

CEED

Communications Engineering & Design/The Magazine of Broadband Technology

August 1984

*cable compatibility,
addressability*

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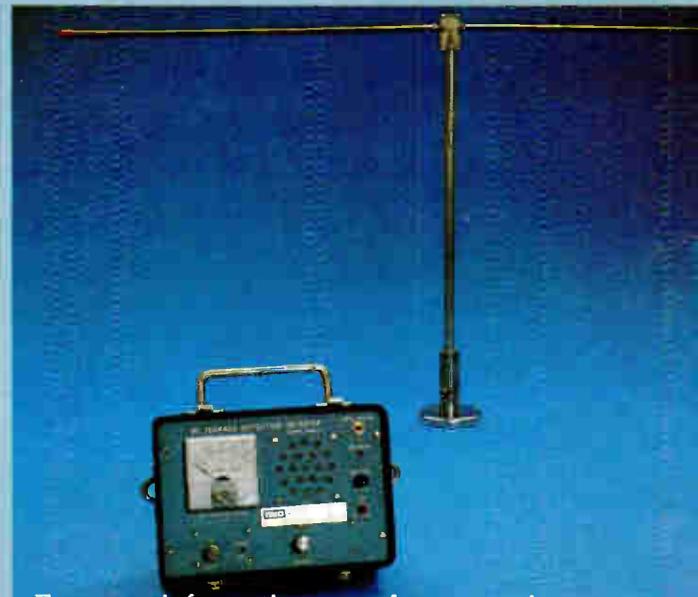
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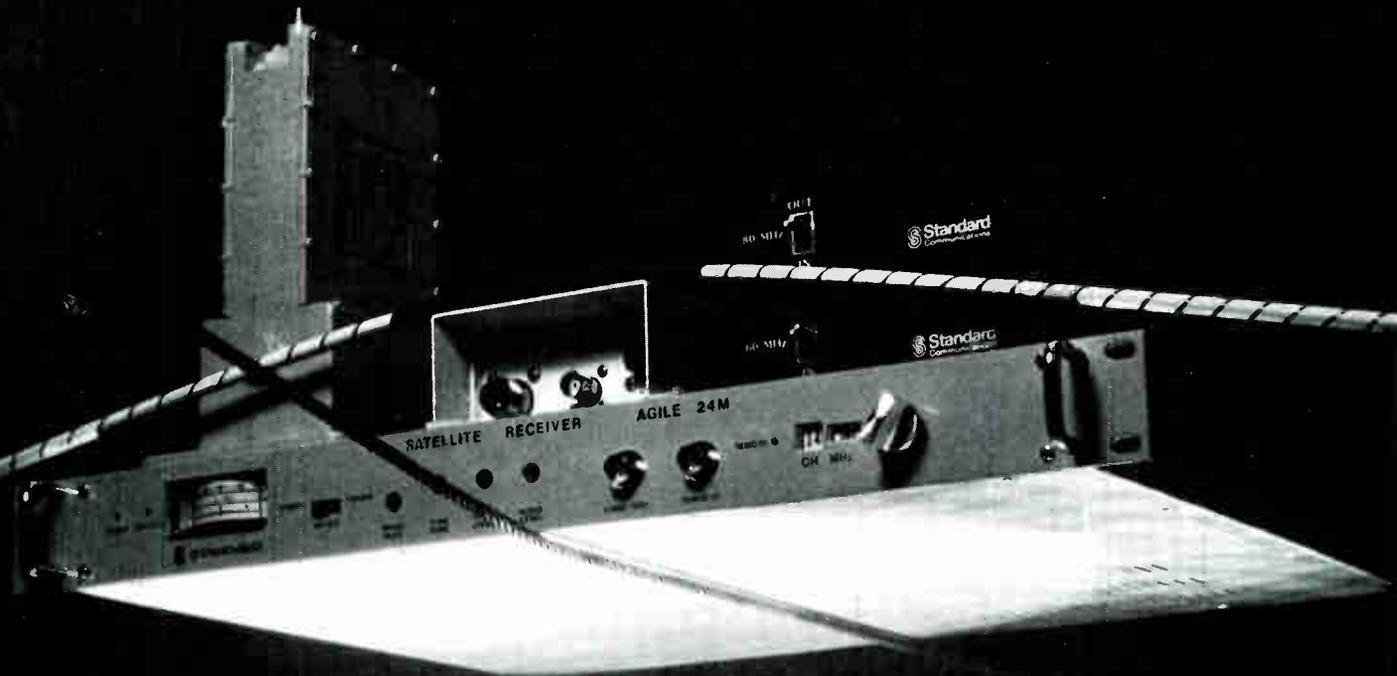
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COMMUNICATION NEWS 16

New delivery systems in spotlight

Vendors and operators discussed off-premise addressability and the prospects for pay per view in Chicago last month, while Georgia cable operators grappled with potential TVRO competition from utility companies. While the City of Palo Alto readies an energy management system, Zenith studies data transmission. Bob Luff, Bob Dickinson and Andrew Viterbi add new laurels to their lists of achievements, while NCTA puts its latest technical papers volume up for sale.

INTERFACE 20

Cable compatibility issues get NCTA/EIA scrutiny

Since 1982, a joint Electronic Industries Association/NCTA engineering committee has been working on compatibility standards for consumer devices hooked to cable systems. An interim channelization standard already has been adopted, while work continues on baseband interface and other issues.

FEATURE 21

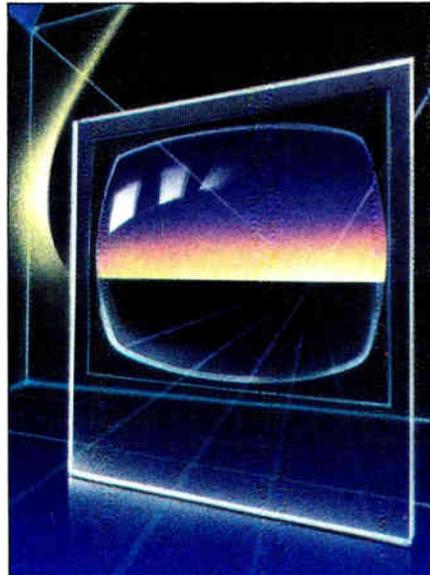
Aeronautical band leakage

Despite the intense heat generated by the controversy over signal leakage in the aeronautical frequencies, surprisingly few documented cases have occurred. In this issue, Bob Dickinson of E-Com and Ralph Haller and John Wong of the FCC take a look at the problem as a pilot might encounter it.

FEATURE 26

On the road to cable stereo

Cable-delivered audio services are a new terrain for the industry and there aren't many guideposts in place. Studioline principal Jason Taylor tackles the issues, examines the opportunities and explains the costs involved.



About the cover

Artist David Uhl renders a futuristic vision of cable-delivered stereo services. See Jason Taylor's story on page 26.



Bob Rast, ATC senior vice president for corporate development, heads the joint EIA/NCTA engineering committee. A report on the group's work runs on page 20.

FEATURE 32

Cable and VCRs

Cable compatible TV sets have been an industry issue for several years and now VCR compatibility is a growing problem. In this story by CED staffer Constance Warren, Bob Luff, Ralph Haimowitz, John Dawson and Doug Semon take a look at some of the problems.

TELEDELIVERY 34

Tiering videotex

New videotex services are moving to a tiering system based on the cable model, Contributing Editor Gary Arlen reports. He also takes a look at a new nationwide data service by Data Cable and TCI and updates CBS and NBC teletext efforts. Other recent developments also are highlighted.

TECH II 38

Optimizing feedforward

Jay Staiger, manager of amplifier systems with Magnavox CATV, discusses an approach to optimizing feedforward amplifier modules. He recommends a single hybrid module architecture and reports on tests comparing conventional preamps and feedforward preamps.

PRODUCT PROFILE 40

Addressable converters

This month, CED highlights addressable converters.

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Reader Service Number 3

Magnavox addressed the way to stop subscribers from monkeying around with your signals.



Tele-Engineering offer extended

Tele-Engineering is extending NCTA convention prices on its commercial insertion equipment and software to all NCTA attendees for 30 days. Company officials said the move was prompted by record buyer interest.

Fiberoptics to spread, but not to CATV . . .

Although sales of optical communications components will rise 150 percent in five years, cable operators won't be buying much, says a new report by Frost & Sullivan. Citing uncertain industry economics, competing low-cost technologies and a lack of suitable optical coupling and conversion hardware as reasons for the hesitation, the report notes that experimental systems still are operational, and more are being installed.

while Burnup & Sims jumps in . . .

Meanwhile, Burnup & Sims has pooled the resources of eight subsidiaries to form Burnup & Sims Lightwave Systems Inc. The new company will sell worldwide, company officials say.

and GTE steps up testing

And GTE has opened a new test facility for fiberoptic transmission products. The Albuquerque, N.M., operation joins the company's existing digital products test group.



Peter Athanas hands CATA presidency over to Carl Schmauder.

CATA celebrates 10th anniversary

The Community Antenna Television Association held what officials call its largest convention ever at Lake of the Ozarks, Mo., July 16-18. CATA President Peter Athanas completed his two-year term of office at the show, and handed the reins over to former Vice President Carl Schmauder. While many of the sessions focused on marketing and financial matters such as theft of service, advertising and non-cable ventures, many technical sessions also were held. Feedforward, two-degree spacing, off-premise addressability, signal scrambling, rebuilds, earth station electronics and status monitoring all received attention.

Equatorial gets patent

Equatorial Communications Co. has been granted a systems patent for its spread spectrum technology, used on the firm's data networks. Spread spectrum allows small-diameter antennas to receive signals from multiple adjacent satellites without interference.

The company also has signed a letter of intent to acquire

DMC Systems Inc., which operates a nationwide service organization for terminal products. DMC also supplies point-of-sale and consumer finance terminals. The move lessens Equatorial's reliance on third-party service organizations.

Engineering services available

Planned Technology Corp. is now offering engineering services ranging from satellite and terrestrial microwave frequency analysis to adjacent satellite interference analysis. The Dallas, Texas, firm also will do system acceptance testing and maintenance management as well as network design. Engineering software for IBM and DEC microcomputers and land mobile and cellular radio services also are offered. The firm can be reached at (214) 867-1971.

Tough times for DBS . . .

Following on the heels of CBS, which has dropped its plans for DBS, Western Union became the second major player to withdraw from the field in two weeks, abandoning its plans for a four-satellite network of Ku-band birds. The CBS decision left Comsat subsidiary Satellite Television Corp. scrambling for a financial partner, and many observers are speculating that the venture may be terminated.

Meanwhile, RCA American Communications Inc. has filed with the FCC for authorization to launch two low-power satellites instead of the four high-power birds it originally had planned on launching.

but a new teleport opens . . .

Uplinks Unlimited has inaugurated a satellite uplinking service in the Dallas/Fort Worth, Texas, metropolitan area. Offering video, data and audio uplinks to all satellites 24 hours a day, Home Sports Entertainment was one of the firm's early customers. The firm plans to install a permanent teleport facility at a later time.

and Telesat Canada tests scrambling

Telesat Canada started a one-year test of its optional scrambling services July 1. The experiment will test consumer demand for encrypted video transmissions. On top of regular charges for satellite time, users pay an extra \$80 an hour for one-way scrambling and \$150 an hour for two-way encryption.

The company also has signed an agreement with Satellite Business Systems for joint carriage of satellite communications services across the U.S.-Canada border.

Bay Area Teleguide expands

The Bay Area Teleguide, which offers public videotex services at more than 36 high-traffic San Francisco locations, installed another 85 in July, said Peter Thieriot, Chronicle Videotex president at the Touche Ross Conference on Electronic Shopping in New York recently. The monthly audience for the system is 70,000 people, and the data base already includes 6,000 pages of information, he said.

SBE certification exams coming up

Certification exams for Society of Broadcast Engineers licenses will be held Nov. 9 to Nov. 17. All applications must be received in the SBE national office by Sept. 14. The group also is taking applications for Broadcast Technologist from engineers holding the FCC's First Class Operator license and who meet the service requirement. These engineers don't have to take the exam and may apply at any time. Further information is available from the Certification Secretary at (317) 842-0836.

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The Z-TAC® addressable system from Zenith.

Zenith is the leader in cable baseband technology. And you can't beat that. You can't beat 65 years of consumer electronics experience. Experience that now brings you the most advanced baseband cable system on the market.

The Z-TAC system offers Zenith's unique remote control unit. Unique because it has features found only in an advanced baseband system like Z-TAC.

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Home-run or Loop-through, DBC can design an addressable system that will turn any building into a money machine.

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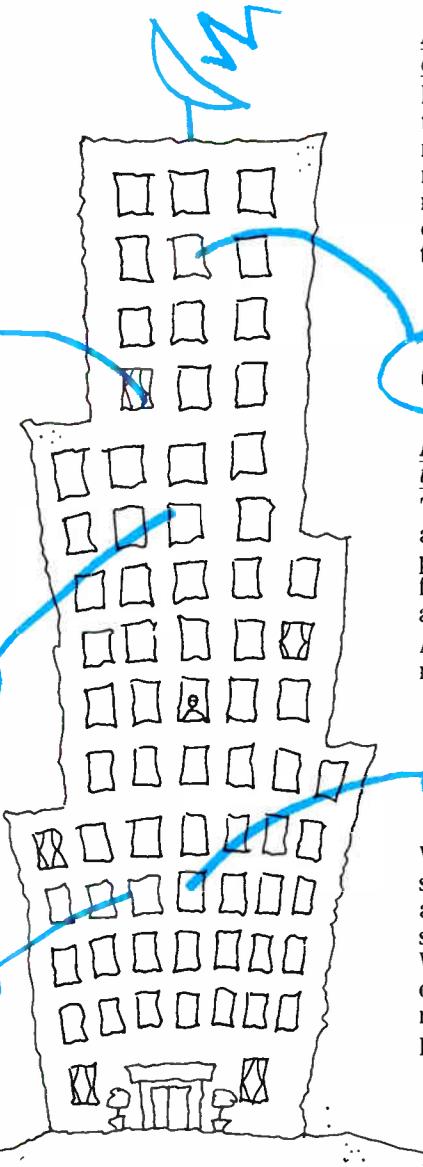
DBC leads in addressability.

We've been at this quite a bit longer than anyone else. And while the technology of addressability is upgraded almost monthly, we conservatively judge ourselves to be easily a year ahead of any competitor.

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We know we'll retain that edge, because we design and build almost every single component in our systems. So the ability to expand and to add on every innovation that comes along, is built in.

MOI, KERMIT?



DBC addressable revenue comes quicker, smoother.

Modernizing or replacing existing systems is quicker with DBC, and installing new ones is a breeze. We have a proven record of smooth, trouble-free, easily monitored performance. And although our technology is superior, we're eager to keep our prices competitive.

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That's because we do design and build all the components. So our service people are second to none...totally familiar with every piece of equipment and its function.

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Rexdale, Ontario Canada M9W 1G1
Tel: 416-241-2651 Telex 06-989357

Reader Service Number 5

Seminars

August

- 1-3: Business Communications Review** offers a data communications: basic concepts seminar in Boston. Contact Marsha Kaplan, (800) 227-1234.
- 3-5: SMATV/Private Cable Workshop**, Kansas City. Contact Burrull Communications Group, (608) 873-4903.
- 8-10: A Magnavox CATV training seminar** will be held in Chicago. Contact Ms. Mancini, (800) 448-5171; in N.Y., (800) 522-7464.
- 10:** A video music seminar will be sponsored by **Rockamerica of N.Y.** Contact Lyn Healy, (212) 475-5791.
- 12-15:** The 10th annual conference of the **Cable Television Administration and Marketing Society** will be held at the Waldorf-Astoria in N.Y. Contact (404) 399-5574.
- 13-14:** A digital communications systems seminar will be held by **Business Communications Review** in San Francisco. Contact Marsha Kaplan, (800) 227-1234.
- 13-15:** A **Magnavox CATV training seminar** will be held in Chicago. Contact Ms. Mancini, (800) 448-5171; in N.Y., (800) 522-7464.
- 21-23:** A **Jerrold technical seminar** will be held in Denver. Contact Kathy Stangl, (215) 674-4800.
- 21-23: C-COR Electronics CATV Technical Seminar**, Ontario. Contact Debra Cree, (814) 238-2461.
- 22: Delaware Valley Chapter of SCTE** meets, George Washington Motor Lodge, Will Grove, Pa. Contact Bruce Furman, (215) 657-4690.
- 22-24: Rocky Mountain Cable Television convention**, Yarrow Holiday Inn, Park City, Utah. Contact Mark Carter, (801) 486-3036.
- 23-25: Colorado Cable Television Association convention**, Keystone Lodge, Keystone, Colo. Contact Steve Durham, (303) 753-1066.
- 23-25: Hawaii Cable Television Association convention**, Intercontinental Hotel, Maui, Hawaii. Contact: (808) 836-2888.
- 27-28: Business Communications Review** offers a digital communications systems seminar in Boston. Contact Marsha Kaplan, (800) 227-1234.

28-30: The sixth annual Satellite Communications Users Conference sponsored by **Satellite Communications** will be held at the Louisiana Superdome. Contact Kathy Kriner or Cheryl Carpinello, (303) 694-1522.

24-27: The Florida Cable TV Association will hold a convention at The Breakers in Palm Beach. Contact Bob Brillante, (813) 688-3787.

29-31: Missouri Cable Television Association, Lodge of the Four Seasons, Lake of the Ozarks, Mo. Contact Charles Broomfield, (816) 453-3392.

September

- 3-5:** Satellite Electronics Show, Opryland Hotel, Nashville. Contact **Satellite Television Technology International**, (405) 396-2574.
- 5-7: Magnavox Mobile Training Seminar**, Buffalo, N.Y. Contact Laurie Mancini, (800) 448-5171.
- 6-7:** The **2nd Swiss Videotex Congress** will be held at the European World Trade and Congress Centre in Basle, Switzerland. Contact, 061/26 20 20.
- 6-8: Eastern Cable Show**, Georgia World Congress Center. Contact (404) 252-2454.
- 10-11:** DBS IV, Washington, D.C. Contact **Phillips Publishing**, (301) 986-0666.
- 15-19: National Satellite Communications Association** convention, Hyatt Regency Hotel, Orlando. Contact Mickey Gorman, (202) 659-2928.
- 17-21: FOC/LAN 84**, an international exposition for fiber-optic communications and local area networks will be held at the MGM Grand Hotel in Las Vegas, Nev. Contact: Michael O'Bryant, (617) 787-1776.
- 18-20: Jerrold** will hold a technical seminar in Atlanta, Ga. Contact Kathy Stangl, (215) 674-4800.
- 19-21: Magnavox Mobile Training Seminar**, Ogdensburg, N.Y. Contact Laurie Mancini, (800) 448-5171.
- 21-23: SMATV/Private Cable Workshop**, Washington, D.C. Contact Burrull Communications Group, (608) 873-4903.
- 22-24:** New building designs and technology will be the focus of

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As an issue, parental control of adult programming on cable systems is something of a yawner. Although many of the major MSOs offer parental control systems to their subscribers, there isn't a stampede of consumers anxious to snap them up.

Operators don't seem to be going out of their way to advertise availability of the devices, and key lock box manufacturers aren't making a fortune selling them, either.

While there have been a few lawsuits seeking a ban on Playboy Channel programming, the company has won all of its cases so far. And a company spokeswoman recently termed the threat of censorship a "relatively minor one."

Still, parental control is an issue worth taking up now, before it becomes a problem. To be sure, there are technical problems to surmount, but marketing and regulatory concerns are interwoven—perhaps paramount.

Key lock traps, it is fair to say, are widely seen as a nuisance. Present key locks tend to bleed into frequencies above and below the intended channel of capture, causing video or audio distortion. Some traps scramble video, but leave the audio track unaffected.

And the low isolation standard normally used means that a 69 dB trap attenuates the picture about 35 dB—enough to distort, but not enough to obliterate the video signal.

A stand-alone key lock device also is one more piece of equipment to clutter a set top, usually costs the subscriber an additional \$10-\$20 and often means a rescheduled installation appointment.

Converter-based systems present other headaches. A system with a large number of key locks in place might find itself in a pickle if FCC frequency assignments were to change, or if the headend itself switches certain channel assignments.

In a saturated system, an operator might face physical replacement of all active traps. The problem would be compounded by a need to reconfigure existing converters or replace them.

So parental control can be a headache. But restrictions on an operator's freedom to program are a much bigger problem.

In the years to come, the issue of adult programming is likely to grow, and will conflict directly with the industry's fight for First Amendment rights on a par with those of the print media.

As a matter of principle, the industry must defend its right to speak and publish—even if our forms of speech are electronic.

But we also should make every effort to secure signals that might prove objectionable to some viewers.

Parental control can be a pain. But it's a technical issue with vast ramifications for the entire industry and we ought to get on it now.



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A new dimension in prevention of signal, and service theft. The Command Center allows physical location of any illegal converter in your system. Protect your asset.

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The TM-1 makes two-way addressability available now without any change to your present plant. The TM-1 actually adds more benefits without added cost and maintenance.

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This totally automatic system can produce monthly statements and instantaneously monitor credit. The Command Center provides impulse upgrading for all tier services.

Added revenue:

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WVL

Reader Service Number 10

World Video Library, Inc. Corporate Offices: 2747 Airport Freeway, Fort Worth, Texas 76111 (817) 831-3811

In the downtown area, the city chose to use twisted pairs instead of coax as the transmission medium, because it was too costly to install buried cable, Kubicki said.

The electricity monitoring system will only work over the coax network, however. Another three miles of trunk will have to be installed to connect all 11 electrical substations, Kubicki said.

The city decided to use coax instead of phone lines for the Supervisory Control and Data Acquisition system because "we were running out of twisted pairs," Kubicki said.

Other factors favoring coax were bandwidth capacity, data transmission rate, reliability and cost. Like the traffic management system, the department's SCADA system will be able to transmit voice along with data.

According to Kubicki, information will be retained in remote terminal unit memories and uninterruptible power supplies will be used if power is lost.

Kubicki expects the system to go on-line in 1986 or 1987.

Other communications networks besides coax will be used to pick up remote gas and water monitoring substations. Microwave is a possibility, Kubicki said. "These substations also may not have

voice communications capabilities."

Equipment needs for water and gas substations will differ from those of electricity substations because "data rates for water and gas monitoring are not as critical," he said.

A stand-alone computer hardware/software system will be installed in the city's water quality and control plant one mile from the utility department's main office. The two facilities will be linked together by the coaxial network.

—Constance Warren

Engineers win honors

DENVER—Bob Luff, Robert Dickinson and Andrew Viterbi recently garnered new honors and responsibilities.

Bob Luff, former 11-year-old Ham radio operator and current vice president of engineering for United Artists Cablesystems, was elected chairman of the NCTA engineering committee.

In his new role, Luff will focus the 35-member committee's efforts on seven key issues: cable-ready TV; satellite signalling, control audio tones and commercial insertion; stereo audio; improving cable's relationship with the EIA, IEEE and consumer electronics groups; interfacing with com-

puters and the "digital environment;" signal leakage and consumer education.

Out of these seven, Luff called consumer education one of his primary new interests and concerns.

Andrew Viterbi, chief scientist and senior vice president of M/A-COM, was awarded the 1984 Alexander Graham Bell Medal from the Institute of Electrical and Electronics Engineers. He was recognized for his "exceptional contributions to the advancement of telecommunications."

Robert Dickenson, head of AM Cable's E-COM Laboratories Division, received U.S. Patent 4450481 for inventing the Tier Guard off-premises pay TV control system and the Tru-Net 500 multiservice interactive addressable system.

NCTA technical papers for sale

WASHINGTON—Copies of the 1984 NCTA convention technical papers are now available for purchase. *Cable '84* contains 58 technical papers on topics ranging from commercial insertion to signal leakage and multichannel sound.

Volumes from previous conventions also are available. To order copies, contact the Science and Technology Department of NCTA at 1724 Massachusetts Ave. N.W., Washington, D.C. 20036.

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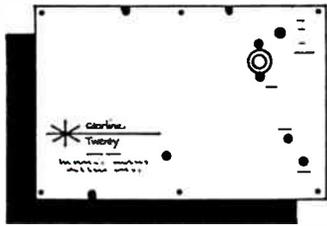
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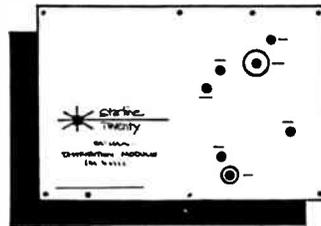
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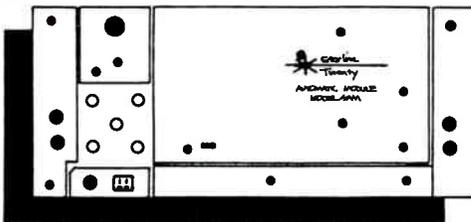
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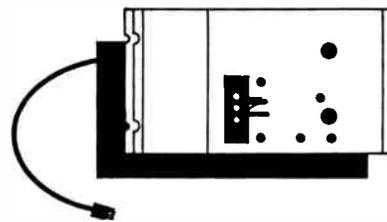
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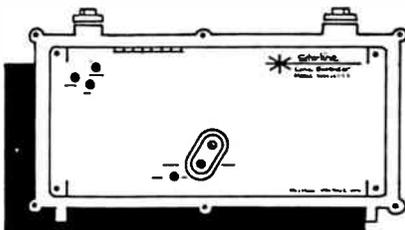
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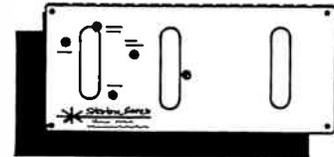
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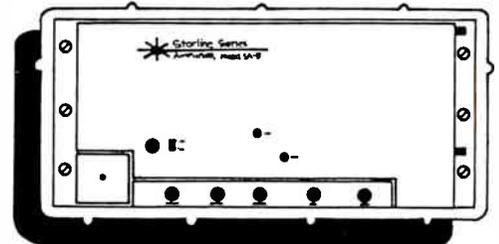
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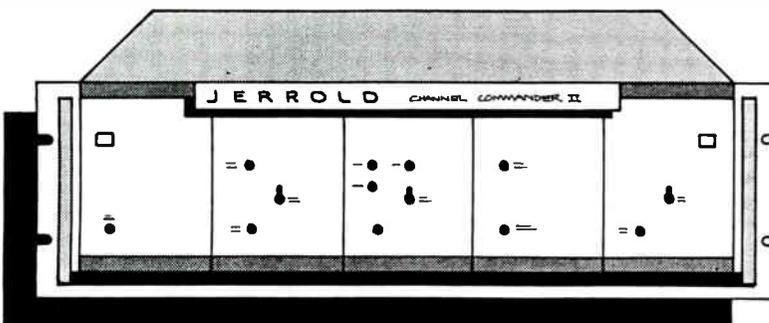
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Cracking down on incompatibility

NCTA/EIA committee bent on interfacing consumer electronics and cable technologies

Since 1982, a joint Electronic Industries Association/NCTA Engineering Committee has been working on interface and compatibility standards for consumer devices hooked to cable systems. The group is trying to describe the electronic environment in the subscriber home so manufacturers and operators know what to expect, says Tom Mock, staff engineer for the EIA Consumer Electronics Group.

Already, the committee has agreed on an interim channelization standard using past cable designations for standard, incremental and harmonically related carriers from 50 to 650 MHz.

The cable compatible TV issue was the impetus for the group's founding, according to group chairman Bob Rast, ATC senior vice president for corporate development. Rast also oversees the work of two other committees.

Walt Ciciora, ATC vice president for research and development, heads the working group on technical standards. Impedance matches between cable systems and TV sets, as well as other compatibility issues, are his primary concerns.

James Hettiger of RCA chairs the working group on baseband interface standards, which hopes to develop a multi-pin connector interface. Located at the rear of a cable compatible TV set, the interface would allow attachment of scrambling and teletext decoders, accept computer input and provide RGB as well as baseband audio and video output. The proposed 20-pin connector would resemble the Zenith Redi-Plug, but would be more general, Mock says.

Rast called Ciciora's interface standards group the linchpin of the committee's work, involving as it does specifications for maximum and minimum input levels, spurious signal leakage and RF shielding.

Increased RF shielding should permit use of cable compatible sets in high ambient signal conditions without the need for a cable converter that protects receivers from direct pickup interference.

"The real problem with the home interface is the co-channel pickup," says Mock.

But the baseband interface standard



Bob Rast, left, and Walt Ciciora, right, work with other committee members to form standards permitting consumer electronic devices to interface with cable technology.

also could have a major impact on cable operators and manufacturers. "If a descrambler could be interfaced at the set level, consumers could use their own TV remote controls and tuning, eliminating the need for a converter," Rast says.

Longer term, the committee hopes to take a look at home bus issues, which might not be as burning as the cable compatible issue, but which are important, he adds.

Of course, it's one thing to propose standards and quite another to get them adopted.

"Down the road, the biggest issue is whether consumers will buy the standards," Rast says. "And there's also the question of whether the operators and manufacturers will support the standards and channelization schemes."

Rast called the Zenith Base-Tac system a conceptual form of the new system proposed. He also says adoption of the standards may hinge on how, and under what conditions, MSOs offer consumers an incentive to go along with the changes.

Both Mock and Rast hope for an agreement on standards by the end of

the year, with baseband interface specifications set sometime after that.

Remote control standards, a problem for the consumer electronics industry irrespective of compatibility problems with cable, might get future attention from the group.

"Longer term, I can see a remote control standard that would send a signal up to the off-premise controller and eliminate all need for in-home hardware," Rast adds.

A remote of this type would eliminate several problems experienced by current remote users, among them redundancy. Subscriber terminal devices duplicate the tuning ability already present in the TV set, while the cable remote duplicates a possibly more sophisticated unit. Not many subscribers are happy with the need for two remotes.

And then there's the problem of sound and color control from the terminal unit, or the default setting on a remote control TV. Some remote control sets come back on tuned to channel 2 after being turned off. But cable terminals frequently use a channel 3 output.

—Gary Kim

Aeronautical band leaks

Fears overemphasized, but not ungrounded

By Gary Kim

In August 1980 an airliner flying at 20,000 feet enroute over Flint, Mich., encountered interference with its communications gear at 133.25 MHz. Other aircraft operating at 25,000 to 40,000 feet in the same sector also reported problems with their communications with the air traffic controller in Oberlin, Ohio.

The interference was traced to a badly damaged cable system in Flint, and a \$20,000 fine resulted. The incident ignited an emotional debate between the cable industry and the Federal Aviation Administration, sparked enormous interest at the FCC and fueled a few brushfires within the industry as the technical dimensions were discussed.

The Flint incident wasn't the first case of documented interference to aircraft navigation caused by leaks from a cable system, although it was one of the most controversial.

In 1976, signals from a system in Harrisburg, Pa., were shown to affect aeronautical band communications. The next year, the FAA asked for a total prohibition on all cable use of the aeronautical bands while studies of the problem were made.

In 1977, the FCC did adopt new rules requiring distance separation and frequency offset by cable operators, but stopped short of a total ban on use of the 108-136 and 225-400 MHz bands.

A second case occurred in 1978 in the airspace over Hagerstown, Md., while a third was discovered that same year at low altitude over Oxnard and Ventura, Calif.

A fourth case surfaced on an approach communications channel over Wilmington, N.C.

Despite the heat generated by the leakage controversy, surprisingly few cases have occurred, and "there are no documented cases of an air hazard created because of cable leakage; no endangering of life or property," says Ralph Haller, chief of the technical and international branch of the FCC's Mass Media Bureau.

The FCC works on about one case of leakage in the aeronautical bands a month, according to John Wong, super-

There are no documented cases of an air hazard created because of cable leakage; no endangering of life or property.

Ralph Haller,
FCC Mass Media Bureau

visory engineer with the FCC's cable television branch. "In general, we're satisfied with the paper inspection stage, but are concentrating on major breaks in the cable as an enforcement issue."

From a pilot's standpoint, there are two ways of looking at the interference issue. "Planes don't tumble out of the sky just because a pilot hears a little white noise

or a modulated signal," Haller says. "A dangerous condition isn't created just because a pilot hears an unwanted signal."

But what can be dangerous is a pilot's loss of confidence in the accuracy of his instruments or a diverting of his attention at a critical moment, Haller, a licensed pilot, says.

Two pieces of equipment can be affected by cable leakage. The communications transceiver, which handles voice communications, can pick up stray signals from a cable leak. A pilot might hear a signal, and it might or might not block the communication. Chances are, it wouldn't, Haller says. But at the very least it can be an annoyance.

The other device potentially affected is the VHF navigation receiver, which drives a needle giving the pilot his bearing from a station. Used for in-route navigation and non-precision landing approaches, a pilot listens to it for morse code identifiers. As with the communications transceiver, a pilot could conceivably pick up an unwanted signal radiated from a cable plant.

There is a more important issue, however. Even if a pilot isn't listening for an audio signal, is there some possibility the needle could be interfered with?

"The chances of that happening are fairly slim," Haller says. "The testing we've done so far indicates that the frequency coincidence would need to be so close that in practice it isn't a major issue."

Bob Dickinson, E-Com president, a pilot and part of a committee that studied this problem for the FCC in 1979, agrees fully with Haller.

"The FAA, after Harrisburg, came up with



the idea that a cable system would act as a huge phased-array antenna," he says. "That's total nonsense, but the idea persisted for some time."

"We did some testing to figure out what it would take to interfere with a variable omni range receiver and glidescope," Dickinson says. The VOR provides directional information, while the glidescope indicates vertical position on a plane's landing path.

"We found out that the coincidence of signals would have to be so perfect that in practice it's almost impossible to cause a deviation in the field. Also, the instruments normally can sense an error," he says.

Navigation systems and instruments are designed to protect against false readings caused by a wide variety of interference sources. Off-air transmitter harmonics and beats as well as powerline harmonics, arcs, lightning and welding are few of the non-cable sources.

The Omni, for example, presents no problem as far as cable-caused interference, Haller says. A popular air navigation system using the 108.0 to 117.95 MHz band, the Omni consists of a needle indicating a deviation to the left or right of course in degrees.

The receiver is highly tolerant of false signals. Even if voice identification is obliterated, the navigation indicators would continue to work. In the event of a total interference, a red warning flag would appear.

Marker beacons also are used for landing approaches. They operate at 75 MHz and give the pilot indications of his position relative to the glide path. Four markers are used, and each radiates a cone-shaped pattern upward toward the glide path.

"Although a cable system can interfere with the marker system, a pilot probably wouldn't notice," Haller says.

The marker transmitters provide audio tones, dot-dash codes as well as signals that light distance indicators onboard the plane. Cable system pilot carriers can be detected by the marker receivers. However, the accompanying code and tones

The FAA, after Harrisburg, came up with the idea that a cable system would act as a huge phased-array antenna. That's total nonsense, but the idea persisted for some time.

**Bob Dickinson,
E-Com president**

would be missing. So even if a pilot heard a false audio signal, visual and morse code confirmation would be lacking.

There is a class of navigation aids that uses ADF low frequency transmitters in the 90 to 3,000 kHz range, but cable systems don't use such frequencies.

During a normal visual approach, it is interference with voice communication that can present the greatest challenge, since the pilot uses voice contact for clearance into the traffic pattern and landing instructions.

Cable interference might be heard by the pilot as white noise, a portion of an audio track or garble and hum if a video channel signal is received. Such a squelch break, any unwanted signal that opens the pilots' speaker channel, is probably the most common form of cable-caused interference.

Smaller airports often use a free-for-all frequency for voice communications, and pilots are free to use it or not. But with or without radio contact, all traffic patterns are well established, and it is a pilot's responsibility to enter the landing pattern and descend without collisions.

Larger airports with visual landing conditions, or VFR, require that pilots establish voice contact at the five-mile point. Still, each pilot is responsible for contin-

uous visual contact. Even assuming radio failure, the pilot has options: abort the landing, find another radio frequency that will work, or break landing pattern or signal by his flight pattern that the radio is inoperative.

The control tower also can indicate by use of red and green lights that a pilot should continue approach or abort.

On an instrument approach (IFR), radio contact is essential for both navigation and voice purposes. Each airport has established protocols for IFR landings, and a typical landing would use two or more electronic navigation aids in addition to a cross check with airspeed, altimeter, rate of descent gauges and gyroscopes onboard.

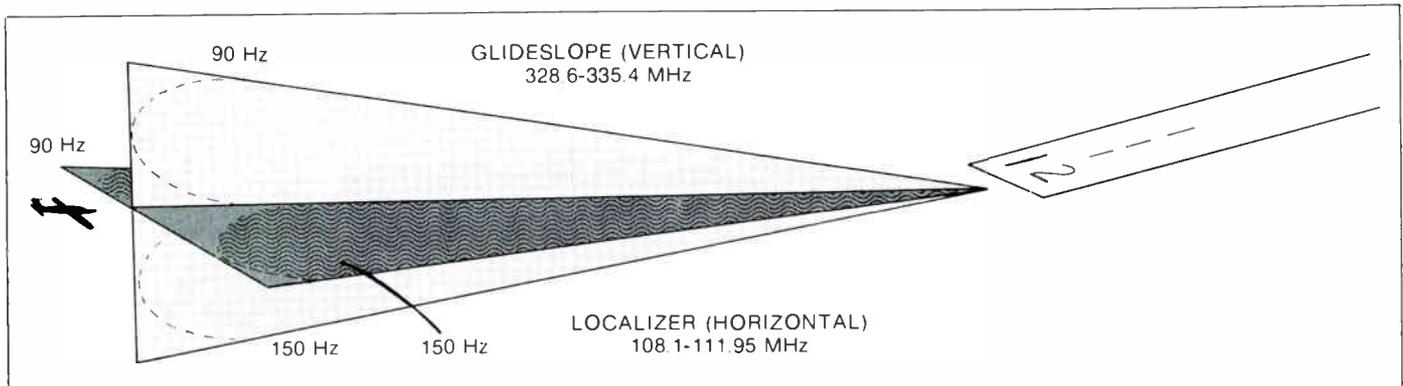
If at any point the different instruments fail to agree, the landing approach is broken off. The point, Wong, Haller and Dickinson say, is that it is improbable that a cable system could disable a navigation system or cause a needle to point in the wrong direction.

Even if, against all odds, such an event were to occur, a pilot's instruments would "flag" the pilot with a warning, rather than give incorrect readings.

The loss of voice communications could present a hazard, but under VFR conditions, the pilot still remains in visual contact. Under instrument conditions, a flagged instrument or a loss of voice contact could cause greater difficulty, although most instrument pilots would probably agree that it shouldn't cause much more than a change in landing procedure.

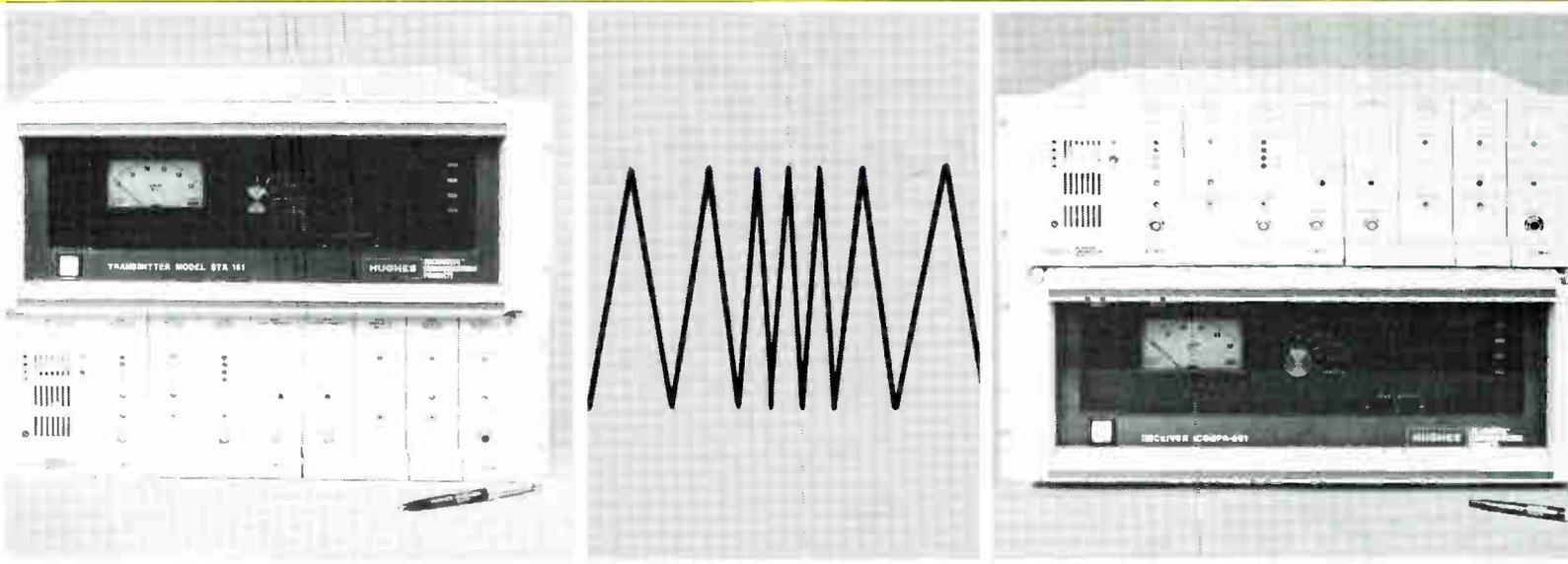
Pilots are trained to ignore for navigation purposes a continuously displayed flag or an intermittent flag, and avionics systems are designed to ensure identification of unusable signals.

None of which is meant to suggest that cable interference with aeronautical signals is to be taken casually. The FCC certainly doesn't, and neither does Dickinson. But it helps to keep things in perspective. While there have been five documented cases of cable interference, there are hundreds of reported cases from non-cable



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sources each year.

As Haller noted, "House drops aren't much of a problem. You can have virtually an infinite number of 100 microvolt per meter leaks and still not have them detectable in an aircraft at 1,500 feet."

Dickinson, who is a Ham radio operator in addition to being a pilot, thinks the brouhaha about aeronautical leakage has been a tremendously positive exercise for the industry.

Still, "being a pilot, I know that one person with a microphone can do more damage than all the cable incident put together,"

he says. "People tend to blow the magnitudes out of proportion. Electromagnetic compatibility is getting to be a bigger problem all the time, and in some cases the culprit is computers, not cable."

"Communication has never been perfect, as any Ham operator can attest," Dickinson adds.

Perhaps as many as a third of all cable systems in the United States use aeronautical frequencies, and this number probably will grow, Wong says.

But he also notes that all the documented cases of aeronautical interference oc-

curred without any frequency offset between the cable carrier used and the aeronautical channel.

"It seems that all the cable interfering carriers are either visual or pilot carriers with peak power levels in excess of 100 microwatts, Wong adds. "That being the case, cable carriers in the aeronautical band probably won't be a problem if the frequencies are at all times at a constant frequency offset from the aeronautical channels."

But the best insurance is undoubtedly a well-maintained plant. "Monitoring is the most important thing an operator can do," Wong emphasizes. "We don't hold systems responsible for acts of God. We're just looking for timely repair in such cases."

The commission does expect, however, that fittings will be maintained and cracks in trunk cable repaired to leakage is less than 200 microvolts per meter.

"Our main concern is preventing leaks, not fining people, but we are finding that the economic crunch has affected maintenance efforts at some systems," Wong says. "Maintenance programs don't satisfy the bank—more customers do, so some operators may be sliding a bit."

So where carrots don't work, there is always the stick. "We find that when a fine is involved, there's much greater attention to the maintenance issue," he says. And although the largest fine ever levied was \$20,000, the FCC does have the power to fine an operator for that amount for each separate leak in excess of commission standards.

The severity of a fine usually is related to the degree of cooperation the FCC receives from an operator. The strength of the monitoring operation and the location of the leak are key factors. A major leak in a trunk located close to the headend is generally considered to be evidence of poor maintenance, Wong says.

And there are extenuating circumstances. The commission would certainly take into account a planned major rebuild scheduled in six months, for example.

The typical compliance effort has two phases. The first, a paper inspection, involves the random selection of systems for review. If a system is using aeronautical frequencies, field personnel would ask for documentation proving compliance with FCC leakage rules.

Violations are reported to the commission's enforcement branch for action.

A second phase review involves an actual walking of the system and measurement for radiation leaks.

In recent years many systems were found to be in technical violation of the rules, since the use of aeronautical frequencies hadn't been reported to the FCC. And as many as a third may have had leaks that could cause interference to aircraft at altitudes of 1,500 feet, Wong says.

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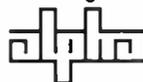
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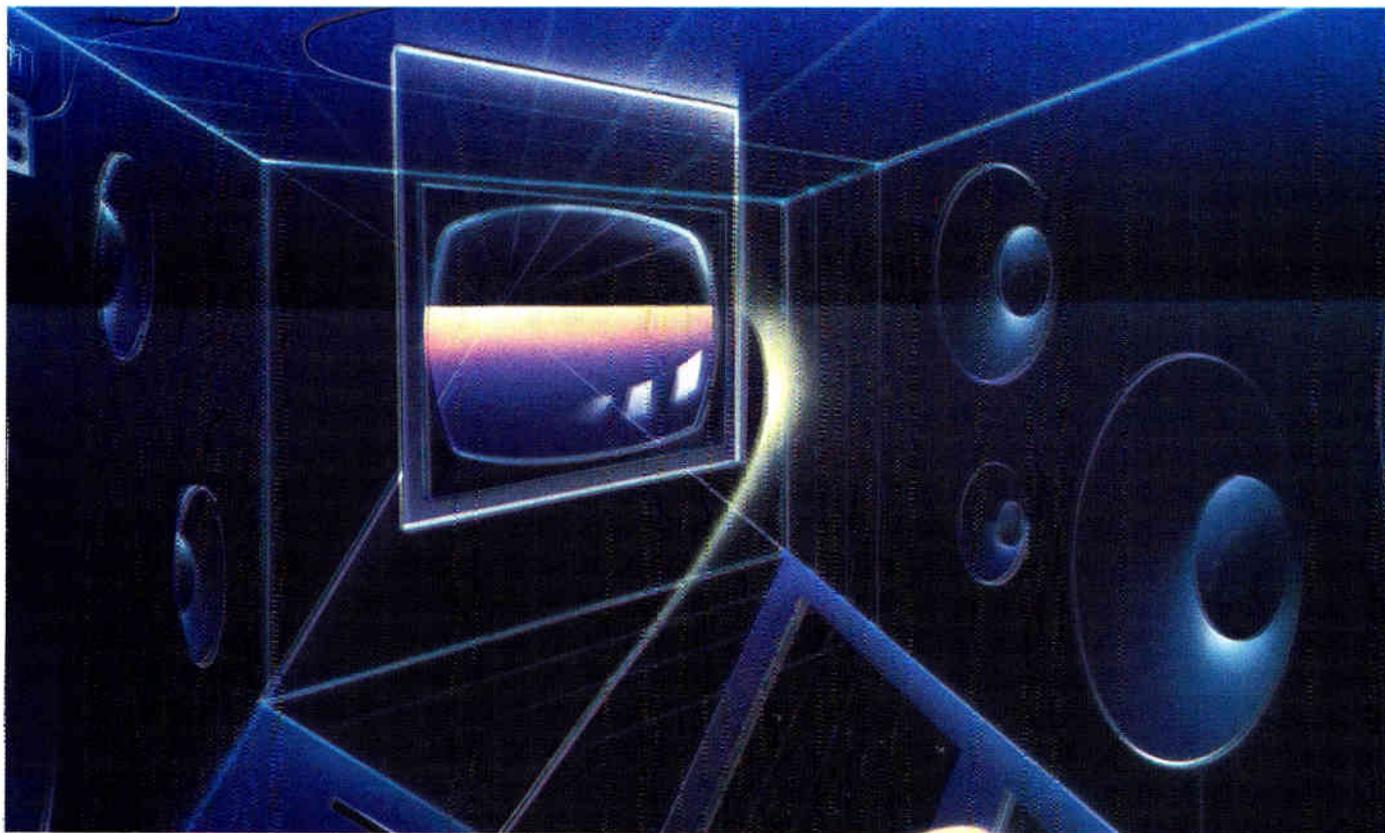
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The promise of cable stereo

By Jason M. Taylor
Executive vice president
Studioline Corp. of America

Fifteen million cable homes will subscribe to stereo by 1990, according to National Public Radio's extensive market research released in late 1982. At that time the projection seemed mildly optimistic. But, consider that broadcast television will begin transmitting stereo either late this year or in early 1985. VCRs, many with full stereo, will penetrate 35 million homes by 1988 and most major forms of home entertainment are already available in stereo (FM, AM, records, tapes). Also, there are approximately 75 million homes with stereo equipment. So the demand for quality stereo entertainment is already proven and the need for cable to deliver stereo is growing more important every week. But how best to do it is a complicated question.

Cable stereo isn't a simple issue

There are two distinct areas for discussion in cable stereo: software and hardware. For the moment, let's dismiss software by saying that it will no doubt contain stereo

enhanced video material and some stand-alone music services.

A laundry list of hardware considerations includes the following: system noise, security, method (analog vs. digital), frequency to be used, addressability, one stop tuning to coordinate with TV usage, level of transmission within the system, in-band or out-of-band for TV stereo, decoder cost, and headend equipment cost.

Let's go through the list, beginning with everyone's favorite: analog versus digital transmission. To first confuse the question, it should be pointed out that digital technology is used for the storing and retrieval of information, not for transmission. When digital information is transmitted, it is done within an analog transmission envelope.

Second, it is an inherent law of physics that, if an analog signal is transmitted in the same amount of bandwidth needed for a digital signal, there will be no actual difference in quality. On the perception side of the question, once the signal-to-noise ratio gets below -70 dB, it is quieter than almost

anyone's home stereo.

For the audio purist, we should point out that current analog systems, using narrowly deviated carriers and companding techniques, can deliver a signal to noise ratio of -88 dB, only 2 dB less than a digital disc player. That degree of quieting is available in a cable home which is 28 line amplifiers out from the headend, using a transmission level which is 25 dB below picture level.

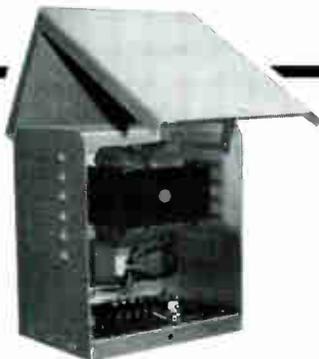
With levels this low, you need not worry much about system loading and interchannel interference. Digital techniques begin to have excessive error problems when their levels are reduced below 15 dB under picture power.

Bandwidth an issue

The next major engineering concern is the question of bandwidth needed. Some so-called "Hi-Fi" quality digital systems need a full six megahertz TV channel in order to send twelve stereo pairs of audio. The noise level in these systems, at -48 dB, can't be considered hi-fidelity.

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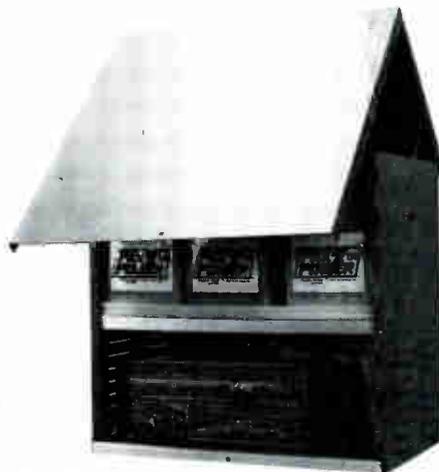
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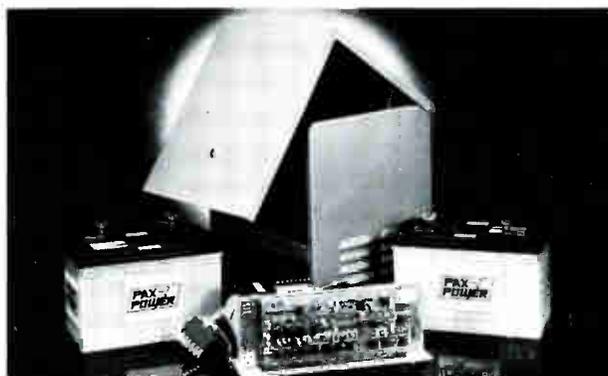
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In order to transmit full fidelity digital quality stereo, it takes at least 1.0 MHz of bandwidth per channel. This means you need a full video channel to send six stereo pairs—or almost six video channels to carry stereo information for 35 channels of video. An analog system can deliver digital quality stereo for 69 channels in 22 MHz of bandwidth, most of which (108 to 126 MHz) is unused in the majority of cable systems.

How many channels of stereo should you have? In most markets, the maximum number of broadcast stereo TV stations will be four—the networks plus PBS. What your system offers its subscribers, to a point, is a marketing question, the answer to which is give them as much as you can for their dollar.

Currently there are 14 cable networks providing full stereo, add this to four local TV stations and then add at least 10 stand-alone high quality music formats to broaden the appeal of the package, and you have a minimum of 28 channels of stereo. This may vary depending on the number of channels offered by your system.

In addition, you should consider adding synthesized stereo to channels which are monaural. This sounds far better than mono and gives your stereo service one more edge over broadcast TV stereo.

Therefore, the question here between analog and digital is how much bandwidth are you willing to give up to carry stereo? Analog seems to still have the advantage.

What about security?

The rule of thumb in security is time multiplied by cost. Ask anyone associated with encryption for the military. If you want to secure a message for one minute, a sim-

“It is possible, with analog decoders already being manufactured, to provide an acceptable level of security without multiplex FM as a basis of transmission.”

ple inexpensive system will do. Security of one month takes a much more elaborate system and far more money. The principal reason for this is that any security system can be broken, given enough time.

In other terms, even a digital audio system can be duplicated by someone who has enough time and motivation. To be practical, what is needed here is a security system which will prevent the masses from stealing that which you would like to sell, while still making a profit.

The real reason that digital security seems more favorable than the current analog is that when you think analog you usually think of block decoders. For anyone who does not know, a block decoder is a very simple device whose only task is to convert multiplexed stereo signals which have been transmitted in the 108 to 120 MHz band (just above FM frequencies) into frequencies which are compatible with a subscriber's FM receiver.

The most obvious security problem is that as cable stereo becomes more popular, so will the availability of block decoders sold by electronic stores become more prevalent.

It is possible, with analog decoders already being manufactured, to provide an acceptable level of security without multiplex FM as a basis of transmission. Custom companding techniques and staggering signals in such a manner as to render them completely incompatible with an FM tuner will work. The ultimate deterrent here is that the cost of this type of decoder makes it unattractive to specialists in pirate equipment.

While there are other potential ways to scramble audio, most of them cause intolerable audio side effects. An acceptable scrambling system could be accomplished using frequency inversion techniques but it would be too easy to decipher and would end up in the stores too soon.

Stereo quality standards

With the audio standards in today's marketplace cable can take the lead. A well-tuned FM stereo station will deliver a signal-

to-noise ratio of about -55 dB at the transmitter. Remember that FM broadcasts use a 75 kHz deviation. The recently authorized broadcast TV stereo system uses a 25 kHz deviation—a full 10 dB noisier than FM.

Off-air stereo television, therefore, ultimately won't please the average consumer. The highest audio specifications have been established by digital audio discs and cable can deliver that level of quality now. FM can't and neither can broadcast TV. The immediate danger for systems would be to jump into a stereo transmission and security technique which does not deliver at the highest level of quality and convenience. You don't have to read too many articles on cable marketing to discover that quality is one of the most frequently given reasons for subscribing to cable.

What should the audio quality standards be? A signal to noise ratio which exceeds -80 dB, channel separation of between 60 and 70 dB, distortion of less than one percent, full dynamic range, and a frequency response of at least 50 Hz to 15 kHz. If your system can meet these specs and your subscribers receive TV audio through their stereos, rather than a three inch speaker, they will feel as if they have been transported to a movie theatre.

In the case of stand-alone audio services, all one need do is compare their favorite record as heard at home against the same record heard through an FM station. You already know that the home unit always wins.

Cable can transmit audio quality which will sound as if a digital disc player was directly connected to the subscriber's stereo. You shouldn't settle for anything less.

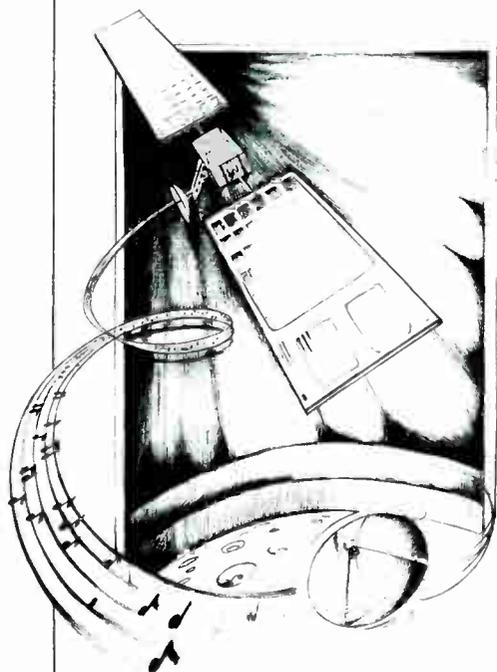
Companding to beat noise

Ask any cable engineer about the two biggest problems in cable stereo and he will say security and noise. Using currently available techniques of narrow deviation transmission, the noise which is inherent in satellite broadcasting is overcome every day. The greatest noise problem lies between the cable headend and the subscriber's home.

Using standard FM stereo techniques, especially at levels which are 15 dB below picture power, signals degrade rapidly. All one has to do to hear this kind of problem, created by multiplex transmission, is to listen to a distant stereo FM station. The level of hiss gets very annoying as you get further away from station, even though you are still receiving the signal in stereo.

By simply switching the station to monaural, the noise goes away. The first solution suggested here is that by not transmitting stereo within a multiplex form, you improve the s/n ratio by as much as 15 dB.

The other major source of noise in cable stereo is line amplifiers. Since noise in electronic equipment is additive, the further out



on the system you go, the more amplifiers you go through and the greater the noise your subscriber hears. With proper companding, this noise can be overcome.

In very basic terms, companding is the act of compressing the audio material on transmission so that the audio is broadcast at nearly 100 percent modulation, and then decompressing that audio by precisely the same amount at playback to restore the full dynamic range. With sufficient companding ratios, you are able to transmit the audio far enough over the noise floor of the cable system to make the noise inaudible.

There are currently only three systems for companding which are patented; Dolby, DBX and Telefunken. According to most engineers, both the Dolby and DBX systems are level sensitive. Unless the decode section of either system sees a level from the transmit section that is within a fairly narrow dB frame, the decoding will not accurately restore the audio to its original condition.

If transmit and receive levels stray too far, the frequency response of the final audio will change from the original. This type of level mismatch can be caused simply by the aging of components. The Telefunken companding system has a much wider level window, and regardless of levels, the frequency response stays flat.

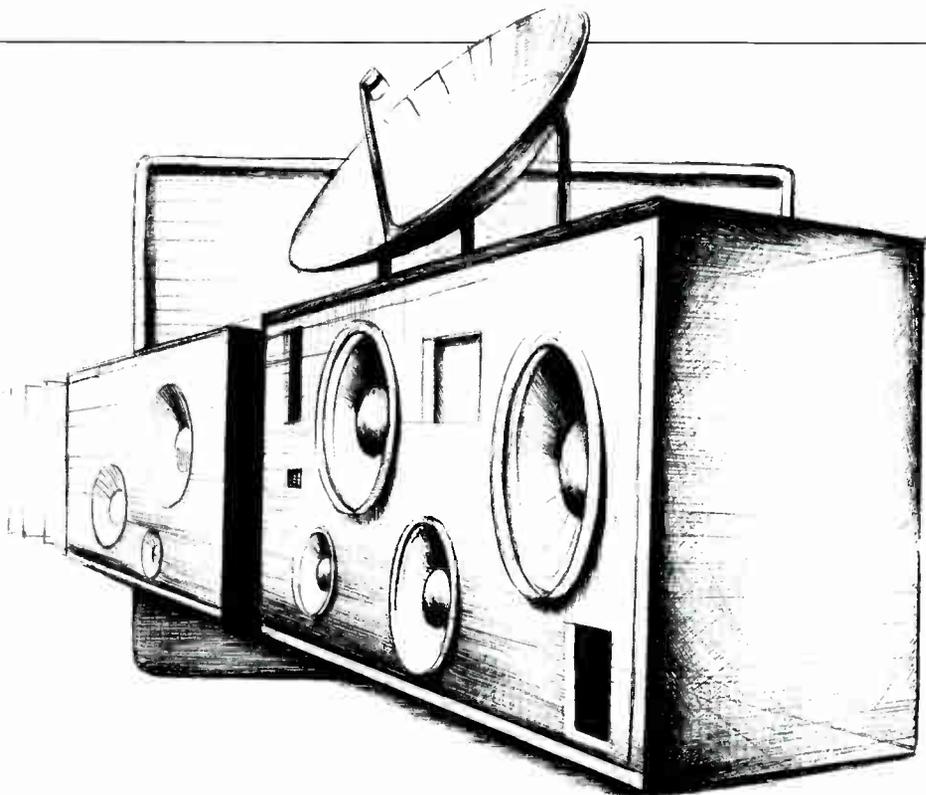
It should be remembered that block decoders, while basically noise free themselves, do not compand their signals in any way, therefore they do not solve the abovementioned noise problem.

A-1, A-2 and channel A

Unless you choose a digital form of stereo delivery and run it in unused video channels, the frequencies between 108 and 126 MHz, plus 72-76 MHz, will become very important to you in answering the demand for stereo. However, use of the 108-126 MHz band is not without its problems and restrictions.

Under section 76.610 of the FCC rules, any time you transmit carriers in the 108 to 126 MHz bandwidth at a peak power of 10^5 watts, you must notify the FCC of the intend-

“With sufficient companding ratios, you are able to transmit the audio far enough over the noise floor of the cable system to make the noise inaudible.”



ed usage sixty days prior to starting.

To prevent interference with aircraft communications and navigation, the Commission expects system leakage to be less than 200 microvolts per meter. Also, when running at levels of approximately 15 dB below video or higher, specific carrier frequencies must be offset from those used by aircraft. Deviations from these standards can be punished by fines of up to \$20,000 per leak.

Using these frequencies for a 6 MHz video channel prevents use of off-set frequencies and therefore requires diligent maintenance of the system. The same situation occurs when data is transmitted for computers in these frequencies. And, as the demand for increased band rates increases, so does the bandwidth requirement. With both data services and digital stereo, protection from infringement offered by lowering the carrier levels to -20 dB below video is not possible because it causes excessive error problems.

Analog stereo directed at block decoders and transmitted at these frequencies with a level of -25 dB below video is totally unuseable by FM receivers at the far end of the system. After going through 28 line amplifiers, such a signal would be at the threshold level of most FM tuners and would sound so noisy that no one would listen to it.

Using an analog system with companding, it is possible to run the stereo carriers at -25 dB. By doing this, and also offsetting the frequencies from aircraft channels, no FCC notification is required and no interference is possible. Another major advantage to this method is that you can run 69 stereo channels at -25 dB and have the same system loading factor as if you ran 14 stereo signals in your FM band at the standard -15 dB below video on a 52-channel system.

Since there are over 70 million stereo sets in the country against approximately seven million home computers, it makes good sense to reserve these frequencies to fill your stereo needs.

Cable's MTS opportunity

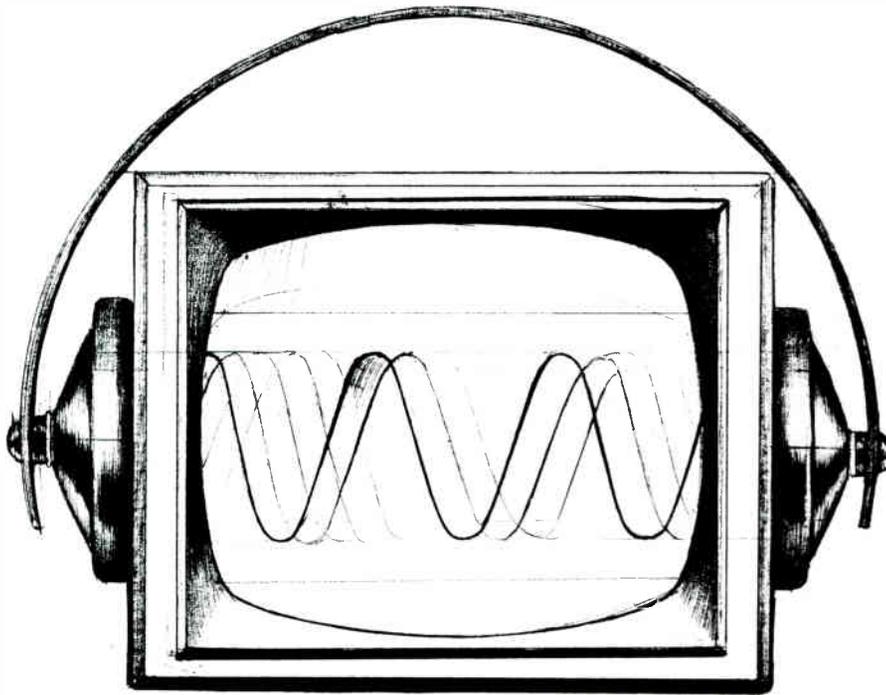
According to the U.S. Census, listening to music is the second-ranked household activity behind watching TV. With this in mind, and remembering that more money is spent annually on non-video music than on all other forms of entertainment combined, cable delivered, stand-alone music formats, would eventually become a profitable business.

But the true driving force behind the rush to cable stereo is the MTS issue. Multichannel Television Sound, as authorized this year, requires more bandwidth to transmit through cable than a baseband converter can handle.

This means that the majority of the country's systems will probably have to use an out-of-band stereo transmission system. One of the easiest solutions would be to use the FM portion of the cable. However, since FM splitters are so inexpensive, this choice would prevent the successful sale of such services.

While the TV networks tool up to present stereo, television set manufacturers are doing the same. When the networks and the manufacturers begin their promotion drive to tout the advantages of stereo TV, cable will have to have an answer to the stereo question.

As mentioned earlier, in most markets, the owner of a brand new stereo TV will be able to receive maybe four local stations which broadcast only part-time stereo. The quali-



“Using an analog system with companding, it is possible to run the stereo carriers at -25 dB. By doing this, and also offsetting the frequencies from aircraft channels, no FCC notification is required and no interference is possible.”

ty of the stereo audio received will degrade faster, with distance from the transmitter, than that of an FM station.

Cable already can deliver digital quality stereo for 14 cable networks, all local broadcast TV stations and stand-alone music services. All of this can and should be presented to a subscriber through a decoder which is fully addressable and will track along with the video decoder for increased customer satisfaction.

One of the major benefits derived by cable from the MTS issue is that broadcasters and set manufacturers will spend millions of dollars increasing consumer desire for a service which cable can deliver in greater quantity and with superior quality.

What stereo will cost

Like anything else, the cost to offer stereo to your subscribers will vary. If the stereo source you wish to offer is on a transponder for which you do not currently have a receiver, you can buy a subcarrier receive-only unit for about \$1,100.

To transmit each stereo pair you will need a modulator at about \$1,000 each, unless you go with a digital system which is estimated at \$1,500 per channel. If you secure stereo with a block decoder, you can expect each unit to cost around \$25.

The more sophisticated analog decoders, which feature better quality, addressability and video tracking, will run closer to \$90 or \$100, while full digital units are estimated to start at \$125 each. To offset some of the decoder cost, and to prime the industry for stereo, two suppliers of music services are offering to absorb some, or all, of the decoder expense as part of their wholesale fee.

The market

In a recent survey of their subscribers, Western Communications found that 93 percent of basic cable homes owned stereo equipment. While this may be higher than the national average, it is safe to estimate that almost 80 percent of basic cable homes are also stereo homes.

The ultimate penetration of cable stereo will grow over the next five years as a result of advertising from both the cable and television industries. In the next year, a system that has just begun to offer stereo and offers high quality services with a professional marketing effort should get penetration between 10 and 15 percent of basic. In more upscale markets, where off-air reception is poor, you may reach 15 to 25 percent.

And, if the National Public Radio study was correct, by 1990 you will see an average stereo penetration of 30 percent.

There are many reasons why music doesn't sound as good through an FM station as it does when the same record is played at home. In the first place, since a large portion of radio listening is done in cars (a noisy environment), broadcasters must be concerned about their average levels of modulation.

The result of this, coupled with the desire of every radio station general manager to have the "loudest" sound on the dial, is excessive audio processing, with compression being at the top of the list.

The first effect of heavy compression is the dramatic loss of high frequency response. The second, in a high percentage of stations, is the almost complete loss of stereo separation.

Another side effect of processing is a lack of dynamic range. A final group of audio ar-

tifacts, which radio listeners react to, but which they normally can't describe, are commonly referred to by audio engineers as clipping, sucking and pumping. This is reason enough not to discuss the topic with laymen. Suffice it to say, cable stereo need not be plagued with any of these problems if the correct technology is used.

Now that we agree that cable can deliver digital quality stereo to its subscribers, the question is, would they want it?

The Electronic Industries Association estimates that over \$10 billion annually is spent on non-video music (records, tapes, etc). Over 25 percent of the homes in the country have a tape recorder.

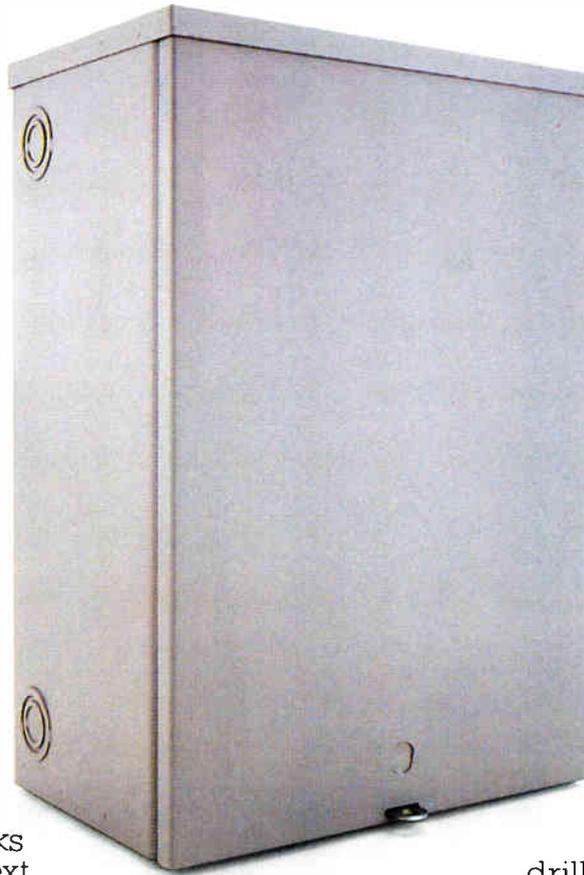
The implication here is that people want high quality music as a part of their lifestyles. Does radio fill this need? Hardly. How many records have you purchased which contained news, weather and commercials?

Cable is the only available technology which can deliver digital quality music entertainment into the home. Not only will high-quality music services have an appeal to your basic subscribers, but, from all the studies made public to-date, it is very likely to attract new subscribers who are in low television viewing homes.

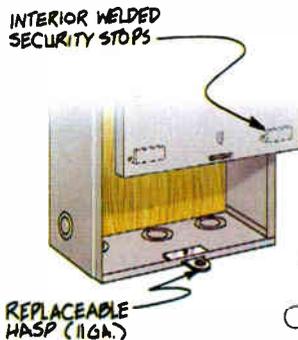
Multiplexed stereo FM, using a 75 microsecond pre-emphasis curve, was a technical compromise whose principal aim was to prevent obsolescence of monaural radios. The same kind of compromises have been made in stereo television.

With proper investigation and thoughtful selection of equipment and techniques, cable has the opportunity to set the highest standards in stereo entertainment which is transmitted for home usage. The dividends for the correct choice will follow.

Details Enclosed



Since one multiple dwelling enclosure looks pretty much like the next, you have to take a close look at the details. And when you do, you'll find that CWY has designed significant advantages into every apartment security box.



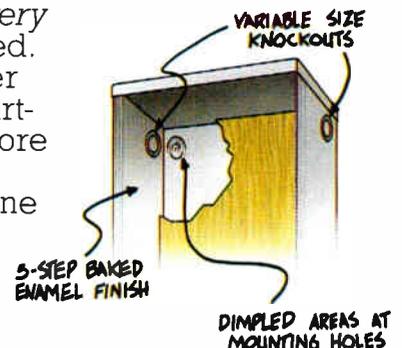
For example, CWY's all-welded enclosures are constructed of heavy 16-gauge aluminized steel—shown to outlast unpainted galvanized steel *at least five-to-one*.

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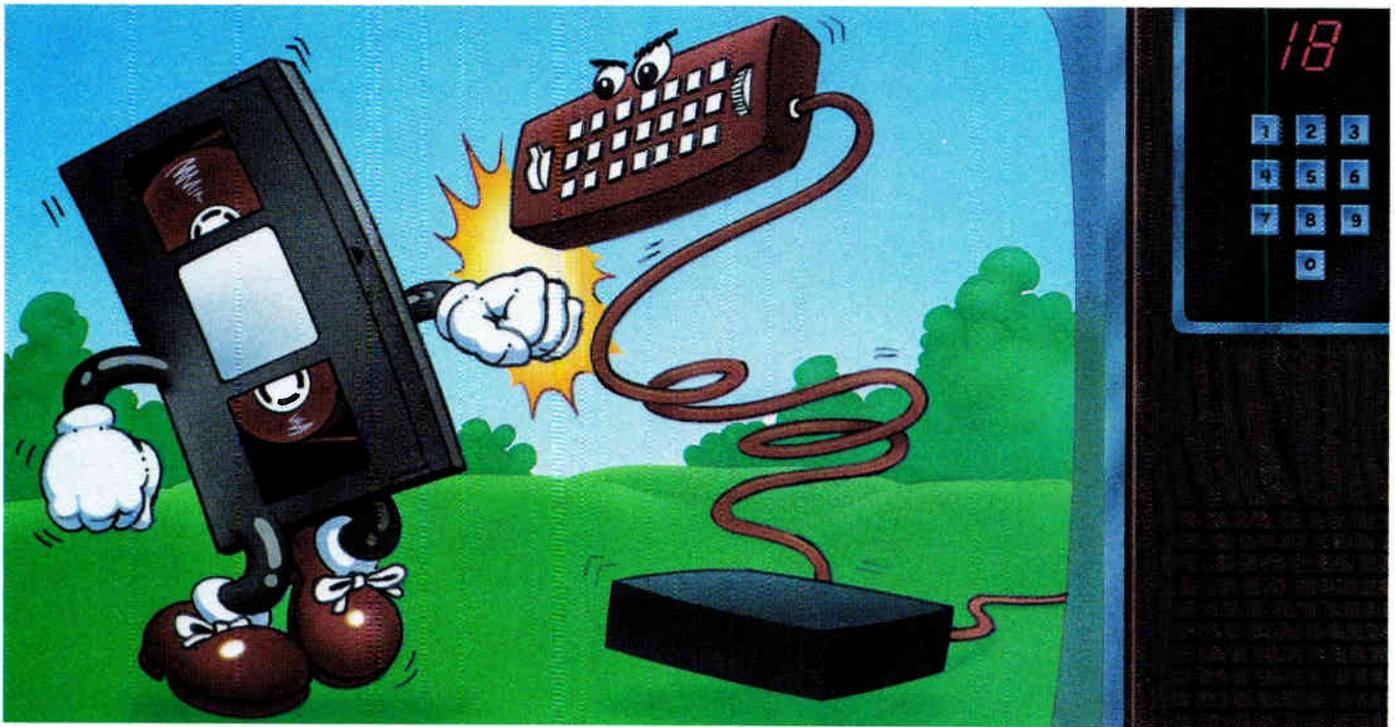


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Reader Service Number 17



Cable and VCRs

By Constance Warren

Cable TV and consumer electronics technologies have been playing a game of leapfrog with each other, say many cable engineers.

And all agree the game is in neither player's best interests.

Videocassette recorders are just one example. Current market research compiled by A. C. Nielsen Co. shows a 44 percent pay penetration among VCR households, which is almost double the national average.

Yet, in many cable systems, VCRs don't operate properly because the two technologies are incompatible.

The only case where VCRs and cable work well together is in small, 12-channel systems. There, cable technicians can easily hook up the VCR to the cable through splitters and an A/B switch, says Ralph Haimowitz, director of engineering for the Community Antenna Television Association.

However, problems arise when the system adds converters, scrambling and remote controls.

In multichannel systems, two converters must be installed in the home so a subscriber can record a program and watch another. The cable is split between these two converters, with one converter linked to the VCR and the other, to an A/B switch. The VCR is then connected to the A/B

switch, with one line extending from the A/B switch to the TV set.

An obvious disadvantage with this setup, Haimowitz points out, is that two pieces of electronics must be placed in the home.

The converter output level also can create problems if it is too high and overloads the VCR, Haimowitz adds.

But, perhaps the biggest headache comes when you rebuild and add both a converter and descrambler, Bob Luff, vice president of engineering for United Artists Cablesystems, contends.

Because there is no present master/slave relationship between cable and VCR technologies, the programmable features of the VCR are rendered useless by the converter/descrambler. Consequently, "the subscriber must physically be there to turn on the converter/descrambler to the channel he wishes to record," Luff says.

But systems using Zenith equipment can circumvent this problem, Luff explains.

Mile Hi Cablevision is one operator using Zenith converters. John Dawson, director of engineering, says the system is very interested in the Zenith VCR interface timer, which allows the subscriber to pre-program different channels for recording. The timer uses a remote control transmitter to pre-set both the decoder and VCR for recording at a later time.

"It helps automate the system, which is

generally why the subscriber bought the VCR in the first place," Dawson says.

But there is a drawback to the Zenith system: It can only work with other Zenith equipment.

"If an operator opts for Zenith, it can create hard feelings within the community and with local dealerships that don't sell Zenith," Luff explains.

Doug Semon, staff engineer for Viacom Cablevision's corporate headquarters, argues that two descramblers in the home means the system almost has to charge double. "Otherwise, it would be like two for the price of one."

Some forms of scrambling cause the VCR to roll and pull, a result of improper or lack of sync, Haimowitz says.

And in other, albeit rare, cases, the VCR can't tolerate the residual effects of video scrambling, Semon says. The net effect is a picture degraded by vestigial scrambling.

Unfortunately, in most of these cases, the operator can't resolve the problem.

Signal sweeps create other difficulties. "The high level of the signal sweep obliterates the sync pulse for a small amount of time. Since the VCR uses the sync pulse to synchronize its recording head, the VCR becomes destabilized and takes a few seconds to resynchronize," Luff contends.

According to Luff, use of sweep signals during prime time was discouraged in New

York state for this reason.

But the NCTA engineering committee and the EIA (Electronics Industry Association) are well on their way toward developing cable ready VCRs and TV sets with internal descramblers, Luff says.

Foreign price competitiveness, however, could dissuade subscribers from paying the \$2 to \$3 extra for the TV set/descrambler, he noted.

Semon sees "no advantages with VCR interfaces when you move the converter out on the pole."

When it comes to VCRs, off-premise converter users are "stuck between a rock and a hard place," Haimowitz says. In most cases, two separate drops are required.

Saying off-premise equipment manufacturers need to come up with a good solution to this problem, Haimowitz admitted he didn't know what would be developed at reasonable cost.

AM Cable's Tier Guard is one possible solution. Because it passes the full band, and not just one or two channels, into the home, two separate drops are unnecessary, Jim Emerson of AM Cable argues.

Luff added that off-premise systems such as the Tier-Guard have minimal incompatibility with consumer electronic devices. "They also greatly reduce the se-

cond, third and fourth set delivery problems."

Remote controls add other complications. If the remote control manufacturer isn't careful about his choice of transmission scheme, he could develop a unit that not only changes channels on the VCR but

The more video gear available, the better our basic and pay penetration will be.

*Bob Luff,
United Artists Cablesystems*

on the TV set or decoder as well.

Dawson, however, dismisses the remote control issue as irrelevant. "The majority of people don't want both a remote for their converter and VCR, because they already have preprogrammed what they want to record."

In the short term, Luff advised operators to become aware of these problems and to figure them into their rebuild and upgrading schemes.

The operator also must educate consumers about these issues.

In the long term, however, Luff advocated cable operators work with the consumer electronics and broadcast industries to try to develop new technologies that are compatible with cable and over-the-air signals.

"It would behoove all of us—cable, broadcast and the electronics industries—to work out these incompatibilities, because it is clearly to our advantage to encourage the use of these accessories," Luff said. The more video gear available, the better our basic and pay penetration will be, he added.

And, as Haimowitz asserted and others affirmed, "VCRs are the fastest growing thing since CB radio."

But the pressure for cooperation will ultimately come from the consumer. "The consumer will demand and will get a unified system where all of these technologies will be married and will work compatibly together," Semon said.

That, however, will take some time, the engineers agreed.

CHANNELIZER

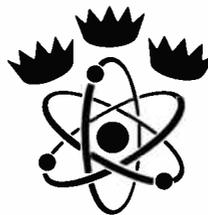
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Videotex tries tiered pricing

By Gary Arlen

With increasing frequency, the new videotex services are shifting to tiered pricing structures, modeled on the cable TV approach. Viewtron was the latest to change its marketing tactics when it instituted a \$39.95 per month fee, which includes a lease on the AT&T Sceptre videotex terminal plus 10 hours per month of usage. Additional access time is charged on an hourly usage basis. The new approach—which generated 100 sign-ups per week for the flagging Viewtron venture in south Florida—supplements the original marketing strategy. That method required users to buy the \$600 Sceptre terminal up-front and then to pay usage charges and telephone access charges totalling about \$25 per month.

Although the new marketing format has yet to prove itself in Viewtron's initial Florida marketing area, its adoption underscores the belief that enhanced services should be offered on a subscription rather than strictly a usage-sensitive basis. The original Prestel videotex system in England is largely a

failure, and much of the problem has been attributed to the per-use pricing arrangement. Obviously, phone companies (including government-owned British Telecom, which ran the Prestel system when it was launched) encourage the concept of metered pricing. The pricing system also is utilized by traditional time-shared database services such as The Source and CompuServ, in the consumer marketplace, or professional databases such as Lockheed's Dialog and special interest services such as Lexis.

But consumers appear to react differently to a service in which the total monthly price is unknown. Hence, Viewtron's shift to a flat fee mirrors the approach that most other U.S. videotex system operators are adopting. Times Mirror Videotex Services will launch its "Gateway" package in southern California in September with a \$29.95 flat fee entitling users to a Sceptre terminal (an upgraded version of the one used in Florida) plus 20 hours of usage per month. In the Chicago area, Keyfax



Gateway's \$29.95 fee includes use of a Sceptre terminal plus 20 hours of usage per month.

videotex will charge \$9.95 per month for five hours of access or \$24.95 for 15 hours of use, with extra time billed at \$5 per hour, calculated in 10-minute increments. (Keycom's approach assumes that users will access through their own personal computers or via a leased videotex terminal.)

Other quasi-videotex systems are studying various pricing approaches to tier their services. Even Gannett, which recently solidified its videotex information provider status, is looking to offer its material as a flat-fee component of fixed-price videotex systems.

CBS and NBC affiliates teletext survey

Slow penetration, not enough decoders

Barely 15 percent of CBS and NBC affiliates in 40 major markets have an agenda for developing a local teletext system, and about half say they now strip network teletext feeds, according to a survey by *International Videotex Teletext News*, an industry publication. Of those which don't have immediate timetables, most claim they are awaiting results of current network and affiliate teletext operations.

The two networks launched national teletext feeds 16 months ago and have been trying to encourage their affiliates to transmit the signals and if possible to start local teletext transmissions. The newsletter's polls showed a startling lack of interest by major-market affiliates. When asked about their level of entry, one-third of the local stations polled said they would install a databridge to retransmit network teletext signals 24 hours a day. Another third said they would develop a fully equipped teletext service with a databridge and production facilities for local origination. About one in eight station executives said they would implement the service in two steps: a databridge to be upgraded to a full-fledged local teletext production

facility. Only 4 percent will promote teletext locally if they retransmit a feed.

The survey also found that many local stations continue to strip teletext from the network feeds, with some stations claiming technical and equipment problems. For example, some affiliates say their equipment is too old to allow digitally encoded information to pass; however, station executives say it wouldn't require much work to revamp for teletext. Other stations strip network feeds because they feel the VBI is the "station's profit center, not the network's." Storer-owned stations do not pass network feeds, apparently awaiting a decision from the parent company, which is planning a company-wide cable and broadcast text strategy. Many stations say they have been contacted by data services interested in leasing VBI space.

NABTS is by far the protocol of choice; nearly three-quarters of respondents said they would use it because it would be impractical to use a format other than the one transmitted by their network. Only one network affiliate says it might implement World System Teletext. However, one-fourth of stations polled said they aren't sure which protocol would

be implemented. As a sign of the high entropy surrounding teletext, many station officials do not know which teletext standard their network is using. But the newsletter researchers found tremendous confusion about teletext at the local stations. One local manager said his station deletes the network teletext feed but the newsletter's staff spotted a VBI loaded with digital information on that station during network transmissions.

About half the station executives believe increased advertising revenue is teletext's primary advantage, while others think enhanced programming is its most viable asset. The prohibitive cost of developing teletext appears to be its biggest disadvantage: half of those surveyed consider the capital investment too high for potential returns. About 20 percent cite lack of decoder availability as teletext's main problem. Less than 10 percent think a teletext feed would detract substantially from traditional television revenues. Surprisingly, no affiliate alluded to the possibility that teletext might not succeed.

CBS and NBC network teletext officials maintain that more than 80 percent of their affiliates are retransmitting national teletext material.

SND signs more public TV stations for data delivery service

Satellite Network Delivery Corp. now has nearly a dozen major-market public TV stations committed under 10-year contracts to carry SND's vertical blanking interval data delivery service. In addition, SND has revised its transmission package and now intends to offer material for access via personal computers rather than through conventional TV sets as originally planned. The company has lined up another \$1 million in private funding, which will pave the way for the \$23 million it needs to implement its nationwide VBI service via TV stations.

Among the latest public TV stations that have signed up with SND are WGBH in Boston, KCPT in Kansas City, KETC in St. Louis and WCET in Cincinnati. They join WNET in New York City, WHYY in Philadelphia and the Maryland

Center for Public Broadcasting, which reaches Baltimore and other Maryland communities. In all, the new deals enable SND's signal to reach 20 percent of the U.S. population. SND still expects to start service in mid-1985. Chairman Anthony Barnett says SND needs 40 percent coverage nationwide before he can begin recruiting information providers for the network.

For its service, SND will supply a tuner and decoder that will pick up VBI signals and feed them into personal computers. SND plans to design the equipment and will evaluate production proposals. The concept calls for information providers using the SND network to buy the equipment to be installed in offices of authorized specialized data receivers.

SND shifted to a system aimed at personal computers when it realized busi-

ness executives felt more comfortable using a PC than a standard TV set for data retrieval and that offices are more likely to be equipped with PCs than with TV receivers. Data transmitted to specific sites can be stored in memory for later retrieval. Significantly, SND's major potential competitor is taking a similar approach. Merrill Lynch has a deal with the Public Broadcasting Service to use PBS's network VBI for data. That service will be used by brokerage offices equipped with IBM PCs that are being installed as part of an IBM-Merrill Lynch joint venture.

Notes

■ Buena Park, Calif., will be an electronic battleground this fall when two interactive electronic systems are offered simultaneously to an unsuspecting public. The Orange County community is within the initial marketing territory for "Gateway," the Times Mirror Videotex Services two-way offering due to roll out in September. At about the same time, Group W Cable will introduce its first "Request" teletext service, a full-channel teletext package offered as a cable TV tier. Observers will closely watch the relative success of each service within the community.

■ United Video will offer Cable SportsTicker, an alphanumeric update of scores, schedules, data and trivia questions under a licensing agreement with Commodity Quotations Inc. of Scarsdale, New York. The full-screen feed can be carried on a separate channel or cable operators can run it as a crawl under other video programming. UV's strategy is first to offer Cable SportsTicker to the regional sport networks sprouting up as an ancillary to their video coverage.

■ CBS is already working on "meaningful business plans for affiliates' (VBI) data delivery services" other than teletext, according to ExtraVision VP Albert Crane III. Although CBS won't elaborate on these plans, the statement fits in with a corporate strategy to pursue special-interest data services in addition to the mass audience teletext venture.

■ NCTA has established a "Telco Relations" committee to examine issues of industry dealings with telephone companies; Gustave Hauser will chair the group. Among items on the agenda, as outlined by new NCTA Chairman Ed Allen, are possible hybrid relationships for cable-telco hook-ups in data and interactive systems.

TCI plans cable info service

Tele-Communications Inc. will launch a nationwide information service this fall, delivering news and data to personal computers through a satellite-cable hookup. The service will use a modem built to TCI's specifications (vendor still unnamed) but will require no other special hardware or software. TCI's plans are linked to its pay-per-view TV efforts.

TCI's information service will capitalize on the company's recent 50 percent investment in Data Cable Inc., the cable information service owned by Telecrafters and having cable rights for UPI material. The TCI connection gives Data Cable access to satellite uplinks and technical facilities.

Data Cable is stepping up marketing while scaling down last year's ambitious plan to develop ad matrix and NAPLPS videotex display systems. Data Cable's current emphasis is on the institutional market, offering an ASCII-format package. The company plans to introduce a "value-added business information" service by late fall. But Data Cable has abandoned for now its Community Information Network and an interactive, upstream hybrid system. Data Cable says it has opened talks with NABU Network to offer information services as part of NABU's enlarged cable services package.

In a separate development, Data Cable has added a specialty sports information service and is planning a financial information text channel to supplement Data Cable's current feed of UPI news to cable systems. The package, described as a "sports information boutique" to com-

plement existing cable sports services, is produced by TeleSports Inc. of Dallas and includes Las Vegas betting lines on college and professional games, weather reports, schedules and pre-game analyses. The financial text feed will be packaged in cooperation with Satellite Information Systems Co., the Denver-based parent company of TeleSports that provides live market data to investors. The unnamed service is expected to be available Sept. 1. The new packages reflect Data Cable's efforts to concentrate on special-interest data rather than broad consumer-oriented information services.

United Media forms "TV Decisions"

United Media Enterprises is centralizing all its electronic information activities under the newly created Electronic Media Services division. The latest group to emerge from the consolidation is "TV Decisions," a cabletext information service encompassing TV listings, news, advertising and research. TV Decisions' first products will be available by December. TV Decisions will operate as a product development and marketing division within UME; its debut at the NCTA convention underscores the commitment of parent Scripps-Howard to electronic media.

Among the first TV Decisions offerings will be television program listings and schedules prepared by TV Data, another UME division.

12 facts you should know about our addressable system

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TECH II

CED's feature supplement and Product Profile

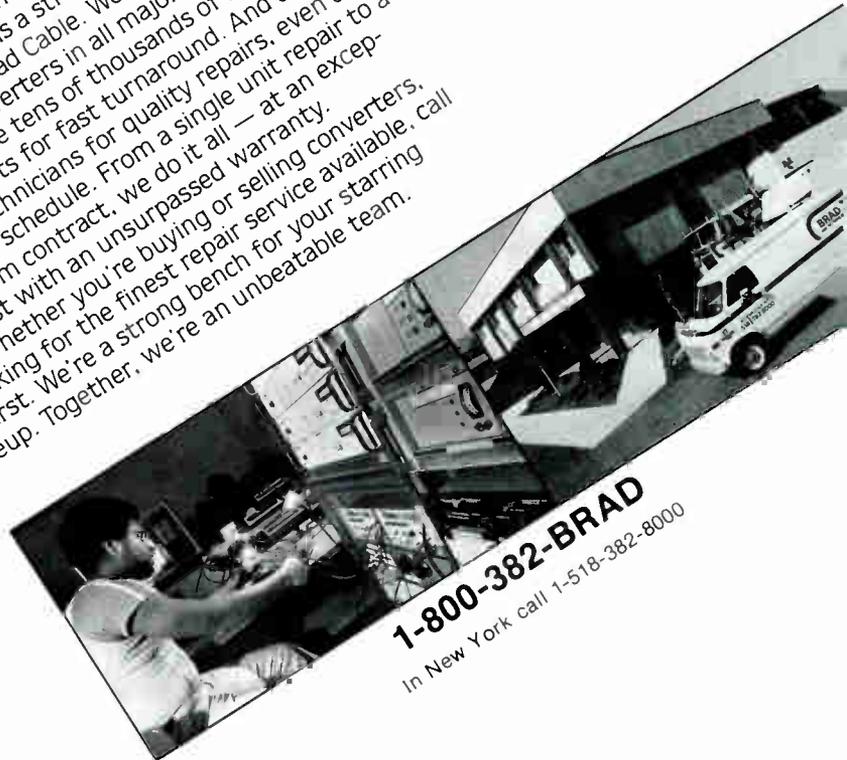
August 1984

- **Optimizing feedforward amp modules**
- **Product profile: addressable converters**

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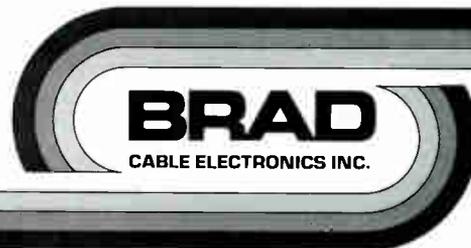


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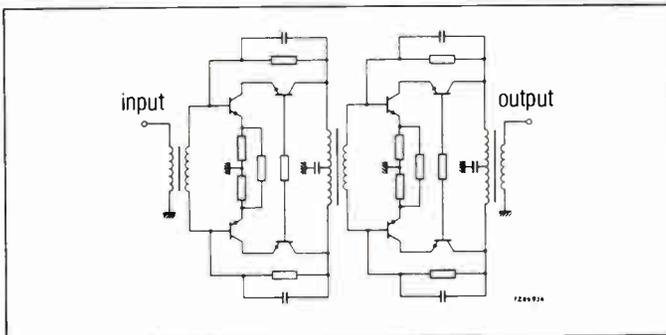


FIGURE #1
Conventional CATV Hybrid Integrated Circuit Cascode Push Pull Configuration

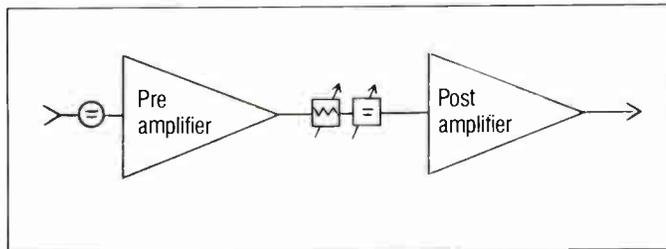


FIGURE #3
Typical CATV Amplifier Block Diagram
Pre and postamplifiers can be selected from a variety of available technologies which include discrete feedforward, single hybrid feedforward, POWER DOUBLING™, third generation and fourth generation conventional push pull cascode hybrids, and even discrete transistors.

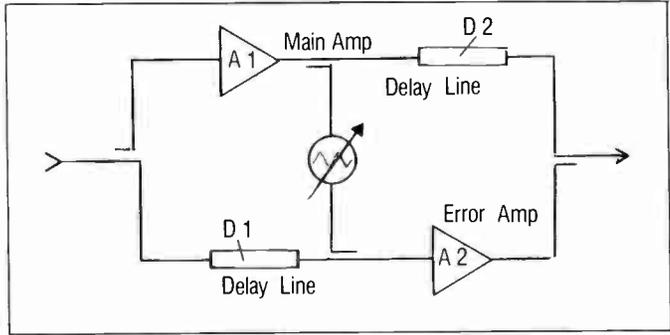


FIGURE #2
Feedforward Block Diagram
Amplifier A 1 (main amplifier) and A 2 (error amplifier) are conventional CATV hybrid integrated circuits of the type shown in Figure #1.

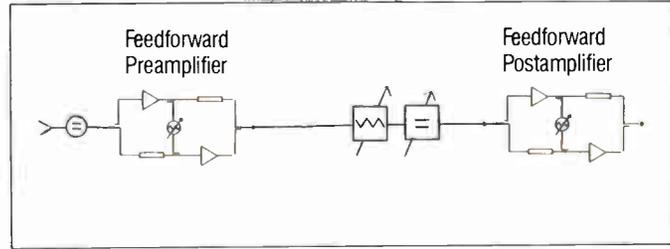


FIGURE #4
Block diagram of CATV amplifier module using a feedforward gain block for both preamplifier and postamplifier.

Optimizing feedforward amp modules

By Jay Staiger
Manager, Amplifier Systems
Magnavox CATV

This paper discusses the best approach for optimizing feedforward amplifier modules. It is assumed that the reader is familiar with feedforward theory. References are provided at the end of the article. For comparison's sake, this paper will briefly describe the old feedforward product architecture and electronic performance.

The discussion will focus on how POWER DOUBLING™ hybrids are used for optimization of electrical performance in a new feedforward architecture. This improved electrical performance results in 3.6 miles more reach than other feedforward approaches and allows for repair of the product without specialized equipment and time-consuming procedures. (POWER DOUBLING™ is an exclusive trademark of Magnavox CATV Systems Inc.)

Whereas traditional feedforward architectures practically preclude repair by the users, the new architecture with single hybrid technology can be repaired as easily as conventional CATV amplifier products. Users who normally perform their own repair on conventional products can now perform these repairs on feedforward.

Old architecture

Feedforward broadband CATV amplifiers are low distortion devices which apply cancellation techniques to improve distortion performance. The basic components which make up the feedforward system have been conventional hybrid ICs configured as a cascode circuit. (See Figure 1.)

Two conventional hybrid IC devices were selected as a matched pair with closest delay and performance characteristics and were built up in a circuit containing phase shifters, delay lines and a multitude of variable components for balancing both broadband amplitude and phase. See Figure 2 for a feedforward block diagram.

Typical amplifier

The typical CATV amplifier is configured in several separately identifiable blocks (see Figure 3). These blocks are generally the same for feedforward amplifiers and other conventional amplifiers.

The difference is in the preamplifier and postamplifier gain blocks. Some earlier vintage feedforward amplifiers built feedforward pre and postamplifier gain blocks from individual components. This is to say that the preamplifier used two conventional hybrid ICs, delay lines, phase shifters, and other associated control circuitry.

Likewise, the postamplifier was a feedforward gain block built from discrete components. (See Figure 4.) This resulted in a feedforward amplifier module that contained four conventional ICs, of which each pair had to be selected as matched pairs. This configuration worked well and provided a significant improvement when compared to a conventional amplifier. The improvement was approximately 18 to 20 dB in distortion for a 52-channel loading.

However, this particular configuration resulted in a significantly degraded noise figure when compared to a conventional amplifier (on the order of 2 to 3 dB worse). The overall net result, however, was still a significant 6 dB improvement in dynamic range.

Old configuration

Other module configurations were used to minimize the noise figure degradation. Instead of a discrete feedforward preamplifier gain block, a low noise figure conventional gain block was used.

Preamp distortion degradation

This had the advantage of not significantly degrading the noise figure and, therefore, maintained equivalent noise figure with conventional amplifier modules. However, the conventional preamplifier block caused significant distortion degradation in

Table 1
(Gain Block Ratings)

Technology Type	Post/Pre C/CTB @ 46 dBmV	Gain	Post/Pre Noise Figure
Feedforward	80/80	24	9/9
POWER DOUBLING™	66/66	18.5	6/6
Conventional	59/56	18.5	7/6.5

the overall amplifier module. This degradation is demonstrated by the following calculations:

Given:

60 channel loading:

$$O_{post} = 40.5 \text{ dBmV} = \text{Output Level of Post Amplifier at } D_{post}$$

$$G_{post} = 24 \text{ dB} = \text{Postamplifier Gain}$$

$$D_{post} = 90 \text{ dB} = \text{Postamplifier Carrier to Distortion Ratio}$$

$$O_{pre} = 30 \text{ dBmV} = \text{Preamplifier Output Level}$$

$$G_{pre} = 18.5 \text{ dB} = \text{Preamplifier Gain}$$

$$D_{pre} = 91 \text{ dB} = \text{Preamplifier Carrier to Distortion Ratio (Conventional)}$$

+ = Voltage Addition Method

$$D_T = \text{Total Module Carrier to Distortion Ratio}$$

Total distortion for feedforward module with conventional preamplifier:

$$D_T = D_{pre} + D_{post}$$

$$84.47 \text{ dB} = 91 \text{ dB} + 90 \text{ dB}$$

Therefore, from this calculation it can be said that the conventional preamplifier degrades the feedforward postamp distortion by 5.53 dB:

$$\text{Degradation} = D_{post} - D_T$$

$$5.53 \text{ dB} = 90 \text{ dB} - 84.47 \text{ dB}$$

When the calculation is performed with a feedforward preamplifier, the following results:

Given:

$$\text{Preamplifier Output Level} = 35.5 \text{ dBmV} = O_{pre}$$

$$\text{Feedforward Preamp Distortion} = 101 \text{ dB} = D_{pre}$$

Total distortion with feedforward preamp:

$$D_T = D_{pre} + D_{post}$$

$$87.84 \text{ dB} = 101 \text{ dB} + 90 \text{ dB}$$

In the feedforward preamp case, the overall module distortion is 87.84 dB and degrades the postamp by only 2.16 dB.

$$\text{Degradation} = D_{post} - D_T$$

$$2.16 \text{ dB} = 90 \text{ dB} - 87.84 \text{ dB}$$

Other calculations were performed using a POWER DOUBLING™ preamplifier and are summarized in Table 2.

You can see that the conventional preamp degrades the overall distortion performance by 3.37 dB more than the feedforward preamp case. The conventional low noise preamp results in approximately the same dynamic range module because of its much better noise figure.

However, there is less power consumed with the conventional preamp. This approach has a dynamic range of approximately 6 dB over the conventional product. Therefore, a conventional preamp with feedforward postamps is the next best approach.

Module configurations compared

Table 2 shows various types of configurations for the module block diagram in Figure 3. There are four different modules illustrated with different pre and postamplifier mixes. The three examples with feedforward postamplifiers are compared to the conventional module.

Table 2 was calculated from the Gain Block Ratings shown in Table 1. An amplifier module was configured from pre and postamplifier gain blocks having performance as indicated. The operational gain of the module was 29 dB and resulted in the module total carrier to CTB ratio and noise figure shown in Table 2.

It can be seen by column F that there is a 12.87 mile increase in system reach for a POWER DOUBLING™ preamp feedforward combination trunk module. Additionally, a POWER DOUBLING/ feedforward combination increases reach by 3.6 miles (21.1-17.9 miles) over conventional preamp feedforward combination modules.

Applications

The impending upgrade/rebuild process for CATV franchises is facilitated by the greatly improved per-

formance which POWER DOUBLING™ and feedforward provides. When existing equipment can be "recycled," upgrade costs will be minimized. Therefore, these new technologies must be fitted in existing products. Available amplifier "real estate" is at a premium and, therefore, a single hybrid approach to feedforward and POWER DOUBLING™ is desirable. Optimum performance and mechanical and thermal design are most critical.

Best approach

CATV system rebuild and upgrades are more cost and maintenance efficient with single hybrid module architecture. Single hybrid POWER DOUBLING™ and feedforward technologies result in the optimum performance in trunk amplifiers and are an important factor for enabling the mechanical/thermal design. Field set-up, maintenance, and repair are simple and do not require special equipment or different procedures. The present level of field and repair expertise is sufficient for single hybrid concepts.

In conclusion, POWER DOUBLING™ preamplifiers in a feedforward trunk module increase the reach of the CATV system. Single hybrid module architectures for both POWER DOUBLING™ and feedforward improves operational efficiency and serviceability.

Appendix I

Definition:

1) *Dynamic range*—A figure of merit for an amplifier which considers Noise and distortion performance. The larger the number the better the amplifier.

$$\text{DYNAMIC RANGE} = (\text{OL}-\text{NF})$$

Where: OL = amplifier output level for a -57 dB carrier to limiting distortion ratio.

NF = amplifier noise figure.

References:

1) *Some Considerations for Applying Several Feedforward Gain Block Models to CATV Distribution Amplifiers*, by John C. Pavlic. Published 1983 NCTA, Technical Papers.

2) *Economy of Feedforward Systems*, by Vic Tarbutton, Century III Electronics.

Acknowledgements:

The author wishes to thank Dominic Colangelo for his effort in developing new concepts, applications for the designs of the Magnavox POWER DOUBLING™/feedforward amplifier modules and suggestions on content of this paper; and Paula Corapi for her advice and assistance in editing and organization.

Table 2
(Dynamic Range Comparison)

Module Type	Preamp Type	Postamp Type	Total Module Carrier to CTB at 40.5 dBmV	Total Module Noise Figure	Miles* Reach
1	Conventional	Conventional	68.97	6.91	8.23
2	Feedforward	Feedforward	87.84	10.19	17.5
3	Conventional	Feedforward	84.47	8.44	17.5
4	POWER DOUBLING™	Feedforward	87.09	8.12	21.1

*Reach is calculated at 25 dB spacing with 1-inch cable at 450 MHz.

Product Profile

Addressable converters

Model	Input frequency/ channels	Input level	Noise figure	Gain	Data carrier	Scrambling method
Jerrold Starcom 450	54-450 MHz; 66 channels per cable	video: 0- + 15 dBmV; sound: - 15 dBmV min.	12 dB nom.; 13 dB max.	0 dB min.; 8 dB max.	(FSK modulated FM carrier) frequency: 106.5 MHz; bandwidth: 400 kHz Std FM; level: 10 dB below channel 6 video	pulse sync suppression, 6 dB, 10 dB, 6/10 dB
Jerrold Starcom II	300 MHz; 36 channels	N/A	12 dB nom., 13 dB max.	1.0 dB min., 7 dB max.	frequency: 106.5 MHz; level: 10 dB below channel 6 video	N/A
Kanematsu-Gosho Sprucer II	54-444 MHz; 64 channels, 128 channels with A/B switch	- 6- + 15 dBmV	9 dB max.	(differential) \pm 10% max. @ 3.58 MHz	FSK transmitted on 73 MHz	random turn-over of video signal polarity for each field
Magnavox Magna 6400	50-440 MHz; 64 channels	- 6- + 15 dBmV	13 dB max.	0-6 dB	N/A	horizontal square wave sync suppression
Oak Sigma	50-450 MHz	- 6- + 15 dBmV	12 dB typ.; 14 dB max.	(differential) 8% max.	either 104.75 or 112.70 MHz	random video inversion, elimination of horizontal and vertical pulse information, digital audio encryption
Oak TC-56	56 channels	- 21- + 10 dBmV	12 dB typ.	N/A	104.75 or 112.70 MHz; stability: \pm .006%; FSK deviation: \pm 67 kHz typ.; transmission bandwidth: 300 kHz	N/A
Octagon-Scientific Roman	50-450 MHz	- 6- + 20 dBmV	12 dB typ.	0-6 dB	106.5 MHz; level: 15 dB below video carriers, min. guard band: \pm 200 kHz	level 1: gated sync suppression; level 2: compound G.S.S./dual mode
Pioneer BA-2000/3000	50-408 MHz	N/A	11 dB typ.	N/A	FSK, 110 MHz standard; 15 dB below nearest F_v , FSK receiver sensitivity: - 25 dBmV typ.	N/A
Scientific-Atlanta 8500	54-440 MHz; 64 channels	- 7- + 20 dBmV	13 dB typ.	0- + 9 dB	N/A	dynamic switched sync suppression
Texscan TRACS	54-450 MHz	0 dBmV	N/A	(stability) \pm 3 dB	15 dB below program; data rate: 19.2 Kbaud; reverse, forward bandwidth: 500 kHz	N/A
Tocom 5503	54-450 MHz; 66 channels	N/A	11 dB typ. 13 dB max.	(differential) \pm 5% max. @ 3.58 MHz	N/A	random dynamic baseband scrambling
Tocom Impulse	54-450 MHz; 66 channels	N/A	11 dB typ., 13 dB max.	(differential) \pm 5% max. @ 3.58 MHz	N/A	random dynamic baseband scrambling
World Video Library TM-1	550 MHz; 120 channels	- 5- + 20 dBmV	N/A	N/A	N/A	N/A
Zenith Z-TAC	50-450 MHz	- 6- + 14 dBmV	\leq 9 dB	(differential) \leq 7.5%	N/A	video inversion, suppressed synchronization, suppressed audio

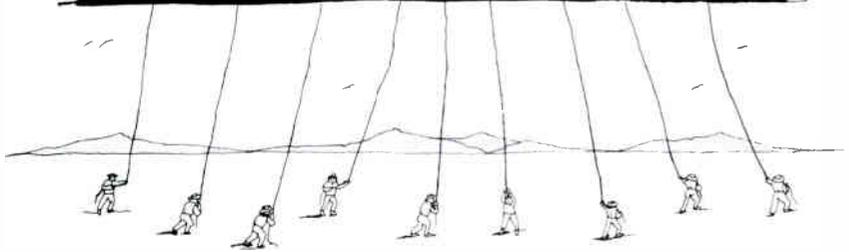
Composite triple beat	Second order distortion	Cross modulation	Hum modulation	Spurious signals	Output frequency stability	Return loss
-56 dB	-60 dB	-60 dB	AM: -50 dB max. FM: 20 kHz max.	input: -10 dBmV max.; output: -60 dBmV max., inband	±50 kHz	input: 7 dB min.; output: 8 dB min.
N/A	-66 dB	-64 dB	N/A	N/A	N/A	N/A
-60 dB @ 15 dBmV	-58 dB @ 15 dBmV	-58 dB @ 15 dBmV	-50 dB @ -6 dBmV	input: -35 dBmV; output: -30 dBmV, outband	(visual carrier) ±25 kHz	input: 6 dB min.; output: 14 dB min.
-60 dB	-60 dB	-60 dB	N/A	N/A	N/A	input: 8 dB min.; output: 12 dB min.
N/A	N/A	-60 dB	N/A	N/A	(accuracy) ±70 kHz	input: 6 dB min.
N/A	N/A	-63 dB typ.	N/A	N/A	N/A	input: 8 dB
(composite beat ratio: -57 dB)	N/A	-57 dB	N/A	input: -35 dBmV	(channel conversion accuracy: ±100 kHz)	input: 6 dB; output: 12 dB
N/A	-60 dB typ.	-70 dB typ: -60 dB max.	N/A	N/A	N/A	input: 13 dB min.; output: 18 dB min.
-57 dB	-57 dB	-57 dB	N/A	input: -37 dBmV; output: -57 dBmV	(frequency stability: ±100 kHz)	input: 8 dB min.; output: 12 dB min.
75 dB max.	70 dB max.	65 dB max.	N/A	N/A	(frequency stability: ±150 kHz)	N/A
N/A	N/A	-55 dB max.	N/A	N/A	(local oscillator phase locked to crystal reference)	input: 6 dB min.
N/A	N/A	-55 dB max.	N/A	N/A	(local oscillator phase locked to crystal reference)	input: 6 dB min.
-55 dB max.; -65 dB typ.	-55 dB @ 10 dBmV	-55 dB max.; -65 dB typ.	55 dB min. over 105-125 volts AC	(output) inband: min. 55 dB	First LO: ±.01%; second: ±100 kHz	N/A
(composite beat ratio: ≥55 dB)	≥55 dB	≥55 dB	N/A	input: -26 dBmV @ 50-450 MHz; output: 60 dB below visual carrier, inband	N/A	input: >6dB; output: >12 dB

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Addressable converter manufacturers

Hamlin International Corp.
13610 First Ave., South
Seattle, Wash. 98168
(206) 246-9330

Hamlin's RF addressable system includes a CR-7000A converter with built-in descrambler. This 132-channel remotely controlled RF unit is compatible with the company's 6400A addressable RF system. Favorite channel memory can be programmed from a remote control transmitter.



Jerrold Starcom 450

Jerrold

A division of General Instrument Corp.
2200 Byberry Rd.
Hatboro, Pa. 19040
(215) 674-4800

Jerrold's Starcom 450 converter features automatic fine tuning, parental control, pay-per-view and an event pending indicator. The unit can be upgraded to two-way capability.

The Starcom II 36-channel unit also features parental control. Changes in the mix of authorized programs are accomplished by entering new information through a video keyboard terminal. Activate, deactivate and disconnect functions also can be performed through this terminal.

Systems using Jerrold's addressable converters include American Cablesystems Inc., contact: Andy Devereaux; Cablevision Systems Development, contact: Bill Quinn; Group W Cable; United Cable TV, contact: Ed Callahan; and Vision Cable/Newhouse, contact: Richard White.

Kanematsu-Gosho (USA) Inc.

One World Trade Center
New York, N.Y. 10048
(212) 524-8353

Among the features of Kanematsu-Gosho's Sprucer II are one- and two-way capability, 15-channel favorite memory, direct channel selection, upward and downward scanning, audio volume con-

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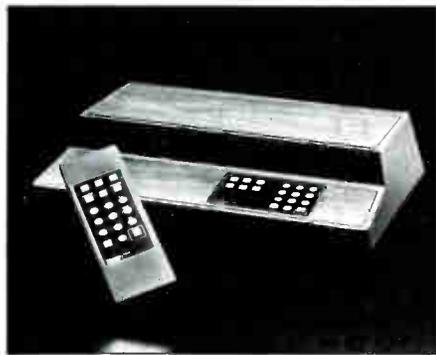
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TECH II

trol, memorized channel scanning, impulse pay-per-view accessed through personal access codes, and multilevel parental control.



Magnavox's Magna 6400

Magnavox CATV Systems Inc.
100 Fairgrounds Drive
Manlius, N.Y. 13104
(315) 682-9105

The Magna 6400 offers custom programmable 64-channel control; synthesized tuning; standard, HRC or ICC frequency configuration; 12- and 24-channel favorite memory for one- and two-way systems, respectively; automatic fine tuning and built-in surge protection. PROM programming provides parental discretionary control, directory channel tuning and A/B switching.

Oak Communications Inc.
16935 W. Bernardo Drive.
Rancho Bernardo, Calif. 92127
(619) 485-9880

Oak's Sigma One and Sigma Two converters feature 84 authorization tiers, including 28 group levels for special subscriber services; self diagnostics; pay-per-view; fully redundant keypads on set-top and remote control units; NTSC, HRC or IRC configuration; bilingual capability; favorite channel memory; parental control; volume up/down; and audio mute.

Oak's TC35B is designed for use in an Oak Total-Control system. It accepts 16 levels of tiering and can descramble programs by tier or level. The keyboard is touch-sensitive and spill-resistant. Favorite channel memory is provided.

Oak's addressable units currently are being used in 56 systems, including Cox's San Diego and Santa Barbara, Calif., and Omaha, Neb., systems; Cablevision of Chicago; Community Cablevision, Irvine, Calif.; Viacom, Nashville, Tenn.; Times Mirror, Las Vegas, Nev.; ATC in Honolulu; and Sammons in Glendale. MacLean Hunter's Suburban Cablevision System, East Orange, N.J., has become the first system to buy the Sigma units.

Octagon-Scientific Inc.
476 E. Brighton Ave.
Syracuse, N.Y. 13210
(315) 476-0660

The Roman R03R addressable converter features fast and slow speed channel scanning, parental control, forced turning of unauthorized channels and a barker channel option.

Systems using the Roman include NewChannels, Syracuse, N.Y., contact: Daniel Cavallo; Vision Cable, Ft. Lee, N.J., contact: John Snyder; Southern Cablevision, Ft. Meyers, Fla., contact: Bud Tongue; Heritage Communications in Collierville, Tenn., and Compton, Calif., contact: Jack Reed and Don Pittman, respectively; Continental Cablevision, Springfield and Brockton, Mass., contact Norman Reinhardt and Ralph Paolo, respectively; and Cablevision Service Co. Inc., Exeter, N.H., contact: Scott Madison.

Pioneer Communications of America

2200 Dividend Drive
Columbus, Ohio 43228
(614) 876-0771

Pioneer's BA-2000/3000 series features a parental control key that locks out all channels except 2-13; remote disable capability; remote control; an on/off switch; a program key for parental control; recessed security bolts and a magnetic key for anti-theft protection; and an access trap that disables the converter upon unauthorized entry.



Scientific-Atlanta 8500 converter

Scientific-Atlanta Inc.
4311 Communications Drive
P.O. Box 10527
Atlanta, Ga. 30093
(404) 441-4000

The SA 8500 addressable converter features central control of authorizations; favorite channel memory; a remote control receiver; pay-per-view preview and advance pay-per-view program load; "global" authorization and deauthorization; non-volatile memory; system security; legal terminal testing; and a system security refresh timer signal.

Texscan Corp.
3102 North 29th Ave.
P.O. Box 27548
Phoenix, Ariz. 85061
(602) 252-5021

The TRACS set-top controller has an 18-key entry system, permitting selection of up to 120 channels.

Other features include favorite 10-channel memory; parental consent control; "999 special functions," such as viewer response and impulse buying; and TV set power control.



Tocom's 5503 addressable baseband converter

TOCOM Division
General Instrument Corp.
P.O. Box 47066
Dallas, Texas 75247
(214) 438-7691

TOCOM's 5503 baseband unit is equipped with a modular expansion plug for two-way and/or teletext capability. Sixteen levels of parental program control; preferred channel memory with last channel recall; self diagnostics; 32 channel packages for controlling pay services by channel or program; and a full-feature remote control unit also are provided.

The TOCOM "Impulse" baseband converter offers similar features to the 5503 plus one-way impulse pay-per-view and credit downloading capabilities.

Systems that have tested or are using the 5503 system include Sammons Communications, Fort Worth, Texas, contact: Bobby Saunders; and Joyce Cable, Romeoville, Ill., contact: Rob Sadler.

World Video Library Inc.

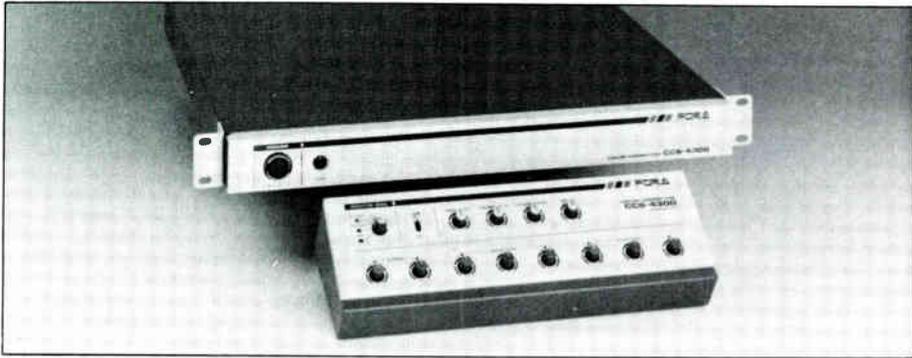
2747 Airport Freeway
Fort Worth, Texas 76111
(817) 831-3811

Features of the World Video Library's TM-1 converter include built-in self testing, time display, programmable keys, 8K RAM memory, parental control on pay-per-view and pay services, favorite channel memory; last and current channel recall, programmable barker channels and automatic credit check with each pay-per-view and each "impulse up tier."

Zenith Electronics
1000 Milwaukee Ave.
Glenview, Ill. 60025
(312) 391-8187

Zenith's baseband Z-TAC system has 20 tiers of programming. Channel assignments can be changed from the headend at any time. Other system features include headend controlled remote control, headend authorized audio suppression and a tuner microprocessor.

Headend



CCS-4300 color corrector

For-A Corp. color corrector, decoder

For-A Corp. of America has debuted a color corrector with a video processing amp and a decoder for conversion of NTSC video signals to RGB components. The company also has modified its FA-410 computer to permit full use of the dynamic tracking capabilities of both the Sony Broadcast U-Matic BVU-820 and the Panasonic NV-8950 VCR.

The CCS-4300 color corrector features independent R, G and B controls for black and white levels and R and G controls for gamma. Differential and balance modes also are provided. Set-top controls on the corrector's remote control unit adjust the video processing amp.

The DEC-100 RGB decoder converts composite video inputs from cameras and VTRs to RGB components for use in pro-

viding chroma key inputs on switchers.

The modified FA-410 now can accept the vertical signal from and follow the speed of Sony's BVU-820. This allows the BVU-820 to be incorporated into broadcast and production video systems.

The unit also was modified to permit the Panasonic NV-8950 VCR to be interfaced and synchronized in a video system. The modification includes an advanced sync input, an RF output for dropout compensator and a video head switching circuit. The addition of the RF output enables the TBC to sense dropouts on tapes and to make the necessary electronic compensations.

For more information, contact For-A Corp., 49 Lexington St., West Newton, Mass. 02165, (617) 244-3223.

SRP character generator debuts

A character generator with 45 pages of memory and a full graphics set is being offered by SRP Electronics for \$1,620. The unit, called the SRP 45/7 Switchmaster, also features eight colors, stand-by power, time, date, temperature, a timer/switch to satellite feed and a cassette tape back-up. As many as two blocks of local avails per hour, 24 hours a day, can be inserted. Switched and unswitched outputs also are provided.

For more information, contact SRP Electronics, 317 25th St. N.W., Fayette, Ala. 35555, (205) 932-7264.

Colorado Video Inc. 290C transmitter

Colorado Video Inc. has reconfigured its single frame narrowband (freeze-frame) equipment for transmission by satellite subcarrier channels, MDS or FM radio.

When used with the 250R receiver, the model 290C transmitter transmits a single-field, NTSC-like color video image in eight seconds over a 75 kHz bandwidth. Use of a second 75 kHz channel provides a video voiceover.

For more information, contact Colorado Video, P.O. Box 928, Boulder, Colo. 80306, (303) 444-3972.

Graphics font packages released

New Media Graphics Corp. has announced the VectorFont and FontEditor graphics font packages for use with the GraphOver 9500 display system.

The VectorFont allows the user to download a prepared vector font from a host computer to the Graphover for display at high speeds. Fonts can be color-filled on screen.

Applications for the FontEditor include presentation graphics, point-of-sale, simulation, interactive training and video pro-

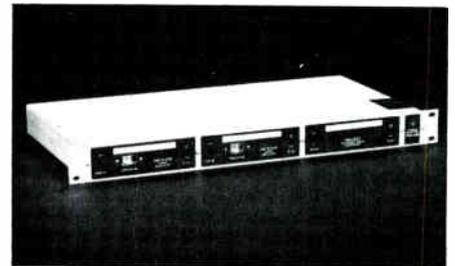
duction. The unit allows the user to create and modify vector fonts that can be downloaded into the GraphOver 9500 for video overlay. The program can be operated through a light pen, touch screen, digitizing tablet, joystick or mouse.

For more information, contact New Media Graphics, 279 Cambridge St., #5, Burlington, Mass. 01803, (617) 272-8844.

Video multiplexer

A video multiplexer, the ChannelPlus, has been introduced by Multiplex Technology Inc. By turning a knob on the front of the system, the user can create new channels by assigning each video source to an unused UHF channel. The ChannelPlus also allows the user to view all local video sources at any number of TV sets on-site. The unit is available in six different models that vary in number of added channels and connector type. Two or more ChannelPlus units are needed to accommodate unlimited video sources.

For more information, contact Multiplex Technology Inc., 251 Imperial Highway, Fullerton, Calif. 92635.



Leaming Industries FMT615M stereo modulator

Leaming debuts stereo modulator

A stereo modulator that can be retrofitted to operate in true stereo or synthesized stereo modes is being offered by Leaming Industries. Called the FMT615M, this modulator can put any mono program source onto a cable system's FM band in synthesized stereo. It also operates in true stereo mode, permitting local origination of stereo programs, and can simulcast stereo TV audio from decoders and off-air stereo TV audio.

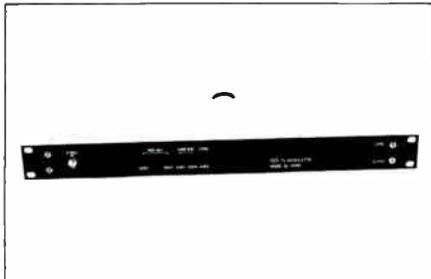
For more information, contact Leaming Industries, 180 McCormick Ave., Costa Mesa, Calif. 92626, (714) 979-4511.

Nova upgrades time base corrector

Nova Systems Inc. has increased the functions of its Nova 500 digital time base corrector. These new functions include "picture in shuttle" and still frame picture

editing. The system is designed for heterodyne 3/4- and 1/2-inch VTRs that accept subcarrier and advance sync for full bandwidth picture correction. List price is \$6,450.

For more information, contact Nova Systems Inc., 20 Tower Lane, Avon, Conn. 06001, (203) 677-5252.

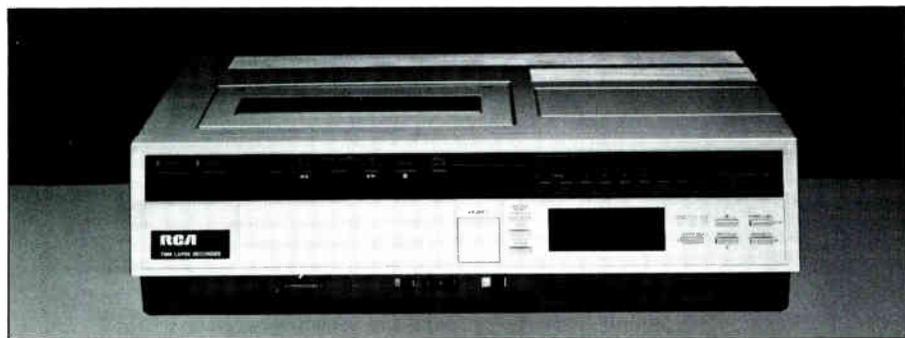


ISS GL2600 modulator

ISS modulator for CATV, SMATV, DBS

A frequency agile modulator for CATV, DBS, SMATV and MATV use is available from International Satellite Supply. Output channels include all the low-, mid- and super-band channels. Frequency selection is accomplished by setting a switch. The modulator, model GL-2600, also features a saw filter and saw resonator, IF modulator with loop-throughs for audio and video, and audio video level indicators and adjustments.

For more information, contact International Satellite Supply, 2225 Sharon Rd., #224, Menlo Park, Calif. 94025, (415) 854-8987.



RCA TC3800 VCR

New series of RCA VCRs released

A series of TC3800 999-hour time-lapse videocassette recorders have been released by RCA Closed-Circuit Video Equipment. These VCRs feature touch-button control, a program timer with four on/off cycles that can be set for different times each day in a seven-day period, and speed control. This control allows a different speed to be set for each on/off cycle. Continuous recording with programmed

ICM Video offers videotape corrector

A video corrector that sells for \$695 has been released by ICM Video. This system, the VC-2000P, is for use in videotape editing, and duplicating and can serve as a camera control unit. It regenerates all sync, blanking and color burst signals, thereby correcting a variety of stability and color problems. Other features include a full set of user level controls, image enhancement, fade to black control and built-in audio and video distribution amplifiers.

For more information, contact ICM Video, P.O. Box 26330, Oklahoma City, Okla. 73126, (405) 232-5808.

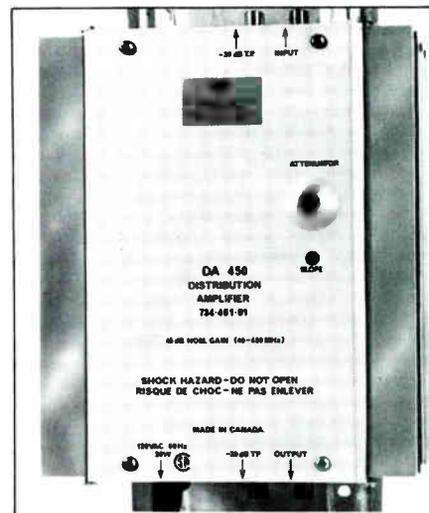
New company announces products

A new company called Compact Cable Systems has unveiled five products: a VCR receiver for hotel, motel and small cable system use; a CCR receiver for commercial applications; a CCM1 modulator with 12-channel capability; a CCM2 modulator with 32 channel capability; and a stereo sound system.

The VCR receiver features standard 420-900 MHz block conversion; and the CCR, 950-1450 MHz block conversion. The CCM1 provides channels 2-13 and features +20 dB output. The stereo sound system, the SSS, can be added onto a receiver to provide a stereo modulated signal. One unit is required for each stereo signal.

For more information, contact Compact Cable Systems, P.O. Box 318, West Liberty, Iowa 52776, (319) 627-2571.

Distribution



Blonder-Tongue DA-450 amplifier

Blonder-Tongue 450 MHz amps

Blonder-Tongue Laboratories has introduced two new 58-channel push-pull distribution amplifiers operating in the 40-450 MHz range. The model DA-450-45 has a flat operating gain of 45 dB that can be reduced to 28 dB with a variable attenuator. The model DA-450-30 amp has a gain of 30 to 13 dB. Designed for large residential complexes, both feature continuously adjustable equalizers that compensate for up to 7 dB cable at 450 MHz.

For more information, contact Blonder-Tongue, One Jake Brown Road, Old Bridge, N.J. 08857, (201) 679-4000.

Vitek Thermalok trap

A new narrow notch trap incorporating a temperature stable dielectric has been developed by Vitek. The Thermalok is designed for performance under severe weather conditions.

For more information, contact Vitek electronics, 4 Gladys Court, Edison, N.J. 08817, (201) 287-3200.

GI data modems introduced

Three new data products have been released by the RF Systems Division of General Instrument. The Metronet 1000 modem provides point-to-point communications at data rates up to 19.2 Kbps. The frequency agile modem features 50 kHz data circuit spacing. The Metronet 1600 modem supports T-1 data circuits at 1.544 Mbps and is configured for rack mounting. The Me-

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His name is Marijan Dizdar. His job . . . independent cable security operator, the largest in the nation. His objectives in buying TOCOM products . . . reliability and reduced operating costs.

Marijan “Diz” Dizdar, of Cableguard,TM Inc. provides security monitoring service to residential and commercial subscribers nationwide. Subscribers who depend on Cableguard for protection. A big responsibility.

His business, like a cable operator’s, is based on recurring revenue and retention of customers. So, his success depends on providing a quality product, problem-free installation and excellent service.

With TOCOM Cable Security[®] products, he’s been able to significantly reduce his installation and maintenance costs. Costs that cut into system profitability. According to Diz, “By using TOCOM equipment we’ve reduced installation time in the home by as much as two man hours and hub location costs by a factor of ten.” Many of Cableguard’s service problems are now diagnosed from the TOCOM IV-A Central Data Security System, eliminating costly truck dispatches. All of which translates into net profit to Cableguard’s bottom line.

He’s impressed with the TOCOM Home Alarm Terminal and its user-oriented design. “It’s a saleable product — easy to install and attractive, with many advanced features. We’ve tested other products, but found them to be totally inadequate in design and function.”

Reliability is also important to Cableguard. “TOCOM has the most reliable product that we’ve ever used,” says Diz. “People’s lives are in our hands. We could not make the commitment we have without being satisfied that the product is the most reliable and comes from a company that will support us.”

TOCOM understands how critical Cableguard’s business is. We designed the first cable security system. And we’re continually developing new generation products that meet customers’ specialized needs.

Diz is sold on TOCOM — its technology, products and people. That’s why he plans to continue using TOCOM products. He can’t afford not to. Neither can you.

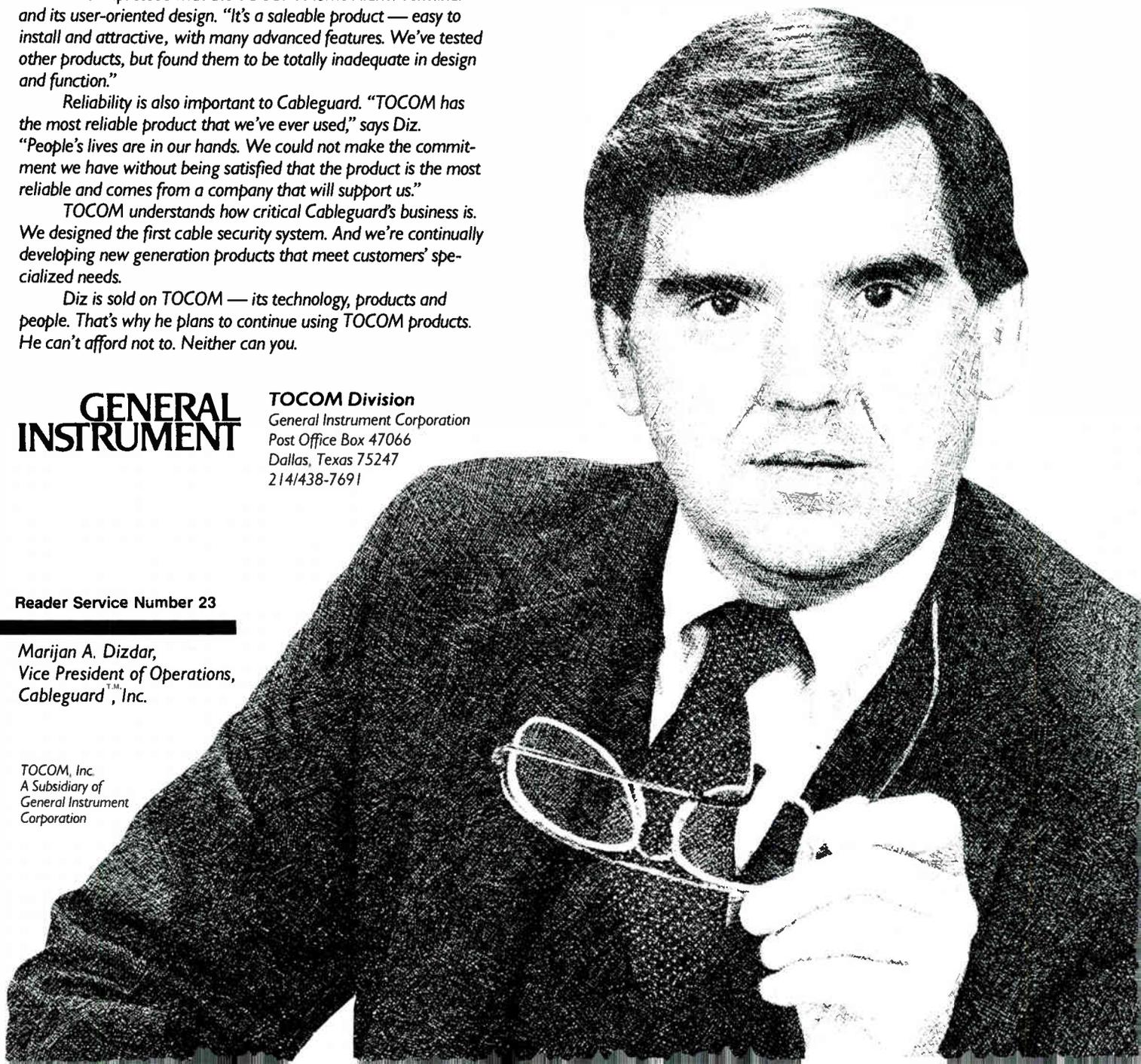
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Cableguard,TM Inc.

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Corporation



tronet 8000 transverter handles frequency translation for Metronet and other modems using 156.25 MHz or 192.25 MHz frequency offsets.

For more information, contact General Instrument, 4229 S. Fremont Ave., Tucson, Ariz. 85714, (602) 294-1600.

Magnavox intros subpassives

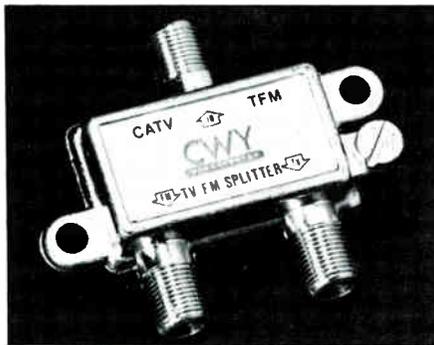
A new line of subpassives featuring RFI isolation of 100 dB or better up to 600 MHz has been released by Magnavox CATV Systems Inc. Cast in Zamak-3, an aluminum alloy, the subpassives are irridited to prevent corrosion and sealed for outdoor applications.

For more information, contact Magnavox CATV Systems, 100 Fairgrounds Drive, Manlius, N.Y. 13104, (800) 448-5171.

RMS intros taps

RMS Electronics has introduced new 4-way and 8-way directional taps. Both feature a built-in grounding block, machined threaded terminals and nickel plate. Impedance is 75 ohms at all ports.

For further information contact RMS Electronics, 50 Antin Place, Bronx, N.Y. 10462, (212) 892-6700.



New CWY FM tap

CWY releases new dist. products

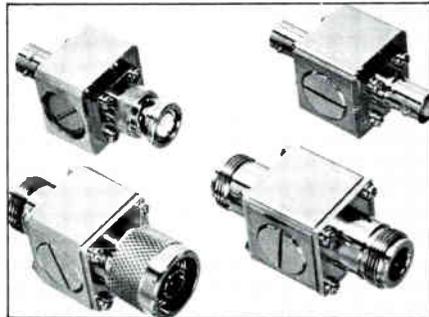
A new FM tap, connector cover and pedestals have been released by CWY Electronics. The model TFM TV/FM splitter allows TV tap port addressing throughout the RF spectrum with a pass band filtered output. Frequency response of 5-500 MHz for TV and 84-130 MHz for FM; insertion loss of 1.5 dB at 5-300 MHz, 2.5 dB at 300-500 MHz and 10 dB at 84-130 MHz for FM are featured. Isolation of 35 dB and rejection of 30 dB also are standard.

The model CC16 connector cover fits RG59 and RG6 connectors.

A new line of pedestals featuring 16- or 18-gauge steel also are available. Rectangu-

lar in design, the pedestals can also be flush-mounted to buildings. A hingeless cover removal system, fully-replaceable 11-gauge hasps and multiple equipment knockouts also are featured.

For more information, contact CWY Electronics, P.O. Box 4519, Lafayette, Ind. 47903, (800) 428-7596.



Transient protectors out

Reliable Electric protectors

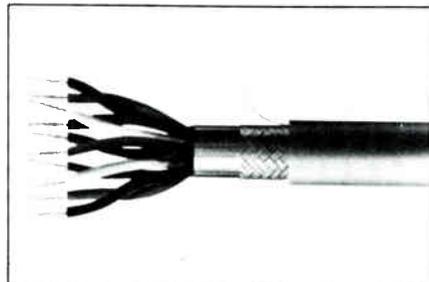
Protection against electrical transients is now available from Reliable Electric/Utility Products. The protector units are available in a range of voltage and connector types can be accommodated.

For more information, contact Reliance Comm/Tec, (312) 455-8010.

Antronix splitters

A series of hybrid splitters in steel housings have been developed by Antronix. The VS-S series features RFI shielding that exceeds FCC leakage regulations, isolation across the full bandwidth and low insertion loss.

For more information, contact Antronix, Gedi Park, Englishtown, N.J. 07726, (201) 446-2626.



Suprashield by Alpha Wire

Alpha cable products

Alpha Wire Corp. has released three new shielding products. Alphabon is a new cable armor featuring an aluminum foil sheath coated with ethylene and covered by an extruded polyethelene jacket. Suprashield offers cable protection

against mechanical abuse. Alphasoc protects cable from heavy, crushing forces, cutting, abrasion and vandalism.

For more information, contact Alpha Wire Corp., 711 Lidgerwood Ave., P.O. Box 711, Elizabeth, N.J. 07207, (201) 925-8000.

Amplifier closure by Federal Telecom

A new amplifier closure designed for the cable industry has been released by Federal Telecom Inc. Taps, splitters, line extenders and directional couplers also can be housed in the model C1230. Made of molded polyethylene, the housing features molded-in vents and recessed handles for easy handling.

For more information, contact Federal Telecom Inc., 114 Cass St., Woodstock, Ill. 60098, (815) 338-6000.



Federal Telecom amp housing

Microwave Filter bandsplitters

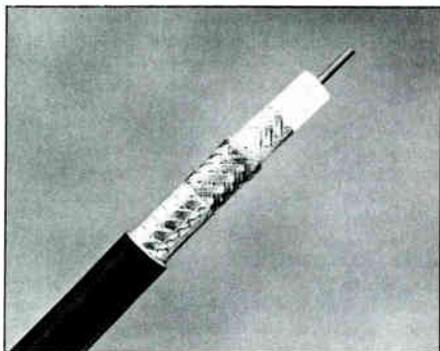
Two new bandsplitters have been released by Microwave Filter Co. The models 3329-51.5(25) and 3329-51.5(40) provide mutual isolations of 25 and 40 dB, combining or splitting sub- and VHF bands with less than 2 dB loss. Impedance is 75 ohms with F connectors.

For further information contact Microwave Filter Co., 6743 Kinne St., East Syracuse, N.Y. 13057, (315) 437-3953.

Mini-attenuator available

An in-line precision attenuator designed for high tolerance and return loss is now available from Macom Industries. The model FAM comes in 3, 6, 8, 12, 16 and 20 dB values.

For more information, contact Macom, 8230 Haskell Ave., Van Nuys, Calif. 91406, (800) 421-6511.



Belden RG-11/U drop cable

Belden drop cable

A new RG-11/U flooded burial drop cable is now for sale from Belden. The model 9764 cable features a bonded foil shield and an outer shorting fold that provides metal-to-metal contact. The cable is flooded with polyethylene grease to resist water contamination.

For more information, contact Belden, P.O. Box 1980, Richmond, Ind. 47375, (317) 983-5200.

Antronix ground block ready

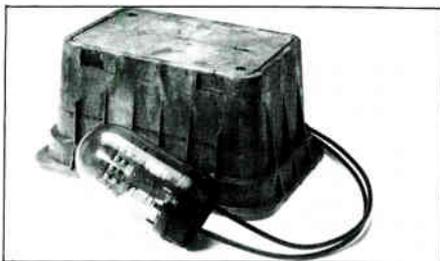
A ground block with high pass filter built in has been unveiled by Antronix. The model GHP-50 features a zinc diecast housing and is designed for use in all active two-way systems.

For more information, contact Antronix, Gedi Park, Englishtown, N.J. 07726, (201) 446-2626.

Channell underground passive housings

Two new air- and water-tight housings designed for underground splitters and taps have been introduced by Channell Commercial Corp. The UTH-708 houses single or dual taps, while the UTH-716 covers splitter and tap combinations. Both are constructed of ABS plastic and feature see-through domes allowing visual inspection of equipment.

For more information, contact Channell Commercial Corp., 620 W. Foothill Blvd., Glendora, Calif. 91740, (818) 963-1694.



Channell UTH-708 housing

TVRO

TVRO, multidwelling markets targeted

A satellite receiver for multidwelling and home use has been developed by General Instrument's RF Systems Division. When used with a low noise amplifier/block downconverter or remote block downconverter and standard low noise amplifier, the MRS-2 receiver permits independent viewing in multiple receiver installations. Standard features include two continuous-

ly variable audio channels operating in mono, discrete stereo or matrix audio; detent tuning with lighted channel indication; and polarity control that interfaces with many popular polarization devices.

For more information, contact RF Systems Division, General Instrument, 4229 S. Fremont Ave., Tucson, Ariz. 85714, (602) 294-1600.



RF Systems' MRS-2 satellite receiver

Retrofit kit for 5-meter antenna

A retrofit AZ/EL motorization kit for Microdyne's 5-meter antenna has been unveiled by Channel One Inc. Features include 12 or 36 VDC, a microprocessor control with 99 memory slots and memory loss protection. The unit is field proven and comes with a one year limited warranty.

For more information, contact Channel One, 79 Massasoit St., Waltham, Mass. 02154, (617) 899-1025.

LNR equalizers

Group delay/amplitude equalizers for use in satellite transmit/receive and terrestrial microwave terminals have been announced by LNR Communications. These equalizers, models GDE-73 and GDE-143, allow the user to set the desired group delay and amplitude response from the field.

For more information, contact LNR Communications Inc., 180 Marcus Blvd., Hauppauge, N.Y. 11788, (516) 273-7111.

Odom antennas

A series of 10- and 12-foot aluminum mesh antenna reflectors have been announced by Odom Antennas Inc. These

reflectors feature an all-aluminum, expanded 24-panel construction design and a reflector surface peak error of less than $\frac{1}{8}$ wavelength.

For more information, contact Odom Antennas Inc., P.O. Box 1017, Beebe, Ark. 72012, (800) 643-2950.

Harris low rate modem released

A full duplex PSK modem has been released by Harris Satellite Corp. The model 8003 transmits and receives data or digitized voice via satellite or microwave radio. Applications include single channel per carrier or multichannel time division multiplexing for private networks.

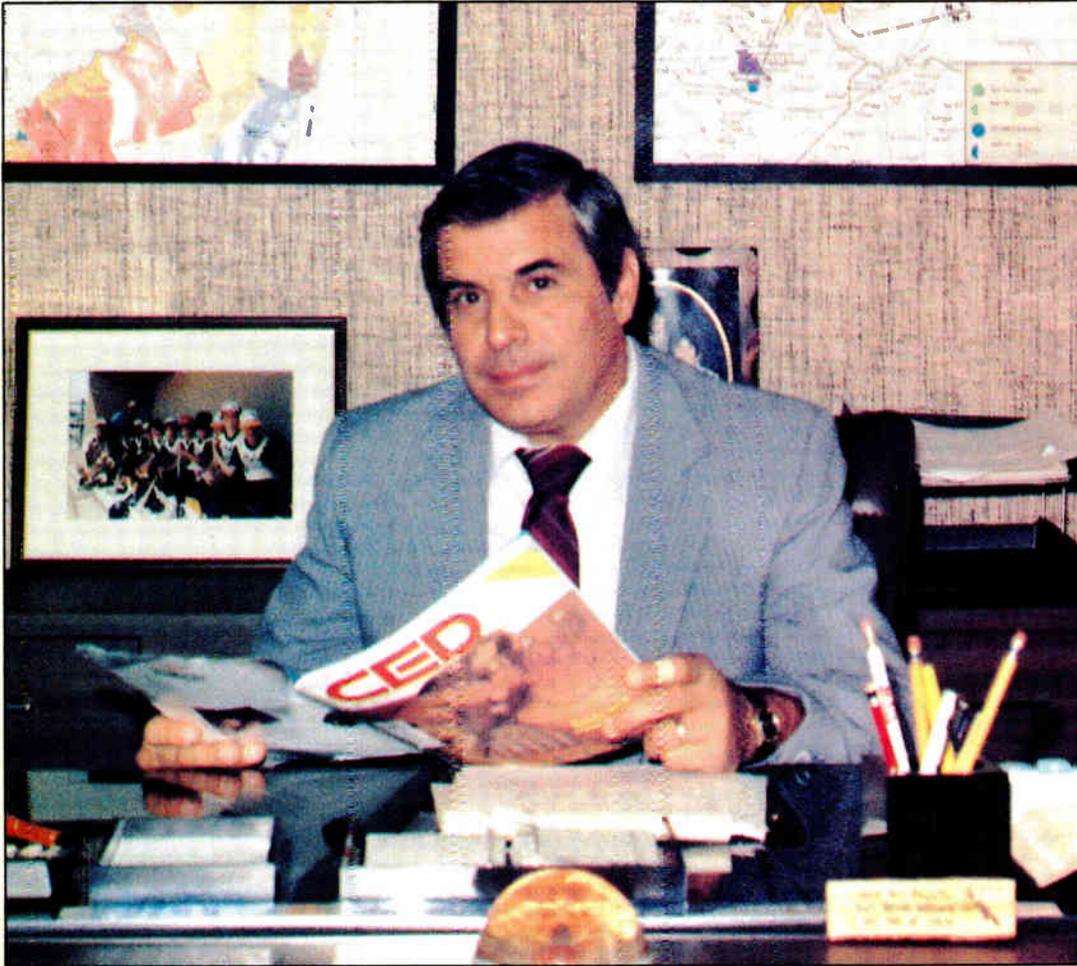
For more information, contact Harris Satellite Corp., P.O. Box 1700, Melbourne, Fla. 32901, (305) 724-3174.

Basic Systems antenna positioners

A new line of 36 VDC-powered satellite antenna positioners have been released by Basic Systems. The systems feature 16 programmable satellite locations, which are stored in mechanical memory overload.

For more information, contact Basic Systems, 1919 South 129 East Ave., Tulsa, Okla. 74108, (800) 251-0014.

*Frank Dejoy
Vice President of Operations
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perience in CATV industry in regional or district positions. (Mail Stop BKC-2)

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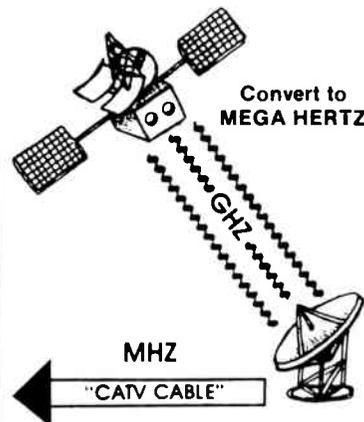
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CWY	19	17
Delta Benco	8	5
Eagle	59	26
Hughes Microwave	23	13
Leader Instruments	9	
M/A COM Cable	25	25
Magnavox	5	3
Pioneer	31	19
Rainbow Satellite	57	25
Sadelco	11	6
Standard Comm	3	2
Standard Components	56	24
TOCOM	47	23
Triple Crown	33	18
UNR-Rohn	12	8
Vitek	2	1
World Video	15	10
Zenith	7	4

People

Joseph Garodnick has been elected chief scientist at Phasecom Corp. He also will serve on the company's board of directors. Before joining Phasecom, Garodnick was executive vice president and co-founder of Stern Telecommunications Corp.



Stanley Burg has been appointed vice president of marketing for Jerrold's distribution systems division. Burg is the former vice president of marketing and sales for Kentrox Industries Inc., a manufacturer of analog, digital voice and data communications products.



C-COR Electronics has announced several promotions. **Michael Doto**, former manager of sales administration, has become marketing operations manager. His former post has been filled by **Carolyn**

Fleming, who previously was payroll accounting clerk. **Janet Brumbaugh** has been promoted from inside sales to supervisor, inside sales.

Christie Mueller has been named West Coast sales representative for Quanta Corp.

Larre Nelson has become program manager of integrated systems for Augat Inc.'s Interconnection Systems Group. Before joining Augat, Nelson was vice president of marketing for Ikier Technology Inc., Boston, Mass.



Kenneth Coleman has been elected vice president and general manager of Times Fiber Communications Inc.'s cable television division. Prior to joining Times Fiber, Coleman was with Jerrold, where he served as

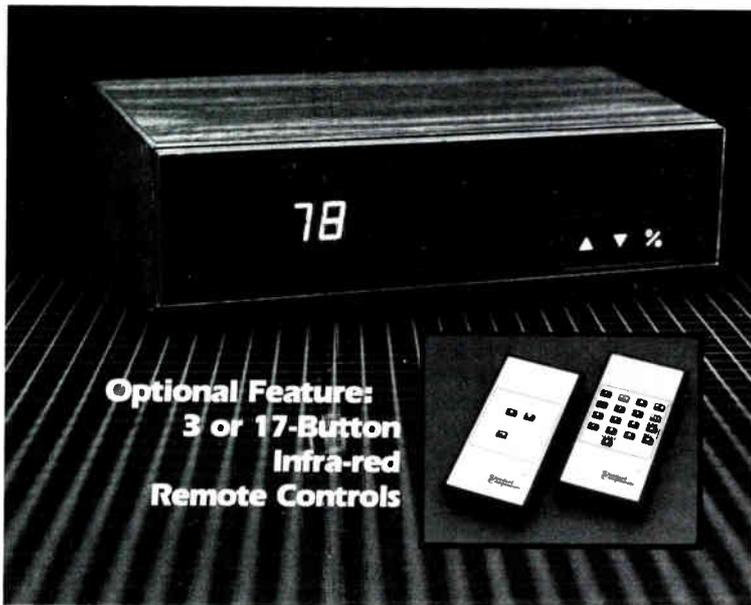


vice president of marketing and vice president and general manager of the company's distribution systems division.

Group W Satellite Communications has formed a new unit, called the Operations and Engineering Group, which will provide production, post-production and satellite transmission services to broadcast, cable and corporate users. **Altan Stalker** will serve as vice president of the group and **Dennis Long** as manager.

Satellite Television Corp. has named **Daniel Kurlander** program administrator and **Marvin Blecker** director, systems engineering and development. Kurlander, formerly with CBS, will direct program scheduling and program operations for STC's DBS service. Blecker most recently served as head of systems evaluation and analysis research for RCA Laboratories.

Joseph Electronics has expanded its sales and management staff with the addition of **Ray Trybus** as outside sales rep serving the Chicago area, **Steve Nisiewicz** as manager of store operations, **Larry Krajewski** as order processing supervisor and **Faye Campbell** as inside sales manager.



STANDARD COMPONENTS PRESENTS

Imagicon 78 Channel Converter With Digital Readout Touch Button Tuning

More For Your Money, that's what Standard Component's 40 years of professional (r.f.) tuner engineering experience has designed into its new trim quality-crafted mini converter. To meet your current needs we also offer, in addition to our 550 MHz 78 channel model; 37, 54, 60, and 70 channel versions.

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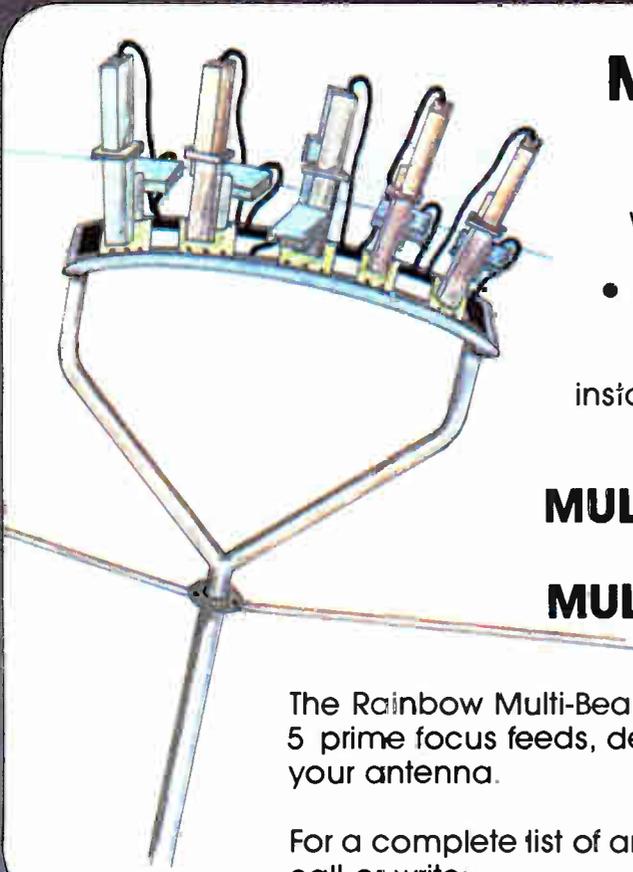
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Phone: 312/ 593-3080

Specifications: • Input Channels: 50 to 550 MHz as specified • Output Channel: 2-3 or 4 • Dynamic Input Range: -6 to +20 dBmV • Output Passband: flat within 1.5 dB • Gain: 1 min. - 12 dB max. • Noise Figure: 11 dB typ., 14.0 dB max. • Cross Modulation: -57 dB or better (78 channels in @ +15dBmV) • Spurious Responses in Output: 57 dB or better (78 channels in @ 0 to +15 dBmV) • Return Loss: input - 7.0 dB, output - 14.0 dB • L.O. Leakage (input): -10 dBmV max. • Frequency Accuracy: output frequency within 250 kHz or as specified • Size: 9.3 X 5 X 2.64.

Reader Service Number 24

5 Star General



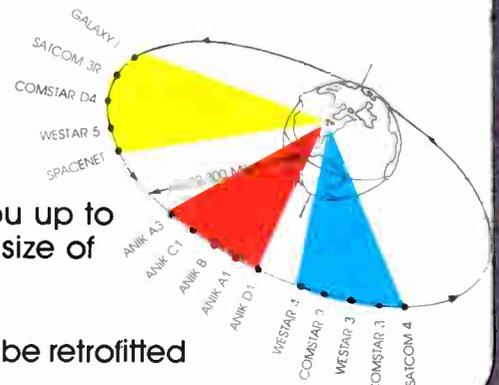
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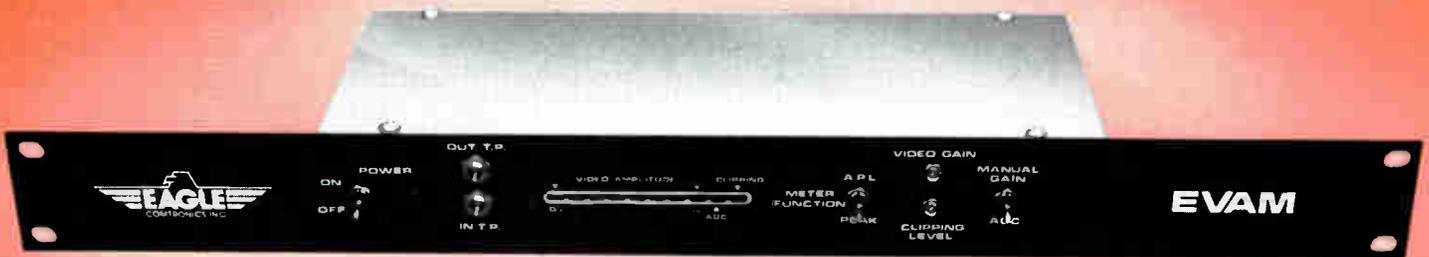
Signal	Day	Start/Stop	Alert Tone	Transponder	Signal	Day	Start/Stop	Alert Tone	Transponder			
Westar V					National Jewish Network							
American Christian Television System	Daily	10 a.m./2 a.m.	None	2X		Sunday	1 p.m./4 p.m.	None	12X			
Arts and Entertainment	Daily	(E) 8 a.m./4 a.m.	311*/519*	12D	Pro Am Sports System		varies	None	7X			
The Disney Channel	Daily	6 a.m./1 a.m.	None	(W) 5X (E) 6X	SelectTV		24 hrs.	None	3D			
Meadows Racing Network	Fri.-Sun. Tues. & Thurs.	7 p.m./11 p.m.	None	11X	Sportsvue		varies	None	4X			
The Nashville Network	Daily	(E) 9 a.m./3 a.m.	674*/#	9D	University Network		24 hrs.	None	1X			
Major Communications Satellites Serving North America					Comstar D-4							
Location:		Satellite			Country Music Television							
Degrees West Longitude	Present	Future		24 hrs.					468*/#	9H		
41	TDRS 1***			ON TV					24 hrs.	None	(W) 5V	
67		Satcom 6**(5/86)		Select TV					24 hrs.	None	7V	
69		Spacenet 2*** (10/84)		Silent Network					Thurs.	6 p.m./8 p.m.	None	9H
72	Satcom 2R**			Galaxy 1								
74	Galaxy 2**			BET					Daily	8 p.m./2 a.m.	406*/#	17
76		Telstar**302 (8/84)		CBN						24 hrs.	414*/# 715*/#	11
76	Comstar D1/2**			CNN						24 hrs.	024*/# 017*/#	7
79	Westar 2**			CNN Headline News						24 hrs.	635*/# 541*/#	8
81		ASC1*** (9/85)		C-SPAN						24 hrs.	195*/#	13
83	Satcom 4**			The Disney Channel					Daily	6 a.m./1 a.m.	617*/# 834*/# (E)	(E,C) 4 (M,P) 24
86		Telstar 303** (5/85)		Galavision					Weekdays	4 p.m./4 a.m.	None	20
87	Comstar D3**			HBO					Weekends	24 hrs.	None	(E) 23
89		SBS 4* (8/84)		Home Team Sports						24 hrs.	None	12
91	Westar 3**			The Movie Channel						24 hrs.	None	(W) 14
93.5		Galaxy 3** (9/84)		The Nashville Network					Daily	9 a.m./3 a.m.	None	2
95	SBS 3*			SIN						24 hrs.	819*/#	6
96	Telstar 301**			WOR-TV						24 hrs.	None	15
97	SBS2*			Satcom 3R								
99	Westar 4**			AP News Cable						24 hrs.	None	6
100	SBS 1*			Arts & Entertainment					Daily	8 p.m./4 a.m.	311*/# (E,C,M) 519*/# (P)	1
103		Gstar 1* (11/84)		Cable Jazz Network						24 hrs.	None	8
104.5	Anik D1**			CBN						24 hrs.	414*/# (E,C,M) 715*/# (P)	8
105	Anik C2*			Cinemax						24 hrs.	None	(E,C) 20 (M,P) 23
105		Gstar 2* (4th Q/84)		CNN						24 hrs.	024*/#	14
108.5		Anik C1* (10/84)		CNN Headline News						24 hrs.	635*/#	15
109	AnikB1***			C-SPAN						24 hrs.	195*/#	19
109		Anik D2** (11/84)		Contact programmer's technical department for more information on transponder, use and alert tone.								
114	Anik A3**											
117.5	Anik C3*											
119	Satcom 2**											
122	Spacenet 1***											
123	Westar 5**											
127	ComstarD4**											
128		ASC2*** (9/86)										
131	Satcom 3R**											
134	Galaxy 1**											
136	Satcom 1**											
139	Satcom1R**											
143	Satcom 5**											
171		TDRS2*** (late/84)										
TBD		Spacenet 3*** (3/85)										

* Ku-Band
 ** C-Band
 *** Dual C/Ku-Band

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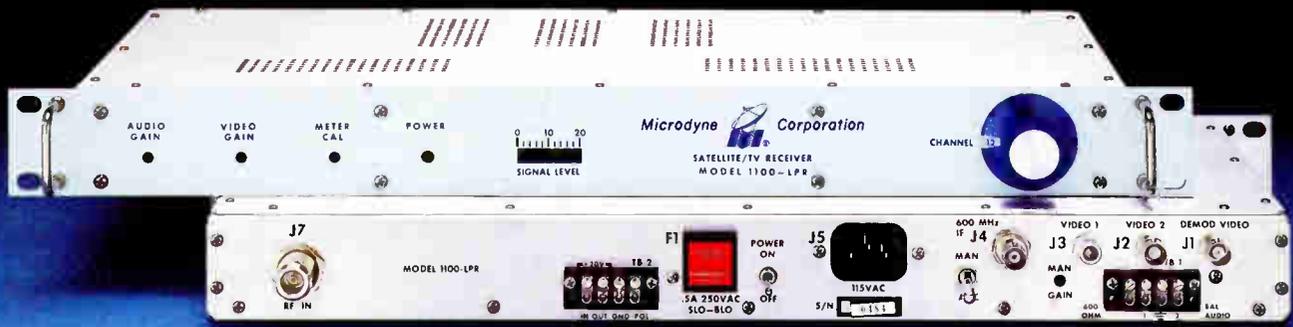
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The Engineers who live in the world of headend electronics have one word to describe Microdyne's 1100-LPR receivers...



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The 1100-LPR is a compact, 4 GHz satellite TV receiver offering commercial quality video and Microdyne's demonstrated reliability at a competitive price. The ideal receiver for new systems or for expanding the capabilities of an existing system. The LPR's single conversion 24-channel frequency synthesized tuner has a stability of $\pm .001\%$ and, with a threshold level of less than 8dB, offers superior performance in weak-signal areas.

Other standard features include: dual video outputs; single knob front panel channel selector for easy tuning; front panel adjustment of the video and audio gain; audio subcarrier frequency of 6.8 MHz; and a power consumption of only 20 watts.

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