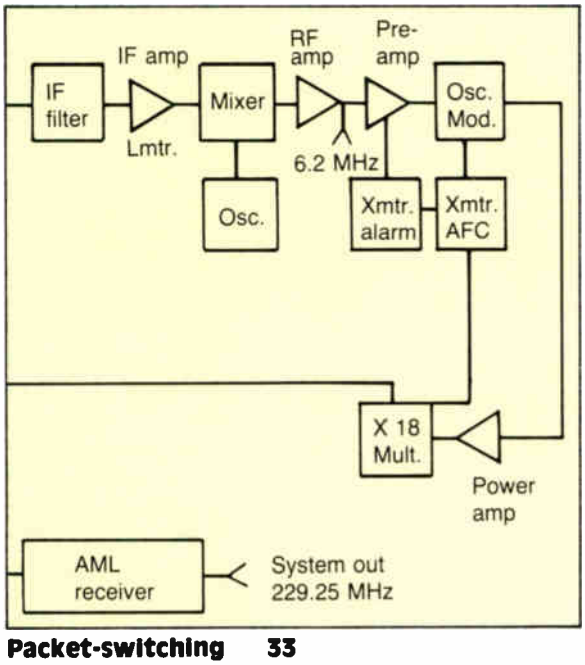

Features

Remember when PPV required a large phone staff? Or two-way cable plant? Now...

The Pay-Per-View Solution
JERROLD STARFONE™

Remember...it was only yesterday when offering a PPV event in one-way cable systems usually meant mass confusion. Too many telephone operators to pay, but not enough to handle the last minute phone calls. In solving this problem, Jerrold drew on experience that dates back to 1956. That year, a two-channel device was developed and demonstrated at the Jerrold plant in Philadelphia. Known as the PBPB "program-by-program billing," it attracted much interest—and visitors—from all over the world. Although the PBPB was too far ahead of its time to be a financial success, it was one of cable's earliest demonstrations that pay-per-view technology was quite feasible.

Get ready to cash in on the coming PPV explosion. Add impulse pay-per-view capability with Jerrold STARFONE, the economical add-on unit.

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Jerrold STARFONE, an inexpensive add-on module, makes all this possible. For detailed information, call or write today. Jerrold Division, General Instrument Corporation, 2200 Byberry Road, Hatboro, PA 19040. (215) 674-4800.

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You know we'll be there.

GENERAL INSTRUMENT

See us at the Eastern Cable Show at booth 113.
Reader Service Number 4.

Educating the masses

Activity in the cable industry is fast and furious. The competition is fierce; the opportunities are incredible; and the learning curve is steep. This month we have focused on a couple of technologies that fit the bill in terms of competition, opportunity and complexity: data and commercial insertion.

Data transmission is a relatively untapped resource for MSOs. In one feature (page 13), Randy Bays of Fairchild Data says, "Some MSOs are recognizing the opportunities and threats of I-Nets and are reorganizing in preparation for offering more services than just video." He continues with suggestions toward positive action for increasing cable systems' profit bases. Bays advises selling bandwidth competitively and offering other services that the competition currently does not have the capabilities to offer.

Pay heed to Bays' advice and listen closely. Take that word *currently* seriously. CATV technical personnel must stay on their toes, keep abreast of current issues, constantly test and experiment, and do all they can to remain forerunners in the telecommunications field. The competition should not be taken lightly!

Also included in this issue are some other very informative data features, but we are far from tired of the subject. Beginning in September, *CT* will debut a new column devoted to broadband local area networks (LANs) and data. David McCourt, president and CEO of McCourt Cable Systems, will be penning the column—so keep an eye out for McCourt's insights next month.

Another revenue source

Commercial insertion is another technology that can be confusing to those who are unfamiliar with all it entails. We felt it was time to provide some intelligent, clear articles on the subject since many systems are now equipping for ad sales.

McCourt

Bill Killion, president of Channelmatic Inc., says, "Cable television technical personnel must familiarize themselves with this new technology and must do so quickly." He explains the problems with some commercial insertion gear for cable, and he presents the solutions. This is surely a not-to-be-missed article (page 53)!

Commercial Cable's John Brady also discusses an interesting aspect of commercial insertion. How does automated verification compare to manual logging? Read "Commercial verification for cable," on page 67, to find out.

A final technical note

Among the many organizations doing their part to facilitate the dissemination of technical knowledge are the Southern Cable Television Association (SCTA) and the Society of Cable Television Engineers (SCTE).

At the Eastern Show (see "News," page 9), the SCTA is offering a special one-day registration to technicians and engineers. On Sunday, Aug. 25, technical personnel can participate in all technical sessions, etc., for $25. Seems like an inexpensive way to update an education.

On Sept. 10-11, the national SCTE and the Rocky Mountain Meeting Group are sponsoring "Signal Leakage—CLI and the FCC." This seminar (in Denver) promises to be one of the best ever! See page 23 and *The Interval* for more information. (In the ad on page 23, Israel Switzer, one of the seminar's guest speakers, was incorrectly identified as being with E-COM, AM Cable; he is actually with Cablecasting Ltd. Bob Dickinson, who also will be a guest speaker, is with E-COM, AM Cable.)

Also in this issue, we have dedicated #1 on the reader service card (page 71) to SCTE's Cable-Tec Expo '86, to be held next June in Phoenix, Ariz. All you need to do for further details, on what promises to be another fine SCTE presentation, is circle #1 on the card and we'll do the rest. It's never too soon to start planning!

Tom J. Barnett

We Gave Standby Power A Good Name

Unlike some other choices, Alpha maintains the Good Name of Standby Power by offering a reliable and failsafe approach—as we have right from the start. We call it the **"single ferro transformer"** concept.

This design concept leaves the ferroresonant transformer always connected to your Cable plant, regardless of power failures or other disturbances, and does away with the need for a second transformer.

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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Maria Sullivan Artist

Office: Communications Technology Publications Corp., 12200 E. Briarwood Ave., Suite 250, Englewood, Colo 80112 **Mailing Address:** P.O. Box 3208, Englewood, Colo 80155, (303) 792-0023

BPA membership applied for November 1984.

The Eastern Show: Cable television in the spotlight

ATLANTA—The focus of the 1985 Eastern Show will be on improving operators' bottom lines according to Robert Bevis, president of the sponsoring Southern Cable Television Association. The show will be held Aug. 25-27 at the Congress World Center here. It will feature management sessions arranged and produced by the Cable Television Administration and Marketing Society, technical sessions developed by 30-year industry veteran Harold Null, workshops and exhibits. Exhibit hours will be 2-7 p.m. Aug. 25, noon-6 p.m. Aug. 26 and noon-5 p.m. Aug. 27. The schedule of program events is as follows:

Monday, Aug. 26
9-10:30 a.m.—Opening Session: New challenges in revenue enhancement
10:45 a.m.-noon—Workshops on revenue enhancers: Cable ad sales, Pay-per view, Ancillary revenue streams and New marketing techniques.

Tuesday, Aug. 27
9-10:15 a.m.—Pay-TV: Who turned out the lights? Problems and solutions.
10:30-11:45 a.m.—Four workshops: Personnel policies: A positive labor relations program; Increased productivity: Motivation and training program; Theft of service; and Business strategy for small operators.

Show tech agenda

In keeping with its policy of encouraging wide participation at the show, the Southern Cable Television Association is again offering a special one-day registration for technicians and engineers. On Sunday, Aug. 25, technical personnel can gain entrance to the show for $25 if other people within their company are registered for the full convention.

Sunday, Aug. 25
Three concurrent sessions on the exhibit floor. Each will be repeated three times.
2:15-3:15 p.m.
3:15-4:15 p.m.
4:15-5:15 p.m.
- Rebuild and upgrade, Sherwood Hawley, national sales manager, Broadband Engineering
- Test equipment, Steve Windel, applications engineer, Wavetek
- Multichannel television sound, Larry Brown, vice president, engineering, Pioneer Communications

Monday, Aug. 26
9-10 a.m.
- FCC update, Roy Ehman, director of technical services, Storer Communications

10-10:15 a.m.—Break

10:15 a.m.-noon
- Signal security/theft of service, Jim Bunker, senior vice president, corporate marketing, M/A-COM

Tuesday, Aug. 27
9-10 a.m.
- Addressability—Off premise, Rick Kerns, Times Fiber Communications

10-10:45 a.m.
- Technical training, William Riker, executive vice president, SCTE

McCourt picked for Sacramento UG build

SACRAMENTO, Calif.—The underground construction for one of the nation's largest cable television systems will be handled here by McCourt Cable Systems Inc. McCourt was selected by Sacramento Cable Television to manage underground construction of the system because of its past track record, primarily the Boston build.

Costing approximately $145 million, the countywide 77-channel network will service 325,000 households, including the cities of Folsom and Galt as well as the state capital of Sacramento. The single-trunk, single-feeder system is designed for 550 MHz but will operate initially at 450 MHz, with the extra bandwidth reserved for institutional networks. It will have a single headend and eight hub sites. Construction includes 875 underground miles and 2,700 aerial miles and is scheduled for completion by the end of 1988.

KG signs pact and opens new facility

SOMERSET N.J.—Kanematsu Gosho Inc. announced the signing of a long-term contract with NYT Cable, a division of The New York Times Co. The agreement calls for KG to provide the two-way addressable cable TV converters and released controller software for NYT Cable's 125,000-subscriber system in southern New Jersey. Under the terms of the pact, KG will ship more than 150,000 units over the next five years.

In addition, Kanematsu Gosho held dedication ceremonies for its new high-tech facility in Somerset, N.J. Hideo Suzuki, president of Kanematsu Gosho Ltd., welcomed state and local dignitaries and KG employees to the new site, which will serve as headquarters for the company's high-tech industries.

S-A sets plans for Australian office

ATLANTA—Scientific-Atlanta Inc. announced plans recently to open a sales and service center in Sydney, Australia. The Sydney office, which is expected to be fully operational in the fall of 1985, will help the company respond to the market for its products created by Australia's new domestic satellite communication system.

Scientific-Atlanta licensed Plessey Australia Pty Ltd. to manufacture and sell B-MAC decoders for home receivers. Scientific-Atlanta's Canadian subsidiary, Digital Video Systems Corp., will produce B-MAC uplink equipment and professional quality decoders for government and commercial TV stations.

This equipment will be primarily used to serve the Australian Homestead and Community Broadcasting Satellite Service. The first Australian satellite, AUSSAT-1, will carry television programming from the Australian Broadcasting Corp. to thousands of homes in the remote outback where live television is presently inaccessible.

GMS and FDR merge

SAN JOSE, Calif.—Gill Industries and First Data Resources announced the consolidation of Gill Management Services Inc. (GMS) into the Cable System Services Division of First Data Resources. The merger is expected to be completed by fall although FDR assumed active management of the company June 1.

Robert Masterson, president and CEO of First Data Resources, said, "Over time we will integrate all of our on-line products into a common set of cable applications."

Cable TV Industries expands U.K. presence

LOS ANGELES—Cable TV Industries announced that it will open a warehouse in the United Kingdom for its Cable TV Supply (U.K.) Ltd. subsidiary. Cable TV has nine distribution centers located throughout the United States.

The new sales and distribution facility will be headed by managing director of Cable TV's U.K. subsidiary, Albert Smith, who has been in charge of the U.K. subsidiary since its formation more than a year and a half ago. The company had maintained only a sales office since then because system construction was delayed.

We're not the only converter manufacturer striving for improved long-term reliability...

...We're simply The Most Successful!

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The case for the 1 percent solution: Act Two

By Isaac Blonder
Chairman, Blonder-Tongue Laboratories Inc.

I.M. American knew that any attempt to leave the warehouse through an exit would alert the central alarm office and soon the street would be crawling with screaming sirens. Peering anxiously for trip wires in the aisle and keeping to one side to hopefully evade any infrared beam, he made his way slowly to an exit sign. Fortunately, it was over a desk with a phone. Several telephone calls later, he was escorted out of the building by the irate store manager who had to leave a hot supper and an equally incensed wife.

Over a cup of coffee, I.M.A. mulled over the facts uncovered to date:

1) An insignificant quantity of consumer electronics was now made in the United States.
2) An old respected American name on the product did not give the clue as to where it was made.
3) Deliberate or not, the country of origin was practically invisible.
4) It is doubtful that a U.S. label would influence the sale.
5) Highest production costs in the world necessitates innovative products by the U.S. manufacturer.
6) Innovation was absent.

"Why no innovation?" I.M.A. wondered. "Washington should have the answer to that; the highest ranking bureaucrats are here, as well as the lobbyists who clog the in-baskets with petitions for partisan relief." I.M.A. took to the streets.

First stop was the Department of Commerce, home to the Patent Office. No one there could explain the lack of American creativity in the consumer electronics field, but I.M.A. did learn that the number of foreigners filing for American patents has been on a steep climb and may soon equal the U.S. applications.

At the next stop, the National Science Foundation, a spokesman explained clearly and without emotion that the charge given to the foundation by Congress was to support research not product development. Therefore, most of its grants went to support professors and their students.

This led to the Radio Manufacturers Association, where I.M.A. found that it exits primarily to act as a liason and a voice for electronics manufacturers in negotiations with government agencies. Committees are formed as needed to help set standards for products purchased by the government. RMA is not empowered to conduct research on its own. Occasionally, some new field in consumer electronics appears and a committee of engineers assigned by private industries will try to resolve the conflict between competing technologies in an attempt to present a unified proposal to the FCC for approval.

"Ah, the FCC," I.M.A. thought; and off he went with high hopes.

What he found: The FCC supports a laboratory for measurements and, on rare occasions, will commission selected engineers to investigate matters left unresolved by industry study groups. Very limited expenditures are available for research on consumer electronics.

At this point I.M.A., somewhat exasperated, called on John Smith, the senior engineer of the prominent consulting engineering firm of Smith & Jones, well known for its definitive studies of the ionosphere.

"John, where did I go wrong?"

"Mr. American, you went to government agencies and industry associations expecting to find creative thinking. If you want inventors, hire our firm. We can do anything you ask for. Just pay us by the hour."

"Will you take a contract dependent upon the award of a patent or on the commercial success of the product you design?"

"No!"

"Perhaps", said I.M.A. to himself, " the users of consumer products are willing to pay for R&D to improve their business and profits."

The "Cable Forever Association" occupied a small building at 1313 Freedom Ave. The modest building reflected the modest budget. Chief Engineer Barnum explained his position: "I am hired to appear before the FCC to support the technical aspects of our association's pleadings. Our enemies are numerous and it takes all my time to back up our lawyers. Research? No item for research in the budget, but the manufacturers do it for nothing."

"Yes", agreed I.M.A., "that was yesterday. But today most of the cable electronics manufacturing is overseas and with it is the R&D."

The "Broadcasting is Better Association" was located just a few blocks away in a larger building in line with their larger budget, and indeed they had an R&D line item, $100,000! Chief Engineer Huck Finn explained the BBA's philosophy for innovation, "We convene committees and study groups to evaluate new technology from any source and our recommendations are for the state of the art, tempered, of course, by the need for near-term answers—we cannot wait for R&D and certainly not for American industry to play catch up ball."

Scientific Detective I.M. American returned to his office, lit the candle (electricity had not been restored), cleaned off the pigeon droppings (window still broken), and penned the following report:

'The 1 percent solution: Contribute 1 percent of the gross revenue of cable and broadcasting for R&D'

"American-owned consumer electronics manufacturing has perished and the void is filled by foreign-owned firms with, in some cases, assembly plants in the United States. R&D is dominated by foreigners often with major financial support from their own governments. Thus, new technologies follow the foreign design leadership making it impossible for American industry to recover its former status.

"My recommendation for remedial action is two pronged:

1) Encourage cooperation between industry and labor to improve the quality and reduce the cost of U.S. goods.
2) The 1 percent solution: Contribute 1 percent of the gross revenue of cable and broadcasting for R&D. If the new developments are designed in the United States, they can be made first by U.S. workers."

I.M.A. filed his report but it was never read. The envelope came back, "Addressee Unknown."

Opportunities for I-Net operators

By Randy Bays
Marketing Specialist, Broadband Products, Fairchild Data Corp.

The operating environment for institutional networks (I-Nets) is changing rapidly in favor of multiple system operators (MSOs). Legal, marketing and technological advancements are opening new profit opportunities that were not available a year ago.

Bell operating companies (BOCs) that used to oppose I-Nets are now asking their public utility commissions to allow competition in exchange for deregulation services. For example, in New Mexico the BOC is charging extremely low prices in hopes that they can eventually monopolize the market with more offerings than just telephone service. MSOs, however, could have a broader service package to offer with just enough twist to make them a serious long-term communications entity.

Some MSOs are recognizing the opportunities and threats of I-Nets and are reorganizing in preparation for offering more services than just video. Traffic management has been implemented by Storer (now owned by Times-Mirror) in Mesa, Ariz. Headed by Harold Kronberg, the MSO plans to initiate similar services throughout the Phoenix metropolitan area. In Portland, Ore., Rogers and Storer are actively transmitting data and video teleconferencing for banks, hospitals, municipalities and large corporations passed by their I-Nets. Rogers also has linked its I-Net in San Antonio, Texas, to a local teleport offering voice, data and video capabilities. In Omaha, Neb., MCI is using Commline to transmit voice as a means of local bypass.

Each of these MSOs is demonstrating a type of service that could be offered as an additional profit base. A new concept for MSOs to earn additional income is in the shared tenant services (STS) arena. Shared tenant services are usually offered as a joint agreement between developers of new buildings and a major telecommunication company like Fairchild, UT and AT&T. STS offers tenants enhanced voice, data and video services in one turnkey package. New buildings (usually greater than 500,000 square feet) are pre-cabled to offer new tenants a host of services from a common PBX located in the building. The PBX is then connected to the common carriers (MCI, AT&T, Sprint) to offer the tenant the lowest possible long-distance telephone cost. The connection is usually made via the local telco. Almost all STS packages make their money from voice, data and video traffic generated by the tenant and equipment leases.

The cable operators' advantage

The opportunity to the MSO is to offer full duplex, local and long-distance voice, data and video services to the STS industry. PBXs hubbing tenant's voice and data calls together; PC, word processing and other data oriented local area networks; energy and security managements; as well as full motion video teleconferencing and videotex can be offered to the STS companies by the MSO. The objective is to sell bandwidth competitively as well as offer other services competition does not currently have the capabilities to offer. The majority of these services could be monitored and maintained from existing MSO facilities and equipment.

Currently, shared tenant service PBXs are being linked to long-distance carriers via based lines offering a 10^{-6} bit error rate (BER). Costs for connecting both ends are getting more expensive and the installation time is getting longer. MSOs, whose I-Net passes an STS building could connect the PBX to the institutional cable in about two days, provided equipment is available. Depending on the distance the PBX is from the cable, the installation charge by the STS company could be from 0-50 percent less expensive than telco installation charges. The monthly charges to the STS company should be based on required bandwidth and competitive prices.

To connect the PBX, the MSO will have to know the maximum speed of the PBX, the interface requirements and the actual digital output onto the cable.

PBXs are now being built with aggregate speeds from 56 kBPS to 1.544 MBPS. The aggregate bit rate includes integrated data and digitized voice terminals (data terminals, hand sets and work stations) hubbed together at the PBX producing a time division multiplexed (TDM) digital output. Some of the newer PBXs (Rohm, Intecom, NEC) have been designed to provide enhanced services to the business community. Such services include stored voice and data, packetized switching and digitized video capabilities.

Businesses are realizing that their army of personal computers can be linked together to share files, access main frames, share printers, facsimile equipment and other peripherals, as well as be integrated into an internal electronic mail system. To link these PCs together a local area network (LAN) would be installed to connect the PCs to the PBX in a multi-drop configuration. The PBX would then act as the headend to other parts of the network or to another LAN operating on another floor or in a different building.

'The operating environment for institutional networks is changing rapidly in favor of MSOs . . . opening new profit opportunities that were not available a year ago'

To access the I-Net, the PBX must be interfaced digitally and converted to an RF signal. Depending on the data rate and distance the PBX is from the I-Net cable, the interface will be a CCITT V.35 or an IEEE RS449/422 or DSI (T1) standard. These interfaces are commonly used to interface PBXs to telco equipment. This digital signal will be transformed into an RF signal through a high-speed modem. Most high-speed modems operate at either 56 kBPS or 1.544 MBPS, though PBXs may operate somewhere in between.

Modems are readily available that can handle data rates required by PBXs for institutional networks; some are even field changeable from 56 kBPS to 10 MBPS. Once the PBX is interfaced to the modem and the modem is tapped into the cable for full duplex operation, data files and voice conversations may take place with people in other buildings linked to the I-Nets. Long-distance calls are routed through one switch for greater cost advantages to the I-Net customer. In addition, I-Net voice conversations are much clearer than twisted pair, and data is supporting a BER of 10^{-9}.

I-Net applications

For buildings now tapped into the I-Net, the MSO can now offer special video services

AUTOMATION

Your Way!

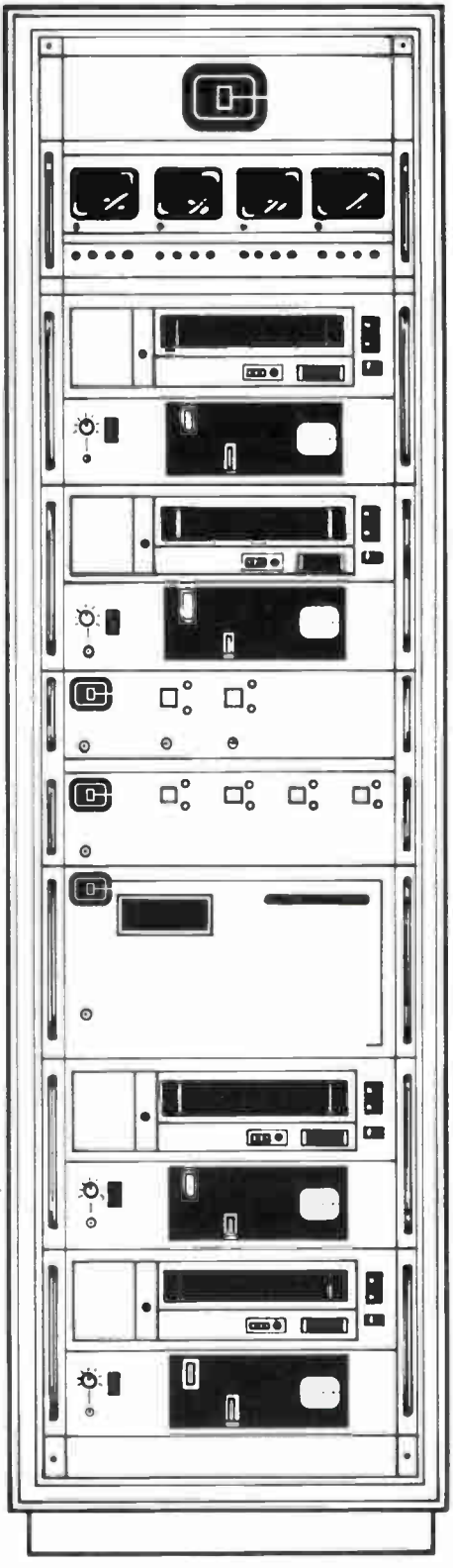
Your requirements are unique to your organization, and that's how your operating system should be.

CCI offers a complete line of video automation equipment that is software based. You tell us how you want your system to run. You even select the format from 1/2" to 1" and how many machines you want.

CCI custom-builds the system to your specifications in our own plant. If you later change your mind about the way your system should operate, no problem. Our CMOS circuitry is driven by EPROMs, so just tell us what you want done diffrently, and we'll blast a new EPROM. Presto, the change is made.

There is nothing CCI loves more than a challenge, so challenge us with your requirements. We've met a lot of challenges already and have over 500 channels currently in operation.

Call us toll-free and let CCI demonstrate how to have automation your way.



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retrieved from satellite. Such services could be stock reports that can be sent directly to a customer's PC or printer, teletext, videotex and video teleconferencing. I-Net customers whose home office has uplink facilities may find more advantages to the I-Net than were first expected.

Potential customers also are recognizing benefits of I-Nets. In Phoenix, Ariz., a large bank has two corporate buildings on opposite sides of the financial district. A preliminary study has shown that 20 MBPS worth of voice and digitized data could be shared between buildings. Using modems at 10 MBPS the bank could experience a cost savings of $40,000 annually if connected to the local I-Net. The study also showed video capabilities could increase productivity between the two buildings as much as 20 percent.

In Kansas City, Mo., hospitals are finding needs to share information. With the development of digitized radiology and magnetic files, hospitals are able to find critical patient data and transmit it directly to another hospital's emergency room in a matter of minutes. The hospitals also are experimenting with video surgery where professionals in other parts of the United States can coach the less experienced surgeons and medical students can watch surgeries from a classroom. On the Kansas City I-Net, banks as well as the city are also considering its use for data. Don Gall, I-Net director, also sees tremendous capabilities for shared tenant services.

In Portland, Ore., Storer Cable has been talking to Tektronics about the possibility of having Tek engineers access corporate computers from home. According to Jeff Wilson, Storer business services director, the engineers would access the computers directly from the cable TV outlets at speeds far greater than those that could be achieved over standard telephone lines.

In Boston, Fairchild Industries shared tenant service division is working with Boston Cablevision to link STS buildings together on the I-Net so that more than one building can share common telecommunication facilities. Fairchild Industries also is talking to other MSOs with active institutional networks that can provide shared services similar to those offered in Boston.

The time is now

Many MSOs are truly in position to offer a number of services geared toward the business industry. Obviously, there are risks to be considered. The local telco could be as much an opportunity as a threat. Some telcos are realizing their vulnerability and are making arrangements to work in as a joint venture with the local cable operator.

These windows of opportunity are expected to be open for the near future. But, as technology is rapidly changing, so is the industry. As fiber technology develops and is laid in commercial areas, competition will get stiffer and opportunity costs higher. Those MSOs planning to reach the commercial industry should act now.

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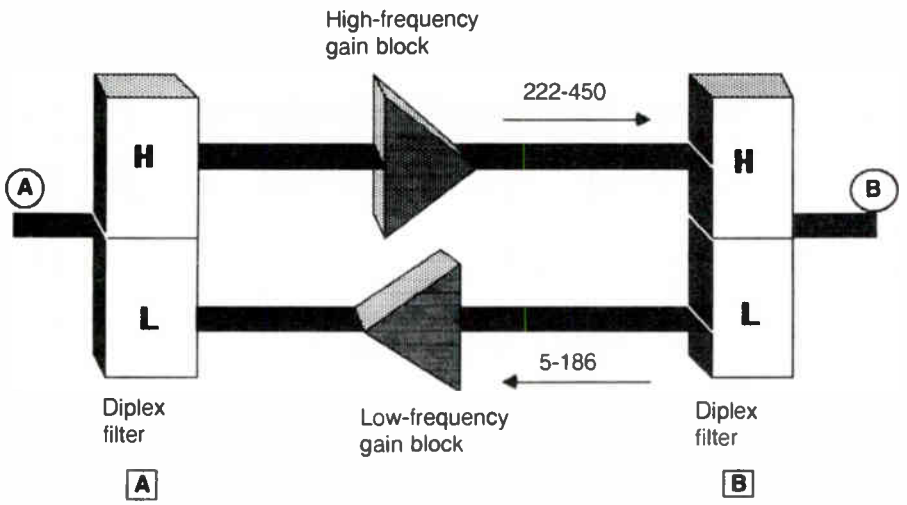
Reader Service Number 13.

Figure 1: Bidirectional amplifier



Broadband data systems

By Kevin J. Hamilton
Applications Engineer, C-COR Electronics

Since its inception, applications of broadband cable have spread from video and audio entertainment to surveillance systems and to data networks. More impressively, all three services may be carried simultaneously on the same coaxial cable. Such combined services could be carried on an entertainment cable if the system has two-way capability, but typically a dedicated network called a broadband local area network (LAN) is used. Broadband LANs are versatile, reliable and expandable networks usually limited only by the owner's imagination and available interface equipment.

Broadband is a popular medium because it can carry many simultaneous signals on a single cable by means of a technique called frequency division multiplexing (FDM). A commercial television signal is allocated a unique 6 MHz channel, so that multiple signals are not carried on the same frequency. In data systems, a channel is not limited to 6 MHz. In fact the channel bandwidth may vary from 50 kHz, as found in low speed (up to 19.2 kbit/sec) modems, up to several MHz (as in a 10 MBPS transmission signal).

Low-speed communications are typically used between terminals and other devices. Each terminal and device on the broadband system must use an RF modem to communicate on the medium. If 50 kHz per modem is required, then 6 MHz divided by 50 kHz equals 120 modems in the same bandwidth as a television signal.

A simple fact is inherent to broadband systems: The more information to be carried at once, the more bandwidth that is required. For example, a commercial-quality video broadcast usually occupies 6 MHz of bandwidth. But a high-resolution video system such as might be used for surveillance can occupy 20 MHz of bandwidth. The same applies to data systems. Small amounts of information do not require as much bandwidth as large amounts. Theoretically, a broadband cable system may carry a data transmission rate of 1,000 MBPS (enough to carry a 30,000-page volume such as the Encyclopedia Brittanica in a second), but current computer and interface hardware cannot process information at that speed.

Broadband systems are popular because they are both easily reconfigured and upgraded. When a terminal needs to be moved from one location to another, broadband technology requires only flexible coaxial cable to be connected to a tap nearest the new location, and that may only be a few feet away. Some LAN technologies require a new cable or cables to be run between the terminal and the mainframe computer, a great expense in time and materials. Conduits may be full of obsolete cables because of office personnel relocation; it is often easier to leave the cable than to remove it.

Large areas may be served by a local area network—30 miles or more from end to end, for example. This potential is more than adequate for the many local area networks that require service only within a few floors of a building or within a few nearby buildings, although citywide networks exist.

Coaxial systems are less susceptible to electrical noise generated from sources outside the coaxial system. The conductive shield of the coaxial cable provides the protection necessary to maintain signal integrity even in noisy industrial environments, provided the system is properly constructed and maintained.

Above all else, reliabilty is considered. Broadband LANs use the same type of equipment that entertainment cable systems use; a technology that has matured over the last 30 years. Most entertainment cable equipment is designed to operate in temperatures ranging from -40 F to +140 F, wet and dry environments, sunshine and shade and even electrical thunderstorms. In fact, broadband amplifiers may be found in sewers, deserts, arctic and tropical regions.

Many of the advantages of broadband RF systems listed previously may apply to other technologies. So why not a state-of-the-art system such as fiber optics? Because a broadband system is the most versatile. It must be able to handle many protocols and applications and yet provide large bandwidth. Broadband can transport data, video and voice on a single cable .

Broadband versatility is exhibited in the various system architectures available. Two popular designs are the split-band single-cable network, and the dual-cable network. Split-band single-cable systems are designed in the familiar "trunk" architecture as found in cable systems. Dual-cable systems use two cables "in parallel," one for inbound signals and the other for outbound signals. Although the two systems are functionally equivalent, they differ significantly.

Single-cable systems

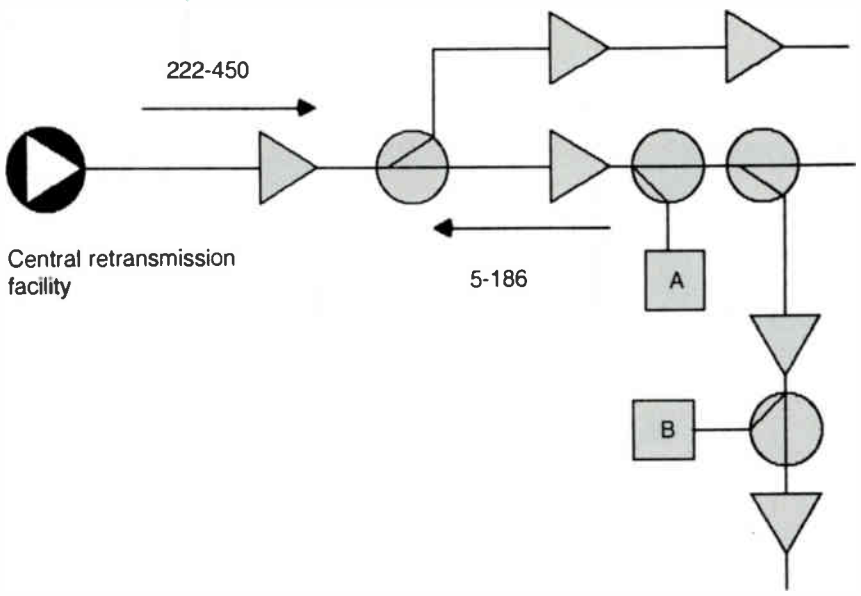
Split-band data networks are similar to entertainment systems in that signals are carried simultaneously and bidirectionally on the same piece of cable. Compared to entertainment systems, however, data systems often employ a larger bandwidth in the inbound directions, and less in the outbound to equalize the number of channels in both directions. Common frequency splits for data systems are 5-112 MHz inbound, 150-4XX MHz outbound and 5-186 MHz inbound, 222-4XX MHz outbound.

Coaxial cable is inherently bidirectional. But amplifiers are unidirectional, amplifying signals in one direction only. To amplify signals in the other direction, a second amplifier is required. A passive device called a diplex filter is used to separate the inbound and outbound signals and to provide isolation between the amplifiers. Essentially, diplex filters are two filters side-by-side, one a high-pass, the other a low-pass.

A typical bidirectional amplifier configuration, as shown in Figure 1, allows signals within the frequency range of 5-186 MHz to travel in the inbound direction, and signals within the frequency range of 222-450 MHz to travel in the outbound direction. The 222-450 MHz signal enters point A, the common side of diplex filter A, passes through the high-pass side of diplex filter A, is amplified in the gain block, enters the high-pass side of diplex filter B and exits the amplifier on the common side of diplex filter B. Likewise, inbound signals enter at point B and exit point A, but travel through the low-pass side of the diplex filters.

At a system level, outbound signals travel away from the central retransmission facility (CRF) in the 222-450 MHz pass-band, while

Figure 2: Split-band data network



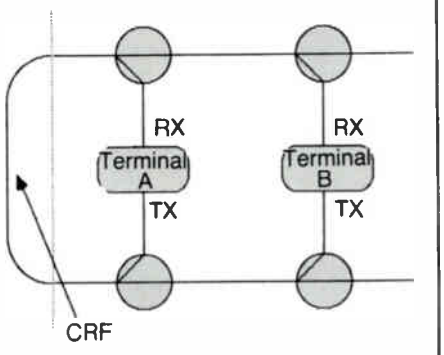
inbound signals travel toward the CRF in the 5-186 MHz pass-band. For two-way communication between two devices, alterations are necessary for signals traveling in the inbound direction to travel in the outbound direction. For example, in Figure 2, A cannot communicate with B because B is downstream from A. Special equipment is needed in the system to allow the two points to communicate. The CRF serves this purpose by retransmitting inbound signals in the outbound direction for reception by all devices tuned to the correct outbound frequency.

In the CRF, a frequency translator (block converter) changes the low-frequency signal to a high-frequency signal by raising the frequency a specified amount. This "frequency offset" is usually 156.25 MHz or 192.25 MHz. In the preceding example, if A transmits at 32 MHz and the frequency offset is 192.25 MHz, the receive modem (B) will receive at 32 + 192.25, or 224.25 MHz.

Not all of the forward and reverse spectrum is available to carry translated data because of the fixed amount of offset at the CRF. In a 5-186 MHz system, the highest translated frequency in the outbound direction is 186 plus 192.25, or 378.25 MHz.

Likewise, not all of the low end of the reverse spectrum can be used because 222 minus 192.25 equals 29.75 MHz. In other words, transmit frequencies must lie between 29.75 and 186 MHz, while the receive frequencies must lie between 224.25 and 378.25 MHz. That is not to imply that the other frequencies are unuseable; all frequencies may be used for communication except for the 186 to 222 MHz band. This portion of the spectrum is a guard band that provides isolation between the outbound and inbound signals. All other frequencies may be used for non-translated communication.

Figure 3: Dual-cable system



Dual-cable systems

Unlike split-band data systems, which have a limited amount of bandwidth, dual-cable networks are designed to maximize the outbound bandwidth.

In the dual-cable system in Figure 3, two cables run in parallel, but with opposite signal flow. Here the CRF is simply a connection between the two cables. The cable carrying high frequencies (42-450 MHz) to the CRF is called the inbound cable, and the cable carrying high frequencies away from the CRF is called the outbound cable.

The inbound cable receives the device data and sends it to the CRF, where it is transferred to the outbound cable for reception by all devices tuned to the correct frequency. Other names for these cables (based upon their function rather than their geography) are: inbound—transmit cable, outbound—receive cable.

Because a dual-cable system uses two cables, it requires approximately twice as many components as a single-cable system, and is, therefore, about twice the cost of a single-cable system. However, more two-way bandwidth is available on the dual-cable system. A 42-450 MHz system has 408 MHz of usable two-way bandwidth. A single-cable system as described in the preceding section has only 156.25 MHz of usable two-way bandwidth.

Data system bandwidth

What is a realistic amount of bandwidth? It is impossible to make a blanket statement for all systems. Questions that need to be answered in order to determine necessary bandwidth include:

1) How many users will be on the system?
2) What kind of information will be carried on the system; very high speed (MBPS) or low speed (19.2 kBPS)?
3) Asynchronous or synchronous?
4) Will other forms of communication such as closed-circuit TV and/or voice be present on the system?
5) What future growth is expected?

After these questions are answered, a final question should be considered: What is the bandwidth of the available equipment for the above required communications? When that is answered, the required system bandwidth can be calculated by adding all the bandwidths.

Often a split-band 400 MHz LAN is more than adequate for most data systems. However, a large amount of video may be required, in which case a 450 MHz system may better meet the system needs.

Backup systems

Although broadband LAN equipment is highly reliable, it can still fail. In data systems, equipment failure could be disastrous because of the large quantity of information carried on these systems, and the value of the information. If the information falls into the "bit bucket" because of equipment failure, revenue is lost by the customer. The longer it takes for the LAN to perform required operations, the more revenue the customer is losing.

Backup systems were designed to help alleviate such disasters. Two common methods of backup are the redundant system and the redundant amplifier. Redundant systems have two identical systems side by side—similar to the entertainment cable A/B configuration. When the primary system fails, then the redundant system is activated. Redundant amplifiers have a second amplifier in the same housing as the main amplifier. In the event of a main amplifier failure, the signal is maintained by routing it through the redundant amplifier.

Cost-effective and wise

Competitiveness demands that today's businesses use the most advanced technology available, and that information be transferred quickly. A local area network enables this transfer of information to be quick and accurate. Using a mature and versatile technology like a broadband LAN is cost-effective and wise—wise because it is reliable and easy to reconfigure, and cost-effective because many signals are transferred on the same cable and equipment.

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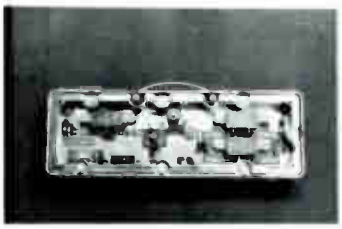
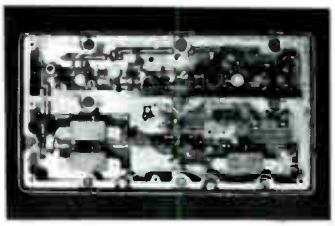
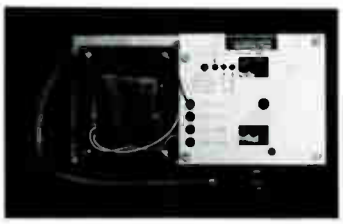
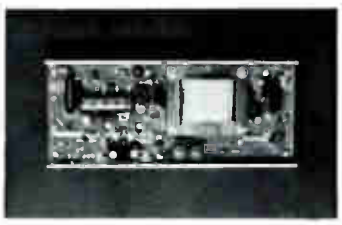

SPECIFICATIONS

STATION FUNCTION		TR. AMP W/ASC BR. AMP.	TR. AMP — BR. AMP.	TR. AMP W/ASC —	TR. AMP — —	TERM./INT. TR. BR. AMP.	LINE EXTENDER
STATION MODEL NUMBER AVAILABLE in P^2 OR PUSH PULL ONLY							
PASSBAND			50 to 330 MHz		50 to 400 MHz		
RESPONSE FLATNESS (See Note 1) Trunk Amplifier		±.2dB	± .2dB	±.2dB	±.2dB		
Bridger or Distribution Amplifier		±.5dB	±.5dB			±.5dB	±.5dB
MINIMUM FULL GAIN (See Note 2) Trunk Amplifier		29 or 31dB	30 or 32dB	29 or 31dB	30 or 32dB		
Bridger or Distribution Amplifier		30dB	30dB			44dB	28dB
RECOMMENDED OPERATING GAIN at 330 MHz, without equalizer Trunk IN to Trunk Out		26/22dB	26/22dB	26/22dB	26/22dB		
Trunk IN to Bridger (Distribution) OUT		40/34dB	40/34dB			38/32dB	26dB
TYPICAL OPERATING LEVELS for 40 channels, with equalizers IN		9dBmV	9dBmV	9dBmV	9dBmV	10dBmV	
Trunk OUT 330 MHz Linear TILT		34/30dBmV	34/30dBmV	34/30dBmV	34/30dBmV		
Trunk OUT 400 MHz Linear TILT		34/29dBmV	34/29dBmV	34/29dBmV	34/29dBmV		
Bridger (Distribution) OUT		49/42dBmV	49/42dBmV			49/42dBmV	48/42dBmV
DISTORTION CHARACTERISTICS (typical for op. levels)							
2nd Order Beats, Chs. 2, 20(g), 13 Trunk Amplifiers		-84dB	-85dB	-84dB	-85dB		
Bridger or Distribution Amplifier		-72dB	-72dB			-70dB	-71dB
Composite Triple Beat	Trunk 330 MHz	-90dB	-91dB	-90dB	-91dB		
Trunk Amplifier	Trunk 400 MHz	-87dB	-88dB	-87dB	-88dB		
Bridger or Distribution Amplifier	330 MHz	-69dB	-69dB			-67dB	-69dB
Cross Modulation	400 MHz	-64dB	-64dB			-62dB	-65dB
HUM MODULATION (by 60 Hz line)				70dB ALL STATIONS			
MAXIMUM NOISE FIGURE, without equalizers	330 MHz	7.0dB	7.0dB	7.0dB	7.0dB	8.0dB	9.0dB
	400 MHz	7.5dB	7.5dB	7.5dB	7.5dB	9.0dB	9.5dB
MANUAL GAIN CONTROL RANGE, mimimum Trunk Amplifier		8dB	9dB	8dB	9dB		
Bridger or Distribution Amplifier		9dB	9dB			9dB	9dB
OPTIONAL INPUT LEVEL PADDING				AVAILABLE PLUG IN PADS S X P'S			
MANUAL SLOPE CONTROL RANGE minimum for Bridger or Distribution Amplifier (Ch. 2/36)		8dB	8dB			9dB	7dB
AUTOMATIC SLOPE AND GAIN CONTROL For changes in temp. (re. to 330 MHz)		+3/-3dB		+3/-3dB			
Amplifier output at pilot frequency holds at		±.5dB		±.5dB			
CONTROL CARRIERS AGC factory tuned to Ch.	AS REQUESTED			AS REQUESTED			
Operating Level, minimum/maximum dBmV				SELECTABLE PLUG IN PAD S X P's			
THERMAL COMPENSATION for ambient changes in amplifier over °F.				AVAILABLE AS OPTION			
THERMAL MATCH at 75 ohm Impedance				16dB MINIMUM ALL PORTS			
POWER REQUIREMENT (In Station Housing) Using QRF-JPP2 60 V System	Watts Amps	1.07A	1.02A	.650A	.590A	.590A	.505A
30 V System	Watts Amps						
DC OPERATING VOLTAGE (AVAILABLE IN -27V, ALSO)		-23Vdc	-23Vdc	-23Vdc	-23Vdc	-23Vdc	-23Vdc

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Reader Service Number 14.

Cable systems talk to computers

By Donald L. Stoner
Vice President, Engineering, Sofcast Corp.

In the fall of 1984, the Sofcast Corp. established the National Digital Network and began distribution of a show called Softcast to radio stations. Softcast contains all the usual ingredients one hears on a radio station, i.e., talk, music, commercial spots and so on. However, the first-time listener immediately notices there is a difference from the usual banter heard when tuning across the dial. The entire content of the Softcast show is directed to owners of personal computers. The news segment highlights events in the computer industry. The music originates in a silicon chip rather than from a keyboard. The announcers are human but they are occasionally upstaged by a smooth-talking MacIntosh.

Pictures, line drawings, color photos and weather maps can be transmitted to home computers.

Broadcasting computer programs

Other strange sounds are heard in addition to the slightly syncopated notes of computer-generated music. Every so often, during the show, the listener hears a steady buzz. These sounds represent a computer program. The sounds picked up on a radio are interfaced to the listeners computer via a device called a Shuttle Communicator. Within two to 20 seconds a complete computer program is transferred from the Softcast studios to the listeners personal computer. During the transfer, the computer screen flashes to indicate a Softcast transmission is being received. Then the computer requests a file name. The listener enters an identifier on the keyboard. Finally, the disk drive whirs momentarily and the recipients program library increases by one. All Softcast software is free.

Not only can programs be transferred but also text files such as instructions, program documentation, news stories, magazine articles and so on. Coupons for merchandise specials and discounts are broadcast regularly to the listeners printer. Detailed weather maps, from the National Weather Service, can be transmitted. It is even possible to send pictures by radio. The first such Softcast occurred two days before the 1984 presidential election. The show transmitted a picture of Ronald Reagan and predicted that he would be the winner. After a picture transmission, the "floppy disk jockey," Robert E. Lee Hardwick, loves to remind listeners that "you saw it first on your radio."

The Shuttle Communicator and the Softcast technique were developed by Microperipheral Corp. This manufacturer of modems, videotex systems and voice recognition/delivery equipment is located in Redmond, Wash. The Sofcast Corp. was established to market the product and is the sole licensee.

Cable softcasting

Early this year the decision was made to extend the Softcast radio feed to cable systems. It was natural marriage. Surveys indicate that up to 40 percent of the homes in a cable service area have personal computers.

The radio show is generally a half-hour in length. Broadcasting on cable networks makes it possible to extend this around the clock. With no time constraints, it is possible to have a half-hour devoted to the IBM, another for the Apple, a third for the Commodore, and so on. Softcasting on the cable also permits much longer programs to be transmitted to listeners. The contents of entire disks can be transmitted during the night and "captured" by a computer while the owner is asleep.

The first system

The first cable system to come on-line was Viacom in the Seattle area. The management at Viacom recognized that Softcast provided a highly desirable service. The Shuttle Communicator could be used as a marketing tool for attracting new customers and retaining existing subscribers. Traditionally this type of product would be installed and leased by the cable operator.

Rather than take the traditional approach, Viacom permitted Sofcast Corp. to market the device directly to Viacom customers on a per-sale commission basis. Even more revolutionary was Viacom's decision to permit customers to install the cable version of the Shuttle Communicator, much the same as for a VCR. Splitters and coax supplied by Viacom are used with the cable version of the Shuttle Communicator. This ensures the continued integrity of the Viacom system.

The Shuttle Communicator can be used with encryption devices, such as the Enigma Logic Safeword system.

Program distribution

The program content is supplied to the Viacom headend in north Seattle and to local radio stations by a leased telephone line. Outside the local area, satellite distribution is mandatory. A single carrier per channel frequency (SCPC) on Westar IV is currently used to transmit the feed. Discussions are now underway and hopefully by fall the feed will be available off Satcom III-R.

The audio feed from the satellite receiver passes through a data regenerator. This device recovers the original data and verifies that no transmission errors have occurred. It also includes a modulation limiter to ensure that no

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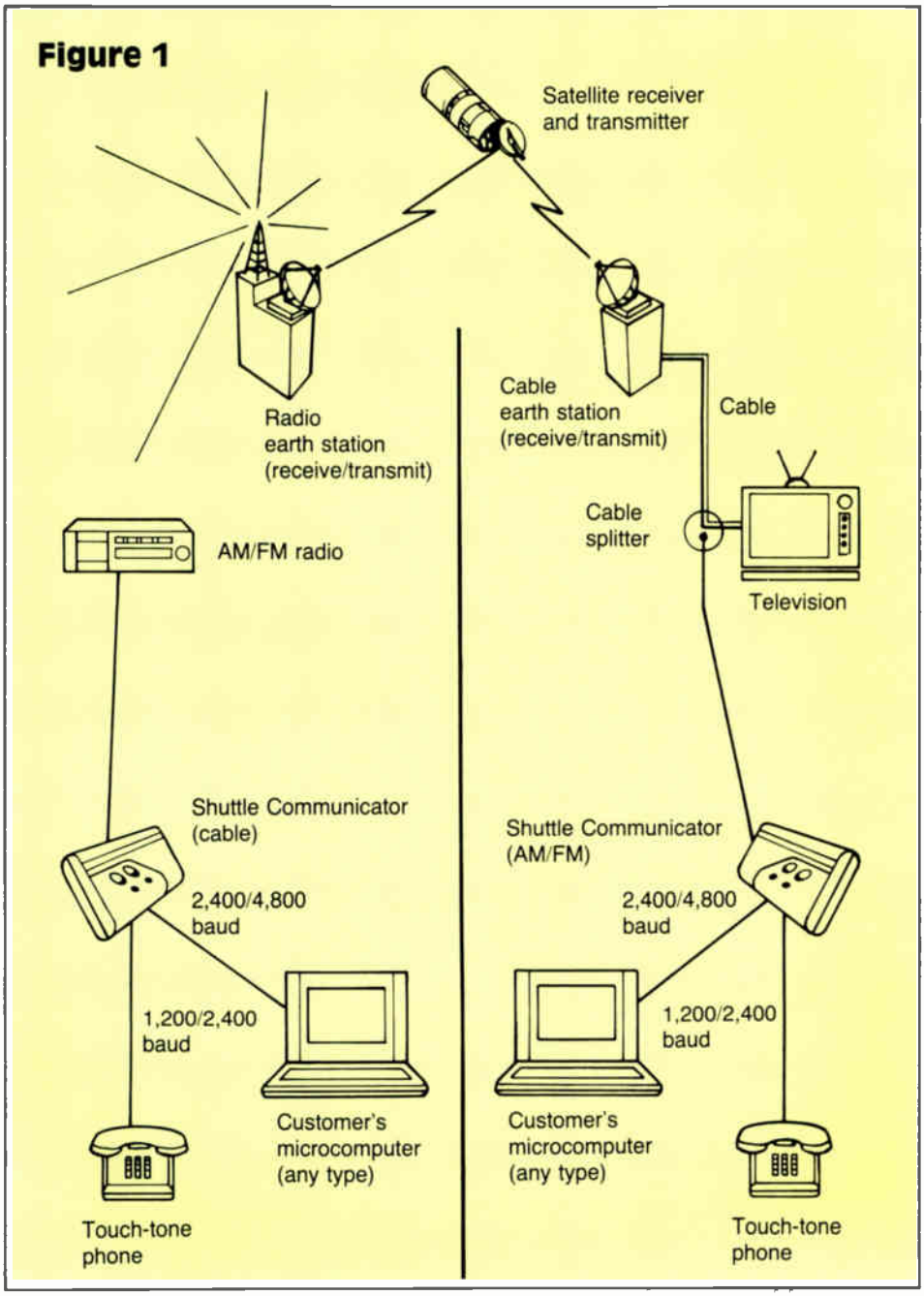
Signal Leakage is the most important technical issue facing the cable industry this year. Don't miss this opportunity to learn from the experts.

Reader Service Number 15.

Figure 1



overmodulation by voice or data occurs. Finally, the regenerator remodulates a tone generator in the Softcast format to recreate an undistorted duplicate of the original transmission. The output of the regenerator is connected to a Wegener 1692 monaural FM transmission card at the cable system headend.

Listeners can receive the broadcasts by having their AM/FM tuners connected to the cable feed. The Softcast program occupies a formerly blank spot on the dial. It can be received by tuning the radio to the broadcast frequency, the same as for any other radio station.

The Shuttle Communicator

The computer data is extracted at the audio output connection of the tuner. This, in turn, feeds the Shuttle Communicator mentioned earlier. Basically, the device is an analog-to-digital converter, or demodulator, which converts the incoming sounds to a serial data stream.

The Shuttle Communicator is available in a number of variations. The most popular is the RS232 version, since it can be used in conjunction with many different types of computers. There are several model-specific versions that do not require that a serial interface be installed in the computer. For example, the Apple IIe version feeds the game paddle port. The data, in turn, drives a software UART. The Commodore version plugs directly into the user port. No RS232 adapter is required. There is even an RS422 version available for the MacIntosh.

The subscriber's AM/FM tuner may not be connected to the cable, or it may be located at some distance from the computer. There is a cable version of the Shuttle Communicator to cover this situation. In addition to the A/D converter, the cable version of the Shuttle Communicator contains a complete FM receiver, an audio system and a speaker.

The data format

As mentioned earlier, all data received via the Shuttle Communicator is free of charge. This concept permits a number of cost-saving design considerations. Since the information is free, there is no need to encrypt the data. Conceptually, every aspect is kept simple and straightforward to minimize cost and complication for the listener.

Frequency shift keying (FSK) is used, rather than the more expensive phase shift system. The data is transmitted asynchronously at 4,800 baud, using an eight-bit word, no parity and one stop bit. The 4,800 baud rate was carefully chosen after an extensive study of existing personal computers. Most computers can operate at rates faster than 480 characters per second. However, they all rely on handshaking to prevent overflow of buffers or dropped characters. Obviously, it's not possible to handshake a one-way radio path. Handshaking is not required at 4,800 baud so long as the screen display is turned off. Very few computers can receive data this fast and still reorganize the screen each time the lines scroll.

Only one computer presented problems operating at 4,800 baud. The ROM-based software in the Commodore 64 permits a maximum rate of 2,400 baud. However, serial communication at 4,800 baud was accomplished by writing a machine language UART program. The program is supplied on a disk with the Commodore 64/128 version of the Shuttle Communicator. While the data format is conventional, the FSK signal is somewhat unusual. It was tailored to permit transmission through narrow bandwidths. The data rate can be twice the theoretical maximum when using frequency shift keying. The overall system is patented by the Microperipheral Corp.

Shuttle software

The use of an eight-bit word permits the transmission of binary information and direct disk-to-disk transfers. However an eight-bit word excludes the use of the parity bit for error detection. To ensure that the listener has received a correct copy of the data, a checksum is transmitted as part of the header information that precedes the program content. The header also describes the program, names the target computer and indicates the exact length of the program in bytes. The end-of-header byte opens the capture buffer in the target computer. The terminal software then counts the number of received bytes and turns off the buffer at the appropriate count. At this point a matching checksum is calculated. If this agrees with the transmitted checksum, the software verifies that a valid copy of the program has been received. The program can then be saved to disk with reasonable assurance that it will load and run.

For those who would like to evaluate a demo tape of the Softcast show, they are available by writing Sofcast Corp., 2565 152nd Ave., N.E., Redmond, Wash. 98052.

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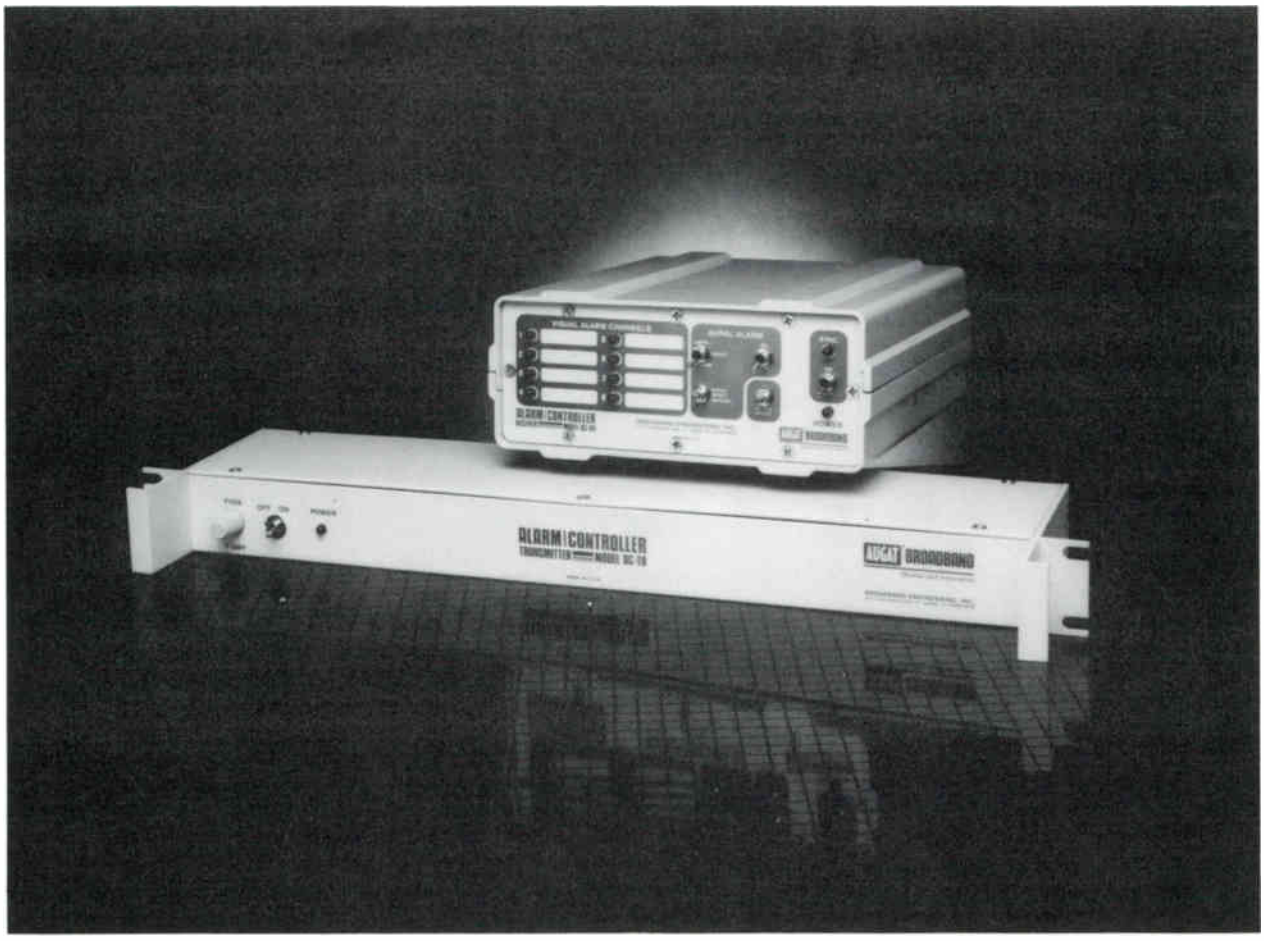

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- Sync light to show receiver and transmitter are communicating

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Getting small systems on-line

By Nancy Frank
Director of Marketing, Cable Data

Large cable systems have made use of automation—computer services for operations and billing—for some time now. It makes sense. The large volume of transactions occurring in a system of 25,000+ subscribers requires a fast method of gathering and cross-referencing lots of data and producing bills quickly. The smaller cable system didn't have that problem, though. The number of transactions was manageable with the usual manual office procedures. Work flowed along. Bills got out. Maybe an occasional logjam, but nothing long-term. Nothing that seriously affected good customer service or overall operations.

Cable operations: Increasingly complex

You probably noticed the use of the past tense above. Operations are changing for the smaller cable system. Cable services are increasingly complex. Subscribers are offered more options, more "choice" (as we've seen and heard in the industry's own promotions), channel capacity is expanding, and pricing structures are intricate, with multiple tiers and multiple pay services. Addressability and pay-per-view add another set of demands altogether. The net result of these changes? More transactions per subscriber, more demands placed on your operation.

Increased revenue vs. increased profit

As you increase the number of services you offer, you'll increase your revenues as well. But will you increase your profits? With efficient office systems in place, profits keep pace with revenues. With outdated, inefficient systems in place, increased revenues are consumed by expenses. You work harder and have less to show for it.

Will manual office systems keep up? Will you be able to keep track of work orders, field schedules, box numbers and rate changes? Will your staff have time for customers, or will more effort go into paperwork than into service and selling? Can you integrate your billing records with addressability service records? Will you be able to report subscriber gains, losses and churn, and the revenue and expenses associated with this activity? Will you have the information you need to run your business?

Smaller cable systems are finding on-line computer services provide the efficient method of handling cable's increasingly complex demands. On-line, as defined here, is the *instantaneous* entry of data into and retrieval of data from the database. In everyday terms, on-line means you can enter a piece of data into your terminal and instantly you or anyone else on your computer system can retrieve that same piece of data. The data is immediately stored and the database is always current. Any reports printed, any information displayed, reflects data entered anywhere on the system only seconds before.

On-line systems become a powerful management tool for increasing operational efficiency and strategizing growth. How?

- Immediate access to all house- and customer-related information.
- Greater accuracy of all information.
- Integrates all subscriber information.
- Optimizes cash flow/cycle billing, fewer delinquent accounts.
- Improves customer relations due to more reliable service.
- Streamlines office procedures, reduces paper and forms.
- Reduces personnel costs.
- Enables operational flexibility and expansion.
- Enables integration of addressability and pay-per-view functions.

An on-line system can make the difference between growth and stagnation—more profit, not just more revenue.

What to look for in an on-line system

There are a number of important characteristics common to superior on-line systems. No matter what size your operation is, or how much data you'll be processing, any on-line system you consider should meet certain standards. Here are some general considerations (also see Table 1).

1) Will the on-line system under consideration meet my needs? It may be the latest, or the cheapest, or highly recommended by another operator, but if the software doesn't solve your operational problems, it's the wrong on-line system for you. Learn enough about the capabilities of on-line services in general to know what you'll expect of the on-line system in your operation specifically. Then measure all the systems available against your needs. Software, hardware, communications gear and vendor support all must meet your particular needs.

Table 1: On-line system characteristics

Software (user)	**Vendor support**
Accurate	*Pre-sale*
Reliable	Vendor understands customer's needs
Easy to use	Amount of hardware tailored to customer's needs
Expandable/dynamic	
Flexible	*Post-sale*
Security is adequate	Efficient installation and start-up
Supported by vendor	Training users to maximize use of system
Software (system)	
Reliable operating system	*Long-term*
User transparent	Ongoing maintenance
User friendly utility programs	Ongoing consultation and training
Database back-up and storage	Vendor-initiated software enhancements and hardware upgrades
Compatible with common protocols	Vendor's continued sensitivity to customer's needs
Expandable/dynamic	Will vendor be in business in a few years?
Security is adequate	
Supported by vendor	**Communications equipment**
Hardware	Reliable
Reliable	Compatible with industry standard protocols
Cost-effective	Cost-effective
Easy to use	Expandable
Easy to expand its processing power, memory, and database storage	Supported by vendor
Fault tolerant	
Current technology	
Heavily supported by vendor	

2) Will the system work reliably? Computers are powerful tools, changing your entire operation for the better. But like any tool, they're valuable only if they work. Reliability is essential in an on-line system. When considering a system, obtain proof of its reliability. The system's software should have passed intensive field testing and be bug free.

Hardware breakdowns should be infrequent. Ask the vendor for mean time between failure (MTBF) and mean time to repair (MTTR) statistics. Time between failures should be high; 10,000 hours for disk drives, 5,000 hours for main system units and 20,000 hours for CRTs is acceptable. The time it takes to repair the equipment should be minimal; one hour or less per device is average. Who does the maintenance? Will they come at 2 a.m. if you need them then?

3) Is the system easy to use? If it's not, it won't be used fully. Everything about the system should be as simple as possible—the user's keyboard, the screen displays, the software design, and maintaining the hardware. When considering an on-line system, ask questions about daily use and test the product yourself. Is it easy to use? Is it easy to learn? Does the vendor provide thorough but easy to understand documentation?

4) Is the system expandable? Will it grow with you for the next three to five years, or is it already a snug fit? Any system you use should allow for greater demands to be placed on it. As your people become comfortable with the system and knowledgeable about its functions, it will be used more frequently for existing operations. And if the number of transactions per subscriber or the number of subscribers increases, even greater demands will be placed on the system. Plan ahead by finding a system that accommodates expansion both in its software and hardware.

5) What support does the vendor provide? Vendor support is essential! Check the track record of your prospective vendor on the following:

Before the sale—Does the vendor understand your operation's needs and provide viable answers to those needs? Is the amount and type of hardware recommended consistent with those needs? Does the vendor customize the system for your unique demands? Is there flexibility in the software? Can the software be customized to meet your

Table 2: On-line software programs

Order taking/work in progress

Complete house/address history of all activity ever occurring at that address

Parameters that allow order taking to be customized

Ability to track equipment

Complete picture provided of subscriber's account status, instantly

Complete picture provided of subscriber's statement, instantly

Order taking screen display customized to stop only at places important to user

Money processing

Ability to handle EFTS (electronic funds transfer service) and bank card processing

Ability to handle lockbox processing with banks

Parameterize collection schemes to customize efforts

Automatic handling of refunds and write-offs

Dispatch

Instantly see how much work each technician has and status of jobs

On-line interaction with customer service staff for ongoing changes

Review at a glance at any time the percentage of jobs done and the status of quotas

Display on demand all pending trouble calls, ranked by severity of problem

Scheduling

Ability to sort jobs by category, such as installations, changes, disconnects, trouble calls

Identify hot jobs that must be done ASAP

Produce for each installer work orders, cover sheets, day's work listing, day's equipment needed

Route jobs by geographical areas

Addressability
Ability of on-line system to interface with your converters

Automatically turn boxes off or on, or change service without a technician visit

Automatically authorize, de-authorize and charge for pay-per-view events

Upload data from an addressable vendor database

Interface with phone entry processing for pay-per-view order taking

Interface with account status program to aid in collections—automatically turn boxes on/off based on payment status

Inventory control
Complete inventory scheme—track equipment at any point in time and at any location

Parameterize inventory control scheme—customize tracking of inventory to meet your operation's needs

Complete reports on inventory status

Reports
House, subscriber information, and work-in-progress reports on demand

Management analysis reports including: subscriber and non-subscriber counts, pay services by customer count and outlet, system activity reports; all connects and disconnects on a given day or in a given period or by pay service

Financial reports, including: payables, receivables, inventory, payroll, fixed assets, income charged, adjustments, aging, special notices, recap, liability analysis, deferred discounts, write-off analysis

needs? Is the software integrated into one overall information system?

After the sale—Is the equipment installation and start-up timely and efficient? Are users and management thoroughly trained to maximize use of the system, especially its software? Does the vendor promptly respond to questions and requests regarding the system? Do you receive thorough documentation on both software and hardware? Does the vendor's conversion team stay with you until you're running smoothly?

Long-term—Does the vendor provide ongoing equipment maintenance, training and consultation? Does the vendor initiate and release software enhancements and hardware upgrades to improve your system on an ongoing basis? Does the vendor continue to be sensitive to your changing needs? Will the vendor still be in business for the next several years, providing full customer support?

6) Do I need a turnkey system or a self-assembled system? Turnkey systems offer the advantages of dealing with one vendor only and having a fully integrated system. It is possible to create a fully integrated system without a turnkey approach, but the burden rests on the cable operator rather than the vendor.

7) Will a shared system meet my needs, or do I need an exclusive system? A shared system usually refers to the sharing of processing power and memory contained in the central units of the computer. Each individual customer has user terminals and communication lines to the main unit. Exclusive, or in-house, systems refer to all elements of a system used exclusively by one customer, housed in that customer's facility, and operated by the customer's own personnel. There are no hard and fast rules here. The needs of your particular operation will determine whether a shared or exclusive system is appropriate.

Specific considerations

In addition to the general considerations discussed above, specific areas within the system require additional review:

Software

- Software used in daily operations must be flexible enough to

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accommodate the various tasks performed. Make sure software parameters allow for such flexibility.

- System security must be adequate. Protection procedures (security codes, cross checks, etc.) must be in place within user software so that sensitive information is accessible to authorized staff only.
- The system's (as opposed to user's) software should be compatible with the protocols common to other on-line systems.
- Database back-up and ample storage should be provided by the system's software. Back-up is essential to prevent loss of valuable subscriber information in the event of a power failure or other disruptive event.

Hardware

- Cost-effectiveness is a key issue in selecting an on-line system. Inexpensive equipment is a waste of money if the system doesn't meet your needs. A system that initially appears high-priced may actually be very reasonable given its impact on your operation. When evaluating the cost-effectiveness of the system's equipment, knowing your needs and expectations will allow you to make a good judgment.
- The system should be fault tolerant, i.e., able to absorb minor hardware problems without disrupting daily operations.

Communications equipment

- As with hardware, compatibility and cost-effectiveness are important aspects of communications equipment.

Specific software features to look for

Once you've determined that an on-line system meets the overall guidelines just discussed, it's time to review the specific software programs available. An on-line system is only as good as its software. It is the software that can provide you accurate, comprehensive, reliable data; software can provide solutions to operational problems. The equipment must be good, but the most reliable equipment is worthless without superior software.

So, what do you look for in prospective software programs? First, each software program must be flexible, designed to adapt and respond to changes in your operation. You may hear the term "dynamic" used. Your cable system is dynamic and changing—your software should be dynamic too.

Second, software programs must offer parameters that allow them to be customized to fit your operation. You have specific needs unique to your organization (whether they're due to franchise compliance, geographical conditions, auditing procedures, marketing strategies or whatever). Well-designed software programs make this customizing ability available while still providing comprehensive data.

Third, all software programs—order taking, scheduling, dispatch, reports, money processing, inventory control, addressability, etc.—must integrate into one overall information system. The customer service function should be able to instantly communicate on-line to the dispatch function a change in schedule. Only when all functions (programs) are integrated on-line will you obtain the full operational and management benefits an on-line system offers.

Table 2 provides information on the various areas to review. Despite the size of your system, the software characteristics needed as your operation becomes more complex are covered here.

Final considerations

Are these types of systems available? Yes, immediately. Is the conversion and start-up process difficult or disruptive? No, not usually (here's where vendor choice can really pay off). Is an on-line system really a good idea for your cable operation? It can be. On-line systems are available to meet the needs of most operations, whatever their information needs. If you want current data, management information, an efficient operation and a method of handling growth, an on-line system could be just the thing—for increased profit, not just increased revenue.

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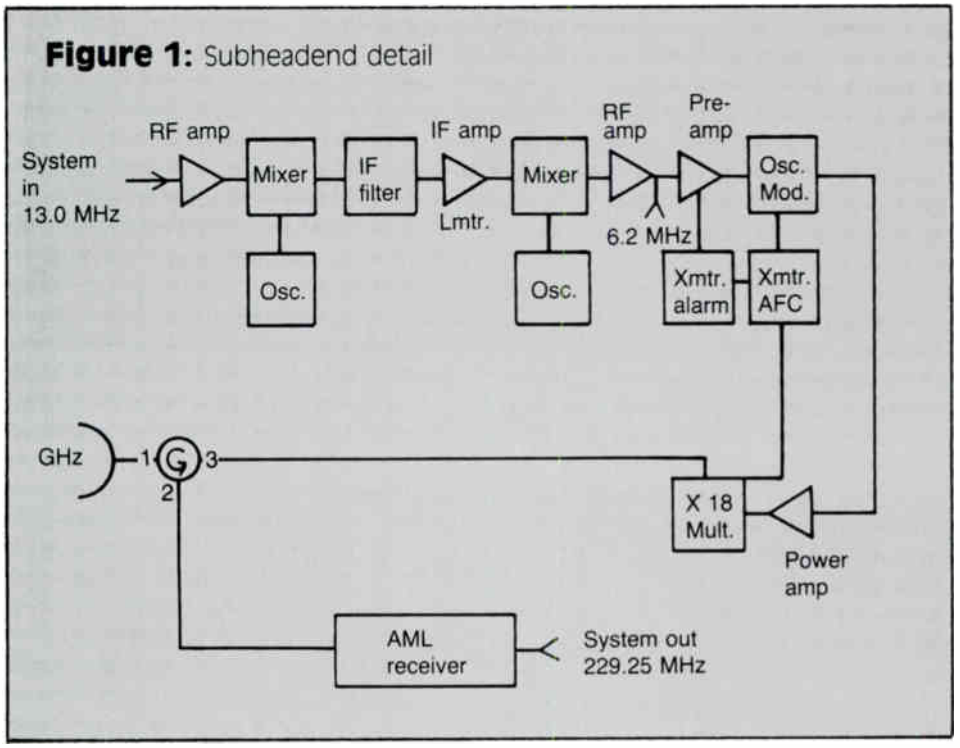


Broadband packet-switching

By Franc Stratton
Manager, New Business Development, Viacom Cablevision

In 1983, Viacom successfully implemented a value-added data communications service for the Mountain View, Calif., Police Department. Asynchronous terminals were remotely linked to a host central processing unit (CPU) for interactive file inquiries and updating. Sytek packet-switching broadband modems linked the terminals to the host over a subsplit institutional cable.

The subsequent success of the application proved that a subsplit system could be used for a value-added CATV communications service. In order to be economically viable, however, the service must cover a wider geographical area than the small subsplit institutional cable system in Mountain View. Since the service should potentially cover a wide metropolitan area, then it must be interfaceable to entertainment and institutional cable systems, two-way microwave links, and private broadband local area networks.

Viacom's Nashville, Tenn., CATV system is a subsplit, 1,800-mile entertainment cable with AML microwave linking six hubs and 200 to 300 miles of plant to a master headend. The service area has large geopolitical boundaries (an entire city and county), and therefore enough potential users to justify implementation of a two-way enhanced service.

Current broadband packet technology

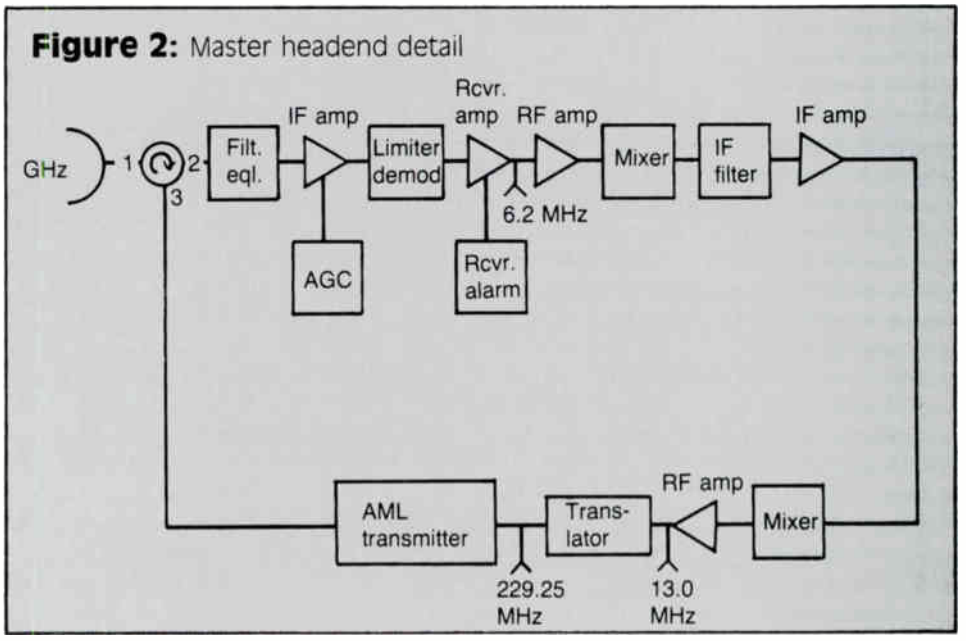
Viacom chose the Sytek LocalNet 20 family of broadband modems and multiplexors because of the positive experience in Mountain View and the fact that the modems (called packet communications units, or PCUs) could still function with a propagation delay equivalent to 35 miles of coax. Each PCU is frequency agile, and can operate on any of twenty 300-kHz subchannels within a 6 MHz pair. An upstream and downstream is necessary for two-way communications created by an RF frequency translator at the main broadband headend.

Many modems can share the same 300 kHz subchannel since access to bandwidth is based on the carrier sense multiple access with collision detection method (CSMA/CD). Modem logic monitors (senses) the subchannel for carrier presence, and transmits data packets via FSK-modulated carriers. During transmission the modem checks its own received data packets for damage occurring when two modems transmit simultaneously, as happens when contending for channel access. When collisions occur, each PCU detects the damaged packet and waits for a predetermined backoff period before again requesting channel access. The random wait period varies with each modem according to an algorithm within PCU firmware logic.

The modems detect errors in packet transmission by a polynomial-based cyclic redundancy check (called CRC-16), which causes the receiving modem to not acknowledge (a nack) an improperly delivered packet. When the network is not inoperable due to ingress or outage conditions, this should ensure bit error rates of 1 in 10 to the 10th power or greater. Modem data transfers (sessions) cease or abort whenever an RF path interruption occurs. These sessions must be reestablished as soon as the CATV system restores service.

Input to the models is via 2 to 32 EIA RS232 ports operating at data rates selectable from 75 bits per second to 19.2 kBPS for asynchronous devices and 1,200 to 9,600 BPS for bisynchronous equipment. Multiple port host communications are supported by multiplexing the individually addressable input ports onto a 128-kilobit RF output F connection to the 300 MHz wide broadband subchannel. Many more terminal ports may be on a subchannel than host ports since busy ports can be detected, and the calling modem can be passed or rotored to a non-busy host port. Port and bandwidth contention also allow very economical network cost-per-port figures.

The PCU converts the serial input into pack-



ets containing destination and sending addresses, data, sequence and control information, and CRC error detection check bytes. This seven-layered open system interconnect packetizing process defined by the International Organization for Standardization (IOS) allows end-to-end speed and flow control conversion between communicating devices. This value-added process differentiates CATV broadband packet communications from regular analog twisted-pair tariffed services.

Packet network/CATV system interface

Since Viacom had a franchise requirement of return video from each subheadend site, frequency modulating microwave transmitters were chosen to complete the two-way link. The FML transmitters and receivers were multiplexed with the Hughes AML downstream microwave so that the same antenna could be used for both links. The lower 4.5 MHz of the return microwave spectrum would be for video with the balance to be filled with packet channel subcarriers.

Experience with a two-way security service in its Dayton, Ohio, franchise had prepared Viacom for the problems of end-to-end dynamic level ranges. Realistic CATV system dynamics with varying operating levels would potentially allow modems with higher carriers to dominate the network. Furthermore, excessive carrier levels fed from the coax network to a subheadend return microwave path could cause transmitter overdeviation of the CARS carrier in excess of FCC standards.

Other problems with the 1,800-mile CATV system include the noise floor contribution of over 4,500 amplifiers funneling into the master headend from remote hub sites. Ingress and distortion from any point in the system would interfere with the network subchannel for all return packet carriers since the two-way bus is shared.

To minimize system dynamics and prevent microwave transmitter overdeviation, Viacom's engineering staff modified a Catel FM processor/limiter (see Figure 1) to convert the upstream data carrier to a microwave-compatible subcarrier. Since the PCUs use FSK modulation, limiting maximum carrier levels would not damage data packets. The limiting also prevented overdeviation and widely varying carrier levels throughout the system.

The engineering staff also added an important squelch circuit, which prevented any output, including return noise and ingress, to the microwave transmitter when a subchannel data carrier was not present. This meant only the return hub with modems transmitting packets would contribute to headend return noise and ingress funneling degradation problems at the master headend translator. The modified processors later proved to be fast enough and stable enough not to cause packet carrier errors.

Using subsplit frequencies but not CATV channel standards, the PCU transmits in the very upper portion of T-7 and lower two thirds of T-8. The translation chain converts the upstream transmit frequencies to the downstream receive frequencies with a 216.25 MHz offset. This places receive subchannels in the upper portion of Channel K and lower two thirds of Channel L.

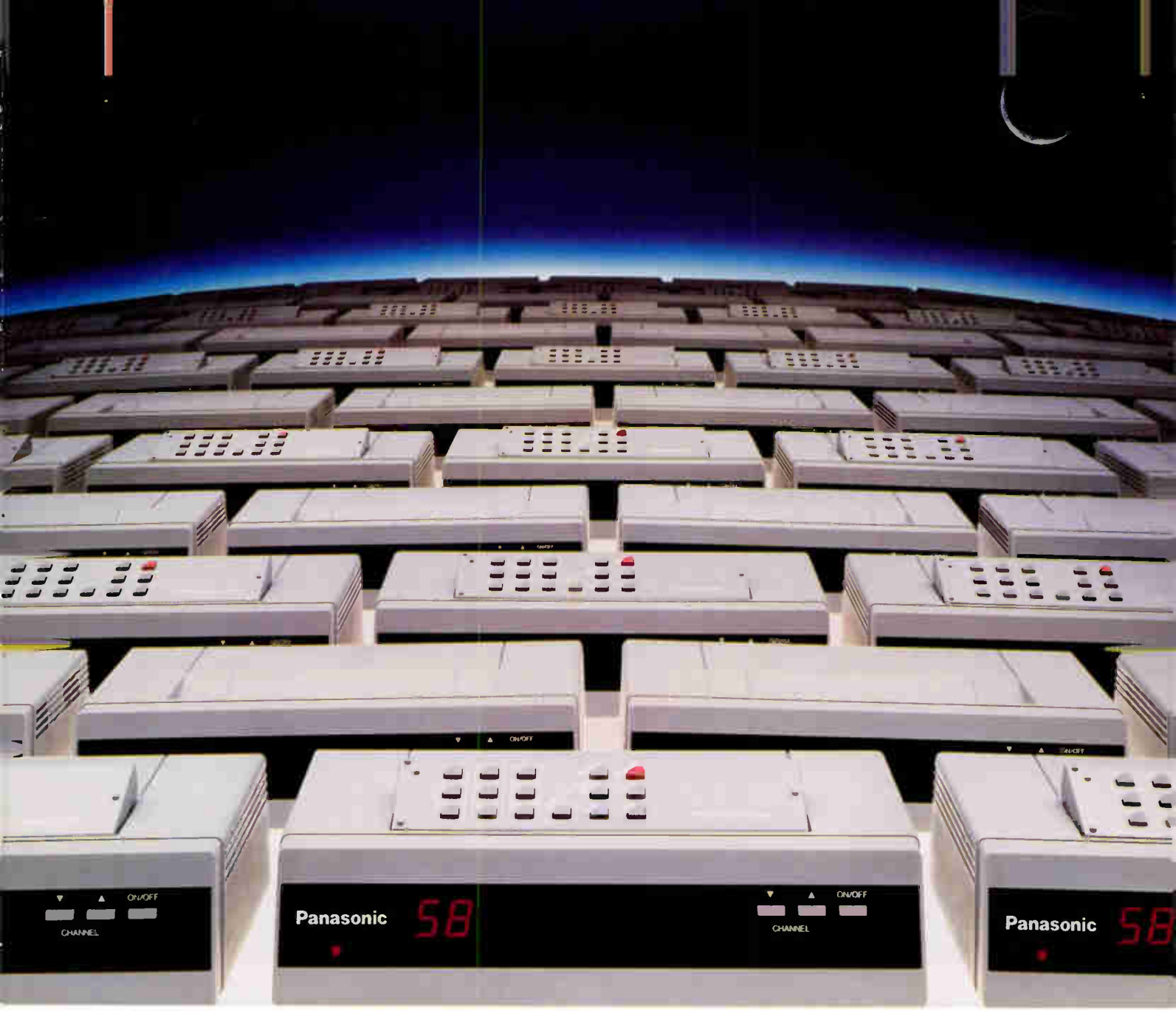
So as not to waste valuable CATV channels, the 10 subchannels available for the T-8/Channel L combination with adequate guardband allocation were used to implement initial circuit testing. Using 13.0 MHz as the first transmit frequency, the upstream carrier is limited (see Figure 1) and then downconverted to a 6.2 MHz microwave subcarrier.

At the master headend (see Figure 2) the FM microwave receiver feeds the 6.2 MHz subcarrier to a 6.2 to 13 MHz upconverter/limiter. A very stable translator then does the 216.25 MHz offset conversion with output turned downstream via AML links. Frequency stability tests have proven this translation chain to be within the modem specifications for frequency deviation tolerances.

Service testing and implementation

When Viacom began testing the packet network and translation chain, too many aborted and bad packets were detected by a network statistical monitor. The initial culprit was assumed to be a carrier-to-noise (C/N) or carrier-to-ingress problem.

Field and lab tests soon revealed the surprising source of the packet errors—the PCU receiver. The receiver works very well even with C/N ratios as low as 15 dB. But if the absolute noise floor was greater than -36



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dBmV (weighted into 300 kHz), then the receiver's oversensitivity caused noise to interfere with packet carrier detection. Since the modems could operate properly down to -23 dBmV, a standard -13 dBmV ± 3 dBmV receive level at a data C/N of 30 dB or better was chosen.

The PCUs do not allow separate transmit and receive level adjustments; therefore, Viacom constructed a diplex filter black box with separate pads in the upstream and downstream paths. This device allowed independent adjustment of modem transmit and receive levels where noise levels presented problems.

Field testing soon revealed positive results, and minimum errors now occurred. Load tests on channel capacity also were positive and concluded that over 1,000 simultaneous sessions transmitting at 9,600 baud and a 10 percent duty cycle could share the 10 subchannels. Practically, many more interactive users could share the frequencies since lower baud rates and lower channel needs would be sufficient for many users.

Hooking up test customers

Since 1981, Viacom in Nashville has provided fixed-frequency synchronous RF links to the city for 9,600 baud data transfer between an IBM host and terminal servers. These circuits were point-to-point and point-to-multipoint bisynchronous links.

Recently, the fixed-frequency modems were replaced with the packet modems with good results thus far. The most difficult portion of the switchover was modem internal setup required by the PCU to be compatible with the character-oriented bisynchronous protocol between the host front-end communications processor and the remote terminal server.

Neither the host vendor nor the user was sure of such esoteric parameters as the hexidecimal value of the synchronization characters or the maximum block size. However, a Comit Model 1500 circuit analyzer from Phoenix Microsystems captured a block of data and provided all the information necessary for modem parameter table setup.

Applications and the marketplace

That 128-kilobit packet communication services can be provided is undeniable but currently risky due to state regulatory unknowns. Despite the current national deregulatory environment, state officials have varied reactions to data communications over CATV systems. However, even when return on investment requirements are commensurate with this risk, packet data communications over cable is potentially a cost-effective alternative to cross-subsidized data communications over a voice network.

Viacom has opted for a deliberate approach to packet communications until regulatory and de facto communications standards emerge more clearly. Meanwhile, the knowledge and experience gleaned from current testing has been marketed with less risk to the private network marketplace. Private networks include local area networks, campus area networks, and private cable systems. These users have well defined needs that often will involve multiplexing many services onto the network including entertainment and commercial video programming, T-1 links, security, energy management, teleconferencing, high-speed imaging, CAD/CAM and more.

One factor that could give many cable systems an edge in this private market is the fact that it is currently being served by unqualified retail outlets or small, poorly financed broadband contractors. Furthermore, their designs or installations are generally substandard compared to most CATV systems with two-way experience. Add the options to lease and provide ongoing maintenance, and a very marketable broadband product and service can be provided by the CATV industry.

Someday a telecommunications maxim may ring true: 80 percent of communications are internal and 20 percent are external. The high-speed internal systems cannot be externalized by the analog, low-speed bottlenecks currently overpriced for bandwidth offered. A 128-kilobit to a 5-megabit external buss should be as affordable as a business telephone.

Reprinted from the 1985 NCTA Technical Papers *handbook.*

Texscan PATHMAKER CATV

WE DIDN'T CHANGE THE NAME, BUT LOOK WHAT WE ADDED!

It's hard to improve on a reputation built from 15 years of field proven reliability. So, Texscan's Pathmaker distribution line retains all the outstanding features you've come to respect such as: Upgradability, Ease of Maintenance and Efficient Construction.

But, now we've added more reasons to buy Texscan Pathmaker equipment with *Splitband* and *Feed Forward* capabilities.

Our Series 1000 Multiservice Amplifier offers *Split-band* for local area network applications. A single 5-210 MHz amplifier covers a wide area of return bandwidth options, selectable by four different modular plug-in diplex filters. And, the forward amplifier covers from 150-450 MHz to complement any one of the diplex filters you choose. Both the forward and reverse amplifiers offer provisions for either thermal or dual-pilot closed loop circuit AGC.

The Pathmaker *Feed Forward* amplifier also features the modular, drop-in design for ease in upgrading and reduced cost. The Series 2000 Trunk Amplifier will feature *Feed Forward* towards the end of this year. Call your salesman for details.

The Station shown contains: Model 752 covering 5-108 MHz with 12 assigned channels 150-450 MHz with 50 assigned channels.

Model 753 covering 5-120 MHz with 12 assigned channels 174-450 MHz with 46 assigned channels.

Model 754 covering 5-174 MHz with 21 assigned channels 216-450 MHz with 39 assigned channels.

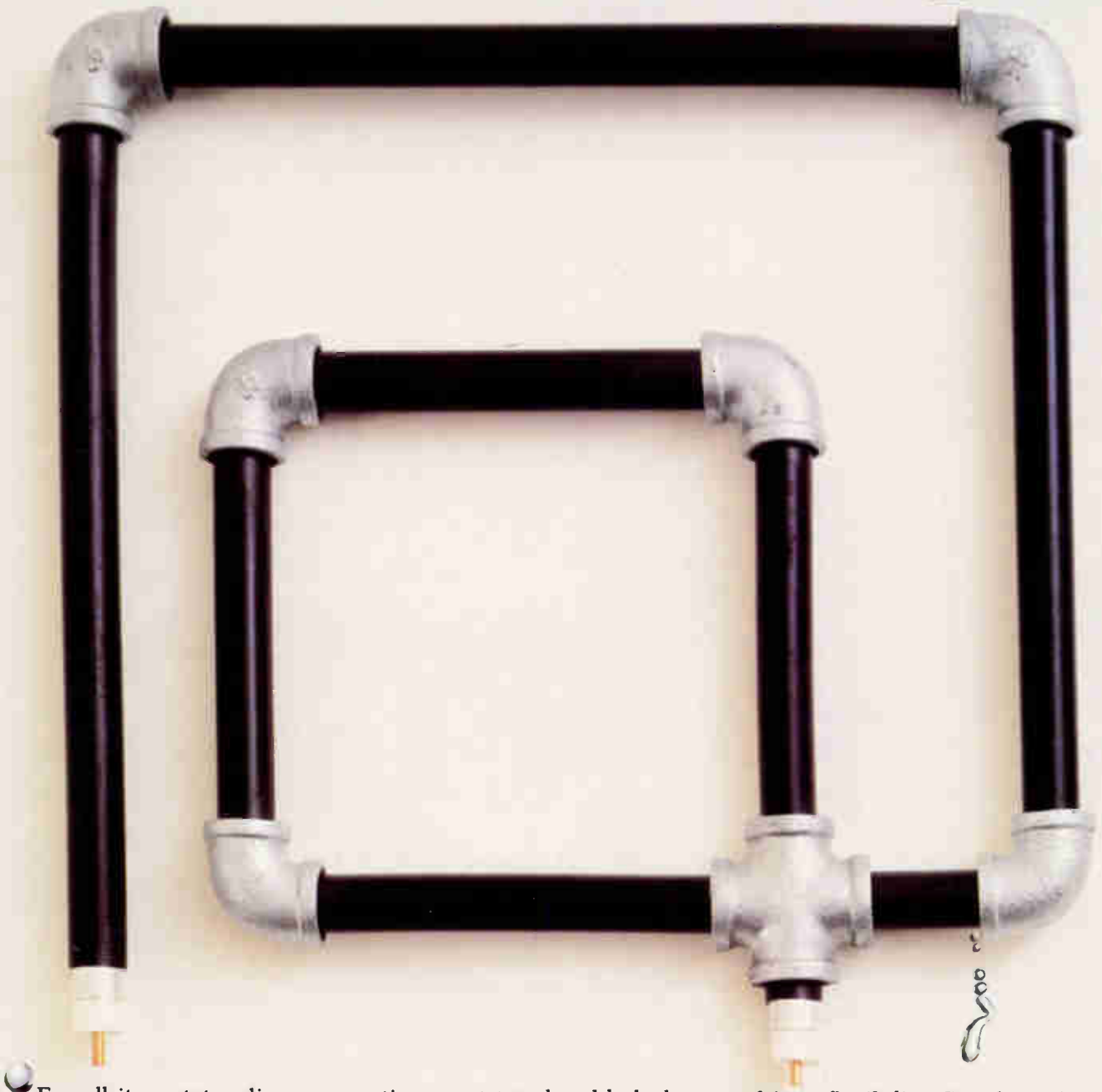
Model 755 covering 5-210 MHz with 28 assigned channels 264-450 MHz with 31 assigned channels.

Texscan Corporation
1440 Goodyear Drive
El Paso, Texas 79936
(915) 594-3555

Texscan CORPORATION

Reader Service Number 27.

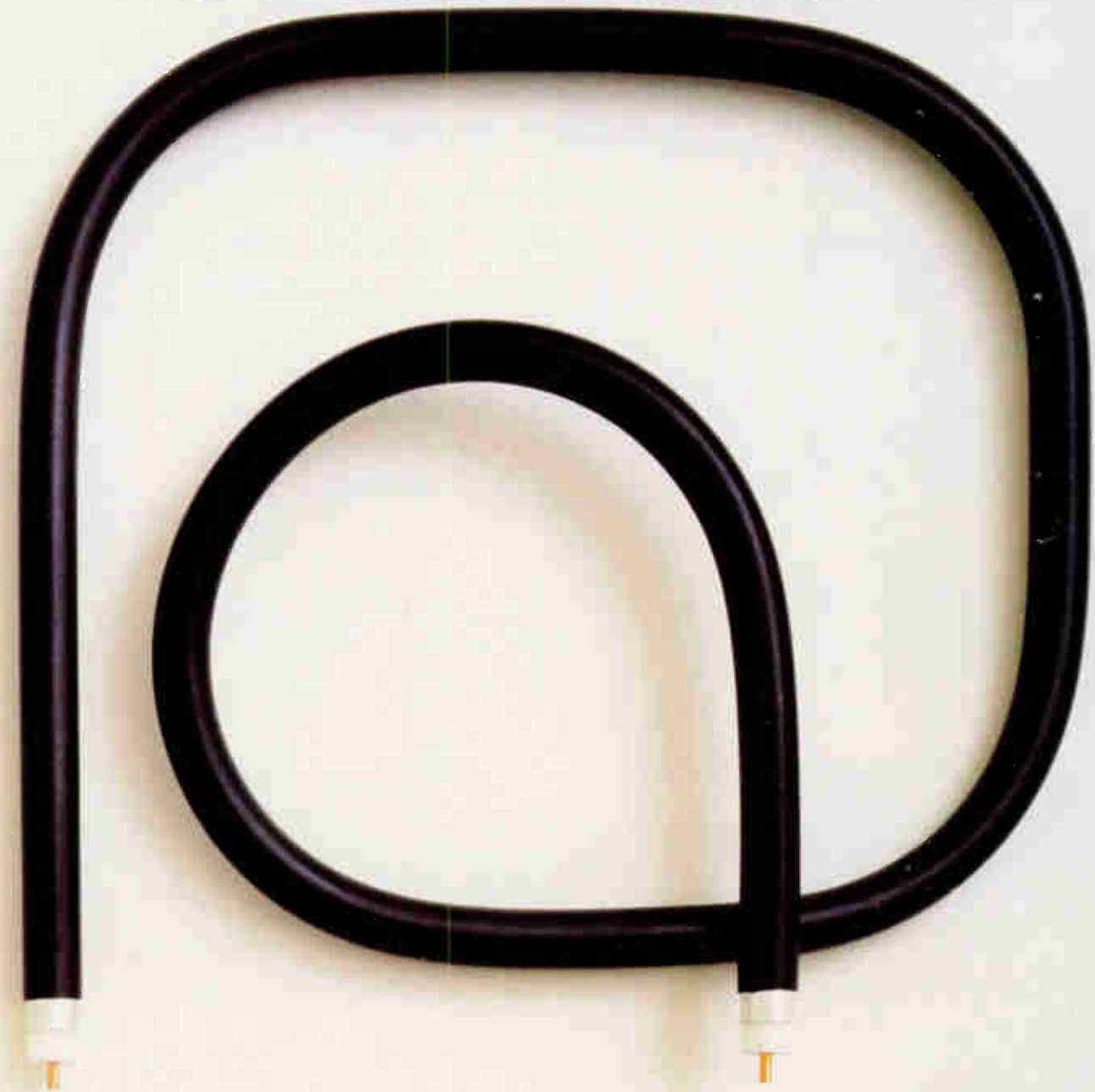
THEIRS:



For all its outstanding properties most trunk cable lacks one thing: flexibility. Bend it a little too much or turn it too tightly and bingo, you're out of the cable installing business and in the cable splicing business.

M/A-COM's Quantum Reach® is the most flexible trunk coax on the market. You can pull it, bend it or twist it and you probably won't hurt anything but its feelings. It's just that tough. And

OURS:



it's just the coax you need if you're tired of sniffing splices, dispatching repair crews, the FCC and expensive fines. So, if you've been using theirs and still haven't tried ours, here's your chance. Call 1-800-438-3331 for samples and data. Ask for QR™. It's brand new from M/A-COM.

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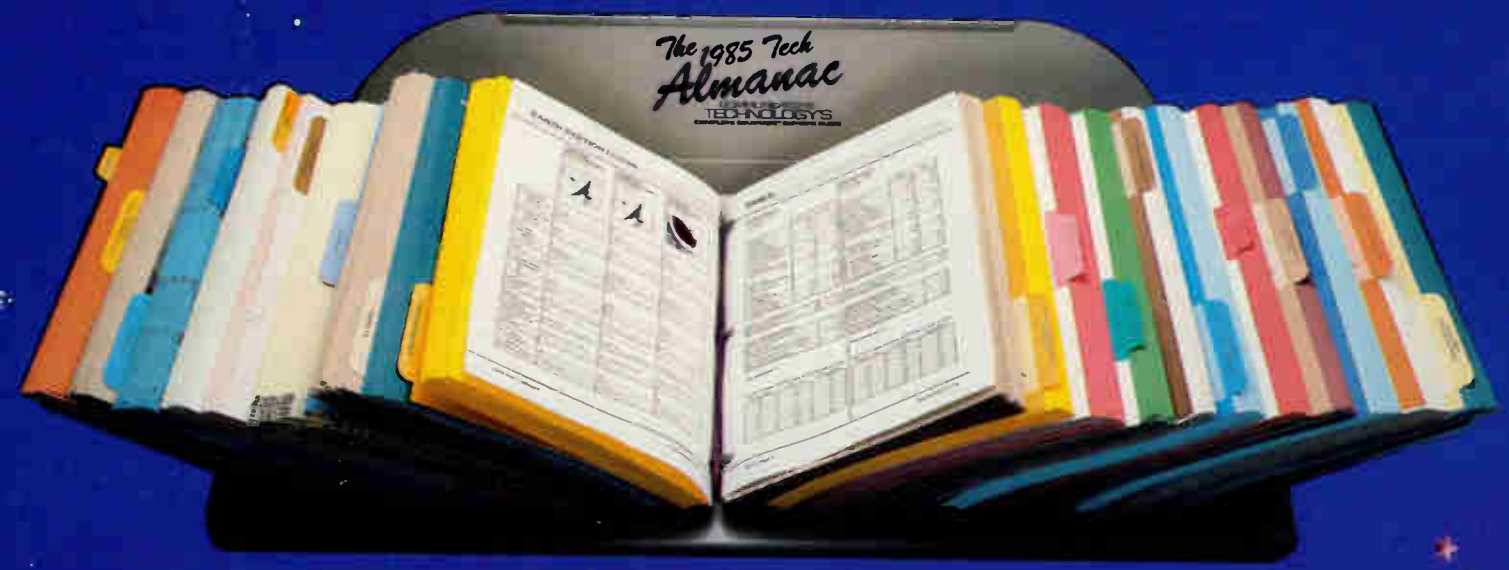
M/A-COM Cable Home Group, PO Box 1729, Hickory, NC 28603, 800-438-3331, in NC 800-222-6808, telex: 802-166

Reader Service Number 28.

A STAR IS BORN

A product of this magnitude only comes along once in a blue moon.* The Tech Almanac is the ultimate cable hardware resource; the yardstick by which all other product and service directories are measured.



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Reader Service Number 29.

'Inserting commercials on cable (TV) is at least five times the problem as inserting commercials in a broadcast situation'

Specifying ad insertion equipment

This article is intended to cover the basic types of commercial insertion systems, their individual idiosyncrasies, and other variables that will affect your buying decision. These variables include accessories required, installation problems and maintenance considerations.

By Bill Killion
President, Channelmatic Inc.

The sale of local advertising on cable television systems has proven itself as a viable source of additional revenue. Quite a few systems are exceeding $1 million annually in local ad sales and many are approaching this figure. Most are showing heavy profit for their efforts in this area. Many of those who were snickering at the mention of local ad sales a year or so ago are now either involved in it or are in the process of equipping to do it.

Many cable engineers are currently faced with the problem of evaluating automatic commercial insertion equipment and most have had little or no exposure to this type of equipment. There are probably about 15 or 20 manufacturers of commercial insertion equipment and out of this group only three or four manufacture equipment that essentially will do the job. Many of the manufacturers are recently formed or new to the cable industry, so the engineer is often faced with also evaluating the manufacturer. To further complicate the problem there are major differences in the approach taken by the various manufacturers, particularly with the more sophisticated systems. In short, most cable engineers have much to learn about this new technology and it is moving so fast, they have little time to do it.

The problem

About the first thing that you will hear when asked to select commercial insertion gear for your system is: "The equipment must be capable of a broadcast-quality job . . . If our commercials don't look as good as broadcast, we can't sell them." The next thing you will hear will probably be: "But we must realize that this is a new business and its future is unknown at this point; we simply cannot afford to spend much money for the equipment."

You're in between a rock and a hard place. You can't win. You're expected to perform like a broadcaster and are given just a few dollars with which to do it. And, once you really evaluate the problem, you will quickly come to the conclusion that inserting commercials on cable is at least five times the problem as inserting commercials in a broadcast situation.

Broadcasters have one channel; you probably will have to insert on at least four and possibly six to eight channels. The broadcaster has a good number of production-oriented people, numerous years of experience, megabucks worth of the best equipment money can buy and usually, total redundancy on any equipment as important as that used for commercial insertion; you have from none to a

Figure 1: Single-channel, four-VCR sequential system

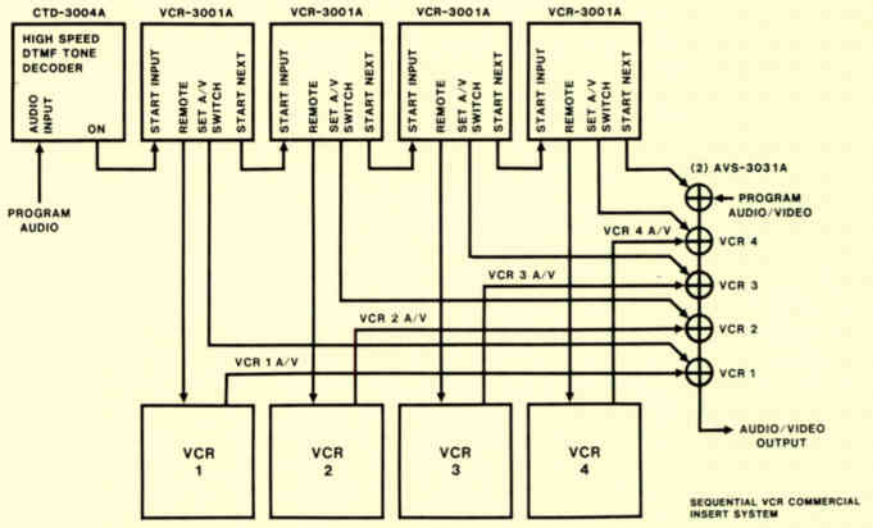
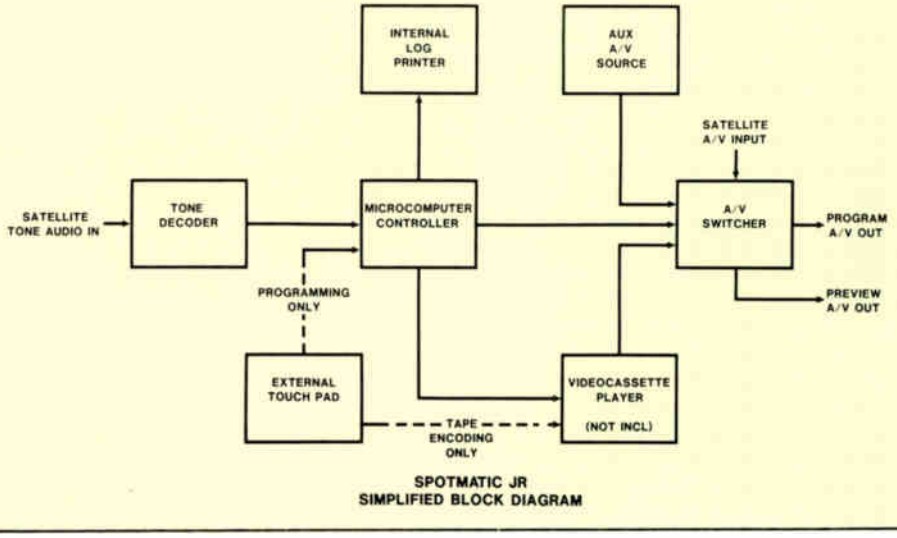


Figure 2: Spot-sequential system



few production people (and they probably are not too experienced), you don't have much money to spend and you won't be able to afford redundancy.

Cable systems can approach the performance and reliability of the broadcaster with their advertising effort. However, there is no magic way to achieve this goal without spending an appropriate amount of money for staff and equipment. The broadcaster is no fool; if it could be done for a pittance, he would be doing it. Find the equipment and manufacturer that you feel comfortable with and, if you don't have sufficient funds in the budget to cover it, arm yourself and fight for the money. Realize that whatever you install, it will be expected to run every spot, every time and to insert it in a broadcast fashion.

Automatic commercial insert systems

Several types of automatic commercial insert systems are available today. The following discussion describes the four general categories and presents estimated costs for each. Accessory items, such as logging and verification are also covered. Simplified block diagrams are included to provide a basic understanding of how each system functions.

Sequential automation: This type of system has the capability of playing, in order, any specified number of VCRs. Each VCR is loaded with a different commercial, with the combined length of the grouped spots filling a particular local avail. The most common configuration controls four VCRs per channel, which allows playback of four 30-second spots, back-to-back, to fill a two-minute avail. Since five video switches occur when presenting a four-VCR sequence, vertical interval switching should be utilized to avoid objectionable degradation.

Sequential systems can be automated by starting the sequence with a satellite tone decoder; however, they are most often used in semi-automatic (operator-based) systems, since the tapes must be constantly changed. In such cases, the operator merely loads tapes into each VCR and presses a start-sequence pushbutton for a few seconds (preroll time) prior to the insert point. All other functions are controlled by the automation system, including switching from and returning to the satellite program. Figure 1 is a simplified block diagram of a sequential system.

The primary disadvantage of this approach is cost per channel because of the four VCRs and their control. The first channel of an automatic four-VCR sequential system would cost approximately $11,800 with Sony VP-5000 VCRs, minus the time-base corrector (TBC), if used. A single-channel turnkey sequential system with color monitoring and time block capability would cost approximately $22,000, complete.

Spot-sequential automation: This equipment arrangement is, by far, the most widely used today for fully automatic systems. In a spot-sequential system, all spots are recorded, in proper sequence, on a single tape and the system automatically plays back the next spot in the sequence each time a satellite insert tone is received. After the last spot on the tape has played, the VCR rewinds and additional satellite insert tones merely repeat the spots.

The most obvious advantage of this system is its relative low cost as compared to other methods, because it only utilizes one VCR per channel. A single-channel price of approximately $4,600, with VCR, makes it very appealing to most cable operators. Figure 2 is a simplified block diagram of a multiple-spot system.

Its disadvantage lies primarily in the amount of effort that is required in tape preparation. Spots must be edited (or grouped) to fill the proper length avail and a predetermined sequence must be maintained. This may present no problem in systems selling time on a "run of schedule" basis, particularly when services such as CNN, MTV, TNN and others having single-length spots are utilized. However, services providing multiple-length spots require even more editing time and care. This situation is further aggravated if the "run of schedule" sales approach is not utilized.

Better systems have an auxiliary mode of operation, which allows 30-second spots to be recorded back-to-back, with a short fade to black between each spot, on one tape. The playback system will then insert however many 30-second spots it takes to fill the avail

each time a * cuetone is received, returning back to the satellite signal when the # cuetone is received. After switching back, the VCR is then slightly rewound and parked on the beginning of the next spot on the tape. These systems are operator-free and very reliable, and any editing time is generally far more than offset by the savings in the operator time, particularly if long schedules are sold, thereby limiting the number of tapes to be edited.

A quality spot-sequential system will be provided with vertical interval switching, a preview buss, a printer for logging and verification, an extra switched input for switching to a character generator to pick up a spot, and battery backup. Such a system is priced around $2,800. A completely wired four-channel system, with monochrome monitoring on each channel and a single color monitor with selector switch, including VCRs can be purchased for approximately $25,000.

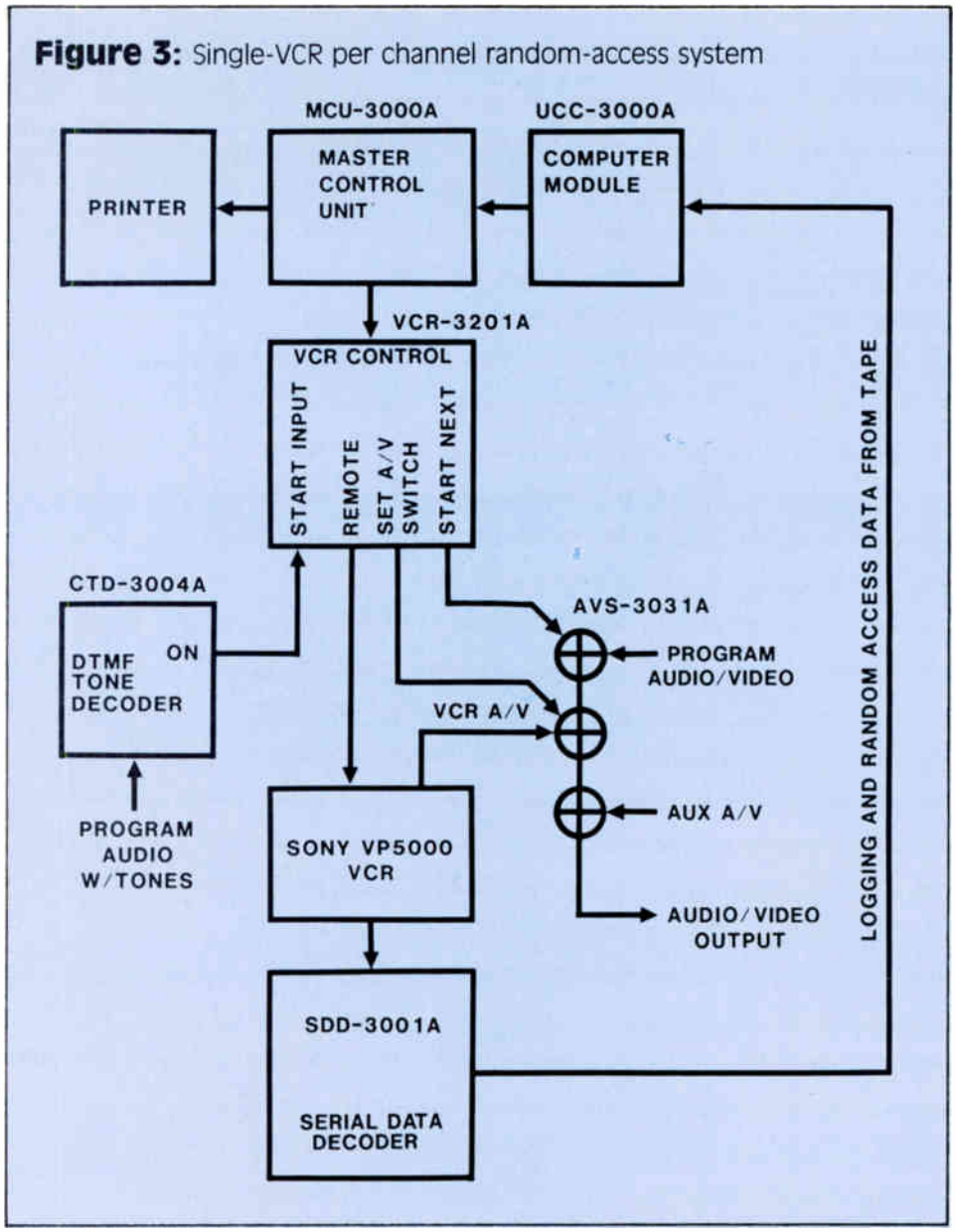
Random-access automation: These systems utilize one VCR per channel in their basic form and operate much like the multiple-spot arrangement. A microcomputer-controller is provided, into which the spot playback sequence of each day is loaded. The controller then locates the appropriate spot, in advance, for insertion upon receipt of a satellite insert tone. This enables the operator to pick any desired playback sequence of the randomly positioned spots for unattended playback over a period of up to one week. Figure 3 is a simplified block diagram of a random-access system.

Although editing time is limited, due to the fact that spots can be placed in any order, the spots must still be grouped for proper length. For example, a CNN tape would require that any spots shorter than two minutes be edited together for an overall length of two minutes. (Obviously, search cannot be performed fast enough to fill two minutes with four 30-second spots located at different places on the tape!) Furthermore, when used with services providing multiple-length avails, independent spot groupings must be edit-assembled to cover all possible avail lengths, thus further complicating the situation.

The advantages of the single-VCR random-access system vary greatly, depending upon the particular application. It is particularly useful with services providing avails of uniform length, where many spots are sold on a time-scheduled basis (prime-time split). Conversly, systems with few advertisers, particularly those selling on a run of schedule basis, would find it difficult to justify this system over the multiple-spot system.

Although recent advances have greatly reduced the cost of this type of system, it remains significantly more expensive than the standard multiple-spot system. Because of the extensive microcomputer-control required, the first channel will normally be substantially more expensive than additional channels. Some systems can be upgraded to multiple VCRs (described next) by merely adding modules. A four-channel, single-VCR per channel random-access system including a computerized tape encoder and printer (without rack, VCRs and other accessories) can be purchased for under $22,000.

Figure 3: Single-VCR per channel random-access system



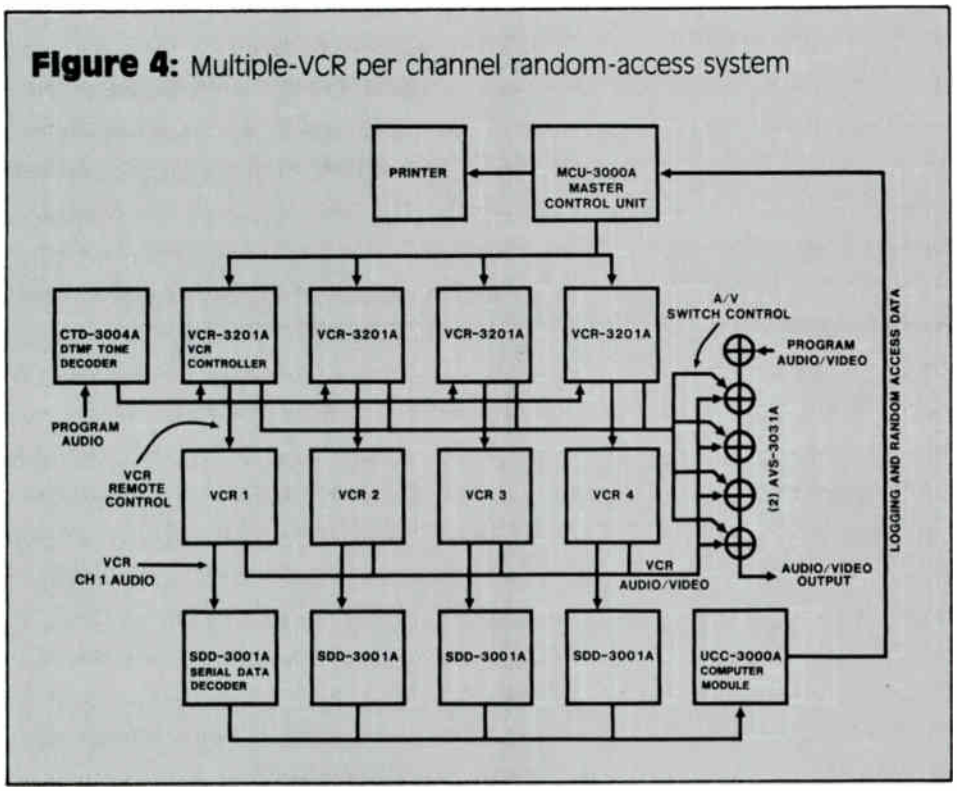
Since it would be computer-based, a properly designed random-access programmer should contain most of the requirements for logging and basic verification by printer. Consequently, adding only about $1,500 to the price (any number of channels) would provide the capability of full-featured logging with daily advertiser-sorted run listings. The time saved in billing with such an aid can be substantial in systems with a large number of advertisers.

A distinct disadvantage of a random-access system as related to a multiple-spot system is the probability of operator error in entering the program sequence; imagine an incorrect sequence, particularly on a service with multiple-length spots! A very judicious operator is absolutely necessary for the program entry function. A printout, for checking purposes, is also mandatory.

Multiple-VCR random-access automation: This is the ideal system for commercial insertion. It is identical to the basic random-access system previously described, except instead of using one VCR per channel, four VCRs are used. This almost eliminates editing, in that it is no longer necessary to edit-assemble shorter spots to provide commercial groupings necessary to fill a given avail. For example, because four VCRs are used, a 30-second spot could be selected on each of the VCRs in advance by the computer and the spots then played back by sequencing through the VCRs; this would provide a clean four-spot grouping to fill a two-minute avail.

Tape preparation time with such a system would be very limited as opposed to other systems. Basically, a master tape is composed by merely recording, back-to-back, all of the advertising spots sold for that particular channel. Four dubs are then made of the master, with one of the dubs used for each VCR. Any one or all of the VCRs can be used to playback one or more spots to fill an avail; consequently, any situation can be covered by merely programming the spot sequence properly in advance. Figure 4 is a simplified

Figure 4: Multiple-VCR per channel random-access system



block diagram of a multiple-VCR random-access system.

This system has all of the logging features of the single-VCR per channel random-access system. Its only disadvantage is in its cost; otherwise, it is, by far, the simplest, most reliable system with which to work. A single-channel system of this type with full logging would cost about $26,500, including the four VCRs, with no TBC or other accessories. A completely wired six-channel turnkey system will cost much more. A turnkey system of this nature is remotely controlled by a minicomputer with a hard disk drive (such as the Winchester) and a color monitor. It should provide a TBC, monitoring, sync distribution, audio distribution, automatic changeover with sync loss, preview buss, test buss and a high-speed tone generator for each channel. A central test and monitoring facility includes a 50-input, one-output audio/video monitor switcher that can select any point on any channel for monitoring audio and video. An audio monitor, a waveform monitor, a vectorscope and a color monitor receive the selected output from the 50x1 switcher. A test signal generator and an audio generator can also supply signals to the system for analysis. This system, complete, is priced at approximately $250,000, depending upon brand of TBCs, monitors and test equipment used. It can be easily expanded in the field to add more channels.

Computer-assigned VCR automation: Several manufacturers are marketing systems that use four to six VCRs in a multiple-VCR random-access configuration to provide commercial insertion on up to six channels. The schedule is loaded into a computer and all spots are loaded on the tapes of all VCRs. The computer then preselects the channel and, when the cuetone is received on that channel, inserts the spots by playing back the selected VCRs in sequence.

This type of system has only one advantage over a multiple-VCR per channel system: it uses fewer VCRs. Generally, its price is about the same, since it requires a much more powerful computer. Using six VCRs to supply spots to as many as six channels does, however, mean that the computer often must reschedule spots because of avail collision on two or more channels (this is particularly a problem with spots occurring on the hour and on the half-hour, which is common on most channels). The possibility of reschedule could be a major stumbling block when selling time to most advertisers, particularly when prime time is considered.

System considerations

When specifying an automatic commercial insertion system, attention must be given to a variety of accessory items, which are necessary for proper operation and maintenance of the system. The following discusses these accessories and some of the problems they solve.

Time-base correction: The primary function of a TBC is to eliminate sync timing inconsistencies in the VCR output signal, which result from tape stretch, improper tension adjustments in VCR mechanisms and improper speed control of heads and/or tape drive components. Improper sync timing can cause bowing in the upper portion of a television picture; this imperfection is normally called "flagging," "skewing" or "hooking." The severity of the symptom is directly related to the ability of the TV receiver to react to sync timing changes; most newer integrated-circuit receivers tend to hide skewing errors; older receivers, particularly tube-type and hybrid sets, have a tendency to amplify the problem. A signal may appear perfect on a studio monitor and be practically unintelligible on an older receiver out on the system.

Early VCRs were very poor mechanically and utilized numerous drive belts in the tape handling and drive mechanisms. These machines, even when in perfect operating condition, had severe time-base problems. These VCRs were largely responsible for the success of the stand-alone TBC. However, newer VCRs (for example, the Sony Series 5000) utilize locking (electronically driven) servo motors for head and tape drive; all tape movements are either directly motor driven, or driven through gears and no belts utilized. These improvements eliminate most of the causes of sync instability, including severe tape stretch. (It is doubtful that TBCs are necessary when using Sony VP-5000 VCRs in commercial insert systems. Hundreds of systems are currently operating with non-TBC'd VP-5000 VCRs and are not experiencing skewing problems.)

TBCs represent a very major investment when used on each channel. They are not needed to facilitate vertical interval switching; that locking function can be performed in other ways for much less money, as I will discuss later. Smaller systems, particularly, should investigate further the practicality of operating without a TBC, or at very best, an inexpensive analog skew-corrector type of TBC, without the gen-lock or advanced sync capability.

A high-quality TBC should always be used in the editing and tape dubbing processes. Along with correcting sync-timing inconsistencies, the more expensive TBCs also contain excellent videoprocessing amplifiers; this signal processing during tape preparation and duplication will assure proper sync and color burst levels and, in general, will greatly improve the picture quality from the resulting tapes.

Vertical interval switching: Vertical interval switching is the method of switching the broadcaster uses to assure a clean transition when changing from one signal to another. This perfect switch results primarily from the fact that the actual signal changeover occurs at that point in time when the TV receiver is "blanked" and it is preparing to trace a new frame of picture information. The blanking occurs so quickly that the human eye cannot perceive its presence; obviously, if switching transients or gaps occur during this period they also will not be perceptible.

In order to switch two signals in this manner, it is necessary that the VCR be "servo-locked" to the source with which it is to be switched (in this case, the satellite signal). Normally, this is accomplished by using a TBC that is equipped with both a sync gen-lock input and an advanced composite sync output. The gen-lock input accepts the satellite receiver output and utilizes it as a timing reference with which to synchronize the sync signals of the TBC. In turn, the advanced composite sync output of

the TBC is connected to the sync input of the related VCR; if more than one VCR is used on a channel, the advanced sync must be split by a distribution amplifier and routed to all of the VCRs. The VCR servo-locks to the advanced sync as it is prerolling and this overall process causes the VCR to be in perfect synchronism with the satellite signal so that vertical interval switching can be performed. Occasionally, this arrangement causes a problem when using TBCs that have a wide window; if the TBC and the VCR are a great distance apart, sync-wise, the VCR may not be completely locked in sync by the time preroll has completed and switching takes place, resulting in a crash switch.

A far less expensive method of synchronizing the two can be implemented by merely removing the composite sync signal from the satellite video, amplifying it, and applying it to the VCR sync input. Such a device is quite satisfactory for vertical interval switching and, at a cost of about $250, it eliminates the need for an $8,000 TBC. If it is desired to use a TBC, a less expensive device, without gen-lock or advanced sync can be purchased for around $5,000. Since one TBC is required per channel (if they are used), this results in a substantial savings.

Vertical interval switching also requires a more elaborate and expensive video switch. Some commercial insert systems available today *do not* have provisions for vertical interval switching. *Any* other form of switching will result in noticeable signal degradation when switches occur. It is strongly suggested that commercial insert systems without vertical interval switching be eliminated from consideration, regardless of cost difference.

VCR sync-lock problems: As previously stated, some method of sync locking the VCRs to the satellite source is necessary for vertical interval switching. This is done by removing sync from the satellite signal, processing it and applying it to the sync input of the VCR. This can be accomplished with either a sync-stripping distribution amplifier, or a plug-in accessory module for the Sony VP-5000 VCR called the Handimod I.

A typical sync-stripping pulse distribution amplifier (about $700) can accept a standard video input and deliver six isolated 4 VPP composite-sync outputs to lock as many as six VCRs to the video source. The Handimod I (patent pending) plug-in accessory module also strips and processes sync, but only locks up the VCR into which it is plugged. It inserts into the unused modulator cavity on the rear panel of a Sony VP-5000. It also provides a balanced low impedance audio output and a gain control. Price of this unit is $300.

VCR audio-interface problems: For some reason, the Japanese persist in providing audio "line-out" impedances on VCRs, which vary from 40,000 ohms to as much as 100,000 ohms. Most equipment manufactured in the United States is either 600 ohms balanced, or 150 ohms unbalanced. Normally, this causes no problem, but when we are faced with switching between the output of a VCR and the output of a satellite receiver (600 ohms balanced), it causes difficulties.

In order to match the satellite audio output, the modulator must be terminated in a low impedance (usually 150 to 600 ohms). The satellite receiver audio output level and the aural controls of the modulator are each adjusted to provide the proper system audio level, based upon this match. Now, if we switch the satellite audio off and connect the 50,000 ohm VCR audio into the same modulator termination, our normally adequate VCR output level is suddenly reduced to near nothing by the low-impedance termination of the modulator. It just does not work. When we insert a commercial, we have little VCR audio at the subscriber's set.

The solution to this problem is to add some sort of impedance converting amplifier between the VCR audio and the switcher. This is usually accomplished by adding a low-cost audio mixer-amplifier (about $300) on each VCR. A few of the commercial insert systems have a built-in impedance converting amplifier that solves the problem, but this still requires that unbalanced Hi-Z audio be cabled between the VCR and the system, which could cause hum pickup. Adding an audio amplifier for each VCR will also solve it. There is an accessory plug-in for some VCRs that also converts the audio to low impedance.

Monitoring

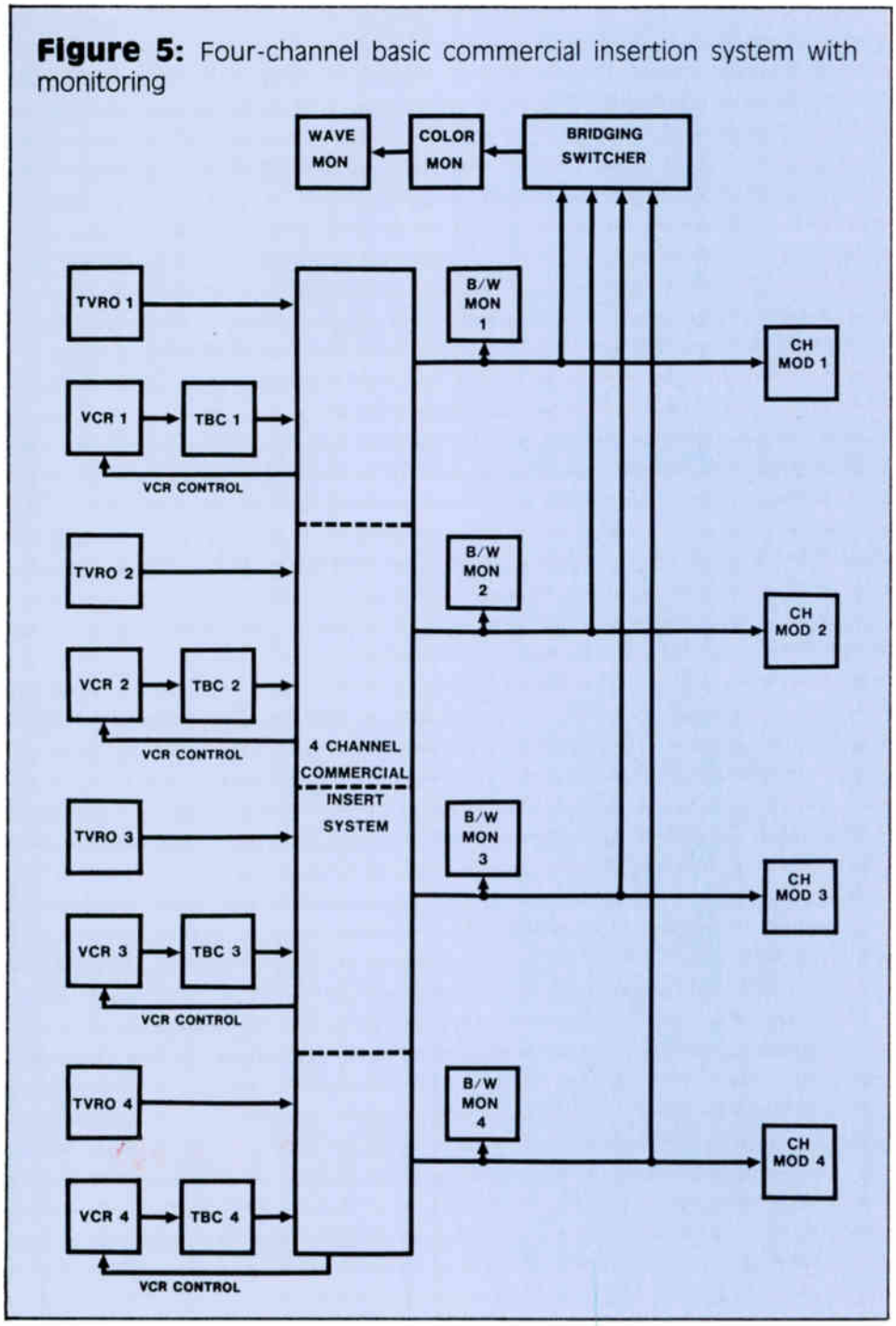
Generally, commercial insert systems are considered a separate entity in a production studio, particularly if they are automatic (which they certainly should be). Because of this, it is often preferable to assign dedicated monitoring equipment to the system. If not carefully planned, monitoring can be very expensive and also very difficult to work with from an operator standpoint.

Using an automatic four-channel commercial insert system as an example, (see Figure 5), a suitable monitoring system for under $5,300 would require:

- One quad four-inch rack-mount monochrome monitor (Sony PVM-411, or equivalent; about $1,275)
- One bridging audio-video monitor preselect switcher (Channelmatic Patchmaster AVS-10A, or equivalent; about $1,000)
- One production-quality rack-mount waveform monitor (Videotek TSM5, or equivalent; about $2,100)
- One rack-mount 15-inch color monitor receiver (Sony CVM-1271, or equivalent; about $900)

The quad four-inch monochrome monitors would allow continuous monitoring of the video signal on each of the four channels of the commercial insert system. The video signals from the quad monitor and the audio signals from the four channels would each then loop through four different inputs of the monitor preselect switcher and then be routed to their respective channel modulators. The output of the preselect switcher (video and audio) would then be looped through the color monitor receiver input with the video then ter-

Figure 5: Four-channel basic commercial insertion system with monitoring



minated at the waveform monitor. The preselect switcher would then allow monitoring of the video waveform or the picture and audio of any of the four channels by merely pressing the appropriate pushbutton. If desired, the receiver section of the monitor-receiver can be connected to the RF cable feed, thereby allowing the subscriber feed to be monitored. The monochrome monitors indicate instantly any major signal problems. The waveform monitor is primarily used for video level checks. The color monitor is used to monitor general audio and video quality.

Auto bypass and test switching: It is important in commercial insertion systems to have some means of assuring that, in the event of VCR or tape failure, the primary program source is always returned to air. A universal accessory for use with any commercial insert system is available (for about $1,000) that can automatically bypass the commercial insert system by switching the TVRO audio and video signals directly to the modulator if it senses loss of sync from the VCR. An audible alarm sounds when sync is lost notifying an operator of failure.

The unit also provides manual bypass facilities to allow the system to be easily bypassed for preview or test purposes (see Figure 6). When in the preview mode, the insert system can function normally, but the commercials will not be sent out to the modulator. When in the test mode the operator is able to switch audio and video test signals through the commercial insertion system for checking performance specs. In addition, internally generated high-speed audio DTMF cue tones can be sent to the tone decoders for testing and calibrating purposes. One unit is required per channel.

System specifications: Certain specifications are paramount to proper operation of a commercial insertion system. Normal video and audio specifications usually apply along with a few others like VCR indexing accuracy.

Minimum video specifications (precluding VCRs) should include the following:

Frequency response:	±0.5 dB or better to 8 MHz
Low-frequency tilt:	±0.5 percent @ 60 Hz
Differential gain:	±0.25 percent @ 3.58 MHz
Differential phase:	±0.25 degree @ 3.58 MHz
System crosstalk:	50 dB down, or better @ 3.58 MHz
Video switching:	Vertical interval, with minimum of 50 dB off isolation @ 3.58 MHz
Hum and noise:	−70 dB at 1 VPP

Minimum audio specifications (precluding VCRs) should include the following:

Frequency response	±0.5 dB, 30 Hz to 20 kHz
Overall gain:	Unity
Total harmonic distortion:	Less than 0.2 percent, 30 Hz to 20 kHz
Hum and noise:	−70 dB referenced to +8 dBm

Another very important specification is the ability to accurately index the videotaped commercials. This can be a problem in simple systems as well as complex ones.

Simple systems usually rely upon cuetones for locating the beginning and end of commercial spots. Often, preroll times are used to time from the point of parking or pausing a VCR to the point of first commercial video after the VCR is placed into play. Accuracy in such systems is primarily determined by the accuracy of cuetone placement during tape editing. The preroll timer is usually sufficiently accurate to cause no problems.

Random-access systems usually count control track, use tones or a combination of both. Some highly expensive systems use SMPTE time code. Control track counting or SMPTE time code systems should provide a repeatable accuracy of at least ±2 frames. Tone systems, or combination systems are often far less accurate than this, particularly when repeat indexing accuracy (accumulative error) is considered. It is best to specify ±2 frames non-accumulative accuracy for random-access systems.

Uninterruptable power supply: In a recent study of power disturbances, Bell engineers estimated that power fluctuations sufficient to cause computer problems occur approxi-

mately 62 times per year at most locations. Since most commercial insertion systems utilize one or more microcomputers or minicomputers, it is absolutely essential that some form of power protection be provided. It should protect against blackouts, brownouts, sudden voltage dips and noise transients and spikes. To assure consistent protection, the device should respond to a power loss in less than a half cycle of the power line frequency. As opposed to some inexpensive units that provide a square wave output, it should provide a sine wave output.

For most commercial insertion applications, I recommend the Topaz Powermaker, Model 84126-01 or equivalent. It has a 1,000 VA output rating, with a backup time of nine minutes at full load, or 30 minutes at half load. This should be adequate to support even the most complex commercial insert systems for at least 30 minutes and typical systems an hour or more. The Powermaker responds in about four milliseconds and sounds an aural alert to indicate that primary power has failed. The unit is priced at a little over $1000 and is typically available from stock.

As an extra measure of protection, you should consider using transient-protected power strips, even when an uninterruptable power supply is incorporated. The SPC Technology Model UL2001SSBN, or equivalent, is recommended. These units have a built-in master power switch and reset circuit breaker. Each outlet has isolated protection, with three-stage noise and spike filters utilized. It has a total of eight outlets and is priced at about $170 (a non-protected power strip of equivalent quality would be priced at about $50).

Installation considerations

Problems related to the installation of the equipment should be considered during the system specification phase. Careful thought should be given to the overall problem of assembling the system and properly documenting it. If a random-access system is being specified, most systems would do well to consider a turnkey purchase, primarily because of the complexity of the wiring and documentation. The following describes some of the less obvious problems of installing such systems.

Environmental conditions: Commercial insertion systems are ideally suited for a studio-type environment. Good dust-free air with an ambient temperature of around 72 F would probably assure the longest tape life and the best possible preventative maintenance cycle on the VCRs. Unfortunately, many systems are placed in headends and, as we all know, many headends are not really a proper environment for any electronics equipment, let alone VCRs.

VCRs cannot tolerate a dusty, hot-in-the-summer, cold-in-the-winter environment without heavy maintenance. Tape wear will be almost impossible to live with. In short, clean up and properly air-condition such places before you install the commercial insertion system. The cost of this is minimal, when compared to the lost advertising revenue that can result from a poor environment.

Static electricity problems: Static electricity can cause major problems with a commercial insertion system. Videocassette machines are particularly sensitive to static discharges, and the condition is aggravated when long control cables are utilized for connection to a control device. Static discharges will often cause the machines to randomly go into erroneous modes of operation, i.e., play, fast-forward, rewind, stop. Static discharges can also cause memory loss and/or component damage in microcomputers.

A commercial insertion system should never be installed on carpeted floors, even if the carpet is "computer grade." Any carpeting will, under certain conditions, cause static electricity to be generated. Don't fall into the carpet spray trap. Spraying the carpet with anti-static spray just does not adequately solve the problem in the first place and, secondly, it is not too good for the videocassette machine heads and video tapes. If a system must be installed in an area with existing carpeting, it is desirable to remove the carpeting in the location of the system racks for an area of about four feet around the system and then add a grounded metal plate in the area between the carpet and the system. The metal

plate will discharge any static buildup from walking on the carpet, assuring that static discharge will not occur when the equipment is touched.

Proper chassis-to-chassis and rack-to-rack grounding is also crucial for proper static discharge protection. Grounding straps between equipment is normally not required, but all equipment should be checked as it is racked to be sure that the rear surface of the mounting bracket is conductive (not painted) so that it will make good electrical contact with the rack mounting rail; this assures, among other things, a direct discharge of static electricity to ground. If any doubt exists about good electrical contact at the point two racks are bolted together, add a large braided ground strap between one equipment rail of each rack. At least one large ground strap should connect the system directly to the power system earth ground.

Proper documentation: Proper documentation usually means very little when the equipment is delivered, particularly if the system is installed and made operational by factory technicians. All too often, manufacturers refuse to supply schematics, wire lists and wiring diagrams. Turnkey systems are often delivered without the necessary wire/cable "to-from" information and many times the wires/cables are not properly labeled. A rack layout drawing and single-line block diagram of the system are seldom included with the documentation. All of this information will be necessary to facilitate maintenance and/or expansion in the future. Make sure that this material will be supplied with your system.

If you are assembling your own system, consider the same type of system documentation on the work you perform. Regardless of who assembles the system, proper documentation is still necessary.

Proper rack layout: Commercial insert systems are generally multichannel and if the equipment relating to individual channels is not obviously separated and, preferably, marked by channel, confusion may occur when operating or maintaining the system. In a six-channel random-access system for example, each of the six channels is assigned one rack and a dedicated monochrome monitor. All equipment and wave form monitoring is in a seventh rack located in the center. A computer desk is provided for the master control computer and printer.

Obviously, this rack-separated example would not be suitable for many smaller systems, particularly spot-sequential systems and random-access systems using only one VCR per channel. Generally, one equipment rack will have sufficient space for a four-channel system of this type.

Future expansion should always be a consideration when designing the rack layout. For example, if a single-VCR per channel random-access system is being installed, it probably would be a good idea to allow sufficient rack space for expansion of the system to the "one VCR per 30-second spot" configuration. This expansion can always be expected to occur if and when the cable system becomes successful at selling advertising. (We often find this expansion occurring within 30 days!) If limited or no audio/video monitoring is included in the original system, it probably would be a good idea to also allow space for future addition of proper monitoring equipment.

Avoid the temptation to add your commercial insertion gear to blank space in your RF racks—it's just not a good idea. It is better not to even have them in adjacent racks, unless shielding is provided between the racks. Always mount the VCRs using the manufacturer's slide-rail kit. This is absolutely necessary to facilitate normal preventive maintenance, such as head cleaning and dust removal. The slide arrangement also will greatly shorten the time required to replace a defective VCR. Slide kits generally add about $200 to the cost of the VCR.

When designing the rack arrangement, pay particular attention to the location of heat generating equipment. Remember that heat always rises, so if heat is present, always use racks that have a vented top panel (ceiling) and sufficient air inlet vents in the lower part of the rack; natural convection caused by the rising heat will then cool most heat-producing equipment. In extreme cases, heat-producing equipment should be separated from adjacent equipment by a 1¾-inch blank filler panel. If a heat problem persists, a rack-mount filtered blower should be installed in the lowermost part of the rack. It should be noted that a

blower will not be effective in an open rack; fill all blank spaces with filler panels and use a vented top panel and an unvented rear cabinet door. If possible, also close off the floor of the rack so that all air movement is through the filtered blower, up the rack and around the equipment and out the vented top panel.

Wiring the system: A small amount of planning at this point will save a great amount of time and grief later. An improperly wired system almost always has reliability problems and can be almost impossible to maintain. If you or your people are not capable or don't have the proper tools for proper cable termination, harnessing, identification, labeling and documentation, hire an expert to do it; it will save time and ultimately money.

A "to-from" cable listing is convenient when wiring the system. This listing assigns a number to each wire in the system, outlines its routing and specifies the type of wire or cable to be utilized. If desired, an additional column can be added to specify the terminating device (connector). The column heading of the table would therefore be: Number/From/To/Type of cable/Termination.

To distinguish between equipment and connectors, assign military designators to all racks, equipment and connectors. For example, the first rack from the left (looking at the front of the system) rack A1, the second A2, etc. Accordingly, the first (uppermost) equipment mounted in any rack would be chassis A1, with the next chassis down being A2, and so on. Hypothetically, if a VCR were mounted as the fourth piece of equipment from the top of the second rack from the left and its video output connector were labeled "J1," the connector would be identified in the table as A2A4J1.

In the case of modular equipment, a third "A" number would be added to designate a particular module of a specific frame. For example, A1A1A3J1 would refer to connector J1 of the third module from the left in the uppermost chassis in the first rack from the left. If a particular connector is not identified with a "J", "P" or some other similar designator, simply use its placarding as the designator, i.e., A1A1 Video out; if desired, you can also solve the problem by simply adding an appropriate designator to the connector.

The cable number is merely a device to simplify labeling the cable on each end. Just number the wires from "1" up, in sequence. Standard adhesive wire marking kits are available from most electronics supply houses. Use these to add the designators to each end of each wire when cabling the system. Since the cable number is basically used to determine where each end of a cable connects, it is possible to simply use the reference designator on the label. This would normally eliminate the need to refer to the "to-from" wire list when reconnecting cables. The only problem with this approach is that handwritten or typed labels must be made to identify the cables.

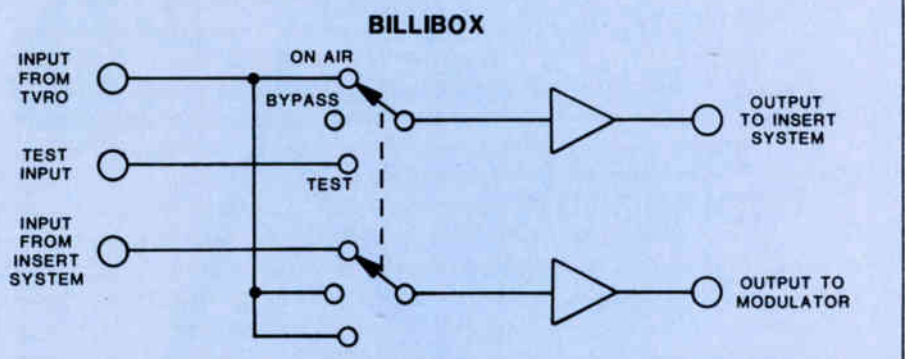
Be particular about your cable and connectors and their routing. Use proper tools for connector installation (never crimp with pliers). Never bundle control or signal wires or cables with AC power wiring. When possible, route AC power down one side of the rack and everything else down the other side. If this is not possible, separate AC power from everything else by at least a couple of inches. Tie all bundles snug, but not tight, with standard plastic wire ties. Secure bundles to rack sides every foot or so.

For video cabling, use Belden 8241 video cable (about 13 cents per foot) with King KC5A-294 crimp-on BNC connectors (about $1.10 each), or suitable equivalents. Strip the 8241 cable with a Paladin 10F7021 Type PA1209 stripping tool (about $43) and crimp the connectors with a Paladin 10F7-005 crimping tool (about $9), or suitable equivalents. When routing the cable, avoid sharp bends and do not smash cable with overtight wire ties or clamps.

For audio cabling, use Alpha 2461 (about 12 cents per foot), or suitable equivalent. Terminate with the appropriate connector. Never use twisted wire as a screw terminal termination; use a good quality crimp-on spade lug of the proper wire and terminal screw size. For balanced audio wiring, the red lead goes to the "+" terminal and the black lead to the "-" terminal, and the shield goes to chassis ground. For unbalanced audio, the red lead goes to the audio signal terminal and both the black lead and the shield go to chassis ground.

Most manufacturers either supply the con-

Figure 6: Bypass and test switching



trol and interconnection cables for their systems, or they specify the type of wire or cable to use. If you don't have the cable or information, usually 22-24 gauge, seven-conductor stranded wire or cable will suffice.

When cabling VCRs or any other equipment that is slide mounted, always leave a "service loop" in the cabling. This is merely a large-loop of the bundled cable to the equipment that has sufficient length to allow the equipment to be fully extended on its slides without removing its cables. Don't forget to also add a service loop to the power cable.

Proper signal termination: The output impedance of any device that will transmit a signal down a cable not only determines the characteristic impedance of the cable that must be used, but also determines the input (load) impedance of the device (or combined devices) to which it is supplying the signal.

Most video equipment available today has high-impedance bridging or looping inputs, in which case, the input is not self-terminating, but has an impedance in excess of 10,000 ohms. For all practical purposes, the terms "bridging" and "looping" can be considered synonymous, since each are designed to allow a signal to be connected to them without providing a noticeable resistive or capacitive loading of the signal.

Bridging or looping video inputs are normally provided with two connectors per input. The source signal is connected to one of the input connectors and taken out again for application to another device by using the other bridging or looping connector. Since the inputs are high-impedance and low-capacitance, several devices may be supplied with a signal from the same cable without loading or other significant signal degradation.

When bridging or looping signals, or when merely using one device with a high-impedance input, it is important to remember that the end of the cable run must always be terminated in its respective impedance. Occasionally, a slide switch is provided with which to add the termination; the switch would have a Hi-Z position (unterminated) and a Lo-Z position (terminated). If no switch is available, terminate the input by inserting a 75-ohm termination plug onto the unused connector of the last bridging input. Termination plugs are widely available, but can also be easily fabricated by simply soldering a 75 ohm resistor across a standard BNC cable connector. A 1 percent resistor is best, but a 5 percent tolerance will suffice. Although not common, some video equipment is provided with 75 ohm terminating video inputs; no exterior termination is required with such equipment.

An improperly terminated video cable will cause VSWR problems and, if the cable is long enough, may result in a picture with obvious multiple images, caused by signal reflection in the mid-terminated cable. The signal will also exhibit double amplitude, so a good check for proper termination is to check the signal level at the output of the signal source with the cable both connected and disconnected; if properly terminated, the amplitude should be exactly halved with the cable connected.

Proper audio cable matching and signal termination is much less critical than video. Unlike 75 ohm video cables, audio cables generally are inexpensive and vary radically in characteristic impedance. Drastic impedance differences even occur throughout a given length of the cable. This, however, causes no problems in audio systems, primarily because of the relative low frequency of the audio signal.

Although very forgiving in terms of impedance mismatches, proper termination procedures should still be observed when wiring a system. Improper terminating can result in varying signal levels throughout the system, making setup difficult. Furthermore, the lack of a terminator (or too large a terminator) at the input to a high-impedance device can cause severe hum problems.

Generally, balanced audio lines are 600 ohms in impedance. In television systems, most unbalanced audio lines are approximately 150 ohms in impedance. Unbalanced lines are normally not used, because of their susceptibility to hum pickup (balanced lines automatically cancel induced hum). Almost all audio inputs are balanced high-impedance bridging; outputs are 600 ohms balanced. Several high-impedance devices can receive a signal from the same cable by merely connecting their inputs to the cable and terminating the last device. Termination is accomplished by adding a 300 ohm (1 percent) or 330 ohm (5 percent) resistor from both the positive and negative inputs to ground. Improper audio wiring or termination problems almost always are indicated by excessive 60 Hz hum in the audio signal.

Turnkey purchase: Generally, it is advantageous to purchase a factory assembled, tested and installed system; this is particularly true when a random-access system is to be installed. Large random-access systems are usually very complex and fall beyond the installation capabilities of most cable systems. The assembly and test of a system such as this requires many manhours of assembly time and, if a professional job is desired, much special equipment.

Often cable systems prefer to purchase the commercial insertion equipment separately and go to discount houses for the VCRs, monitors, distribution amplifiers, monitor switchers and other accessories required for the system. The cost savings over a turnkey package usually appear substantial. However, almost always, the cost of labor to purchase the accessories, to engineer the system, to document it and then to install it and make it operational will bring the cost up to or above a preassembled system. And, the wiring and documentation are usually not nearly as professional.

Purchasing a turnkey system is particularly good when dealing with a manufacturer who not only builds the insertion equipment, but also manufactures a broad line of accessory equipment, such as switchers, distribution amplifiers and such. It is far easier to maintain a system when one manufacturer has most of the responsibility.

Whether or not a turnkey system is purchased, any complex system will usually require initial factory training on operation and maintenance. This training can be performed at the factory, at the cable system or possibly both places. It is almost always an extra cost item, particularly when the instructor must visit the site; however, the charge is usually minor, covering primarily the expenses involved. Some manufacturers include this cost in the overall system price.

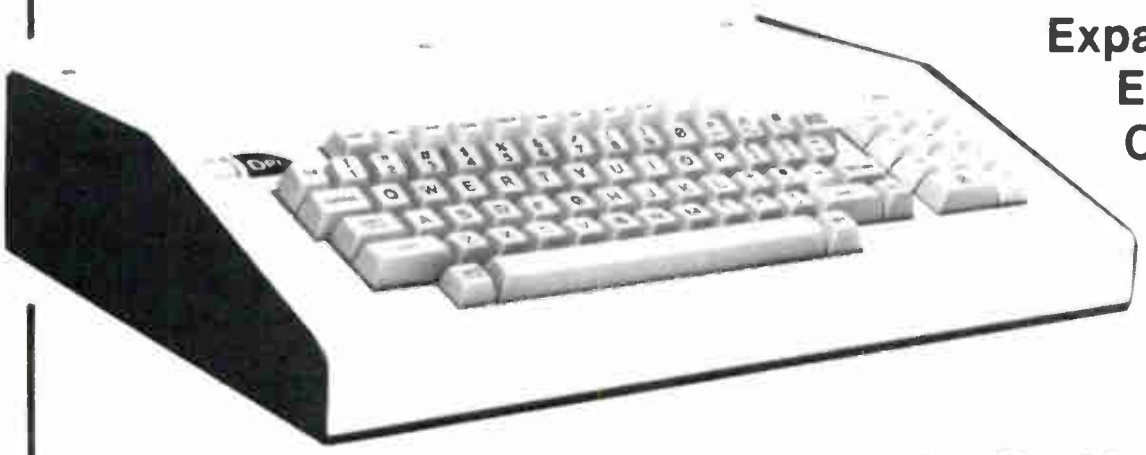
A learning experience

Involvement with automated commercial insertion systems will be a new experience for most cable television engineers and technicians. A variety of equipment is available from a number of different manufacturers (and some of the equipment is not so good). Cable television technical personnel must familiarize themselves with this new technology and must do so quickly. Hopefully, this article will be an assistance in achieving that goal.

Any price estimates included in this article are based upon current manufacturer's catalog prices. No discounts were taken into consideration. Consequently, if anything, the price estimates will be higher than the actual purchase price.

NOT THE WORLD'S FIRST...just the NEWEST!

WITH THE FEATURES AND PRICE YOU HAVE ALWAYS WANTED!



Expandable Memory
Exciting Displays
Crisp Characters
Easy Operation
Bright Colors
Remotable

CBB-1 Color Billboard

$1995.00

We Designed A New Character Generator BECAUSE . . .

There was no other way to bring you a quality video display with the operational simplicity and low cost available except thru latest technology.

The CBB-1 delivers a video quality and visual impact far beyond its cost. It displays seventy nanosecond resolution, finely sculptured upper and lower case characters over colored backgrounds which are selectable on a line by line basis. Simplified keystrokes let even new operators use the CBB-1's sixteen vivid colors, 8 character sizes and 3 display regions to provide effective communication or advertising.

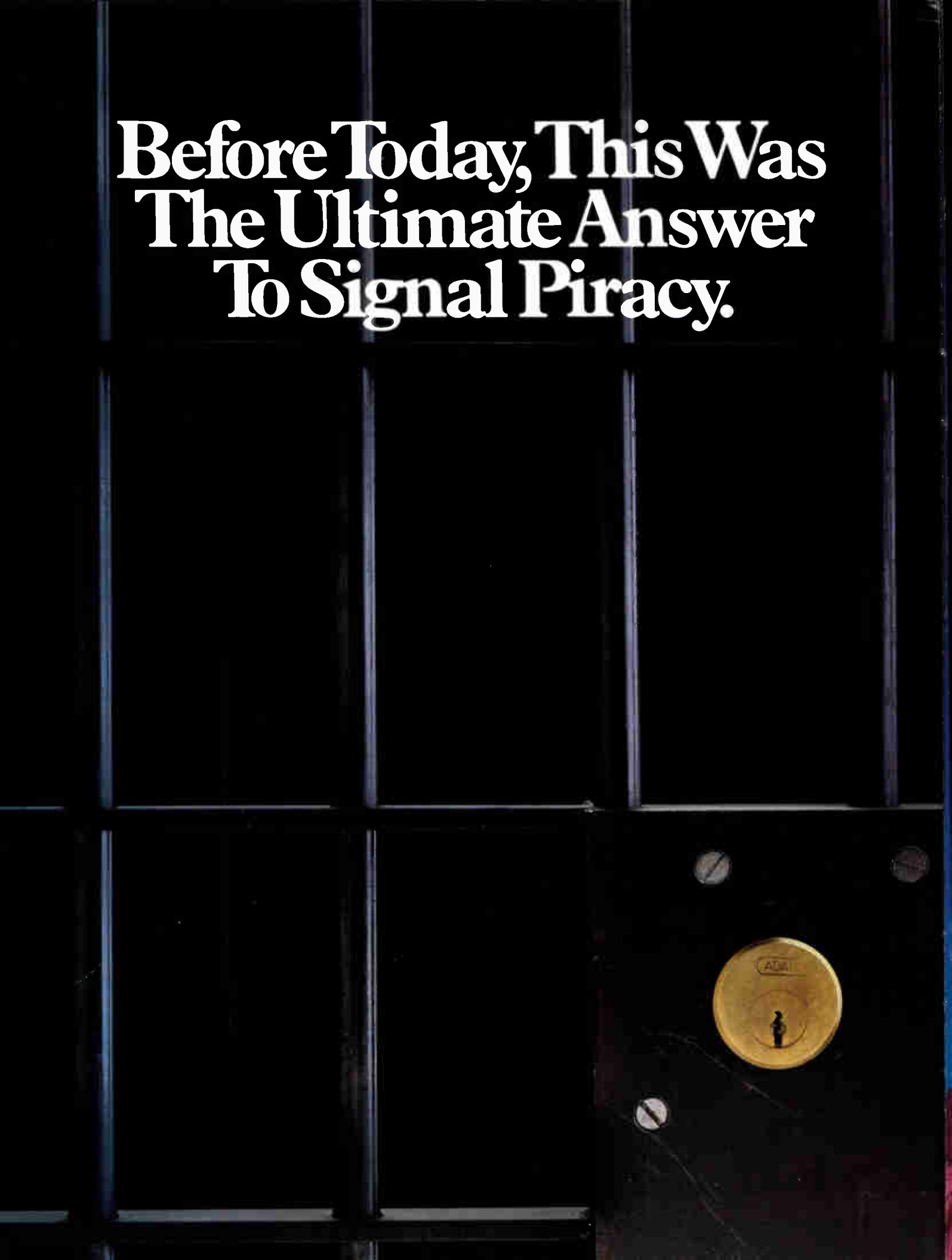
It's so simple it's fun! The CBB-1 is the tool you need for effective communications or advertising in hotels, condos, SMATV, hospitals, as well as cable systems.

AD SYSTEMS INCORPORATED

9500 South 500 West • Suite 212 • Sandy, Utah 84070 • **(801) 561-1657**

Reader Service Number 37.

Before Today, This Was The Ultimate Answer To Signal Piracy.



Introducing The Secure System From General Electric.

The Comband™ System.

Cable operators lose an estimated 700 million dollars every year because of signal theft. Now, the best weapon in the war against signal piracy is here. It's Comband,™ the most secure system in the cable industry.

Modular in design, the Comband™ system gives you the features you've asked for. It's a one-way addressable baseband converter that's competitive with any product on the market. It gives you control, flexibility and tamper-proof security in one stereo-ready package.

Add the Comband decoder and the inherent scrambling of the bandwidth compression process makes signal theft virtually impossible. With Comband, unauthorized programs cannot be seen or heard.

We've also added other security features such as the Technician's Set-Up Unit. This is a portable device that assigns the address code and initial authorization parameters, machine to machine. It puts dishonest installers out of business.

The design of the Comband system allows you to control when, and to what extent, you upgrade your operation. You satisfy yourself, your franchising authorities and your subscribers in a matter of weeks or months. You increase your revenues, lower your operating expenses and get a faster return on your investment.

To fully appreciate the Comband system's advantage, you have to see it in operation. For a Comband Express demonstration, call Ron Polomsky at 1-800-GE-CABLE.

Call for the Comband system today. And see how to lock out signal pirates before you have to lock them up.

Reader Service Number 38.

regulations, if anything, has increased the advertising agencies' sensitivity to accurate verification of their clients' commercials.

The vast majority of radio and TV stations have voluntarily continued to comply with the old, mandatory regulations. Indeed, some major market TV stations are starting to use verification systems that have been used by the cable industry for several years.

Verification of commercials on local cable systems presented some unique problems. We needed to give the advertising agencies the same type of data provided by the broadcast industry, but we really couldn't do it by having a person physically monitor each commercial, 24 hours or even 18 hours per day. In the cable industry, we are usually dealing with commercial insertion on multiple channels that often have breaks running at the same time or so close that actual verification of each spot is almost impossible.

The alternative is electronic capture of the data, for the data itself or further manipulation of the data for billing purposes. This leads to a discussion of verification versus logging.

Figure 3: Summary data in ASCII format

```
 1                 24
H1015120000
D00100601024112140
D20901907022105658
D20901907021105740
D20901907023111512
D20901907024112208
D25500104023111545
D25500504023113456
D26001007024112312
D26001007023113529
D26001007021115630
D28800107024112242
D28800107021115710
D29100108023103917
D29100208022105732
D29200108021105642
D29300107023103845
D29300107022114042
D90202700021105813
D90201800022114120
D90201800021115815
D90700200021115740
D99900600021105708
Z

TYPE 'E' TO ENTER
ANOTHER DAY OR PRESS
ENTER TO CONTINUE ? E
 2                152
H1016000000
D00100601022120532
D00100601024122224
D00100601024152046
D00100601024162109
D00100601022164337
D00100601024172246
D00100601021175706
D00100601022181548
D00100601021185635
D00100601024192458
D00100601024202112
D00100601022205935
D00100601024212047
D00100601021225711
D00100601024232155
D00100601021235651
D20901907022120601
D20901907024152114
D20901907022154650
D20901907021155740
D20901907023161244
D20901907022164406
D20901907022172308
D20901907024172315
D20901907022175528
D20901907021175735
D20901907024182152
D20901907023184207
D20901907022184550
D20901907021185734
D20901907022194017
D20901907021205713
D20901907022210004
```

Verification vs. logging

The essense of any system is to identify each commercial event. Typically, this is done by assigning each commercial a specific ID number. Often a 10-digit dual-tone multifrequency is encoded on track one of the audio of the commercial. These tones are laid down during the production of the play tape on the master, so they always remain with that commercial, regardless of when it is run.

With a logging system, a commercial is shown as having run whenever a set of DTMF tones passes over the audio head of a VCR, regardless of the signal actually going to the modulator from the tape machine. A verification system, on the other hand, communicates with the insertion device to ascertain its *play* condition and only recognizes those spots that have actually been sent to the modulator for that particular channel, i.e., if a spot that has been called for is out of sync and it doesn't go to the modulator, the spot isn't recorded as having run.

Further, if the commercial break scheduled is recalled by the network before it is supposed to be, the spot is not logged electronically as run. This gives excellent protection for the advertiser and much greater credibility for the seller of advertising on cable television.

A typical verifier consists of the following four principal elements:

The *clock* features a six-digit LCD display showing day, date and time. It is interfaced directly with the computer to provide for an automatic printout as the event occurs.

The *decoders* are all on one PC board. The decoding is totally discrete, with a separate decoding chip for each channel.

The *computer* constantly searches each decoder chip for inputs. When a # code is received, the day, date, time, channel and all encoded information is entered into the "buffer" memory. As soon as the printer is available, this information is printed out and entered into the "store" memory. Both "buffer" and "store" memories are protected by GelCell battery backup. The program is blasted on an electrically programmable read-only memory (EPROM) and is not power-sensitive. The computer and the decoders are all on one PC board.

The standard *printer* is an Epson LX-80. This is a dot matrix printer with a print rate of 100 characters per second. This printer was chosen because it is a compact, reliable unit, readily available, inexpensive and easily resupplied. Many other computer printers can be substituted to meet various cable systems' needs, however. The Epson LX-80 is bidirectional with logic-seeking in the text mode and comes equipped with an RS232C serial interface and 2K buffer.

There are a number of ways this data may be retrieved. As we detailed earlier, a logger may be used. In this case, a printout of everything that rolls by the audio head of a VCR is printed out, and the traffic secretary, typically breaks the data out and notarizes it. This is dangerous, as it does not account for the anomalies when a network does not fulfill its break. With true verification, the data is not transmitted to the verifier unless the inserter is actually transmitting audio and video to the modulator.

To make preparation of the billing much easier, more sophisticated verification systems have random access memory (RAM). This memory allows data to be stored by client number, so that periodic data dumps can be done, presorted by client (Figure 1). Using this system, the billing clerk only has to cut apart the printout to obtain the data for the affidavit of performance.

Although the preceding summary printout marks a decided advantage to most cable system operators who sell local advertising avails, it still falls short for MSOs and rep firms, with central traffic and billing systems for multiple cable operations.

Meeting the needs

Several years ago, a way to meet their needs was developed. The printer was retained but used only for the rolling data, that is a printout, by time and channel, of each spot that is actually run (Figure 2). The summary data, again grouped by client, is transmitted to an audiocassette tape in binary form to save room. This audiocassette is then sent to the central billing source, where it is interfaced with a translator to convert the data from binary to ASCII (the American National Standard Code for Information Interchange), so the data can be manipulated by an IBM PC XT or compatible Figure 3).

The software used with the PC enables the

DYNAMIC DUO

THE DRAKE PROFESSIONALS

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

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

The DRAKE VM2410 Modulator

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

The DRAKE ESR2240 Earth Station Receiver

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

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

Call or write us today for more information.

R.L. DRAKE COMPANY

DRAKE

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

Reader Service Number 41.

Figure 4: Data printout with client name

```
JONES BROTHERS          CLIENT #20902

CNN

 SHOWN ON:   BATTLEFIELD CABLE
             CHATTANOOGA  TN

REPORT SUMMARY FOR  10/15     12:00:00

209  :30  19  07  02  1  10:57:40

REPORT SUMMARY FOR  10/16     00:00:00

209  :30  19  07  02  1  15:57:40
209  :30  19  07  02  1  17:57:35
209  :30  19  07  02  1  18:57:34
209  :30  19  07  02  1  20:57:13
209  :30  19  07  02  1  22:57:40
209  :30  19  07  02  1  23:57:50

REPORT SUMMARY FOR  10/16     12:00:00

209  :30  19  07  02  1  02:57:54
209  :30  19  07  02  1  04:59:25
209  :30  19  07  02  1  05:57:21
209  :30  19  07  02  1  08:57:23
209  :30  19  07  02  1  10:57:35
209  :30  19  07  02  1  11:57:26
```


client number to be printed out as a name. This software also permits the data to be printed out in longer form than the common 12-hour data dump (Figure 4).

By using a pair of phone modems and a dedicated phone line, it is possible to have the audiocassette at the headend with the verifier and have the printer at another location. This is commonly done when the headend is remote from the office. The rolling data is sent in ASCII to the modem at the headend to be transmitted to the modem at the office. The ASCII data is then sent to the printer through a serial interface.

With this configuration, the cable operator can make sure everything is working fine at the headend, by monitoring the running data, while still having the advantages associated with the audiocassette-based data dump. Combined with the proper PC software, the binary data is used to compare what actually ran with what was ordered; and display a discrepancy report.

This same software package can be fleshed out to include traffic, billing, accounts receivable, cash receipts and other business-oriented reports based on ad sales on cable television.

A more recent breakthrough in verification has been implemented in The Stationmaster ACV 2006 verifier. Like its predecessor, the ACV 1004, the 2006 is designed to provide a highly accurate record of spots that actually ran. Every 24 hours, a complete, hard-copy printout is produced containing a line-by-line listing of pertinent data for every spot aired.

The ACV 2006 verifier features all complementary metal oxide semiconductor (CMOS) logic, six input channels, and a reset button located inside the front panel of the unit. The new unit is more compact, yet has a larger memory capacity than the ACV 1004, storing 24 hours of information rather than the usual 12.

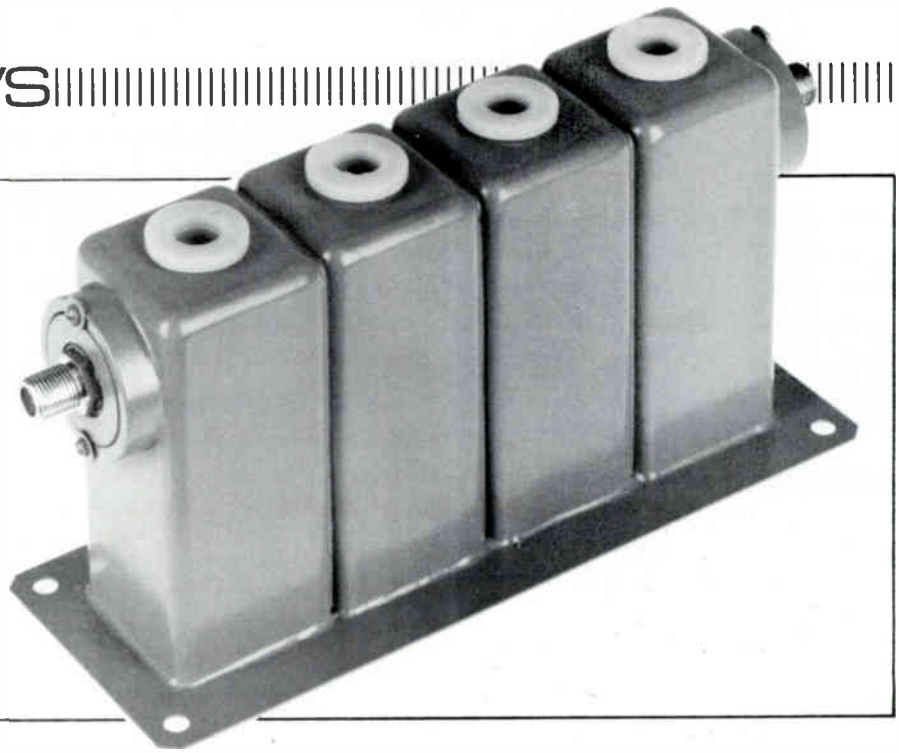
At 23:59 (one minute before midnight), the "store" memory is searched and the following data is printed for each insertion: the advertiser, spot number, time, channel, and two other slots that can be used for information of the user's choice, for example, a salesperson and agency. With an add-on interface, the computer-stored data may be transferred to another computer for further manipulation and analysis. This could include automatic traffic reconciliation and billing. The add-on interface is a double-sided double-density 356K half-height diskette that is built in the verifier.

As local advertising on cable TV expands with local, regional and national spots, accurate verification will be essential. It shoud be pointed out that the *Yellow Pages* list some 13,000 advertising agencies. The *Red Book* lists some 6,000; and there are 617 4A (American Association of Advertising Agencies) member agencies who account for about 70 percent of all agency-placed advertising. Cable TV advertising will be a major medium, but it will have to be highly professional on all fronts to achieve its potential. Cable advertising will have to be credible to the larger 4A members in order to be successful.

Bandpass filter

The 4930 semi-adjacent bandpass filter is available for any hyper-band channel AA-YY (300-450 MHz). It passes the specified channel with a 2.0 dB maximum loss and rejects the semi-adjacent channels (second channel down and up) a minimum of 25 dB. This bandpass filter can be used to clean up the desired channel at the input of the processor or at the output before combining. Impedance is 75 ohms and the 4930 comes with F connectors. Approximate size is 3.3" × 2.5" × 7.2". This filter is panel mountable for indoor use.

For more information, contact Microwave Filter Co. Inc., 6743 Kinne St., East Syracuse, N.Y. 13057, (800) 448-1666 or (315) 437-3953.



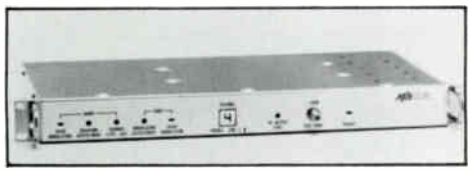
Add-on for IPPV

Pioneer Communications of America Inc. introduced an add-on, two-way addressable hybrid to upgrade its BA-5000 series from one-way to two-way addressable. Field tests are scheduled to begin this summer with mass production beginning in late 1985.

The two-way module, primarily for IPPV, can store and forward up to 20 purchased events to the center through a phone line. The system also can perform viewer statistics and opinion gathering.

The new hybrid connects and attaches to the base of the BA-5000 converter with a non-exposed connector and can be installed in the home through an existing phone line.

For more details, contact Pioneer, 2200 Dividend Dr., Columbus, Ohio 43228, (614) 876-0771.



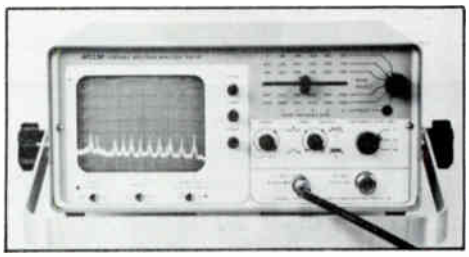
Modulator

M/A-COM Cable Home Group is now marketing a variable modulator as part of its commercial satellite receiver system. The VM Series variable modulator operates in four frequency ranges: low-band channels 2 through 6, mid-band channels A through I, hi-band channels 7 through 13, and super-band channels J through W.

Vestigial sideband response on the VM Series modulator is optimized with a SAW filter arrangement for adjacent channel operation, according to M/A-COM.

These modulators accept standard polarity (SYNC negative) of 0.7 to 2.5 V p-p levels from video sources such as TV cameras, video tape recorders, TV demodulators or satellite receivers.

For complete details, contact the M/A-COM Cable Home Group, P.O. Box 1729, Hickory, N.C. 28603, (800) 438-3331; (800) 222-6808 (N.C.).



Spectrum analyzers

Avcom recently introduced four new products. A portable spectrum analyzer, the PSA-35, designed for the TVRO industry, offers frequency coverages of 10 to 1,500 MHz and 3.7 to 4.2 GHz for checking signal strength, in-band attenuations, terrestrial interference and filter alignment, faulty connectors and LNAs, feedhorn isolation, and cable loss at all commonly used frequencies in the TVRO industry, including 12 GHz downconverters. The unit features a built-in DC block with + 18 VDC for powering LNAs and BDCs, calibrated signal amplitude display and rechargeable battery. The PSA-35 is portable and easy to use in field test situations, according to the firm.

Avcom's MSA-85 spectrum analyzer, designed for the TVRO industry, offers coverage of 4 to 1,500 MHz and 3.6 to 5.1 GHz, including satellite receiver IF frequencies, block downconverter outputs (including 12 GHz downconverters) and actual satellite frequencies. The MSA-85 features separate inputs for low- and high-frequency bands; internal DC power inserters on both inputs for powering LNAs and BDCs; and automatically coupled span and resolution bandwidth controls, which can be overridden with the push of a button to give independently selectable span and resolution bandwidths.

A new signal sampler and calibrator from Avcom, Model SSC-70, is designed for use with the PSA-35 portable spectrum analyzer. The SSC-70 is capable of sampling TVRO downconverter IF signals, which are looped through the SSC-70 between the downconverter and the satellite receiver, in the 30-200 MHz range. The tuning voltage present in the IF coax is passed from the receiver to the downconverter unaltered, according to the firm. The IF signal is sampled and is available on the "sampled IF" F-fitting, to which the PSA-35 spectrum analyzer is connected. Terrestrial interference filters (if used) can be tuned. Also, an internal 70 MHz oscillator, with harmonics at 140 MHz and beyond, is provided to check amplitude calibration and frequency settings of the PSA-35.

Avcom also introduced a terrestrial interference survey horn, Model TISH-40, to be used in conjunction with the PSA-35 for site surveys. The TISH-40 features 25 dB gain in the 3.7 to 4.2 range, offers full directional capabilities with high gain, rugged construction, and ¼-20 stainless nuts pressed into flange for LNA assembly and disassembly.

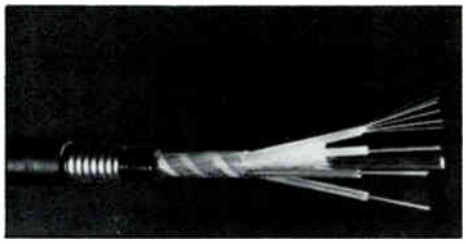
For further information, contact Avcom, 500 Southlake Blvd., Richmond, Va. 23236, (804) 794-2500.

Cable fault locator

Riser-Bond Instruments announced the introduction of the Model 2901B digital TDR (time domain reflectometer) cable fault locator. The 2901B tests all types of metallic paired cable. Coaxial, twisted pair, flat ribbon, cable in conduits or behind finished walls can all be tested. The 2901B features a new variable return loss sensitivity control (20 dBRL to 40 dBRL), five-digit digital LCD, open/short fault indicators, display in meters or feet, pow-

ered cable warning, low battery indicator and increased range (11,000 feet/1,999 meters).

For more information, contact Riser-Bond Instruments, 505 16th St., Aurora, Neb. 68818, (402) 694-5201.



Fiber-optic cables

A new line of densely packed, multiple fiber-optic cables was introduced by Pirelli Cable Corp. Pirelli DensePac™ fiber-optic cables feature up to 156 fibers inside gel-filled loose tubes that water block cables to prevent water from wicking into equipment. Reducing diameters to ½" for a 36-fiber cable, they are ideal for crowded ducts, according to Pirelli.

Withstanding -50 C to 60 C, the fiber-optic cables come with single-mode, 50/125 or 62/125 micron fibers. Jacketed with polyethylene, they are offered in up to 2 km lengths for multimode fibers and up to 6 km for single-mode fibers.

For more information, contact Pirelli Cable Corp., 2 Tower Dr., P.O. Box 50, Wallingford, Conn. 06492, (203) 265-5533 or (800) 243-3959.

Data interface

Telecommunications Techniques Corp. has introduced a new framed DS1/T1 data interface for the Fireberd family of data error analyzers. The interface fulfills testing requirements necessitated by the new T1 format constraints imposed by AT&T. It enables Fireberd users to interactively and passively test framed or unframed T1 services. In the passive mode, the Fireberd performs in-service testing by monitoring the DS1/T1 signals, both AMI and B8ZS, for bipolar violations. Additional features include current looping for direct connection to the T1 span, bypassing the CSU; loop-up and loop-down code generation for creating remote loopbacks; switch selectable zero suppression for stressing T1 repeaters; and local loopback while monitoring. A 1.544 MBPS timing source is included in the DS1/T1 Interface; no modification to Fireberd instruments in use is required.

For more information, contact Telecommunications Techniques Corp., 444 North Frederick Ave., Gaithersburg, Md. 28077, (301) 258-5011.

IEEE publication

A new publication, *Television Technology Today*, has been released by the IEEE Press, the book publishing division of the Institute of Electrical and Electronic Engineers Inc. A volume in the IEEE Press Selected Reprint Series, *Television Technology Today* was prepared under the sponsorship of the IEEE Consumer Electronics Society.

It contains 50 original papers and articles assembled from worldwide sources and the 488-page volume is divided into eight parts, as follows: CATV and broadband communications; Direct broadcast television from satellites; Advanced television systems; Digital television; Teletext; Multichannel television sound; Projection television; and Videotape. Each part is introduced by an industry expert who gives an overview of the particular subject.

The editor, Theodore Rzeszewski, is currently a member of AT&T's technical staff and a professor at Midwest College of Engineering. His past credits include project engineer on the first microcomputer-controlled frequency synthesizer for television.

Television Technology Today may be ordered from the IEEE Service Center, 445 Hoes Lane, Piscataway, N.J. 08854-4150.

COMMUNICATIONS TECHNOLOGY

Official trade journal of the Society of Cable Television Engineers

Upcoming editorial focus

September
- Theft-of-service
- Satellite security
- Upgrading

October
- Pay-per-view
- Audio advantages
- Plant design

November
- Combating signal ingress/egress
- Signal relay

For editorial information, contact:

Toni Barnett, Vice President of Editorial
(303) 792-0023

Wayne Lasley, Managing Editor
(303) 792-0023

For advertising information, contact:

Paul Levine, Publisher
(303) 792-0023

Rob Stuehrk, National Sales Manager
(303) 792-0023

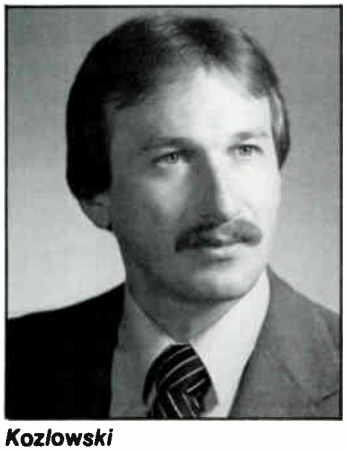
Pam Macy, Production Coordinator
(303) 792-0023

Space reservation deadline: 1st of month prior to insertion
Copy deadline: 10th of month prior to insertion

KEEPING TRACK

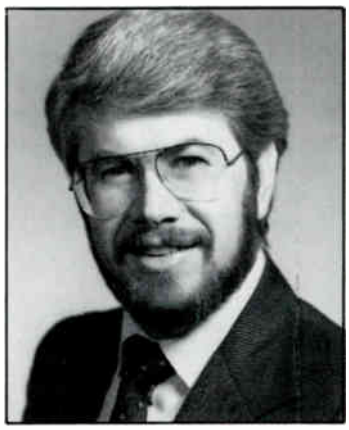
The promotion of **Tom Ladd** to vice president of operations, AM Communications Division, has been announced by **AM Cable TV Industries Inc.** Ladd joined AM Cable in 1978, following eight years in various positions within the CATV industry. As vice president of operations, Ladd replaces **Bill Ross,** who has resigned his divisional post, but remains with AM with responsibilities for special corporate projects. Contact: AM Drive & Route 663, Quakertown, Pa. 18951, (215) 536-1354.

Szymanski

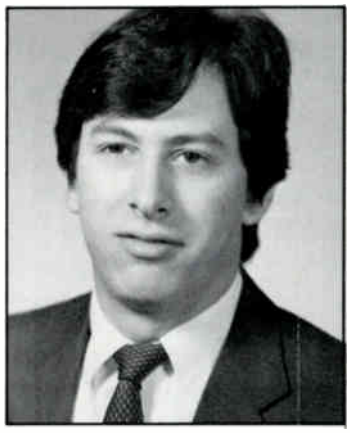


Kozlowski

Renaud



Landis



Cinquino

Magnavox CATV recently announced six appointments. **Karen Szymanski** has been promoted to manager of the communications department of marketing and sales at Magnavox. Before being recruited by Magnavox in 1982 to create a new technical publications department, Szymanski served as a private communications consultant and instructor at Syracuse University.

Paul Daloia has been named mechanical engineer for Magnavox CATV. He will aid in the design and development of distribution and subscriber equipment.

David Kozlowski has been named senior account specialist for Magnavox. In this position, Kozlowski is responsible for generating sales activities in the Pacific Northwest and Southwest states. Prior to working at Magnavox, Kozlowski was the audit-coordinator for Rogers Cablesystems.

Mary Renaud has been named account specialist for customer services at Magnavox. Renaud will coordinate customer service activities in the Northeastern and Southeastern United States and serve Magnavox's European distributors. Before joining Magnavox, she was an accounting clerk for Harvard University.

Samuel Landis has been named account executive. Prior to joining Magnavox, Landis held the position of staff engineer for Storer Communications Inc. of Miami.

Louis Cinquino has been named product specialist, subscriber equipment in the product management group at Magnavox. As product specialist, Cinquino will assist with product development, sales support and marketing. Before assuming this position, he set up and maintained a computerized customer information database as a marketing analyst for Magnavox. Contact: 100 Fairgrounds Dr., Manlius, N.Y. 13104, (315) 682-9105.

D'Agostino

Regency Cable Products announced the promotion of **Stephanie D'Agostino** to the position of Southwest sales manager. D'Agostino has been with Regency for the past three years and has held such positions as data systems installer, director of customer training/service and marketing representative. Contact: 4 Adler Dr., East Syracuse, N.Y. 13057, (315) 437-4405.

Alphonse Jamrozek has been named operations manager of **Zenith Electronics'** CATV decoder manufacturing plant in Chihuahua, Mexico. He will be responsible for all new cable product manufacturing in Chihuahua as well as cable product finished goods shipping and receiving in El Paso, Texas. Jamrozek joined Zenith in 1946. He held various positions in the production control and production departments before his appointment to plant manager at a Chicago facility in 1963. In 1972, he was named operations manager at the Sioux City, Iowa, plant. In 1977, Jamrozek was appointed operations manager for Zenith's black-and-white TV operations in Chicago. He was named operations manager of Zenith's Toronto facility in October 1982.

Jamrozek succeeds **Edward Quinlan,** who will manage service and support for Zenith's Canadian cable operations. Quinlan was the first operations manager at Zenith's Chihuahua cable plant and has been there since it opened in 1982. Contact: 1000 Milwaukee Ave., Glenview, Ill. 60025, (312) 391-8181.

James Palmer, president and chairman of **C-COR Electronics Inc.** was awarded the Professional Achievement Citation in Engineering from Iowa State University at its Alumni Days held recently in Ames. Palmer is a 1944 graduate of ISU.

Palmer was honored for his outstanding contributions as a nationally known cable television pioneer. Contact: 60 Decibel Rd., State College, Pa. 16801, (814) 238-2461.

Jeff O'Brien has been appointed sales engineer for **Texscan MSI/Compuvid**. A specialist in automated commercial insertion, O'Brien was previously the product manager at Tele-Engineering Corp. Contact: 8355 S. 500 West, Suite S, Salt Lake City, Utah 84115, (801) 262-8475.

Edward Dooley, vice president for public affairs of the National Cable Television Association since 1981, was named a partner of **Anderson, Benjamin & Read Inc.,** a Washington-based management and public policy consulting firm that specializes in serving the communications and information industries. Prior to joining NCTA, Dooley served as chief of the Federal Communications Commission's press and news media division from 1979 to 1981. He also has served as a

chief spokesman for the President's Council on Wage and Price Stability and as press secretary and special assistant to a U.S. senator and a member of the U.S. House. He began an eight-year career with United Press International in 1965, including five and one-half years in Washington where he covered the U.S. House and Senate.

Dooley will direct Anderson, Benjamin & Read's public relations activities. He joined the firm July 1. Contact: 1020 19th Street, N.W., Washington, D.C. 20036, (202) 659-5656.

A number of new appointments were recently announced by **Times Fiber Communications Inc. John Kowalchik** has been appointed manager, digital products engineering for the Communications Systems Division of Times Fiber. Kowalchik's responsibilities will include managing the software and microprocessor product development groups as well as developing digital computer control systems for TFC's switched star network, Mini-Hub II, and for future communications systems products. Kowalchik comes to Times Fiber from RCA Consumer Electronics Division, where he served as manager, computer integrated manufacturing systems.

Times Fiber appointed **Robert Plonsky** as product manager for its Mini-Hub II system. Plonsky's responsibilities will include forecasting, positioning and product planning for the Mini-Hub II product line. He brings to Times Fiber experience in marketing, management and instrumentation engineering with companies such as Bristol-Babcock and Foxboro.

Cheryl Wolfe has been appointed sales administrator for the Communications Systems Division of Times Fiber. Wolfe's responsibilities will include managing customer service, order entry, forecasting and other administrative aspects of the sales function. Prior to joining Times, Wolfe served as sales administrator for Rockwell International. She also has extensive experience supervising customer service departments and as a marketing administrator.

Alice Grusse has been promoted to the position of advertising manager for Times Fiber. She will be responsible for all advertising functions as well as the production of company publications. In addition, she will continue to supervise the administration of the corporate communications department. Prior to this appointment, Grusse was manager of production and administration in this department. Grusse has had over 20 years experience in marketing, communications and administration. Before joining Times in 1979, she was a product manager for International Silver Co.

The Communications Systems Division of Times Fiber announced two senior account executives charged with spearheading the sales activities of the division. **Thomas Christensen** and **Joseph Schuder** will have the responsibility of managing sales activities related to TFC's Mini-Hub II. Christensen served as vice president and general manager of Alta Technology Inc. before moving to Times. Schuder comes to Times from Telecom Plus International where he was divisional vice president. Contact: 358 Hall Ave., P.O. Box 384, Wallingford, Conn. 06492, (203) 265-8500.

Lynn Watson of Showtime/The Movie Channel has been elected president of the **SCTE North Central Texas Meeting Group.** Watson is Showtime/TMC's Dallas-based regional engineering manager and is responsible for providing engineering support to affiliates of both Showtime and The Movie Channel in the Central United States.

In addition to Watson's election, several other appointments were announced by the SCTE meeting group. **Terry Walthall** has been elected first vice president. Walthall is the technical operations manager of Star CATV. **Ken Leeder** has been named second vice president. Leeder is the southwest division engineer for Capitol Cities Cable TV. **Tom Hill** has been selected as secretary/treasurer. Hill is the assistant director of engineering for Sammons Communications. Contact: 2775 Villa Creek Dr., Suite 250, Dallas, Texas 07470, (214) 241-1421.

Building for tomorrow

By Anthony J. DeNigris
President, Nationwide CATV Services, Inc

How long should a cable system last? When will technology surpass the practicality of the existing system and its electronics? How could a system be built today to encompass the unknowns of tomorrow? What should be done to keep a system in top-notch shape after it is newly constructed and running? What should be thought of in the construction phase to enable the system to operate as it was designed to for the optimum period of time?

The list of questions along this line of thinking could go on and on. When it comes time to build a cable system today, how many engineers and executives roll up their sleeves and really look at the picture in the future? The cable TV industry has exploded in growth all along the way and because of that, I don't believe there are many individuals who, as they have climbed the ladder of success, have taken the time to think of the real life of the systems they are playing a part in building today, for tomorrows objectives. I strongly feel that this is true in all positions in the industry, from the low man on the totem pole to the top brass. Most people who have been responsible for building systems in the past knew then that the object of the moment was most important to them, and that was to get the system up and running (and look good of course). They also knew that most likely, someone else would have to worry about the system down the road. There is no doubt that the industry today is paying the price for that hustle-bustle, build-for-the-moment period.

There are those that will take offense to my words, claiming that in the earlier period of explosive growth we all did the best that was humanly possible given the task at hand and the deadlines imposed. And besides, who in those earlier days could have known how sweeping an effect technology would have on this industry and plan for it properly? Well, I would agree in part with those objections knowing that the cable and equipment was limited in those days as compared to today; but what I am saying deals with the realms of what goes way beyond the physical limits of what engineers and project planners have to work with in the present. For I believe that it is not the equipment that limits the task, it is the lack of planning for that equipment's life.

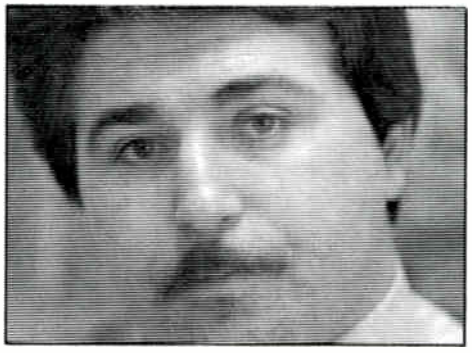
People: A commodity

How many systems have had to be rebuilt, or are being rebuilt today because they were physically shabby and in run-down condition. If those systems were maintained properly all along the way, with care and precautions taken against cable damage, would they have been adequate for an upgrade (electronically) instead of the necessity for a complete rebuild? The answer should be obvious in the majority of cases. But, what is the major reason things got the way they did? People. People, the cable television industry's most valuable commodity. People, the one force that can make or break your company. People, to whom the operation and care of millions of dollars in equipment is entrusted. Not only the people who planned and built the system, but also the people in the "after-the-build-is-over phase."

It is an outright shame and disgrace to see the tons of money being poured into highly sophisticated systems at the time of construction, only to watch that investment get squandered away by poor maintenance and care afterward. The culprit—people; people who move along too fast from one job to another within the industry never being forced along the way to feel the steps and achieve sound footing. People who are too eager to find people to fill a position so that they themselves can get on to other things.

How could I say such things? Simple, when I point out to a chief tech, who is in charge of a highly sophisticated cable system, that I noticed numerous spans of cable hanging low due to broken lashing wire, one span in particular hanging across a road, and he doesn't get excited, in fact seems rather oblivious to this information and seems to be more interested in devouring his coffee and donut rather than to make a note of the information and then act on it. When I see three techs sitting around playing cards in a construction trailer "away from it all" on a rainy day, instead of finding something useful to do. When I see the chief tech of a 350-mile system sit at his desk in the back room fumbling for something to do to look busy, because he really doesn't know what his real obligations are in the first place. And when I notice a project manager on the job worry more about covering his ___ in order that the man upstairs thinks he is doing ok, instead of really doing his job.

Those are just some of the reasons why I feel the way I do. It's because I am aware of it first hand; and I honestly think that many execs and engineers think that they are, but in fact, they are so far removed from the line of action, that they couldn't possibly be aware of what takes place and what doesn't, and how it does if it does. This industry was built in the field and it grew in the field. The executive who thinks he can grow a crop from a desk in this business is probably one of those individuals who climbed the ladder knowing that the next guy in his shoes would have to worry about whatever he left behind.



Engineering in the field

When it comes to making things work in the field, the progress and improvements of the physical aspects of hardware and equipment were tested, modified and proven in the field, on actual construction sites. For the most part, many physical advances were developed as the result of on the job needs. Example: In one particular project in the Northeast today, due to the extreme winters and the known problems with cable pullouts, the field personnel set up a flexible harness to suspend amplifiers from the strand instead of permanent clamping. This was to allow for the extreme and expected expansion and contraction of the cable and strand during severe temperature changes.

I once wrote that most people worry that lashing wire is too loose when they see air spaces between the cable and the strand, and that I believed that too tight lashing should be more of a concern than too loose. Cable must be free to move in the direction it chooses. You will never see lashing wire break from being loose; however, it will always suspend the cable from the strand, which is what it was meant to do, not to bind it to the point of being a tremendous resistance to cable and strand in the process of expansion. My feelings come from the experience of working with these things and this means looking into, not at, what I am working with.

I don't necessarily have all the answers to the questions and issues I raise all the time, but I raise them only to make aware those that need ammunition to light a fire, whether it be under themselves or under someone they have contact with. As far as building for the future, it involves not only using state-of-the-art technology and the utmost of care and caution in construction today, but it also involves keeping the system fed and allowing it to grow throughout the future. This means giving it tender loving care, and guiding every step of the day-to-day servicing and maintenance programs, not to allow installers to go wild and turn your system into a rats nest. Take these thoughts and add hundreds of your own as they develop and keep the system alive in the future and for the future. All it takes is dedication and common sense.

CATV's critical resource

By Andrew J. Healey
President, Technetronics Inc

With the explosion of the cable industry in recent years, there has been considerable focus placed on new technology, new products, building the new and maintaining the old. The tasks and responsibilities confronting all levels of management can be monumental. How do we get everything done in the amount of time we have? That question appears to be the one constant in this constantly changing industry. Everyone seems to have more work to do than the time needed to do it. This can become an alarming thought once we realize a sobering fact about time—there isn't any more of it! We all share one common denominator, though: Few people have enough time, yet everyone has all there is.

With that thought in mind, the problem is not necessarily with time per se. The problem lies within ourselves (the manager, the system engineer, the technician, the customer service rep). It is not how much time we actually have, but rather, how well we utilize it.

So how then, do we harness this vast resource? No one is immune to its ravages. We can no longer accept a stacked desk, long hours, missed vacations and a relentless stream of phone calls and interruptions as a way of life.

Table 1: Time wasters

1) Procrastination
2) Lack of planning
3) Unclear goals
4) Shifting blame
5) Delegating responsibility but not authority
6) Shooting from the hip
7) Inability to say "no"
8) Doing everything yourself
9) Not listening
10) Not giving clear instructions

The problem

We all tend to feel that our problems are unique. However, the problem with time-management—or rather, a lack thereof—is not limited to the cable industry. Many large corporations have calculated that their largest losses are in wasted time.

If you were asked to compile a list of your biggest time wasters, could you identify them? Listed in Table 1 are some common ones. Do any of them sound familiar? These are just a few, of course. The possibilities are endless. But now that I've got you thinking, why not take a few minutes and formulate a list of your own. You may want to add the following: not motivating your employees, lack of standards, no sense of urgency, inability to make a decision.

After you've completed your list, ask yourself if these time wasters are generated internally or by external factors. After some thought, you will probably come to the conclusion that *you* are the source of most of your time wasters, and subsequently, *you* are also the solution. Good time-management can only come from good self-management.

There are many myths about hard work and long hours. Too often I have seen a chief technician or manager succumb to the myth that hard work is a sign of positive accomplishment. I have found that when management personnel lose control, they will generally react by appearing to work hard. One of the hardest transitions that technical people have in becoming good department managers is realizing that there is nothing wrong with sitting, thinking and planning. High performers are characterized by their skill, how they work, how they manage their stress and how they take their risks. Good supervisors plan the work, and then work the plan!

The solution

Now that you have identified your time wasters, the next step is to get organized. Follow these basic time-management principles and you're on your way!

Priorities and planning—In order to be a good manager, you must have the ability to set priorities. Your priorities determine the activities that make up your day. Without them you have no basis for making decisions, solving problems or planning your time. Supervisors who do not give thought to their priorities often use the excuse that their activities are controlled by the needs of the work. They spend their time on crisis-management, dealing with obstacles as they arise. They are forced to make snap decisions based on few or no facts, and are frequently dissatisfied with the results.

Once you have a clear understanding of what is expected of you, and what you want to accomplish, you can identify your own priorities as well as those of your workers. Crisis-management can be eliminated, and instead of operating in a firefighting mode, you can switch to a fire-prevention mode.

Daily time plan—Every day should be organized in the form of a list. At the end of each day, or the first thing every morning, make a list of all activities you want/need to accomplish. Think of what must be done to meet a deadline, perhaps, or to prevent a serious consequence. Some samples are listed in Table 2A. Scan your list and number the items according to priority. Review the list regularly, adding

new items as needed and crossing off those completed.

As you begin each day, pick five or six of the most important items on your "Activity" list and make a second list of "Things to do." Each task should be in order of priority (Table 2B). Start with number 1 and stay on it until it's done. Doublecheck your priorities, and go on to number 2. If a task takes all day to do, just stick with it as long as it's the most important one on the list. This procedure should become a habit of every working day.

Your daily "To do" list helps you to concentrate on your priorities. The so-called rush job often loses much of its importance and immediacy when it is compared against your list.

Deadlines and goals—Setting deadlines provides you with the needed motivation to push ahead. There is an old saying I've heard: "Work multiplies to fill the time available." By setting deadlines, you avoid the possibility of the work stretching out longer than it should.

Setting goals is very important for achieving a feeling of accomplishment. As a quick example, think how boring it would be to go bowling with a sheet hanging in front of the pins. Every time you threw the ball and heard the pins fall, you would know you had done something, but not exactly what. Working without goals can be much like bowling with a sheet over the pins. A helpful acronym for setting goals is to keep them SMART: specific, measurable, attainable, realistic, tangible.

Table 2: Daily time plan lists

A: Activity

1) Design Brown Street
2) Order cable
3) Repair bucket
4) Survey Jack Drive
5) Check inventory
6) Adjust headend
7) Send meter for repair
8) Check signal-leakage logs
9) Install new channel 7 processor
10) Arrange safety class

B: Things to do

1) Repair bucket
2) Adjust headend
3) Send meter for repair
4) Install channel 7 processor
5) Arrange safety class

The application

As a supervisor, the quickest and easiest strategy for improving productivity is to put the previously mentioned principles to work. Because they do not require any additional technical skill or job knowledge, everyone is capable of learning how to manage time more successfully and efficiently. However, this does not mean that it's going to be easy. Good time-management requires commitment, constant and consistent attention, and careful tracking.

The benefits of time-management are numerous and the need for it exists at all levels. The increase in personnel activity level is directly proportionate to the greater need for time-management.

Project-management can best be described as a set of principles, practices, methods, procedures and techniques for the effective planning of an objective-oriented task. It establishes a sound basis for organizing, scheduling, controlling and managing a project effort.

In more personal terms, the project-management approach is essentially a team effort. A team is established to accomplish a specific objective and the project engineer or manager is responsible for the success or failure of that goal. Based on my definition of project-management, it is fairly obvious that I'm talking about time-management. The activities that make up the project will always be there, but the critical resource needed to carry them out is and always will be *time*.

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CALENDAR

August

Aug. 7-9: Magnavox CATV training seminar, Syracuse, N.Y. Contact Laurie Mancini, (800) 448-5171; in New York, (800) 522-7464.

Aug. 12-14: Magnavox CATV training seminar, Syracuse, N.Y. Contact Laurie Mancini, (800) 448-5171; in New York, (800) 522-7464.

Aug. 13-15: Jerrold technical seminar, Minneapolis. Contact Beth Schaefer, (215) 674-4800.

Aug. 14-16: Rocky Mountain CATV Association's annual convention, Jackson Hole Racquet Club, Jackson, Wyo. Contact John Harrison, (307) 245-3392; or Oscar Davis, (505) 538-3701.

Aug. 17: SCTE Capitol Cities Meeting Group annual picnic, Fort Ward Park, Alexandria, Va. Contact Ed Milner, (703) 841-7723.

Aug. 19-20: University of California, Berkeley's intensive course on recent developments in telecommunications signal processing and ICs, Palo Alto, Calif. Contact (415) 642-4151.

Aug. 20-22: C-COR Electronics technical seminar, Minneapolis. Contact Deb Cree, (814) 238-2461, or (800) 233-2267.

Aug. 20-22: Texscan Instruments training program, Indianapolis. Contact Ron Adamson or Brenda Gentry, (317) 545-4196.

Aug. 21: SCTE Delaware Valley Chapter meeting on FCC rules update and field testing procedures, Williamson's Restaurant, Horsham, Pa. Contact Bev Zane, (215) 674-4800.

Aug. 25-27: Southern Cable Television Association's annual convention, the Eastern Cable Show, Congress World Center, Atlanta. Contact (404) 252-2454.

Aug. 27-29: Security Equipment Industry Association and **National Burglar & Fire Alarm Association** "ISC Expo 85," New York Coliseum, New York. Contact Ann Feltes or Bill Campeau, (818) 965-7454.

Aug. 28-30: Missouri Cable Television Association annual convention, Lodge of the Four Seasons, Lake of the Ozarks, Mo. Contact Charlie Broomfield, (816) 453-3392.

September

Sept. 9-10: Wisconsin Cable Communications Association's meeting at the Concourse Hotel, Madison, Wis. Contact Lynn Walrath or Cheryl Cuccia, (608) 256-1683.

Sept. 9-11: Tennessee Cable Television Association annual meeting, Hyatt Regency Hotel, Nashville, Tenn. Contact Dan Walters, (615) 256-7037.

Sept. 9-13: M/A-COM MAC training seminar, MAC training and conference center, Burlington, Mass. Contact Carolyn Calorio, (617) 272-3100.

Sept. 10-11: Society of Cable Television Engineers and **SCTE Rocky Mountain Meeting Group** technical seminar on signal leakage, CLI and the FCC, Denver. Contact Sally Kinsman, (303) 696-0380.

Sept. 10-12: Jerrold technical seminar, Boston. Contact Beth Schaefer, (215) 674-4800.

Sept. 10-12: Texscan Instruments training program, Indianapolis. Contact Ron Adamson or Brenda Gentry, (317) 545-4196.

Sept. 11-13: Maganavox CATV training seminar, Worcester, Mass. Contact Laurie Mancini, (800) 448-5171; in New York, (800) 522-7464.

Sept. 15-17: South Dakota Cable Television Association annual meeting, Sylvan Lake Resort, Custer, S.D. Contact (605) 854-9121.

Sept. 16-18: Magnavox CATV training seminar, Worcester, Mass. Contact Laurie Mancini, (800) 448-5171; in New York, (800) 522-7464.

Sept. 17: Pennsylvania Cable Television Association annual meeting, Atlantic City, N.J. Contact Patricia Wilson, (717) 234-2190.

Sept. 17-19: C-COR Electronics technical seminar, Toronto. Contact Deb Cree, (814) 238-2461.

Sept. 18-20: Atlantic Cable Show, Atlantic City, N.J. Contact (609) 848-1000.

Sept. 25: SCTE Appalachia Mid-Atlantic Chapter business meeting, Holiday Inn, Chambersburg, Pa. Contact Flint Firestone, (301) 252-1012.

Planning ahead

Sept. 18-20: Atlantic Show, Atlantic City, N.J.

Sept. 25-27: Great Lakes Expo, Convention Center, Indianapolis.

Dec. 4-6: Western Show, Convention Center, Anaheim, Calif.

March 15-18: National Cable Television Association annual convention, Dallas.

June 12-15: Cable-Tec Expo '86, Phoenix (Ariz.) Convention Center.

Sept. 25-27: Illinois, Indiana, Ohio and Michigan CATV Associations present the Great Lakes Expo, Convention Center, Indianapolis. Contact the Ohio Cable Television Association, (614) 461-4014, or (517) 351-5800.

Sept. 25-28: Hawaii Cable Television Association's third annual convention, Coco Palms Resort Hotel, Kauai, Hawaii. Contact Kit Beuret, (808) 834-4159.

October

Oct. 2-3: Online Conferences Ltd. system security conference, London. Contact 01-868 4466.

Oct. 2-4: Magnavox CATV training seminar, Atlantic City, N.J. Contact Laurie Mancini, (800) 448-5171; in New York, (800) 522-7464.

Oct. 7-9: Magnavox CATV training seminar, Atlantic City, N.J. Contact Laurie Mancini, (800) 448-5171; in New York, (800) 522-7464.

Oct. 8-10: Jerrold technical seminar, Pittsburgh. Contact Beth Schaefer, (215) 674-4800.

Oct. 11-13: Satellite Today's Eastern home electronics satellite dish/video expo, Orange County Convention Center, Orlando, Fla. Contact Bonnie Mundie or Dee Botsford, (602) 581-0188.

Oct. 15-17: Texscan Instruments training program, Indianapolis. Contact Ron Adamson or Brenda Gentry, (317) 545- 4196.

Oct. 16: SCTE Delaware Valley Chapter meeting on technical management, Willow Grove, Pa. Contact Beverly Zane, (215) 674-4800.

Oct. 22-24: C-COR Electronics technical seminar, Montreal. Contact Debra Cree, (814) 238-2461.

AD INDEX

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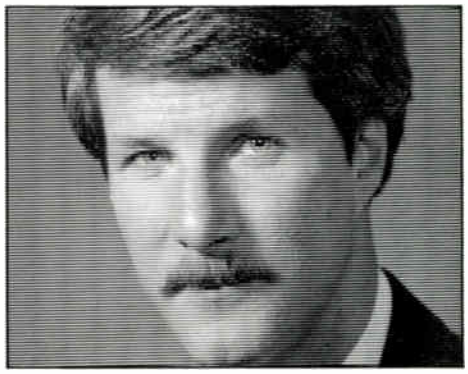
Rockets' red glare

By Robert A. Luff
Senior Vice President, Engineering
United Artists Cablesystems Corp.



After watching this year's spectacular display of July 4th fireworks, I could not help but reflect on the freedom and responsibilities those "rockets' red glare, the bombs bursting in air" represent to us and the cable industry in our more and more technologically oriented country. But, do we personally and collectively as the CATV technical community fully appreciate and exercise these freedoms and responsibilities?

Pursuit of happiness

Freedom is far more comprehensive and important to us than can be expressed here. But one of the most important of all—freedom of speech—is the underlying reason for the abundance of radio and television stations, the foundation of the cable industry, and yours and my "pursuit of happiness" in CATV technical endeavors.

We are all free to come and free to go in this industry at our will. There are no licenses, no internships, and no fees. Indeed, Uncle Sam has seen fit to continue further technical deregulation of an already hardly regulated cable industry. It would seem that things could not be better with all the freedom for the CATV technical community.

Technical responsibilities

But all this new CATV technical freedom is not without increased personal and collective technical responsibility. In general, our near technically unregulated freedom stops if we begin to cause harm to others. For example, while the FCC may have, in fact, relaxed the specifics of how to develop a needed quarterly CATV signal leakage monitoring and correction program, it does not mean that we are free to turn our backs on cable leakage and cause interference to aeronautical or other safety-of-life services. Indeed, the technical departments of cable companies may well have more responsibility.

The FCC has given us more freedom as to how we ensure we will not interfere with others, but not freedom to interfere. We will continue to ultimately have the same "must not interfere with other radio services" rule (check for yourself—76.613 is still there and emphasized in all commission releases). So as the FCC removes its overly restrictive, mandatory "how to comply program," the same final non-interference burden continues to rest directly over the heads of all CATV technical departments. These same technical departments must now decide, if at all, how to develop their own detailed "voluntary" daily, weekly, monthly and bottom-line signal leakage program. Further, they must accept the full responsibility of interference to other radio users and its stiff consequences—especially to safety-of-life services.

The FCC is not alone in returning technical and operational freedom to the CATV technical community. It was not too long ago that I saw a bumper sticker that said, "If you think OSHA is a small town in Ohio, YOU ARE IN BIG TROUBLE." Today, OSHA has also softened its bark. But, the final legal and social responsibility for the safety of our employees and the public is no less. The difference is now responsible technical departments must do their own barking and assume more responsibility for creating safety checklists, inspections and training programs. The end result—less regulation and more freedom, yes, but more responsibility to maintain the final unchanged bottomline requirement—safe operations for all.

Establish new boundaries

As the federal government in particular continues pulling away accustomed regulatory props resulting in an unprecedented level of daily technical operation freedom, a void is being created for needed self-imposed responsible boundaries in these areas. For example, no federal law requires CATV technical departments to check engine oil levels periodically. We have been on our own from the beginning to protect and conscientiously maintain our costly investment in vehicles. It was, and is, simply good engineering practice to develop adequate vehicle maintenance programs and checklists with or without any federal or state mandate to do so.

So, too, it should be with CATV signal leakage, safety, signal quality and system reliability. Less hand-tying federal or state regulations do not mean a wholesale abandonment of continuing high performance by the CATV technical community in these areas; it only means we have the responsibility to develop *our own* socially responsible set of governing boundaries to zealously adhere to.

The situation should be the same as if the government suddenly deregulated the commercial airline maintenance requirements. Certainly the airline companies would not abandon their corporate, industry and social responsibility for continued safe maintenance programs. To protect their own interests, they could not afford for their aircraft or their industry's aircraft to slip into poor repair and eventually result in air disasters.

There is a big job ahead for NCTA, CATA, SCTE, and state and local cable associations. Make no mistake, self-imposed industry technical boundaries are the hardest to develop, win acceptance and encourage daily usage. And, there are always the few who do not accept these social responsibilities; which can result in bad press for everyone. NCTA and SCTE have already made significant contributions in written and video reference material defining, educating, and encouraging self-adoption of a comprehensive set of good engineering practices and training aids. CATA and state and local association publications and meetings have also already focused on these and other materials.

But, more is needed. Many key technical parameters remain undefined and no guidelines set. For example, the industry has no guidelines for system reliability—one of the most basic and visible system/subscriber/franchise authority issues from time to time.

Paradise lost

If the CATV technical community does not appreciate and exercise our freedoms and responsibilities, they well may be taken away again by others. If by irresponsibility, neglect or inability, CATV operations encroach on the well-being of others or do not continue to maintain a competitive edge through technical innovations, our freedoms will be lost. If we allow systems to fall into disrepair and signal leakage to cause interference to other safety-of-life services or even our own signal quality and reliability, we will invoke the FCC, state or local franchise authorities to create new regulations. Or, if we do not continue to improve and innovate new services, other technologies will capture our subscribers and jobs.

Responsible freedom

Freedom from technical regulations comes with important social responsibilities. Often these social responsibilities such as not causing interference, providing high-quality and reliable signals, or adequate customer service are sometimes hard to identify and develop proper self-imposed industry or company boundaries of good engineering and operating performance. The industry should work together to cooperatively develop such guidelines and encourage acceptance before inadvertent or irresponsible abuses by a few operators result in others (states) taking away our freedoms again.

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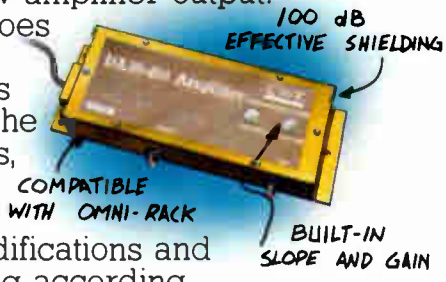

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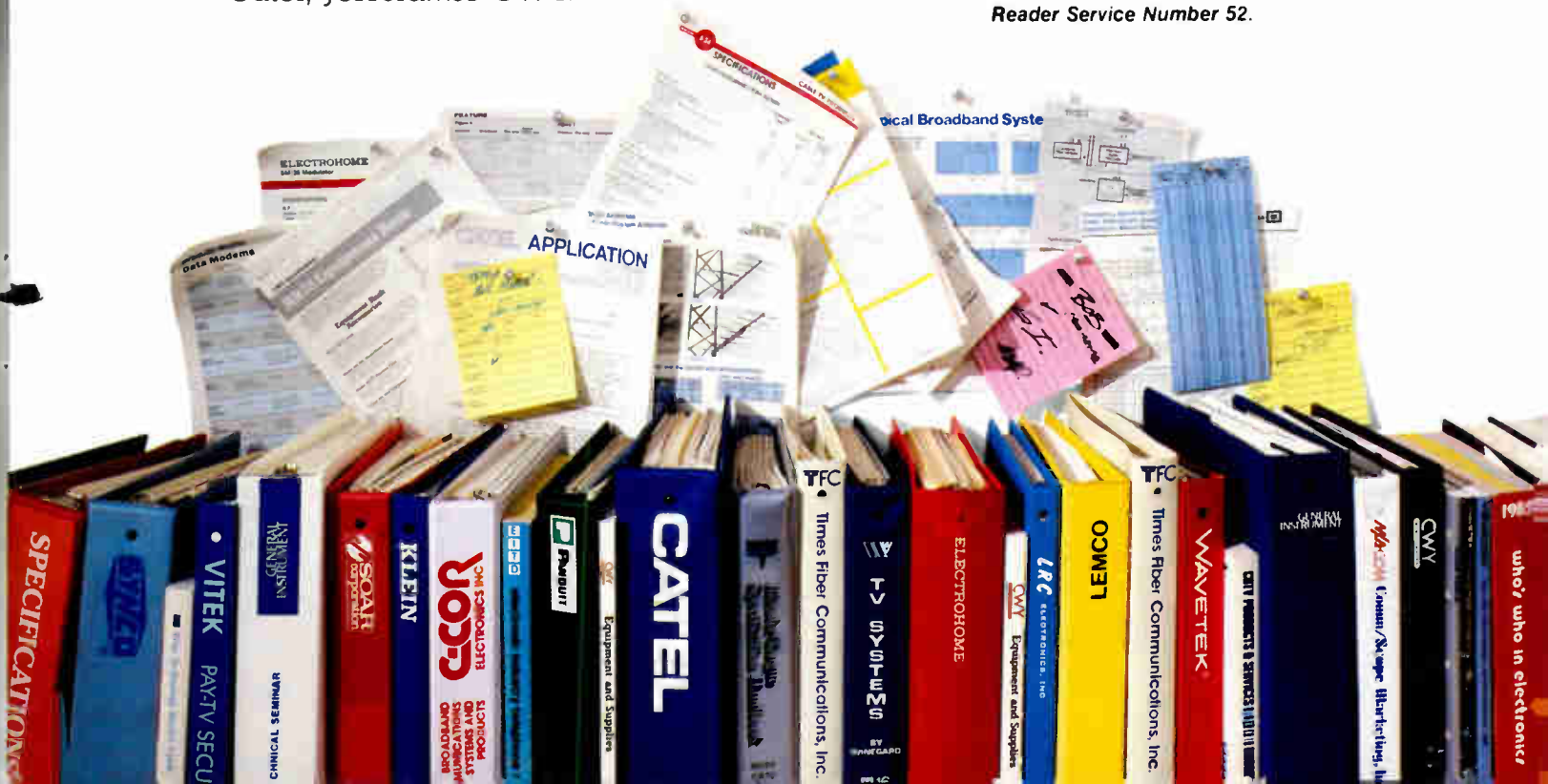

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