CED™

NCTA Convention

Communications Engineering Digest/The Magazine of Broadband Technology June 1981

Cable and the Aeronauticals

- FCC Crackdown
- HRC Conflicts
- Reporting Forms

Plus:

- Predicting Sun Outages
- HRC Distortion Analysis
- Microwave Revisited
- Signal Interference

Oak TotalControl is NOW

The first and only commercially proven addressable CATV system.

If now is when you're interested in a new addressable system or a rebuild, consider that there's still only one commercially proven addressable system that's available – Oak TotalControl.® With tens of thousands of operating TotalControl terminals, it's a proven profit-builder – not an experiment. The same technology has also been proven with over half a million operating STV terminals.

That's a record no one else even comes close to.

TotalControl is a true turn-key system offering second generation modular software, unequaled in versatility. TotalControl delivers up to 16 tiers, 56 channels (112 channels on dual-trunk systems), pay-per-view and remote disconnect, and offers infrared remote.

For a free TotalControl package, including an actual system cost analysis, call our locator operator toll-free at 800-323-6556 (in Illinois, 800-942-6345) and ask for the CATV information desk.

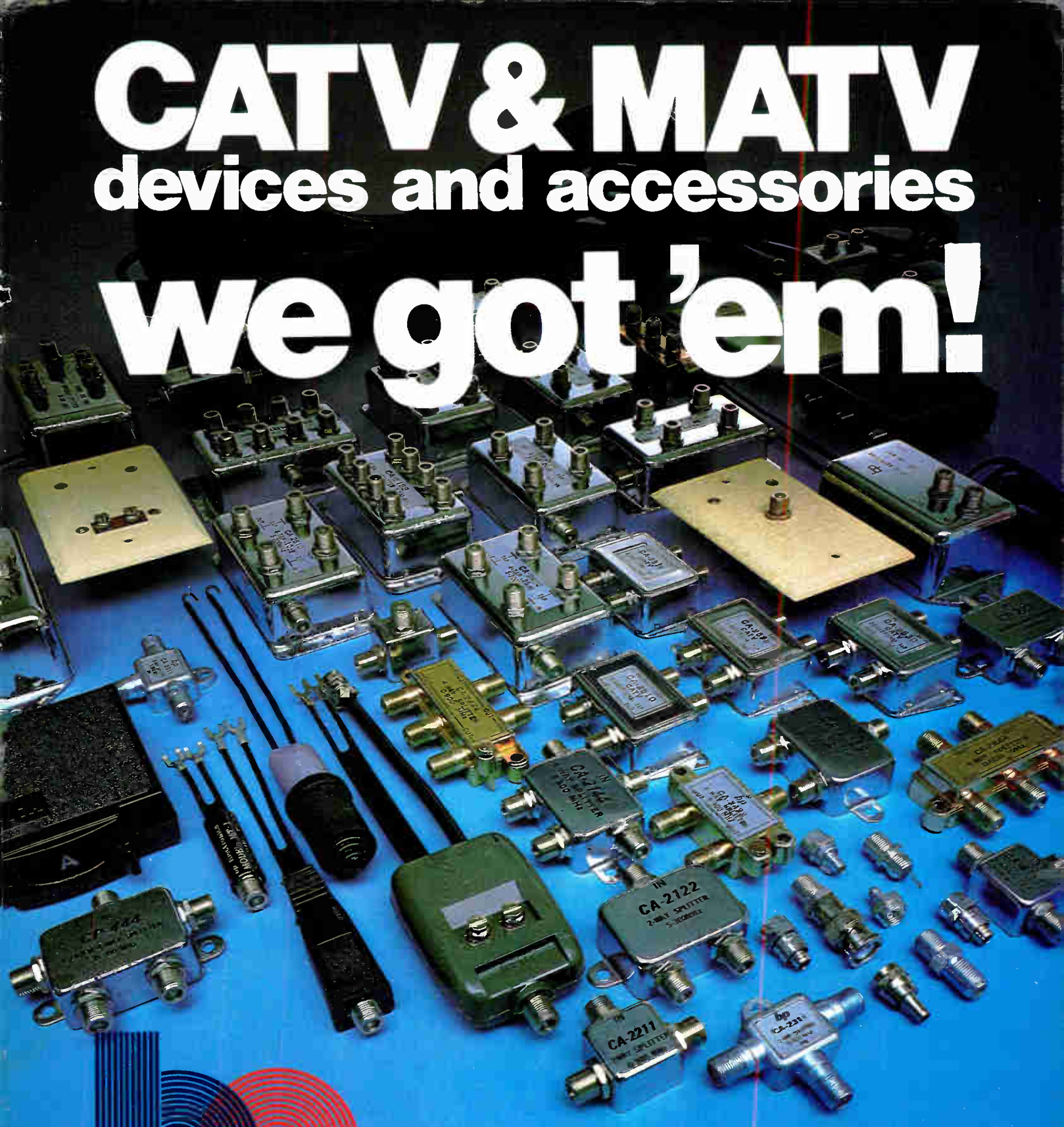
OAK Communications Inc. | CATV Division

See Us at NCTA – Booth #250

[illegible] 800 [illegible] Telephone 815 459 5050 FAX 815 874 3353

CATV & MATV devices and accessories

we got 'em!

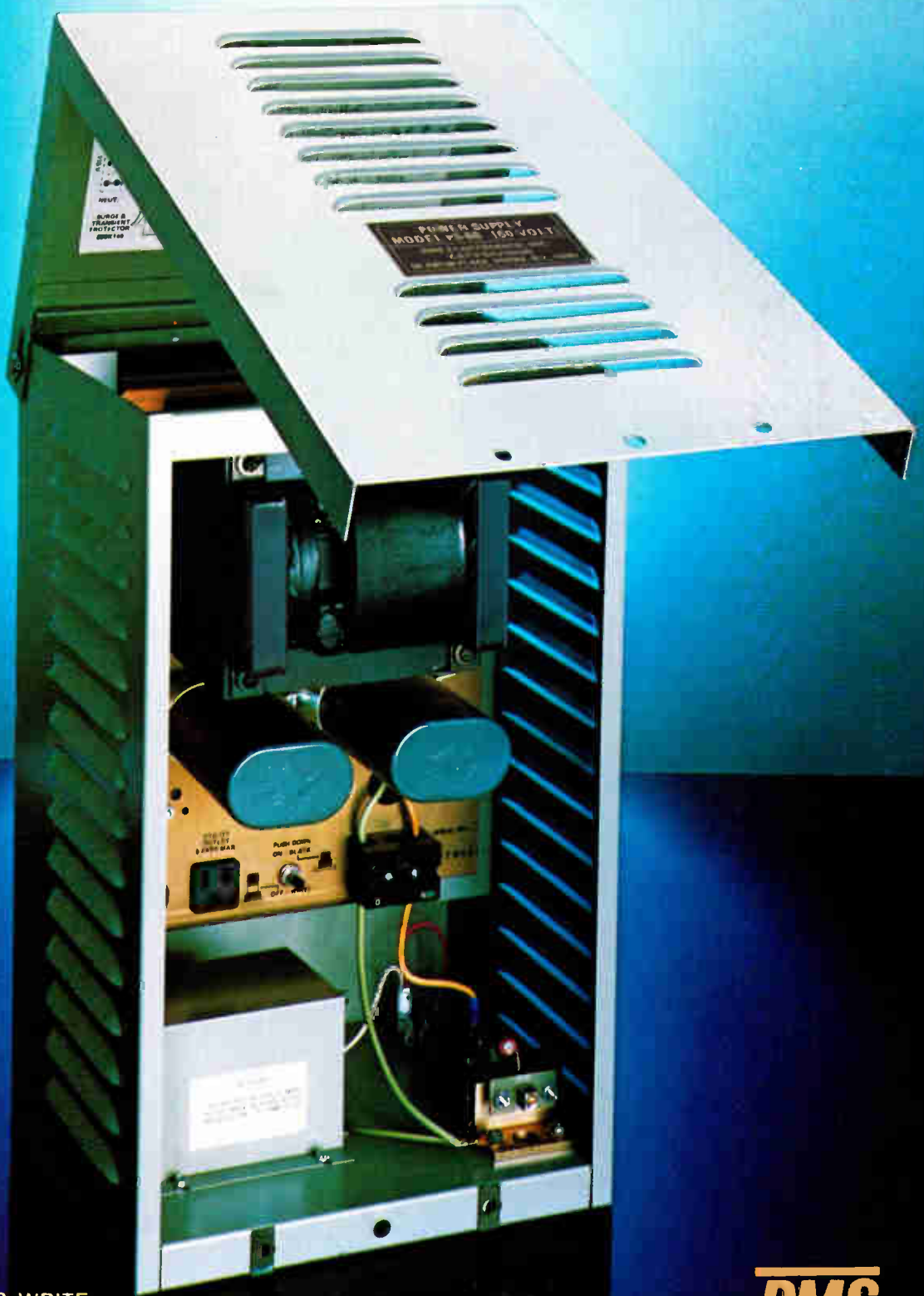


From splitters, directional taps, amplifiers, couplers, connectors, adapters, terminators and switches, to jumper cables, outlets, wall plates, matching transformers and antennas. We got 'em. And delivery is off-the-shelf.

Want our complete catalog? Write BP Electronics, 855 Conklin Road, Farmingdale, New York 11735. Or for prompt action call, 516 752-0313.

See Us at Booth #212 at NCTA

INCOMPARABLE



TELEPHONE OR WRITE
FOR IMMEDIATE DELIVERY

RMS ELECTRONICS, INC./CATV DIVISION
50 ANTIN PLACE, BRONX, N.Y., 10462

TOLL FREE (800) 223-8312

(Continental U.S.A., Puerto Rico, U.S. Virgin Islands)
(212) 892-1000 Call Collect (New York State)

RMS

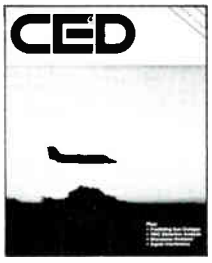
'POWER·KING'™

Series

MODEL PS-60 AC REGULATED POWER SUPPLY

CED

Contents



About the Cover

As they streak across the horizon in a race with the sun, aircraft seem impervious to that which lies in the shadow below. Nevertheless, the controversy continues as to whether cable television's use of particular frequencies have the potential for causing harmful or even dangerous interference to aeronautical navigation and communications.

CED (USPS 300-510) is published monthly on behalf of all parties, including the Society of Cable Television Engineers (SCTE), interested in the advances of broadband technologies, by Titsch Publishing, Inc., 2500 Curtis Street (P.O. Box 5400 TA) Denver, Colorado 80217.

Subscription Price 1 year, $20. Canada and Mexico add $6.00, and other foreign subscribers add $12.00 per year. Controlled circulation paid at Denver, Colorado. POSTMASTER: Please send form 3579 to P.O. Box 5400 TA, Denver, CO 80217. BPA membership applied for May 1981.

wall and all

it's the only way to steal... when you use a **TONER** lockable cabinet

Total security begins with **TONER SUPER-SECURE™** lockable cabinets. The best protection for your **CATV** and **PAY TV** system equipment. From an assortment of in-stock cabinets there is an answer to your every need.

Call for our free brochure today! See what **TONER** lockable cabinets are all about. You'll be glad you did.

See us at the NCTA Show—Booth #401

Please send me your free brochure on **TONER'S** lockable cabinets

NAME _____

TITLE _____

COMPANY _____

CITY _____ STATE _____ ZIP _____

Toner

969 HORSHAM ROAD • HORSHAM, PA. 19044
IN PENNSYLVANIA CALL (800) 492-2512
Call TOLL FREE (800) 523-5947

Burying the Hatchet

Although officials of either organization don't like to admit it, the National Cable Television Association and the Society of Cable Television Engineers have long conducted what has been described by insiders as a "cold war." Now, however, detente appears to be at hand. As each organization feels more secure in its role within the industry, it has become possible to lay the groundwork for a new spirit of cooperation. Considering the magnitude of technical issues facing cable television in the months and years ahead, the industry can only benefit from whatever sharing of public policy and engineering expertise the two organizations can effect.

High-Definition Development

Sony Corporation has developed a prototype high-standard video recording and playback system that could further the drive toward high-definition television (HDTV). Three months ago, CBS demonstrated an HDTV system based primarily on research conducted by NHK of Japan. At that time, CBS officials stated that one key element holding them back was the development of a recording system. Well, now we apparently have one. The prototype is called the Sony High-Definition Video System (HDVS). According to the company, the HDVS features 1,125 scanning lines, 60 fields per second, and a frequency band width of 30 MHz. It consists of the following equipment: high-definition three-tube camera with a newly developed one-inch high resolution pickup tube; a one-inch wide-band RGB VTR with a new high-density recording format; a wide-band digital time base corrector with a new wide-band AD converter; a 20-inch and 32-inch high-definition Trinitron monitor; and a 100-inch high-definition TV projector with a wide-band picture tube for projection use. It seems like the future keeps getting closer and closer.

Ready, Get a Set

Cable-ready television receivers have not been received all that warmly since they began hitting the market, primarily because they are not cable-ready. In fact, converter manufacturers would be the first to tell you that they probably never will be. "The different features which are being designed into converter systems," they say, "could hardly be incorporated into a single line of receivers." Nevertheless, the receiver manufacturers persist. Talk is that the "next generation" of cable-ready sets will be unveiled at the Chicago Section of the EIA Spring Conference. The new receivers are said to perform adequately, particularly through the low- and mid-bands.

All Aboard

Satellite Television Corporation certainly knows a bargain when it sees one. The Comsat subsidiary that will be responsible for the company's direct broadcast satellite plans has announced its intent to reserve space on the space shuttle to launch its DBS satellites. After the successful maiden flight of the shuttle last month, satellite companies are already lining up to take advantage of the cheaper launch costs involved with reusable spacecraft. STC has requested a berth on the shuttle in both July and October of 1985. Company plans call for the launch of one operational and one spare satellite to provide its premium pay television service to viewers in the eastern area of the United States. Construction of the birds will take about three or four years. Assuming everything goes well and the DBS slots are granted to the United States at the 1983 RARC, STC's first satellite will be ready to go zooming into space in mid-1985.

Meter Reading

Teleprompter, which recently signed an agreement for proprietary rights to two-way technology developed by a company called Datavision, Inc., East Detroit, Michigan, will begin initial testing for its new subsidiary, Teleprompter Multiservices Corporation, in Grosse Point, Michigan. The first test of meter reading in some 200 homes is scheduled to begin next month, and officials say that the Datavision system will soon be installed in the Dearborn, Michigan, franchise recently awarded to Teleprompter. The Datavision system reportedly offers 16 "passive" channels and 16 "interactive" channels. Officials say that the system is built around a universal mode which is expandable and that the "intelligent" terminals which go into the home will be cheap enough to make the concept economically viable.

All-Metro Team

Subsidiaries of Bob Schmidt's Communications Technology Management, Inc., MetroNet and MetroSat, plan to provide microwave and earth station facilities for the Bell & Howell Satellite Network (BHSN) of Washington, D.C., a division of the Bell & Howell Video Group. Primary users of the network's teleconferencing facilities will be the Federal government and public service and non-profit organizations. According to Frank Dobyns, general manager of BHSN, use of the MetroSat and MetroNet facilities will enable BHSN to offer users "enormous advantages over other satellite communications services." Organizations will be able to operate on short notice from a downtown location with no long-term use commitments and no investment in expensive equipment.

They Tried It and Liked It

Oak Communications recently completed the first phase of its market test of teletext over WKID, Channel 51, its STV station in Hollywood, Florida, and came to the conclusions that STV is an excellent medium for videotext and that the response from subscribers in the Miami-Ft. Lauderdale market was positive. Oak's "Video-Text" was carried on a subcarrier of the aural as opposed to being on lines of the vertical blanking interval. Oak went this route because of elements in common with the handling of STV data on the existing system and because a continuous stream of data could be employed compared to the burst characteristics of using two lines of the VBI. At the test's peak, 125 decoders were in place and exposed to 120 pages of information updated seven days a week from 6 a.m. until 10 p.m.

Seminars

JUNE

1-5: The **Community Antenna Television Association** is holding a cable television technical training seminar at the George Washington Motor Lodge-East in Philadelphia, Pennsylvania. Contact the CATA at (305) 562-7847.
4-5: TeleStrategies, Inc., is sponsoring a seminar on "Satellite Communications" at the Twin Bridges Marriott in Washington, D.C. Contact Telestrategies, (703) 734-7050.
9-11: A **Jerrold** technical seminar will be held at the Plaza Airport Inn, Millbrae, California. Contact Len Ecker, (215) 674-4800.
9-11: The International Marketing Center of the U.S. Department of Commerce, Paris, France, is sponsoring an exhibition and seminar on U.S. fiber optics, **"Fiber Optique-'81."** Contact Ellen M. Bond, (617) 739-2022.
14-16: Montana Cable Television Association will hold its annual meeting at the Sheraton Hotel in Billings, Montana. Contact Bob Briney, (406) 586-1837.
14-17: The **Institute of Electrical and Electronic Engineers** is holding its 1981 International Conference on Communications at the Hilton Hotel in Denver, Colorado. Contact Bob Skelton, (303) 779-0600.
15-16: The National Endowment for the Arts and Temple University are supporting a conference entitled "**Cable Television and the Independent Producer**" to be held at the university in Philadelphia, Pennsylvania. Contact Professor Alan Bloom, (215) 787-1873.
16: Showtime and Wometco Cable TV will host a dinner meeting of the **Atlanta Cable Club** at the Atlanta Stadium Club, Atlanta, Georgia. Contact Marian McConnell, (404) 898-8500.
16-18: A **Jerrold** technical seminar will be held at the Princess Kaulani Hotel, Honolulu, Hawaii. Contact Len Ecker, (215) 674-4800.
16-18: Nepcon East '81 will focus on the East Coast electronics manufacturing industry and take place at the New York Coliseum, New York, New York. Contact Industrial & Scientific Conference Management, Inc., (312) 263-4866.
22-26: Hughes Aircraft Company's microwave communications products has scheduled a technical seminar on its AML local distribution microwave equipment at the firm's Torrance, California, facility. Contact Seminar Registrar, (213) 517-6100.
22-26: The **University of Wisconsin** is offering a short course on "Laser System Design" at The Concourse in Madison, Wisconsin. Contact Donald Baxa, (608) 262-6381.
23-24: A **Blonder-Tongue** MATV/CATV technical seminar will be held in Baltimore, Maryland, in conjunction with LCA Sales, Inc. Contact Glenn Stawicki, (201) 679-4000.
23-25: A **Jerrold** technical seminar will be held at the Best Western Arena Motor Inn in South Williamsport, Pennsylvania. Contact Len Ecker, (215) 674-4800.
24: The bi-monthly meeting of the **Appalachian Mid-Atlantic Group** will be held at the University Lodge, Shippensburg, Pennsylvania. "Text Equipment" will be the meeting's topic. Contact Tom Carbaugh, (717) 263-8288. Lee Burkholder, (717) 265-8591.

24-26: Data Communications will sponsor a conference on "Teleconferencing and Satellite Systems Technology" at the Sheraton Centre in New York City. Contact McGraw-Hill Conference and Exposition Center, (212) 997-2855.

25-26: The **New York State Commission on Cable Television** will hold its "Seventh Annual Northeast Cable Television Technical Seminar" at the Empire State Plaza Convention Center in Albany, New York. Contact Robert L. Levy, (518) 474-1324.
25-26: "Understanding Telecommunications Technologies for Non-Engineers" is the topic of a seminar sponsored by **TeleStrategies, Inc.**, at the New York Sheraton in New York City. Contact TeleStrategies, (703) 734-7050.
28-30: A second workshop on "How to Video-Teleconference Successfully," sponsored by the **Public Service Satellite Consortium**, will be held in Denver, Colorado. Contact PSSC, (202) 331-1154.

JULY

7-9: A **Jerrold** technical seminar will be held at The Concourse in Madison, Wisconsin. Contact Len Ecker, (215) 674-4800.
9: The **National Federation of Local Cable Programmers** is sponsoring a pre-convention seminar for access and program directors at the Atlanta Biltmore Hotel, Atlanta, Georgia. Contact Cindy Kuper, (404) 523-1333.
9-10: TeleStrategies is sponsoring a seminar on "Local Networks and Office Automation" at the New York Sheraton, New York City. Contact TeleStrategies, (703) 734-7050.
10-12: The **National Federation of Local Cable Programmers** is holding its fourth annual convention at the Atlanta Biltmore Hotel in Atlanta, Georgia. Contact Cindy Kuper, (404) 523-1333.
12-15: The 13th annual **New England Cable Television Association** convention and exhibition will be held at Dunfey Hyannis Hotel, Hyannis, Massachusetts. Contact the association, (603) 224-3373.
15-18: The **Florida Cable Television Association** annual convention will be held at the Lago Mar Resort in Fort Lauderdale, Florida. Contact Convention Chairman James L. Cooper, (305) 527-6620.
21-25: A **Jerrold** technical seminar will be held in Hatboro, Pennsylvania. Contact Len Ecker, (215) 674-4800.
23-24: A two-day seminar on "Satellite Communications" is being sponsored by **TeleStrategies, Inc.**, at the Copley Plaza, Boston, Massachusetts. Contact TeleStrategies, (703) 734-7050.
27-28: The **Society of Cable Television Engineers** will sponsor a "System Preventive Maintenance" seminar at the Dutch Inn in Orlando, Florida. Contact the SCTE at (202) 293-7841.

AUGUST

2-4: The **Michigan Cable Television Association's** annual convention will be held at the Hyatt Regency in Dearborn, Michigan. Contact Mike Welch, (312) 693-9800.
4-6: A **Jerrold** technical seminar will be held at the Holiday Inn/Southeast, Englewood, Colorado. Contact Len Ecker, (215) 674-4800.
6-7: TeleStrategies, Inc., is sponsoring a seminar on "Telecommunications Technologies, Opportunities and Strategies for Senior Management" at the Hyatt Regency in San Francisco, California. Contact TeleStrategies, (703) 734-7050.
17: Southmedia Company and Scientific-Atlanta will host a dinner meeting of the **Atlanta Cable Club** at the Atlanta Stadium Club, Atlanta, Georgia. Contact Marian McConnell, (404) 898-8500.
18-20: The **Institute of Electrical and Electronics Engineers'** 1981 International Symposium on Electromagnetic Compatibility will be held at the University of Colorado, Boulder, Colorado. Contact Charlotte Tyson, (303) 447-5072.

DEPENDABLE CONVERTERS FROM THE PEOPLE WHO MADE TWO-WAY INTERACTIVE A REALITY!

In day-to-day CATV operations, large system or small, the cheapest converter is seldom the best buy. For overall cost effectiveness you want converters that promise more than great laboratory specs — you want converters that work everyday...under the worst conditions.

Converters that are simple...simple enough for subscribers to install themselves.

Converters that are ready to grow with an expanding system ... all the way to 400 MHz. Converters that are so reliable you can cut down on maintenance costs.

Pioneer's converters guarantee you'll get all these features and more. From the 7 and 14 channel BC-1000 and BC-1100 block converters to the 36 channel BC-2000 converter, all have hidden advantages from the knowledge we've gained with our two-way, interactive experience. Our BC-2000 converter has a buffer amplifier to reduce spurious signals and SAW filter to eliminate adjacent channel interference.

So, from our simplest converter to the most complex interactive terminal, Pioneer equipment does the job it's been designed to do — whether it's expanded channel selection or filtering out unwanted interference.

That's why Pioneer's converters have received so many favorable comments from MSO's. Because they know dependable converters aren't a luxury.

After all, Pioneer promises not to make the cheapest converters, only the best.

PIONEER®

PIONEER COMMUNICATIONS OF AMERICA

3518 Riverside Drive Columbus, Ohio 43221 (614) 451-7694

CED

Volume 7, No. 6

OFFICES: Denver, Titsch Publishing, Inc., 2500 Curtis Street, Denver, Colorado 80205 - or- P.O. Box 5400 TA, Denver, Colorado 80217, (303) 573-1433; **Washington Bureau**, 3800 N. Fairfax Dr., Arlington, Virginia 22203, (703) 522-3888; **New York Bureau**, 75 East 55th Street, Suite 404, New York, New York 10022, (212) 753-2095; **West Coast Bureau**, 101 North Robertson Boulevard, Beverly Hills, California 90211, (213) 659-3965; **Atlanta Bureau**, 789 Barnett, N.E., Suite 2, Atlanta, Georgia 30306, (404) 872-8592

Editorial

Bringing the Aeronautical Controversy Down to Earth

"The operator is the first to know" is not quite how the old saying goes, but it is close. In fact, even as the Federal Communications Commission carries out its current monitoring for compliance of Section 76.610 of the rules on cable television's use of the aeronautical frequencies in the 108-136 and 225-400 MHz bands, one notion persists amidst the controversy. That is: any significant signal leakage "problem" with the potential for interfering with air navigation or communication is likely to manifest itself in the form of system degradation, almost immediately identifiable from subscriber complaints or, for that matter, complaints from users of other electromagnetic devices on the ground.

It becomes then a question of just how responsive a cable operator is in particular, and how responsive the cable television industry is, in general. In this case, that is not close enough for government work, to pervert another old saying. The issue itself strikes such a raw nerve with some industry and government officials that even bringing the problem up during a meeting of professionals or devoting space in a publication draws derision. "Cable doesn't make airplanes fall from the sky," is the slur which is usually hurled. In support of that claim is offered the fact that it hasn't happened, yet. Pray that it doesn't, not only out of concern for life and property, but also out of fear for the repercussions which would hail down upon the cable television industry. If that is beginning to sound like a threat, it is. At stake is a wholesale loss of bandwidth or premature, forced channelization.

To consider the problem politically for a moment, the FCC has been caught in the middle between the Federal Aviation Administration which, at times, has offered no quarter, and the cable industry itself, which, also at times, has had difficulty in proving that cable is really a "closed" system. What the commission has relied on during the past three years is the interim to keep certain calls in the Department of Transportation and the Department of Commerce at bay has been the interim compromise scheme embodied in the current rules. Not the least of those rules is the requirement that grandfathered systems notify the commission in advance of activating additional channels in the aeronautical bands, and that newer systems request approval for activation of any channels in the 108-136 and 225-400 MHz range. Now, any hopes for improving the situation have been dimmed, in the view of some officials who consider the cable industry's compliance with even the basic reporting requirements of the rules less than the exemplary. In other words, the support has not been there at a level sufficient to make the commission enthusiastic about continuing the battle. And, to be sure, the battle will soon be rejoined. The industry has really only two options in this one—either to roll over, or to dig in its heels and fight in whatever the appropriate arena. It won't get past the first round, however, unless it can demonstrate good faith by compliance with the rules as they exist now.

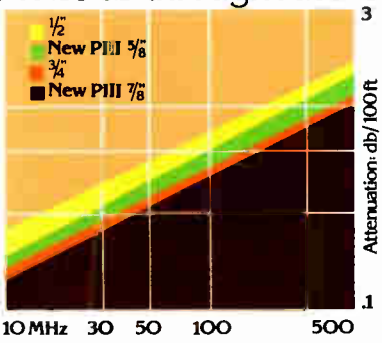
On another note, **Communications Engineering Digest** has reached another milestone in its young history. Now completing its fifth year of publication, **CED** has been accepted by Business Publications Audit for a certified analysis of its circulation. When the BPA audit is completed, a detailed account of **CED**'s distribution will be available to advertisers and others interested in tracking the significant scope and growth of the cable television industry's technical community represented by **CED**'s readership.

Pat Gushman

We found two more ways of improving our patented PIII coax.

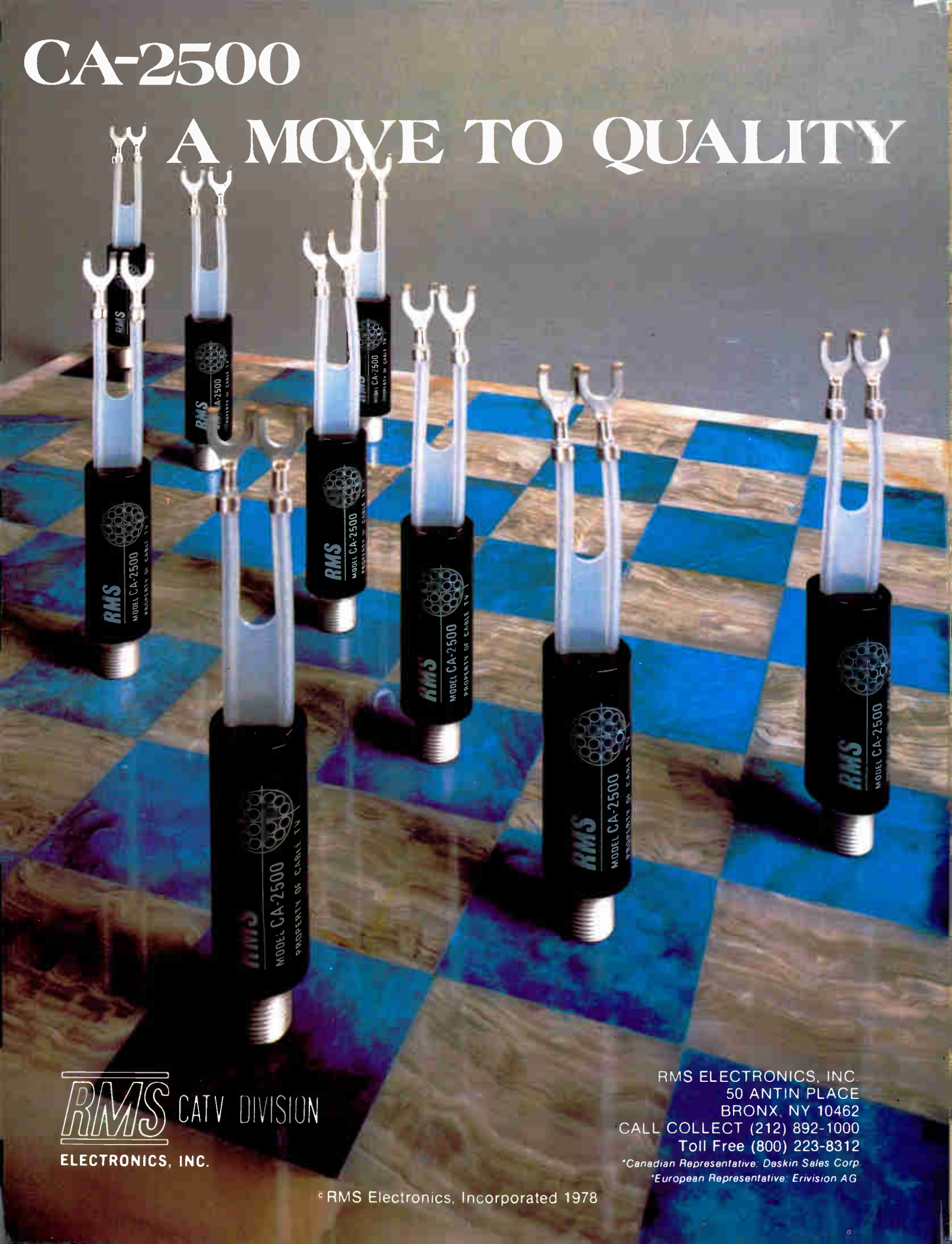
Every reel 100% sweep-tested.

We've added two new sizes. Now the top of the line is a full line. You have your choice of ½", ⅝", ¾", ⅞" and 1" cable. The ⅝" and ⅞" are new. ■ Comm/Scope PIII still offers 50% more bandwidth (5-450 MHz) with a minimum return loss of 26 db throughout the range. Stable attenuation is assured with outstanding low-loss characteristics. ■ So now you have a full range of PIII sizes; you have PIII application-proved reliability; and, as always, Comm/Scope service and quality. ■ Finding more ways to offer you the finest coaxial cable on the market at competitive prices is what being the industry leader is all about. **Comm/Scope,** A M/A-COM Company, Box 199, Catawba, NC 28609, (704) 241-3142.



CA-2500

A MOVE TO QUALITY



RMS CATV DIVISION
ELECTRONICS, INC.

RMS ELECTRONICS, INC.
50 ANTIN PLACE
BRONX, NY 10462
CALL COLLECT (212) 892-1000
Toll Free (800) 223-8312
*Canadian Representative: Deskin Sales Corp.
*European Representative: Erivision AG

NCTA Opposes Adoption Of British Teletext

WASHINGTON, D.C.—The National Cable Television Association has gone on record as opposing the adoption of the British "defined format" system as the national teletext standard. On March 26, the United Kingdom Teletext Industry Group petitioned the Federal Communications Commission to accept the British system that is represented under the tradename of Prestel.

Although the NCTA did not specifically criticize the Prestel system, the organization stated that "there is insufficient information available upon which to articulate a national teletext standard."

The UKTIG is one of three organizations that is backing a particular teletext system as the national standard. Both the French Antiope and the Canadian Telidon systems have been suggested in previous filings.

In its latest filing, the NCTA offered its arguments against the British system while objecting in general to any "premature" acceptance of a national standard.

"Conventional broadcast television will only be one of many users of teletext in the years to come," the NCTA filing read. "Careful consideration, therefore, is required as to how other users, including cable television, may take part in providing teletext services. However, too little is known today about the technical compatibilities or incompatibilities which are likely to emerge between any given teletext system and nonbroadcast users of teletext."

Several studies of teletext transmission are currently underway. In 1979, the Electronic Industries Association initiated an industry-wide evaluation of teletext transmissions, including via broadband television. The EIA effort has been proceeding slowly, but is expected to be completed by midsummer.

The NCTA has also been studying teletext through its own Engineering Subcommittee on Teletext. According to the filing, one of the goals of the subcommittee is "to examine whether technical characteristics of cable distribution systems present any difficulties to the effective carriage of teletext signals." Field tests based on the subcommittee's studies will be implemented "by mid-June at the Viacom Cablevision system located in Suffolk County, New York."

"NCTA submits that the results of these efforts by industry groups must be taken into consideration before the FCC can adopt a truly meaningful national teletext standard which would serve the public interest, convenience and necessity," the filing read.

There are several technical uncertainties surrounding the British system and its compatibility with cable systems, the NCTA said. Two of these involve the bit rate and the pulse shape.

"The UK's proposed bit rate is 5.727272 bits per second, exactly 8/5 times the color subcarrier," the filing stated. "This bit rate may be too fast, possessing too much energy to be accommodated by existing cable television equipment. If so, proper decoding of the teletext material, after it has gone through the cable distribution system, might be unreliable."

As for the pulse shape, the NCTA said there is a possibility that cable converters cannot technically accept the shape, resulting in interference to the channel on which the teletext material is being carried.

"This is not to say that present cable television equipment will not accommodate the bit rate and pulse shape of the proposed teletext system," the NCTA said. "Rather, the equipment presently used by cable systems was not specifically designed to accommodate them and its capability to do so has yet to be determined."

Video, Data Transmission Okayed for Private Microwave

WASHINGTON, D.C.—The Federal Communications Commission has authorized licensees in the private operational fixed microwave service to transmit entertainment programming directly to hotels and data directly to business but limited the programming to material owned or controlled by the licensee.

Omni-directional and other point-to-multipoint transmissions were authorized on three 6 MHz channels in the 2.5 GHz band. Point-to-point service was authorized on the bands above 13 GHz.

The action did not authorize direct transmission of video programming to private homes and master antennas of apartment buildings. The possibility of a hybrid classification for multipoint transmission of subscription direct-to-home programming is under consideration as part of the commission's direct broadcast satellite inquiry.

Transmission functions anticipated under the new rules are expected to include one-way omni-directional video, possibly with some type of response capability, one- and two-way directional video, one- and two-way directional voice and, as they are developed, high speed data services.

Ordinarily, commission officials said, the FCC will assign only one channel at a location for omni-directional operations and only one along each path for directional point-to-point service, whether one-way or two-way. They said they would consider assigning more than one in either type of service only on a strong showing of need.

All licensees will be required to comply with applicable provisions of the rules. All the OFS (operational fixed service) frequencies are subject potentially to an inquiry and rulemaking on implementation of actions taken at the 1979 World Administrative Radio Conference.

Licensees in the 2.5 GHz band will be conditioned on the outcome of proceedings proposing new technical standards for the band and a reallocation of frequencies providing, among other things, OFS access to more channels. Licensees will be required to comply with technical standards in effect for the Instructional Television Fixed Service until those proceedings are completed.

The FCC stated that only the bands above 13 GHz can provide the channel widths of 20 MHz necessary for high-quality "multihop" directional transmission of more than one transmitter-to-antenna relay. It said that frequencies in the band are subject to attenuation by weather and the suitable equipment is limited. Better system design may reduce the attenuation, officials said, and availability of the band may stimulate technical developments.

NCTA Engineering Has Full Plate

WASHINGTON, D.C.—The National Cable Television Association's Engineering Committee, chaired by Viacom's Frank Bias, met here recently to deal with a number of important industry issues, including signal leakage, teletext standards, safety codes and grounding, and the latest in a series of performance testing of three-meter earth stations.

The meeting marked the first occasion the full committee had the opportunity to work with Wendell H. Bailey, NCTA's new vice president of science and technology. Bailey came to NCTA from MCI Telecommunications Corporation, where he worked as engineering manager over-

Cliff Paul of the FCC Cable Bureau (left) and Michael Jeffers, Jerrold vice president of engineering, converse during the recent NCTA Engineering Committee meeting.

seeing engineers and technicians responsible for the design and construction of MCI's terminal facilities.

Bailey recently told **CED** that among the most pressing technological challenges facing the cable television industry are: signal leakage, 400 MHz, low-power television, VHF drop-ins, teletext standards and U.S. participation in the worldwide satellite allocation proceedings.

At the committee meeting, members heard from the Cable Bureau's Cliff Paul on the subject of signal leakage and the potential for interference to aeronautical frequencies. At this point, what the commission and the engineering committee are seeking, for the most part, is compliance with the FCC's interim rules as they presently exist. But, as one member of the committee stated, "Cable is just not capable of making airplanes fall from the sky." (See page 30.)

The committee then discussed the association's pending filing with regard to the United Kingdom's Teletext Industry group's proposal for a national standard. According to Bailey, a subcommittee of the NCTA engineering committee will be conducting tests of the potential effect a standard for teletext would have on the nation's cable television subscribers, currently estimated to be 18.6 million.

"We certainly don't object to the establishment of standards," Bailey said. "What we have to concern ourselves with is that the services can be transmitted via cable."

Also on the agenda was a review of the latest NEC and NESC codes which some engineers believe ignore problems very basic to cable as far as electrical shock and safety are concerned.

Prompting as much discussion as any of the agenda items was, once again, the role in the marketplace for "cable-ready" television sets. Concern is, of course, not only for compatibility if it should become workable at all, but also for the fallout to the cable operator should a potential subscriber buy an expensive receiver with the expectation that it would be sufficient to accept a full range of cable services. A joint EIA/NCTA subcommittee is being formed to study the matter further and possibly open "negotiations" with the manufacturing community.

FCC Grants Comsat Authority To Develop DBS

WASHINGTON, D.C.—Despite stringent objections from the broadcast community, the Federal Communications Commission has granted initial authority for Comsat to proceed with its plans to develop a direct broadcast satellite (DBS) subscription television service. The commission also proposed interim policies for what was termed "the new generation of television technology."

(For other DBS developments, see "Satellite News.")

Although the commission was unanimous in its decision to proceed with interim guidelines for DBS, several thorny issues must still be resolved. Foremost among these is the ironic fact that even though the FCC will now accept applications for interim DBS systems, the specific frequencies and orbital positions cannot be allocated until after the 1983 Regional Administrative Radio Conference. During the time preceeding the 1983 RARC, applicants will be allowed to offer suggested preferences for frequencies within the 12.2 to 12.7 GHz band.

FOR

FULL-SERVICE Construction

- ☐ Make-ready survey
- ☐ Design: strand & electronics
- ☐ CATV equipment
- ☐ Field engineering
- ☐ Quality construction
- ☐ Project management

For FULL SERVICE...
from survey thru proof of performance,
call on

AM CABLE TV INDUSTRIES, INC.
P.O. Box 505, Quakertown, PA 18951

Formerly AM Communications Corporation, AM Electronics Corporation and Courier-Hooks Corporation

Toll Free: (800) 523-6742 or 6743
In PA: Call Collect (215) 538-2165

See Us at the NCTA—Booth #523

Another prime concern will be the treatment of existing terrestrial fixed microwave services that operate near or within the band that will be allocated to DBS services. According to Dr. Stephen Lukasik, chief scientist for the FCC, there are 1,400 microwave links currently in operation with an additional 150 to 200 added each year. Depending on the number of companies that offer DBS services, there is a potential problem of inteference between the two services that would affect DBS subscribers.

"All the interference is from the microwave transmitter into the DBS home receiver," Lukasik explained.

For this reason, the commission noted a strong possibility that some terrestrial microwave users would be forced to move to another frequency. Still at issue is who will be responsible for the financial burden incurred by those who must vacate the frequencies they are presently using.

NCTA Warns of Interference From "Limited Facility" VHF

WASHINGTON, D.C.—The National Cable Television Association has officially expressed its reservations concerning one of the legacies of the FCC's Charles Ferris regime: the authorization of new VHF "limited facility stations" (LFSs—not to be confused with the recently proposed low-power station plan).

According to comments filed by the association, the commission failed "to recognize the interference potential" to cable subscribers. It also neglected to develop "appropriate standards or guidelines governing the disposition of interference problems."

The FCC adopted a notice of proposed rulemaking last September 18 that would establish LFSs across the country. The new stations would be designed to operate in communities geographically closer to existing full-power VHF stations operating on the same or adjacent channels. FCC estimates indicate that approximately 139 new LFSs are possible within 72 of the top 100 television markets.

"Presently there are approximately 800 cable television systems located within these 72 markets," read the NCTA filing. "Another 340 franchises have been granted for new cable systems, making a total of 1,140 operational and planned cable systems within the 72 markets that will be exposed to LFS interference."

Under the proposed alteration of the commission's channel allotment policy, LFSs will reduce their effective radiated power to provide "the equivalent interference protection" afforded by the standard fixed-mileage allotment policy for full-power stations, according to the NCTA. Other than this power limitation, an LFS will have equal status to a full-power station, including mandatory carriage rights on cable systems, under the proposed rules.

The possibility of granting the LFSs mandatory carriage status prompted a stern response in the NCTA comments.

"The NCTA is concerned that the commission proposes arbitrarily to extend its mandatory signal carriage rules to include the new LFSs—despite the fact the continuing validity of these rules is suspect; the commission's authority to adopt them is suspect; and the commission provides no public interest justification for making them applicable to LFSs," the filing read.

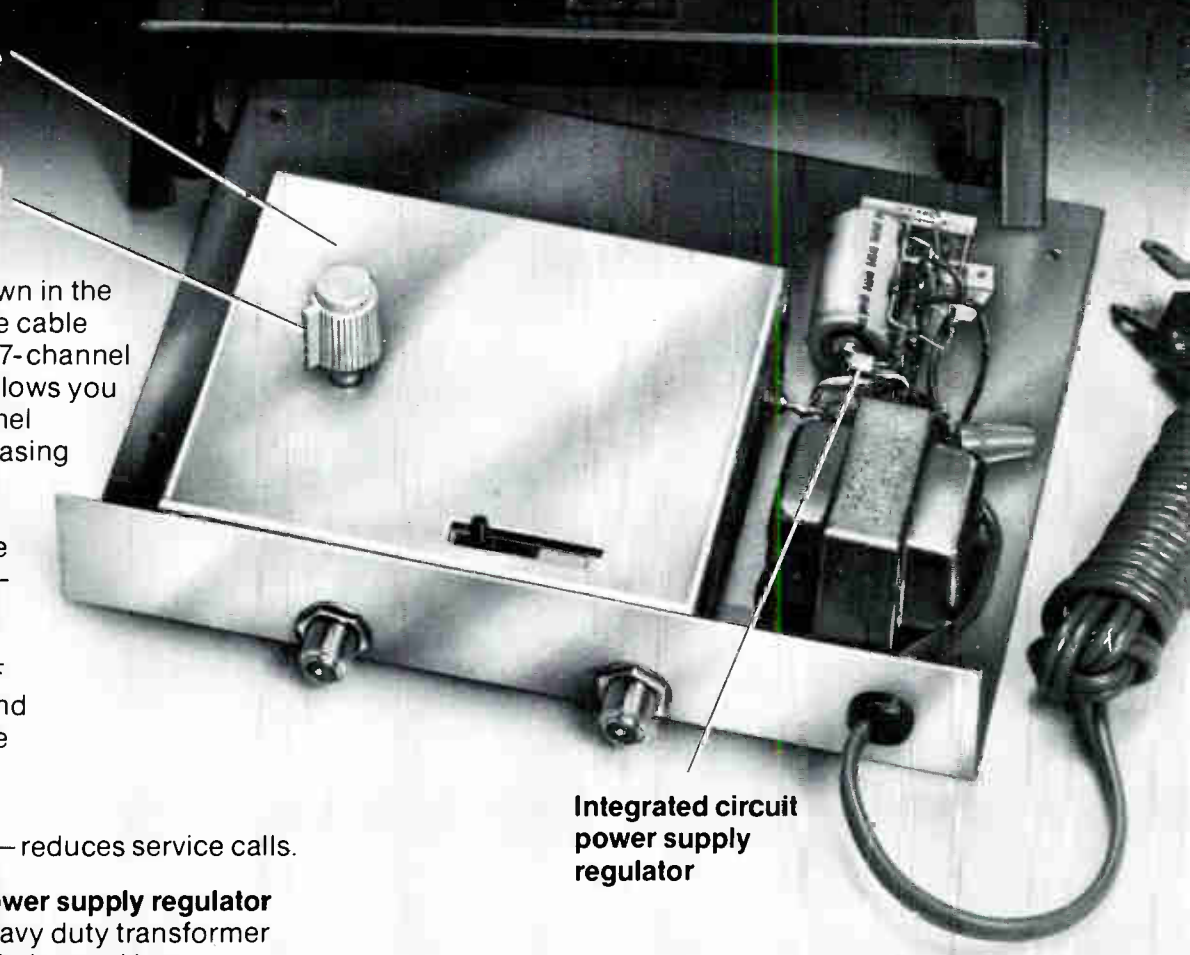
According to the NCTA, the potential interference from LFSs will be in two forms: the interference in reception of distant signals at the cable headend; and direct reception of the stations by home receivers in cable households.

Regarding the first situation, if an LFS begins operating on the same channel as the one on which the distant signal is broadcasting (or an adjacent channel), "the formerly perfectly good distant signal may be rendered unusable for cable distribution," the NCTA stated.

"Such interference at the headend will be intolerable and uncorrectable on virtually every cable television system

ATTENTION, 12-CHANNEL SYSTEMS READY TO EXPAND:

See Us At The NCTA SHOW Booth 556



Vitek Electronics, known in the industry for our unique cable trap, now offers you a 7-channel block converter that allows you to increase your channel capacity without increasing your problems.

Our converter uses the single conversion principle and converts the 7 midband channels (A' thru G') to the VHF channels (7 thru 13) and has the features you've been asking for...

- **Fine tuning control** — reduces service calls.
- **Integrated circuit power supply regulator** — coupled with a heavy duty transformer gives excellent regulation and increases protection against power-line surges.
- **Totally shielded RF module** — prevents interfering signals from entering (ingress) into the converter and prevents signals from radiating from the converter (egress).
- **PC board design** — neat and compact construction allows more reliable and consistent performance.

You wanted an inexpensive, highly reliable 7 channel block converter with impressive specs and a manufacturer to back them up! This is the one. ***Request a demonstration.***

VITEK
A Subsidiary Of AUGAT®

VITEK ELECTRONICS, INC.,
4 Gladys Court, Edison, NJ 08817
(201) 287-3200 Telex-VITEK-EDIN

located within 50 miles of the LFS transmitter, even if the LFS operates at the maximum power reduction," the filing read. "Interference will be caused to about one-half the distant signals received by cable systems located between 50 and 100 miles from the LFS."

To underscore these conclusions, the NCTA commissioned an examination of three sample markets—Scranton, Pennsylvania; Springfield, Illinois; and Lexington, Kentucky.

"The results demonstrate that severe technical interference is likely," the NCTA stated.

In Scranton, the 205 cable systems within a 100-mile radius receive a total of 467 non-local off-the-air stations, the study found.

"It is estimated that 334 of these stations, or 72 percent of the total, would no longer be receivable off-the-air at the cable system headends if the maximum number of LFSs [seven] in the Scranton market become operational," the filing read.

Based on all the information gathered, the NCTA urged that any new rules adopted by the commission: 1) require strict technical coordination between the new LFSs and cable television systems within 100 miles; 2) require the new LFSs to correct interference to previously established cable systems; 3) preclude established cable systems; 3) preclude LFS allotments on channels that are used for subscriber converter output on cable systems within the LFS's predicted Grade B contour; and 4) adopt a "may carry" signal carriage status for the LFSs.

SCTE News

SCTE's CETA Handbook Published

WASHINGTON, D.C.—The Society of Cable Television Engineers, under a grant from the U.S. Labor Department, has produced a handbook entitled: "Cable Television and CETA: An Industry Guide to Working with Government and the Private Sector Initiative Program."

According to Judith Baer, executive director of SCTE, the handbook is designed to assist and encourage companies in the cable television industry to participate in a partnership of business and government. The handbook focuses on local community involvement with the Private Sector Initiative Program (PSIP) in order to bring much needed funding into the industry for training and manpower development.

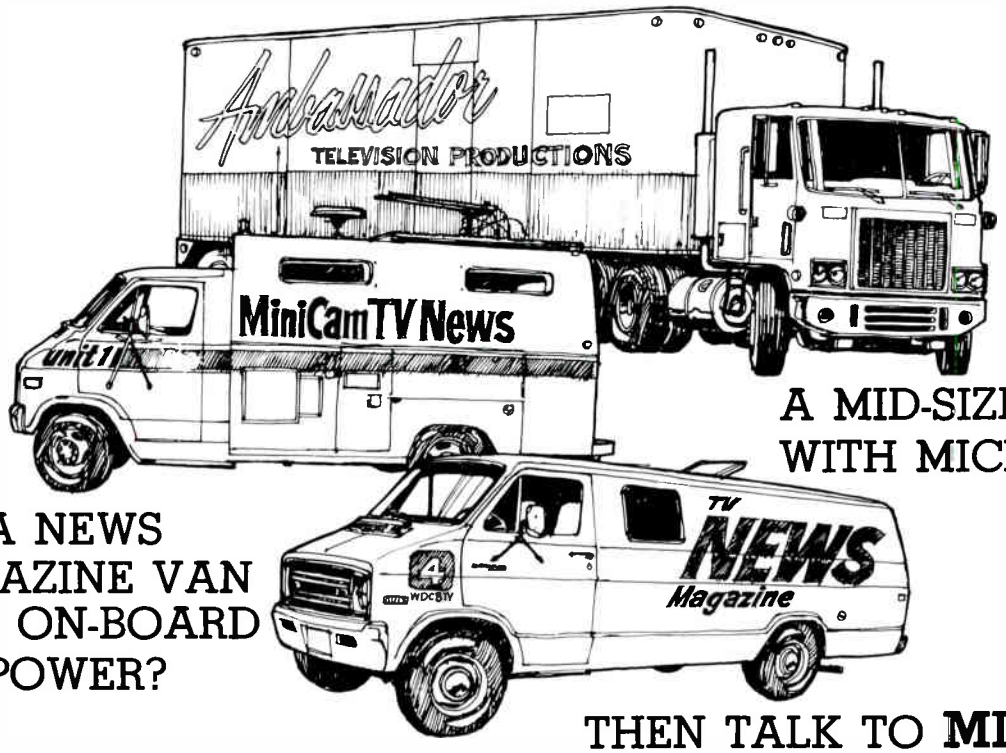
"Participation in this program is most productive at a local level," said Baer, "which makes it well suited to the cable television industry. Nearly $1 million has already been funded to cable television training programs through PSIP. More money is available, but it is up to the industry to take the initiative and communicate its needs with local Private Industry Council leadership."

The handbook explains in detail the workings of CETA and PSIP, benefits available to the cable industry, model programs and resources to contact. SCTE was among seven membership organizations to work with the Labor Department in the development of manpower development programs participating in some $183,000 in grants.

Officials are anxious to point out that although the total budget for CETA recommended by the Reagan Administration could halve the funding available, the private sector initiative program would be left intact and would only eliminate funds designed to serve specific groups of disadvantaged people in preparing them for public service jobs. Funding for the private sector is slated to remain at $325 million for next year in order to permit private industry councils to continue directing CETA expenditures toward training the disadvantaged for permanent jobs in the private sector.

SCTE has distributed 3,000 copies of the handbook, free-of-charge, to its

NEED A FULLY EQUIPPED 40-FOOT PRODUCTION UNIT?



A MID-SIZE ENG TRUCK WITH MICROWAVE?

A NEWS MAGAZINE VAN WITH ON-BOARD POWER?

THEN TALK TO **MIDWEST'S** MOBILE UNIT DIVISION!

Selecting a vendor to supply a $100 thousand or $3 million mobile unit is a great responsibility.

MIDWEST CORPORATION, the nation's largest video sales and service organization, is the best choice for meeting your needs, and here's why:

- We handle major lines of all production equipment, so we don't have to charge for two-stepping.
- Our size and volume means cost savings passed on to you.
- More than 20 years in television means expertise and a good reputation.
- As a major division of UNR Industries, we offer the security and stability of a large and financially sound company.
- We are the single source for custom vehicle, equipment, installation and service.

When your mobile unit order calls for QUICK DELIVERY, GOOD QUALITY, and COST EFFECTIVENESS, don't just pick two . . . pick MIDWEST, and get all three.

A PARTIAL LIST OF OUR MAJOR PRODUCT LINES:

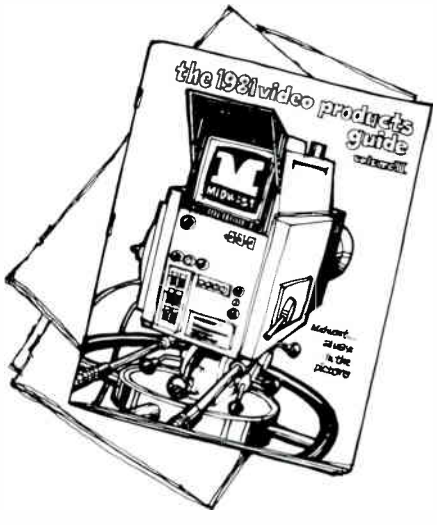
Ampex, Cezar International, Conrac, Digital Video Systems, Fernseh, Gerstenslager, Hitachi, Ikegami, ISI, ITE, Lenco, 3M Minicom, Microwave Associates, O'Conner, Panasonic, Quick Set, RTS Systems, Scientific Atlanta, Sony, System Concepts, Tektronix, Van Ladder, Video-Media, Videotek, Vinten and Wilbert Masts.

Give Carl Raasch, Mobile Unit Sales Manager, a call and allow MIDWEST to quote on your first . . . or next mobile unit requirement.

MIDWEST
CORPORATION

1021 West 8th Street
Cincinnati, OH 45203

A UNR Company



CALL –

800-543-1584

(In Ohio 513-651-1904)

Request a copy

- Mobile Unit Information
- 1981 Video Products Guide
- 1981 CATV Products Guide
- Midwest Capabilities Brochure

See Us at the NCTA Show-Booth 1220

membership and other industry organizations. Additional copies are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Satellites

Common Carrier Enters DBS Competition

WASHINGTON, D.C.—Just 24 hours before the FCC's landmark meeting on direct broadcast satellite (DBS) policy, a second company entered the scramble for squatting rights in the 12/14 GHz arc. Unlike the initial system proposed by Comsat, Direct Broadcast Satellite Corporation (DBSC) has asked to be classified strictly as a common carrier.

On April 20, DBSC notified the FCC of its intent to file for an experimental common carrier license. The license would allow the company to provide DBS service "via one operational satellite that will have a number of spot beams of various configurations covering one-half or two-thirds of the United States geographically." Under the provisions of the proposal, the programming transmitted will be "free to the home viewers" who will provide their own terminals. It will also offer "many more television channels" than the three channels proposed in Comsat's DBS application.

According to the DBSC notice, transponder time would be leased on a "first-come basis to whomever is willing to pay a relatively low price of approximately $500-$1,000 on a TV beam per hour [non-prime time] basis." DBSC would simply be a conduit for the programming, which would be obtained from other sources. sources.

DBSC is still attempting to arrange financing for the venture. Initial financial backing will come from the European/American Bank Venture Corporation of New York. According to the notice, the corporation is owned by six European banks and is the 28th largest bank holding company in the United States. DBSC is also in discussion with several other U.S. investment bankers.

Broadcaster Files For Network-Style DBS Service

NEW YORK, NEW YORK—Another company has joined the small but growing roster of applicants making a case for direct-to-home satellite broadcasting before the Federal Communications Commission. Hubbard Broadcasting, a broadcast station owner with three television outlets (KSTP/Minneapolis-St. Paul, KOB/Albuquerque and WTOG/St. Petersburg, Florida) has approached the FCC with a proposal for a direct-to-home programming service that would utilize the resources of major market over-the-air stations and low-power outlets around the country. If approved, independent television stations could be provided with an opportunity to hook up with a service equivalent to a fourth commercial network.

Under the proposal, filed with the FCC earlier this month, DBS subscribers would receive programming free of charge but would have to supply their own earth stations. For the most part, Hubbard would confine DBS operations to rural communities, with the top 50 television markets covered by individual commercial stations and low-power outlets willing to affiliate with the service.

Under the Hubbard plan, independent stations would be approached to participate in the service first, with low-power stations next in line. Each station would be required to set up an earth receive station as well as provide uplink capability to transmit local programming deemed worthy for possible nationwide broadcast.

The service, to transmit 24 hours daily, would operate under a separate corporation organized by Hubbard.

Stanley S. Hubbard, the company's president and general manager, says the proposal was filed in order to give over-

Now you can find all your CATV test equipment with one phone call. Because Wavetek and Mid State have joined forces and are at the same place on your dial.

For a catalog describing our complete line of CATV instrumentation, call us toll-free at 800-428-4424. In Indiana (317) 787-3332. Or write Wavetek/Mid State, P.O. Box 190, Beech Grove, Indiana 46107. TWX (810) 341-3226.

WAVETEK
MID STATE

See Us at the NCTA—Booth #402

A new line of CATV instruments that's bigger and better than Wavetek or Midstate?

the-air television a chance to survive in an era of increasing competition from cable, home video and, possibly, DBS.

"Free over-the-air television is a cornerstone of broadcasting, and it's imperative that it be maintained," Hubbard said. "If people were mandated to pay for DBS, it would automatically disenfranchise those who couldn't afford to pay. In addition, it would be a threat to television as its exists and prove to be just as much a threat to cable.... We'll be able to ensure a healthy television system where everyone has free access to quality shows. And for many small cities, the DBS aspect will make it possible for them to have the equivalent of their own local station at a reasonable cost."

To be set up at an initial cost of approximately $200 million, the service would offer a mix of news, public affairs, entertainment and children's fare, all on an advertiser-supported basis. Individual stations would take the responsibility for selling local ad time and national spots. In the manner of the television networks, stations taking the service would receive compensation.

Specific programming details are yet to be formulated, but in one area, news coverage, Hubbard plans to mix reports from member stations with those from news bureaus maintained by the service. On the entertainment front, a number of producers and syndicators have already been contacted about Hubbard's proposal. "From all indications," Hubbard adds, "they're very excited about the potential."

In addition to providing programs on a daily basis, stations would also have a say in national programming fare through a special board comprised of program directors affiliated with the service. An executive would be appointed to handle daily programming decisions and scheduling.

Although technical details of the DBS service will be submitted to the FCC at a later date, Hubbard noted that one or more satellites would be used for transmitting the service, with the outside chance of sharing satellite capacity with other potential DBS services, including Comsat.

Start-up of the service could take place within two to three years after FCC approval.

Business Notes

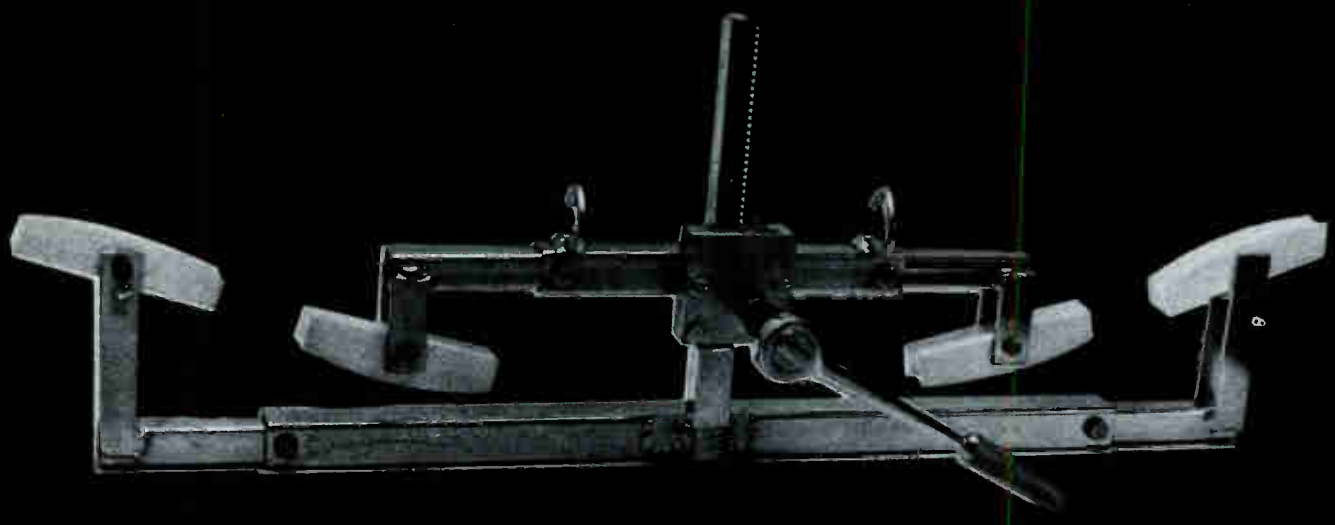
★ **American Telephone and Telegraph** is moving ahead with its three-year trial of distributing television programs by satellites, and has signed contracts to provide the service to CBS and ABC. CBS intends to supplement its full-time transmission facilities by providing satellite interconnection between its production complex at Television City, Hollywood, and its Broadcast Center in New York. Additional ground terminals will be installed at key network distribution locations over the next 24 months.

★ **Warner Amex Cable Communications** has presented the City of Somerville, Massachusetts, a $70,000 grant which will be used to establish two new locally oriented cable channels for educational and municipal purposes. The grant also includes new cable equipment. The equipment being donated by Warner Amex consists of field production equipment, studio cameras, editing equipment and a highly sophisticated character generator, and has a cash value of approximately $50,000. The budgetary resource grant of $20,000 will be used to set up the programming originating on the two channels. The municipal channel will serve as an "Electronic Bulletin Board" for the city, carrying up-to-the-minute information on city services, public events, and notices from municipal offices and city officials.

★ The Electronic and Industrial Cable Division of **Brand-Rex Company** has

"flat-bottomed loops will withstand continued flexing longer than the round-bottomed loops."

— December '80 CED "Out Of Sync"



Specify the

Jackson Bender

for superior "flat-bottomed" loops

Jackson Tool Systems

Division of Jackson Enterprises

P.O. BOX 6 CLAYTON, OHIO 45315 (513) 836 · 2641

increased tubing and sleeving manufacturing capabilities at its Willimantic, Connecticut, facilities. The added capability includes the addition of two new extrusion lines and the planned addition of a third. The division also has expanded its marketing and sales staff and dedicated part of its process laboratory to development of new material formulations for non-cable products. The expansion is part of an overall program Brand-Rex initiated in July 1980 to add 60,000 square feet of manufacturing floor space.

★ **CDC-Lectro Products** has recently moved into a new 25,000 square foot office and production facility at 650 Athena Drive in Athens, Georgia. This space more than doubles the previous manufacturing area. With the additional production space, Lectro will be able to manufacture in excess of 1,000 standby power supplies per month, according to a company spokesperson. Lectro Products manufactures the Lectro Standby and regular power supplies used in cable systems throughout the U.S., Alaska, Mexico and Puerto Rico. CDC is the marketing arm and sister company to Lectro.

★ **Radiation Systems, Inc.**, has formed a subsidiary, SatCom Technologies, Inc., to provide a complete line of earth station antenna products. The company, based in Atlanta, Georgia, is now delivering earth station antennas ranging in size from three-meters to 13-meters. One of its products is the Torus multiple-beam earth station antenna which provides constant quality signals from several satellites simultaneously. Under exclusive license from Comsat, the Torus will be manufactured by Radiation Systems, Inc., and marketed through SatCom Technologies.

★ **Comsearch, Inc.**, of Fall Church, Virginia, has produced new literature on its low-power TV engineering services. The subjects of low-power broadcast TV frequency search, interference analysis, application preparation and satellite earth stations are discussed. The literature is available at no charge by writing Comsearch, Inc., 7633 Leesburg Pike, Falls Church, Virginia 22043; (703) 356-9470.

★ **Microdyne Corporation** has received a contract from Wold Communications, Inc., to manufacture and install at least 100 satellite receive only earth stations during the term of the agreement. More than fifty seven-meter stations have already been ordered for installation by late summer. The total purchase under this agreement may exceed $4 million. The earth stations will be used to implement nationwide satellite distribution of *Entertainment Tonight* and *The Merv Griffin Show*.

INTRODUCING

THE GCC 4100

THE GCC 4200

Visit Us at the NCTA Show Booth #206

Our customers told us how *they* would like a receiver designed. We took their advice. We maintained our basic belief that every receiver should be independent of other devices. The result — two great new Gardiner products. Evolved from our highly successful 4000 series receivers.

No more crystals to stock. 24 channel synthesized tuning. No tuning adjustments needed. Two audio sub-carriers standard. Provision for two additional sub-carriers. LNA power from every receiver.

Test points are available on the front panel. Indicator lamps display circuit functions. The 4200 has dual input and is remotely controllable.

SEVEN DAY DELIVERY IS TYPICAL

Gardiner Communications Corporation A Burnup and Sims Company

1980 SOUTH POST OAK ROAD, SUITE 2040 ■ HOUSTON, TEXAS 77056 ■ (713) 961-7348 ■ TWX 910 188 1586

Cable And The Aeronauticals

As the FCC noted even back in 1977, the issue of interference to air navigation and aeronautical frequencies is not a new one. But stepped up monitoring activities by the commission, plus the more sophisticated design of cable systems now being built in the suburban and urban markets, have raised the profile, once again, of what has long been described by nearly all but the FAA as "a phony issue." For the cable television industry, the issue is, at least politically, a real one and the solutions to it are largely technical. Flanking a "backgrounder" below are two approaches to a major part of the problem put forth by two of the industry's best known engineers. Their "exchange" first appeared in* Tech Line, *a publication of the National Cable Television Association.

HRC Inflexible

By Archer Taylor,
Malarkey, Taylor & Associates.

The August 1980 case of aeronautical interference on 133.25 MHz at 20,000 feet over a badly damaged cable in the Flint, Michigan, cable system has virtually eliminated any chance that the new, relaxed signal leakage rules will be adopted for many years. In fact, if the cable industry in the U.S. fails to comply fully, and soon, with FCC RR 76.610 (notification and leakage monitoring), the pressure will be enormously increased to prohibit any cable operations in the bands 108-136 MHz and 225-400 MHz.

The HRC channelling plan is inflexible and will not permit offsets to avoid conflict. The power ceiling is 10^{-5} watts, or 28.75 dBmV. Assuming 7 dB true tilt, the maximum operational visual carrier level allowable at 400 MHz is shown in Table 1.

Frequency of Conflict MHz	Max. Visual Carrier Level at 400 MHz	
	If Conflict is a Visual Carrier	If Conflict is an Aural Carrier
72	34.5 dBmV	47.5-51.5 dBmV
120	32.8 dBmV	45.8-49.8 dBmV
270	30.0 dBmV	43.0-47.0 dBmV
400	28.8 dBmV	41.8-45.8 dBmV

Table 1

From this, it appears that conflicts with visual carriers cannot be resolved by power reduction; however, most aural carrier conflicts could probably be resolved by keeping aural levels close to 17 dB below visual.

As I see it, HRC systems probably will be required to

Continued on Page 32.

It has been nearly four years since the Federal Communications Commission established its restrictions and rules requiring cable systems to monitor for signal leakage, especially as they pertain to systems operating on frequencies used by air navigation and aeronautical and marine emergency radio services. Except for occasional proddings by the Federal Aviation Administration and the interest generated by the findings of the joint government and industry advisory committee to the Federal Communications Commission on the subject of cable's use of the aeronauticals, the issue remained relatively quiet.

Recently, as a result of an "incident" last summer in which it was thought that signals radiating from a system in Michigan caused potentially dangerous interference to aircraft operations over Michigan, the situation has changed. This "incident,"

FCC Cable Television Bureau engineer Cliff Paul discusses cable's use of the aeroneutical frequencies.

combined with a stepped-up effort by the Federal Communications Commission to see that cable systems are in compliance with all of the rules, has once again focused attention on what some consider a serious industry problem. To others, the question is a "red herring," the result of bureaucratic blustering.

At the time the FCC established Section 76.610 of the rules governing the use of aeronauticals 108-136 and 225-400 MHz and the rules which became effective January 1, 1978, it decided to grandfather systems already using those frequencies as long as such use was reported using Form 325. Subsequent to that date, all new uses of those frequencies had to be reported to the commission in writing 60 days before their activation. System operators were also required to monitor their systems regularly for signal leakage, keep logs of such leaks, and make any repairs necessary.

It wasn't until this fall, however, that the FCC let known its intentions to make monitoring of these frequencies a priority. The FCC's Field Operations Bureaus are inspecting cable systems to determine what channels are being used, when use of the aeronautical channels began, what carrier frequencies are being used, what peak power levels are being employed, and when the FCC was first notified of the use of aeronautical.

Under the forfeiture authority given to the commission by Congress in 1977, cable operators could be liable for fines up to $20,000 per violation. In fact, the FCC has said that systems operating in these frequencies without prior notification and authorization will most likely be fined. Those who file notification now, even though it is late, and cease operation on those channels until authorization is received will "probably be all right." Power on the channels could be reduced below 10^{-5} but that could lead to technical problems and violations of other rules.

The latest crackdown, as necessary as the commission believes it to be, has once again fueled the controversy over the integrity of cable television technology and sparked renewal of the debate over whether or not radiation from cable systems is a threat to air safety.

As the members of the Advisory Committee on Signal Leakage reported to the FCC in late 1979, there never has been any question that air traffic safety takes precedence over cable systems. The principal questions are what constitutes harmful interference; is it possible for cable television systems to cause harmful interference and, if so, under what conditions is it possible to assure that harmful interference will not occur?

As a result of its research, the advisory committee recom-

Continued on Page 34.

HRC Flexible

By Sruki Switzer,
Cablecasting Limited.

Let me deal specifically with the problems raised with respect to "inflexibility" of HRC systems in dealing with present aeronautical interference rules (76.610).

Table 3 shows a practical current example from a major metropolitan area (Chicago). This listing has been received from the FCC in response to a 400 MHz HRC notification in that area.

Note that no conflicts outside the 108-136 MHz band were reported by the FCC. The aural carrier conflicts are resolved by the reduced aural carrier levels in the system.

Cable Freq. MHz	Aero Freq. MHz	Aero Location	Co-ordinates		R KM	D KM
114.00	113.90	Chicago	41-59-16	87-54-17	74	14.3
118.50	118.40	Chicago	41-37-17	87-46-10	74	29.4
118.50	118.55	South Bend	41-41-55	86-18-35	74	126*
118.50	118.60	Kenosha	42-36-00	87-55-00	37	80.0
120.00	119.90	Wheeling	42-06-35	87-53-35	46	26.1
120.00	120.00	Milwaukee	42-57-00	87-54-02	9.3	119*
120.00	120.05	Chicago	41-47-19	87-44-38	74	11.7
124.5	124.5	W. Chicago	41-55-14	88-14-20	56	36.6
126.00	126.05	Chicago	41-57-57	87-53-21	74	11.6
132.00	132.05	South Bend	41-41-55	86-18-35	74	125*

**The signals will not be in conflict if cable system in direction of aeronautical service falls outside 111 KM radius of aeronautical service.*

Table 3

The HRC system is not inflexible. We can change the frequency of the master 6 MHz oscillator somewhat. The limits on this change are set principally by considerations of adjacent channel interference. The 6 MHz spacing should not be so altered as to significantly affect the adjacent channel selectivity of subscribers' receivers.

Our principal conflicts are the visual carriers at 120.000 and 126.000 MHz. We can achieve a tolerance of 1 KHz in our cable system visual carrier frequencies at modest cost; in fact, we can do much better if we wish to. To achieve the desired degree of flexibility, we replace the crystal in the harmonic comb generator with a laboratory type synthesizer driven by a

Continued on Page 32

abandon certain channels because they cannot offset and cannot reduce power. The only hope would be a waiver, probably based on location outside the service volume of the aeronautical station. Table 2 is a list of channels an HRC system might not be able to use.

From my experience, I would expect that virtually every metropolitan cable system with an HRC plan would encounter at least one or two of these channels in conflict with respect to the visual carrier. The aural conflicts are not so difficult to resolve.

But, in addition, the band 225-400 MHz is assigned for government use, primarily military.

Channel	Frequency of Conflict MHz		Aeronautical Frequency—MHz
	Visual	Aural	(FCC Assignments)
4A	72.00	—	72.02, 72.04, 72.06, 72.08, 72.10 MHz
A-2	108.00	112.50	108.1 Localizer; 108.00, 108.05, 106.10 112.40, 112.45, 112.50, 112.55, 112.60 DME
A-1	114.00	118.50	113.90, 113.95, 114.00, 114.05, 114.10, DME; 118.400, 118.425, 118.450, 118.500, 118.525, 118.550 118.575, 118.560, Airdrome Control.
A	120.00	124.50	119.900, 119.925, 119.950, 119.975, 120.00, 120.025, 120.050, 120.075, 120.100, 124.400, 124.425, 124.450, 124.475, 124.500, 124.525, 124.550, 124.575, 124.600, Airdrome Control
B	126.00	130.50	125.900, 125.925, 125.950, 125.975, 126.000, 126.025, 126.050, 126.075, 126.100, Airdrome Control; 130.400, 130.425, 130.450, 130.475, 130.500, 130.525, 130.550, 130.575, 130.600, Enroute Communications
C	132.00	—	131.900, 131.925, 131.950, 131.975, 132.00, Enroute Communications; 132.025, 132.050, 132.075, 133.000, Airdrome Control
( )	330.00	334.50	330.05, 334.55, Glide Slope

Table 2

I know from experience that there are several frequencies in conflict with the standard (or IRC) channelling plans in the 250-280 MHz range. I also know that the 335-400 MHz band is full of military aircraft frequencies, classified, and constantly changed for security reasons. I suspect that most HRC systems will encounter one or two conflicts at these frequencies, and those in the vicinity of Air Force bases may have a very serious problem (unless the military simply overlooks the matter, which is a possibility).

I cannot agree more that the issue of interference to aeronautical radio is a phony issue. But phony or not, the guys with the power to take action—punitive and regulatory—are unwilling to face the political hazards of arguing that it is phony. The threat of total shutdown in the 108-136 and 225-400 MHz bands is more real now (after Flint) than ever.

Potentially, a 402 MHz system may be able legally to carry far less than the 55 channels which it has been claimed to be capable of carrying. That is good for composite triple beats, but doesn't make much sense. Without HRC, most of the aeronautical conflicts can be resolved by offsets, though even this may put a burden on IF selectivity in the TV set.

time base of whatever accuracy and stability we need and are willing to pay for. A large system can easily afford a rubidium time base. These are commonly used by broadcasters for precision offset transmitter frequency control. The synthesizer can be adjusted in increments of 0.1 Hz to any frequency we want in the 6 MHz region. This frequency will be maintained to the accuracy and stability of the external time base. An accuracy of 1 in 10^{-5} can be achieved by using a rubidium oscillator time base for the synthesizer. This is equivalent to 0.4 Hz at 400 MHz. Let us therefore forget about the system carrier accuracy factor. We can achieve virtually any accuracy we (or the FCC/FAA) want.

Let us discuss the tolerable range of frequencies for the 6 MHz master oscillator. Adjacent channels in the broadcasting system can differ from the nominal 6 MHz by as much as 22 KHz. This 22 KHz is the sum of the ±10 KHz offsets and the ±1 KHz frequency tolerances. When multiplied into the 120 MHz region (harmonics 19, 20, 21, and 22) the 22 KHz shift becomes carrier shifts in the range of 450 KHz approximately.

How will I use this in my Chicago example? Let us consider a master oscillator shift upward, i.e., all carriers would shift upward. A shift of only 150 KHz (assuming that the carrier frequency tolerance is negligible by comparison, e.g. 100 Hz) would get me out of trouble in all the conflicts.

We want the nominal 120.000 MHz visual carrier to become 120.150 MHz by setting the frequency of the 6 MHz master HRC oscillator. The required master oscillator frequency would become 120.150/20 = 6.007500 MHz. The interchannel spacing becomes 6.007500 MHz, well within the ±22 KHz range discussed previously as necessary for adjacent channel interference considerations. The "critical" frequencies are listed in Table 4.

This has cleared up this particular set of conflicts. I may have created a new set. I would submit the revised set to the FCC and see.

The 7.5 KHz upward shift in the master oscillator means that all the HRC channels would be shifted upward. The higher channels will experience the greatest shift. The highest channel in a 400 MHz HRC system would have a harmonic number of 66. The nominal carrier frequency would be 396.000 MHz. With the shifted master oscillator the carrier frequency will be 66 × 6.0075 = 396.495 MHz. This is about 500 KHz from HRC nominal, and could conceivably affect the use of subscriber tuning converters. Our experience is that tuning shifts of this magnitude are not significant.

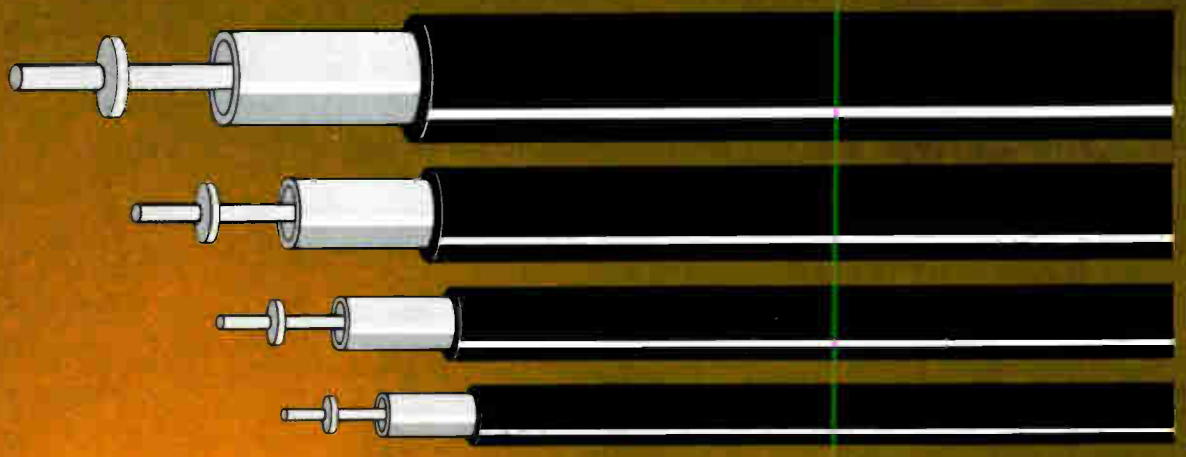
Aero Freq	Nominal HRC	"Shifted" HRC
113.90 MHz	114.000 MHz	114.1425 MHz
119.90	120.000	120.1500
120.05	120.000	120.1500
126.05	126.000	126.1575

Table 4

My preference would be to submit an engineering showing as the basis for a waiver. There is a minimum 50 KHz spacing from voice communications channels. There is a 100 KHz spacing from the navigation channel. With assured frequency stability these should be adequate separations from aeronautical frequencies. I am building a brand new system in an urban area with high ambient broadcast signal levels. I am really more concerned about signal ingress from these broadcast sources (and others, such as land mobile transmitters). In the process of protecting my system from these ingress sources, I protect the aeronautical system (and other telecommunications users). I notify the FCC. I have a radiation patrol. I have 24-hour technical service capable of shutting down the offending channels. I will even have remote control for shutting them off. I can maintain visual carrier frequency tolerance to 100 Hz, or 10 Hz or even 1 Hz. I believe

Continued on Page 34

FUSED DISC® III



Today...

Fused Disc® III is the standard in low-loss cable system design. This unique design provides you with:

- Maximum Efficiency Hub Design
- Reduced Electronics and Power Supplies
- Lower Maintenance Costs
- Lower Energy Costs

And Tomorrow...?

An extraordinary concept in Fused Disc® is just over the horizon. Don't miss our exhibit, booth 156, at the NCTA show.

More and more systems are being built, rebuilt and expanded with our cable. For an information package on this high performance cable, write:
General Cable Co., CATV Division,
P.O. Box 700, Woodbridge, N.J. 07095
or call Toll Free: (800) 526-4241,
if calling from N.J. dial: (201) 636-5500.

General Cable
a GK Technologies company
CATV
DIVISION

See Us at the NCTA—Booth 156

Continued from Page 32

that I can file a credible appeal for a waiver, if I could get the FCC to "listen." The people in the cable bureau tell me that they just don't have the manpower to deal expeditiously with any requests for waivers at the present time. I expect that this situation will change in the near future and the commission will deal expeditiously with our waiver requests.

Furthermore, non-coherent systems are also somewhat inflexible in channel allocation. The optimum adjacent channel spacing is 6 MHz + 22 KHz. Anything outside that range could create problems. The "shifts" I propose for HRC systems create useful carrier flexibility without exceeding the allowable channel spacing. Admittedly all channels must shift together and in the same direction, but we should not assume that non-coherent systems are completely flexible in their channeling. In fact, I think we will find significant problems in shifting individual "conventional" carriers by 100 KHz if we have to do so. I expect that significant adjacent channel rejection problems will be created in many subscribers' receivers.

I am confident that my 400 MHz systems will legally carry all the channels which are claimed for them. Aeronautical conflicts are a temporary nuisance. We can cope with them, but the industry must achieve a better basic accommodation with the FCC and FAA on this issue. We might have to take court action to achieve it. Cable interests must realize that yielding on the aeronautical issue exposes us to similar claims on every part of the cable spectrum. Public safety spectrum users will claim similar protection. Even broadcasters will claim protection, arguing that radiation from our systems can interfere with direct reception of their broadcasts. Either we are operating on a "closed circuit" system or we're not. We must determine the design, construction, and operational parameters of a "closed circuit" system and then get full FCC agreement on those parameters.

Continued from Page 31

mended that, as the commission already ruled, existing systems be grandfathered for a period of time long enough to permit cable system improvement in the normal course of rebuilding. Also recommended was that the FCC adopt a new set of rules based on proof that cable systems leakage is below a specified threshold. The recommendation was that systems meeting the criteria would be permitted to use almost any of the frequencies. And, it also recommended that the FCC have the authority to terminate cable system operation if harmful interference occurs, regardless of whether or not leakage criteria are met.

Clouding the issue now, is what has been described as the cable industry's "lack of good faith" in not fully complying with just the notification requirements as set out in 76.610. As for the technical aspects of the debate, it is often said that the record need only be examined. As the commission noted four years ago when it promulgated the rules: " . . . present concern over the issue of cable television interference to air navigation and aeronautical frequencies does not stem from a plethora of reported incidents involving the effect of cable radiation on aircraft. Indeed, we know of only one such case in the last 25 years."

That case became known, of course, as the "Harrisburg Incident." According to the commission, an improperly radiating cable television signal in Harrisburg, Pennsylvania, caused unwanted noise in aircraft receivers when no desired signal was present. "But even in that case," the commission said, "we have no reports of actual degradation of desired signals."

That was four years ago, however, and the dramatic increase since then of the industry's use of the mid-band frequencies, the move to 400 MHz, and the rapid growth of the industry in general, now give more credence to the commission and FAA's concern that "totally uncontrolled" cable use of the aeronauticals might cause difficulties even though cable television is still not making airplanes fall out of the sky.

In House Reporting Form

Printed below is a suggested "in-house" reporting form sent to **CED** by Frank DeJoy, vice president engineering, Suburban Cablevision, East Orange, New Jersey. When DeJoy was corporate staff engineer at Warner Amex in Piscataway, New Jersey, one of his responsibilities was to prepare and submit the 76.601 notices to the FCC for all system upgrades and new builds involving the use of these channels.

"After struggling through the initial notices and following several discussions with the FCC," DeJoy writes, "I prepared the data sheets and distributed them throughout the company's systems. When completed, they were returned to me for filing with the commission. The primary benefit is to substantially reduce the time-consuming inquiries by the individual systems to the commission regarding specific data required."

Compliance With FCC Section 76.610
Distribution Frequency Data

System Name _____
System Community Code Number_____ System Location _____

Headend Coordinates — Latitude _____ Longitude _____

Approximate center of franchise coordinates — Latitude _____ Longitude _____

Distance and direction from center of system to franchise extremities

North _____ mi — South _____ mi
N. East _____ mi — S. West _____ mi
East _____ mi — West _____ mi
S. East _____ mi — N. West _____ mi

Maximum distribution radius _____ mi.

Date service will begin _____
or
date service began _____

Type of system
Standard_____ HRC _____Other _____
Aerial _____% Underground_____%

Proposed Channels Within Frequency Bands 108-136 MHz and 225-400 MHz

Ch.	Video Carrier Freq. (MHz)	Modulation	Audio Carrier Freq. (MHz)	Modulation	Maximum Distribution Level (dBmv)
Aux-1					
Aux-2					
A					
B					
Pilot Carriers/Control Signals					

Levels Below 28.75 dBmv Not Applicable

Attach separate sheet if additional space is required.

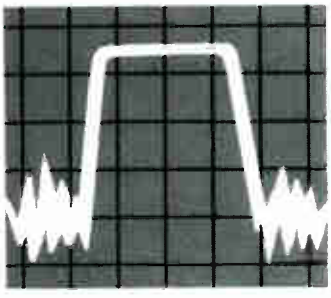
Phasecom Is Now Delivering the Industry's FIRST SAW Filter Heterodyne Processor.

First...and foremost. A heterodyne processor with the performance and reliability virtues of the Surface Acoustic Wave Filter. We're delivering them now in production quantities to cable systems across the country.

The SAW Filter did so well in our high performance modulators that we incorporated it in our processors as well. Now, the Model 2306 Heterodyne Processor's ±0.5dB video passband response and ±25nsec. group delay provide greater than ever signal transparency and drift-free adjacent channel rejection of better than 65dB.

And while we were at it, we added some extra interface versatility. Like external IF links for emergency alert access, and remote enabling of the internal standby carrier. Add this to our unique "Automatic Notch Control" circuits for control of the visual/aural carrier ratio and the 2000 Series reputation for exceptional reliability, and you'll see why it's not only first ...but foremost.

Call today for price & delivery. You'll be pleasantly surprised!



PHASECOM CORP.
The Headend Experts

6365 Arizona Circle
Los Angeles, CA 90045
(213) 641-3501
Telex: 181899

Turning a Color TV Into an Input Converter

By Robert Rotella, Jr., lead/bench technician; and Richard White, system engineer, Cox Cable South Carolina.

As it so often happens, situations in cable television arise where innovation and the ability to use equipment on hand become paramount in the operation of the system. This article relates a somewhat uncommon problem with an equally uncommon solution. Finding the solution required an operational understanding and familiarity with signal processors, spectrum analyzers and the IF relationship of televisions.

On Saturday, January 3, 1981, our system's only ABC affiliate, WWAY, Channel 3 from Wilmington, North Carolina, suddenly went off the air. At the time it was checked at our headend and found to be the station's problem.

Later that evening another Wilmington station announced on its six o'clock news that a fighter plane, an F-105, flying low level practice missions had struck one of the elements of WWAY's 24-element,

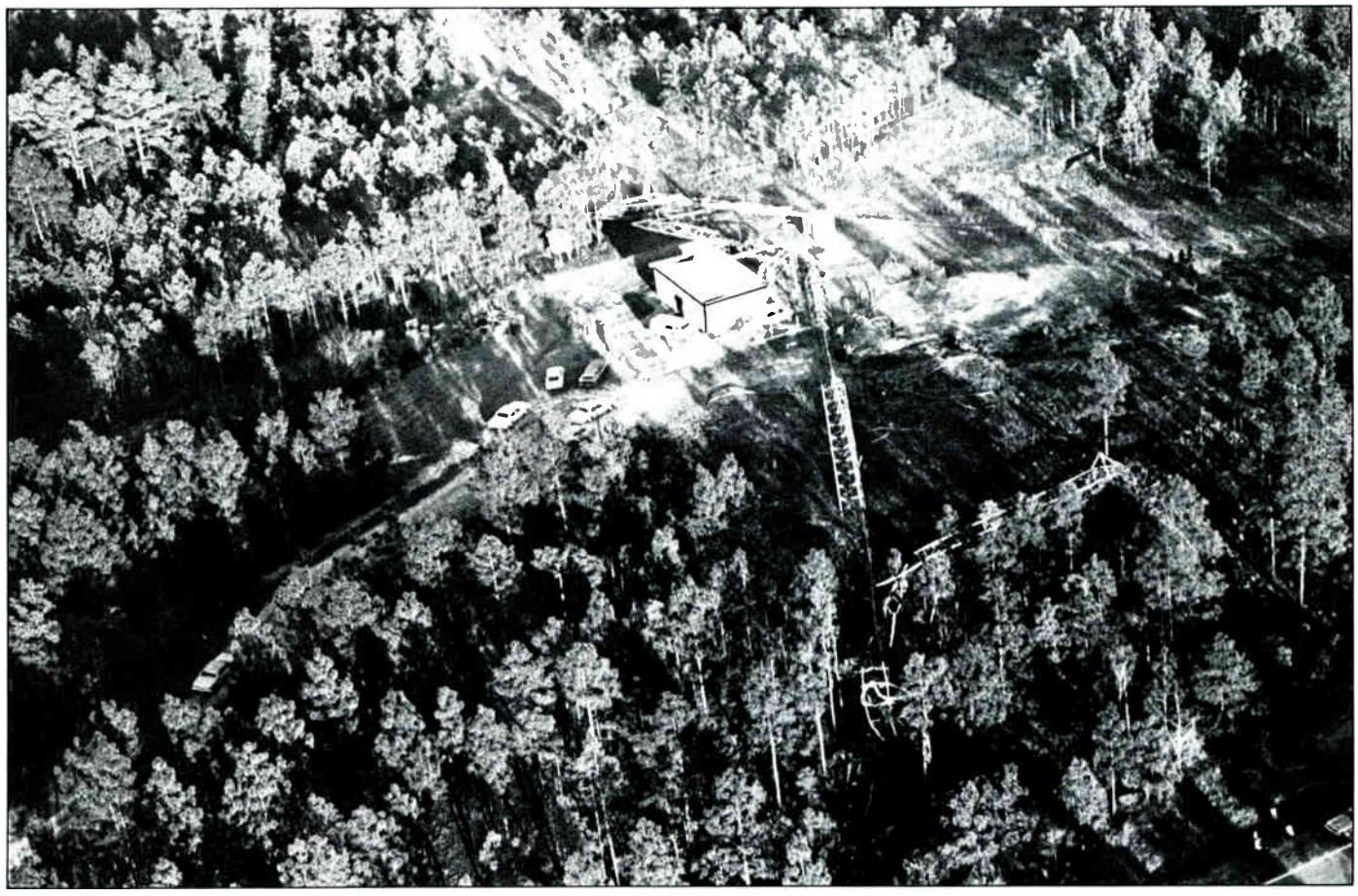
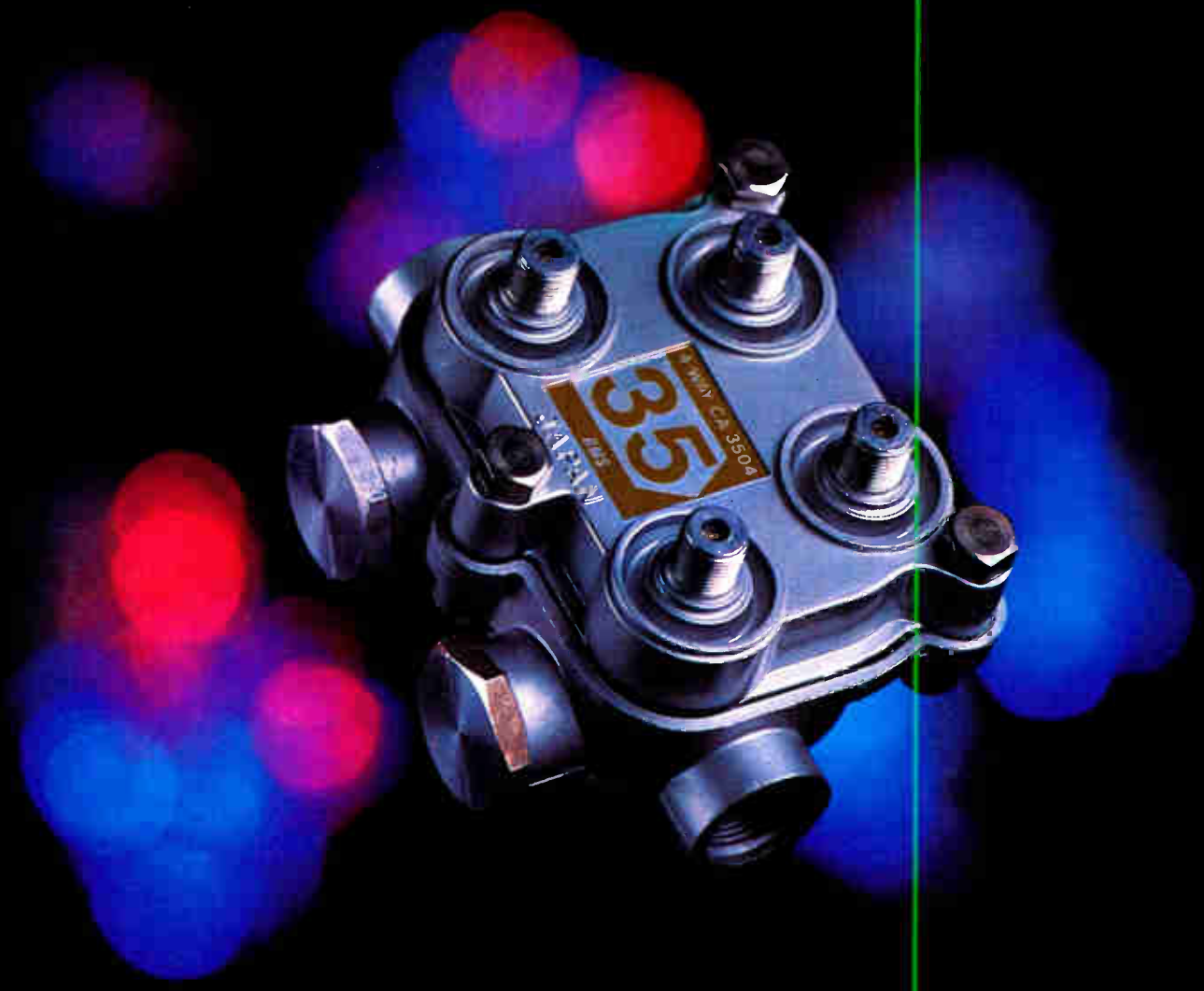


Photo courtesy of WWAY, Wilmington, North Carolina

Cox Cable South Carolina's problems began when WWAY's tower collapsed.

When Quality Counts . . .



. . . count on RMS CATV DIVISION

ELECTRONICS, INC.

A unitap PRODUCT
RMS ELECTRONICS, INC.
50 ANTIN PLACE
BRONX, N.Y. 10462
CALL COLLECT (212) 892-1000
Toll Free (800) 223-8312

Canadian Representative: Decom Sales Corp.
European Representative: Envision AG

"All that was needed was a way to process Channel 15 to Channel 13 temporarily until the appropriate input converters could be received and installed."

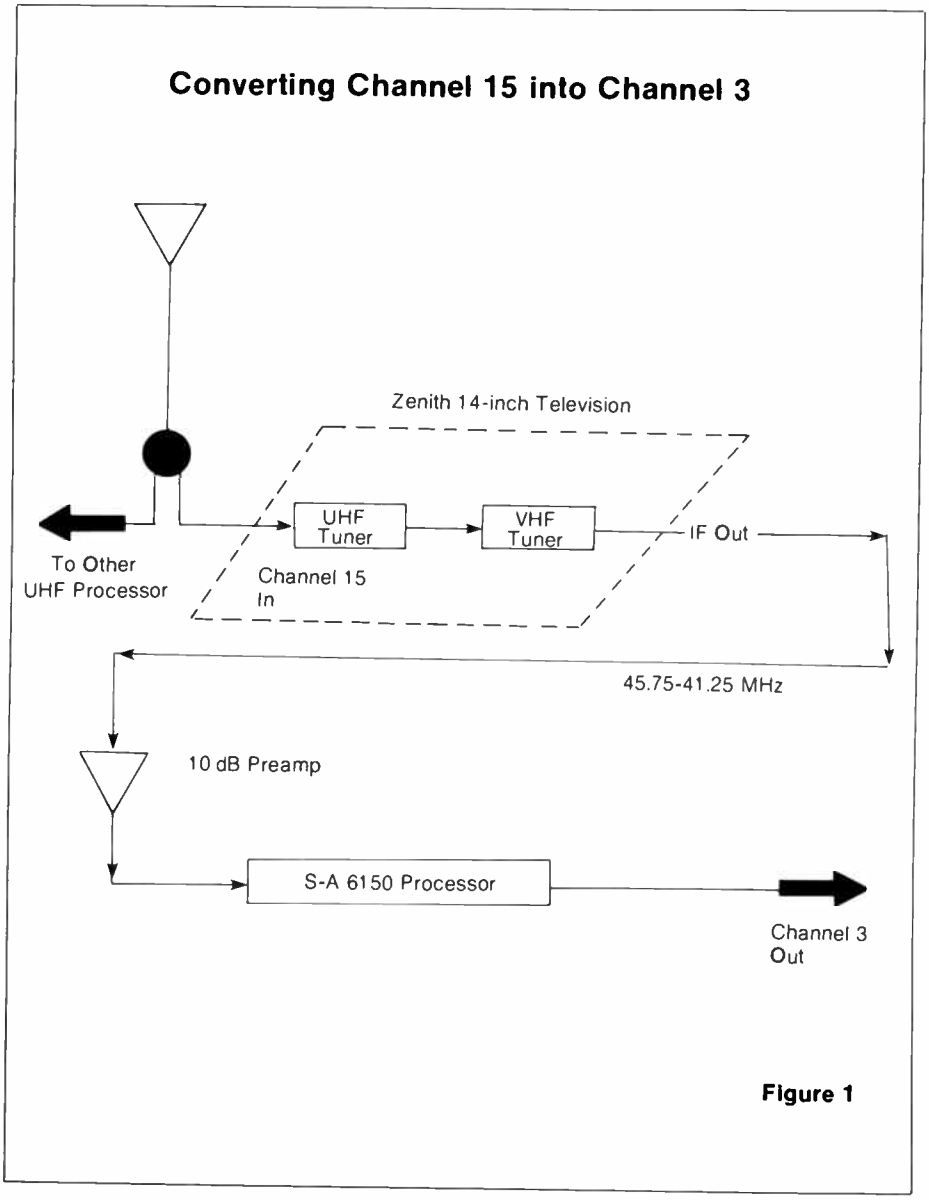


Figure 1

1,187-foot transmitter tower. The tower swayed and then collapsed onto the transmitter building, crushing it and all the equipment inside. Miraculously, no one was hurt at the transmitter site, and the pilot was able to land the plane safely.

Naturally, viewers of Channel 3 were upset because, as I said, it was the only ABC station on the system at that time. Monday morning we contacted WWAY and were told that the approximate rebuild time was about one year. The station's engineer told us that WWAY would erect a temporary stick to provide a signal to its "in town" viewers, but as our antenna site is about 70 miles away, we would not be able to receive an acceptable signal until the rebuild was complete.

As luck would have it a new ABC affiliate, WPDE, Channel 15, out of Florence, South Carolina, went on the air several weeks prior to the tower incident. We are in the station's Grade B contour and planned to carry it, but we hadn't received the input converters at that time. A quick signal-level check verified that one of our other UHF antennas was situated such that an acceptable picture was available by sharing of that antenna.

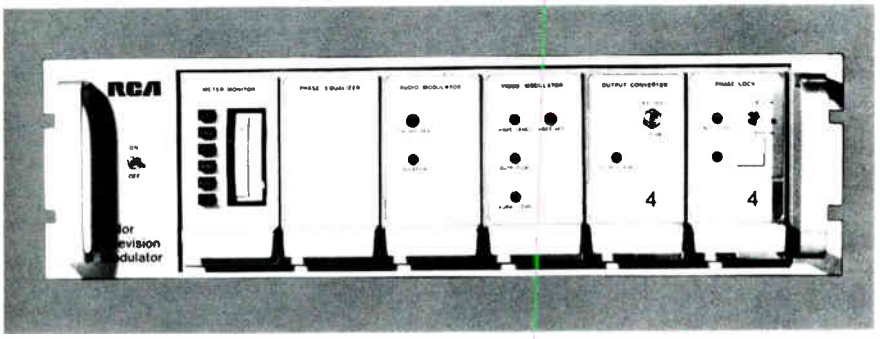
All that was needed was a way to process Channel 15 to Channel 3 temporarily until the appropriate input converters could be received and installed. Although many of our ideas would have worked, feasibility and reliability criteria prevented envoking most of them. While studying the situation, we decided it wasn't necessary to bring the signal from UHF to VHF, or UHF to baseband, but instead to IF frequency. An intriguing thought came to us that television receivers have ready available IF outputs via the downlead from the tuner to the IF stages. Voicing this idea we concluded that this would be the most sound approach and that given the circum-

CABLE TODAY

RCA Introducing New Modulator and Set-Top Converter at NCTA

New products for cable television and a full line of equipment and services will be featured at RCA Booth No. 151 during the National Cable Television Association convention in the Los Angeles Convention Center, May 29-31.

RCA Cablevision Systems will be introducing its newest generation of color television modulators, the CTM11. The CTM11 incorporates a surface acoustic wave (SAW) filter which provides superior adjacent channel performance while retaining the excellent group delay characteristics of the CTM10. The new filter also aids in better performance when used in conjunction with pay TV scrambling systems. The SAW filter is a development which utilizes the technology that today is employed in most modern television broadcast transmitters.



The RCA CTM11 Modulator

RCA will also be showing the latest addition to its line of subscriber devices, a new Set-Top Converter which features very attractive styling and a high degree of dependability. The new converters utilize a single control direct address switching technique which is simple to operate, economical and reliable.

RCA Cablevision Systems will exhibit a broad spectrum of products and services available to the cable operator, including headend equipment, amplifiers, passives, subscriber devices and turnkey system capabilities. Demonstrations at the RCA booth will include a distribution line for 400 MHz operation, 54-channel headend equipment and premium television encoder/decoder systems.

In addition, RCA Broadcast Systems will exhibit television program production and origination equipment for the cable TV industry. RCA American Communications (Americom) will highlight its communications satellite system and services.

West: 15335 Morrison St., Suite 340, Sherman Oaks, CA 91403 (213) 894-8111 or (800) 423-5651
East: 777 Henderson Blvd., Folcroft, PA 19032, (215) 237-1100/01 or (800) 345-8104
East: 334 Ramapo Valley Road, Rt. 202, Oakland, NJ 07436, (800) 345-8104 or (201) 337-8158
Midwest: 815 Clairborne St., Suite 225, Olathe, KS 66062, (913) 782-4033
Midwest: 9369 Kungsholm Drive, Apt. F, Indianapolis, IN 46250, (317) 842-0250
Southwest: 643 Sky Harbour Drive, Granbury, TX 76048, (817) 573-2752
California License #176131C61

RCA Cablevision Systems

Win a SelectaVision VideoDisc Player at RCA Booth No. 151!

Three RCA SelectaVision VideoDisc Players will be given away in daily drawings at RCA's booth number 151 during the NCTA in Los Angeles this year.


The new RCA SelectaVision VideoDisc Player.

The player is an exciting new form of entertainment for the home which enables you to watch a wide variety of programs through your own TV with VideoDisc records. The ever expanding RCA catalog of VideoDiscs includes feature films, both current and classic, children's programs, opera and ballet, highlights of great sport events and many other programs.

The first drawing will be at 5:00 on Friday, May 29. Following will be a drawing at 4:00 on Saturday, May 30, and one on Sunday, May 31, at 4:00.

Visit us at the NCTA Show-Booth #151

Convert.

RCA's new CATV 36-Channel Set Top Converter lets MSO's sit back and relax. Small, simple and elegant, our Set Top Converter is packed with the kind of features that make good reception great – dual IF conversions and a high level double-balanced diode mixer for exceptional dynamic range, and filtered freedom from spurious signals or cross modulation.

Built rugged inside and out, our second generation converters stand up to heavy handling, hostile temperatures and the kind of subscriber mishaps that can shatter profits. Even the channel switch has a life expectancy greater than 100,000 turns. But it's the little things that make a big difference, like a touch of woodgrain on top, and a convenience plug in back. And the best little thing of all: the price.

Call your nearest RCA Cablevision Systems Representative and find out why so many MSO's are converting to us.

RCA Cablevision Systems

See Us at the NCTA Show—Booth #151

CALIFORNIA: 213/894-8111 OR 800/423-5651 ☐ INDIANA: 317/842-0250 ☐ KANSAS: 913/782-4033
NEW JERSEY: 201/337-0751 ☐ PENNSYLVANIA: 215/237-1100 ☐ TEXAS: 817/573-2752

CABLE TODAY®

West: 15335 Morrison St., Suite 340, Sherman Oaks, CA 91403 (213) 894-8111 or (800) 423-5651
East: 777 Henderson Blvd., Folcroft, PA 19032, (215) 237-1100/01 or (800) 345-8104
East: 334 Ramapo Valley Road, Rt. 202, Oakland, NJ 07436, (800) 345-8104 or (201) 337-8158
Midwest: 815 Clairborne St., Suite 225, Olathe, KS 66062, (913) 782-4033
Midwest: 9369 Kungsholm Drive, Apt. F, Indianapolis, IN 46250, (317) 842-0250
Southwest: 643 Sky Harbour Drive, Granbury, TX 76048, (817) 573-2752
California License #176131C61

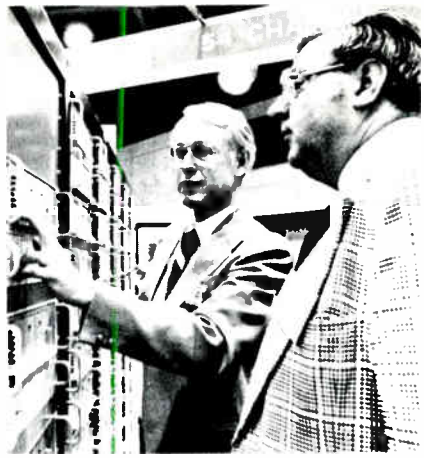
RCA Cablevision Systems

No Two Headends are Alike

Over 30% of the RCA Cablevision Systems customers have saved valuable time and been assured the delivery of a totally pretested and interfaced custom-built headend. They have taken advantage of RCA's Engineering Custom Headend Group. No matter what size the system, there are distinct benefits in allowing RCA to design and preassemble the headend.

First, there's a time savings. While the equipment is in production, the RCA engineering team will be simultaneously designing, wiring and hooking up the racks. All parts, components and hardware will be gathered and assembled by RCA. For the system operator to acquire all of these parts on first-time, single-buy basis could be a monumental task. Additionally, limited in-house staff and the need for valuable technician time to be spent elsewhere often precludes a system operator from assembling their own headend.

Then there's system knowledge. Every system operator has specific goals. No one better than RCA has such a thorough knowledge of RCA equipment capabilities. RCA can normally execute what may appear to a customer to be a complicated and expensive job at a minimal cost.



Bob Hamell, Manager of Headend Products, RCA Cablevision Systems, (left), going over the advantages of RCA's headend rack.

Finally, there's peace of mind. RCA will provide preliminary recommended headend block diagrams, rack configuration drawings and a general system description. All assembly including wiring, line drawings and cable tagging will be established. Each component is individually tested prior to system assembly. The entire system is then checked out as a single operating unit. At the system operator's facility, reassembly is simply a matter of inserting the components and plugging them in. Complete instructions are supplied by RCA. If desired, this stage can even be executed by RCA.

The RCA custom, pre-packaged headend is cost and time efficient.

Going Turnkey . . . Is It Beneficial for You?

Going turnkey used to be for the large system operator only. Now, RCA Cablevision Systems has introduced SCAT for the limited size franchise or expansion.

The RCA Special Construction and Action Team (SCAT) has been formed to literally overpower a limited size job to completion in six weeks or less. By meeting this time frame and employing such innovations as mobile warehousing, RCA SCAT opens the world of RCA Turnkey Operations to the small system, to the operator expanding his system and to the operator facing franchise time limitations. SCAT has already been successfully implemented. In twelve working days, an RCA SCAT completed a 45 mile system, and customer connects began the next day. This was an imperative economical factor in this dual-built franchise.

No matter what size system you plan to construct, RCA Cablevision Systems Turnkey Operations can support you. RCA will take over all the hardware purchasing, warehousing and installation burdens so you can concentrate on operation start-up. RCA will locate and hire all the construction managers and labor required for construction completion. This relieves you of national talent searches and possible repercussions from local workforce layoffs.

If you are planning a system that you believe will fit the limited mileage scope and intense construction schedule of RCA SCAT, contact RCA Cablevision Systems, (800-423-5651). In California, (213) 894-8111). Act today . . . RCA will be implementing a limited number of these projects available for 1981.

RCA Adds New 800 Phone Line

RCA Cablevision Systems had initiated a new "800" telephone number. Serving the eastern half of the country, the new number is:

1-800-345-8104

This new RCA number joins the western service number: 1-800-423-5651.

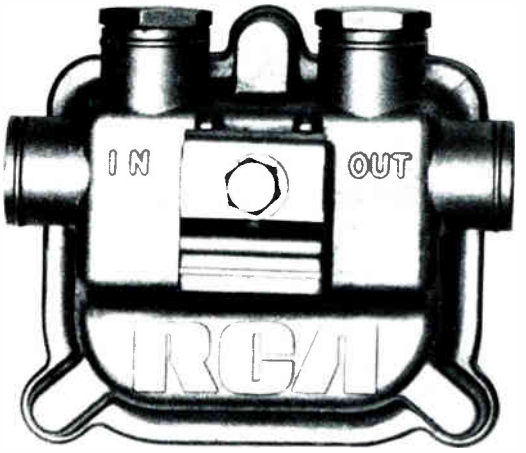
CABLE TODAY®

West: 15335 Morrison St., Suite 340, Sherman Oaks, CA 91403 (213) 894-8111 or (800) 423-5651
East: 777 Henderson Blvd., Folcroft, PA 19032, (215) 237-1100/01 or (800) 345-8104
East: 334 Ramapo Valley Road, Rt. 202, Oakland, NJ 07436, (800) 345-8104 or (201) 337-8158
Midwest: 815 Clairborne St., Suite 225, Olathe, KS 66062, (913) 782-4033
Midwest: 9369 Kungsholm Drive, Apt. F, Indianapolis, IN 46250, (317) 842-0250
Southwest: 643 Sky Harbour Drive, Granbury, TX 76048, (817) 573-2752
California License #176131C61

RCA Cablevision Systems

The RCA Model 452 Amplifier provides an increased channel capability of 54 channels with an expanded bandwidth from 50 MHz to 400 MHz. The Model 452 features a totally new housing that has an improved hinge configuration, expanded shrink boot collars for improved surface contact, and plug-in surge arrestors that are mounted directly to the housing connectors.

We Stock Passive Components,



So You Don't

Today's high cost of capital forbids most MSOs from maintaining large inventories of trunk passives and subscriber taps. Yet RCA is aware that when you need devices for system expansion, replacement, or new construction, you want immediate delivery.

RCA has a fully stocked warehouse to serve your needs. Available for off-the-shelf shipment are: directional couplers in 4, 8, 12 and 16 dB values, 2- and 3-way splitters, power inserters and 2-, 4-, and 8-way subscriber taps.

All RCA passive components are specially priced, including those for 400 MHz applications. Count on RCA passives for superior strength, ease of installation and reliability. Then count on RCA to deliver those passives at the right time and price.

To place an order, or for information, contact: RCA Cablevision Systems, 8500 Balboa Blvd., Van Nuys, CA 91409. Toll free number:

800-423-5651
Except California: (213) 894-8111

RCA

Visit us at the NCTA Show-Booth #151

stances any small beat or hetrodyning problem which might result from cable, connections, or levels would certainly be less objectionable than no picture at all.

First we made a "phone" to "F" adapter to extract the IF signal from the television's VHF tuner (the VHF's tuner IF signal must be used since the IF of a UHF tuner is not the standard 45.75 MHz-41.25 MHz IF). The UHF tuner was then tuned to Channel 15 and the IF signal measured with the spectrum analyzer for beats and proper levels. Amplification or padding of this signal may be necessary to meet the input requirements of the processor.

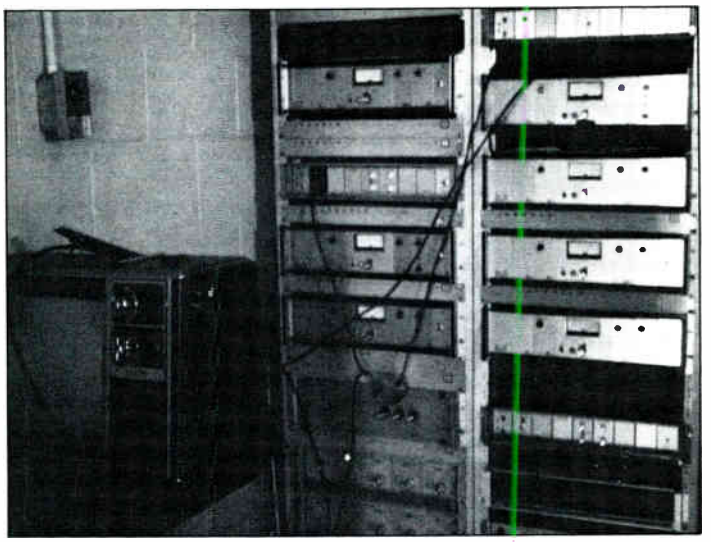
The television is then connected to the processor's IF input, as shown in Figure 1. The processor must now be switched to "off channel" conversion and the television fine tuned, using a spectrum analyzer to place the processor's output frequency on the desired channel. The frequency stability of this arrangement is surprisingly good after the set has been on for several hours. The single channel response for Channel 3 is shown in Figure 2, and the in-channel response for channels 2 through 5 are shown in Figure 3. The instrument in the photographs is an Avantek spectrum analyzer model CR 2000.

One point to note about this configuration is the loss of AGC action. This is due to the fact that the television's tuner is external of the processor's AGC circuitry. Since AGC action is lost, the output of the processor will vary with input signal fluctuations. This has not been a problem in our area, due to good signal strength.

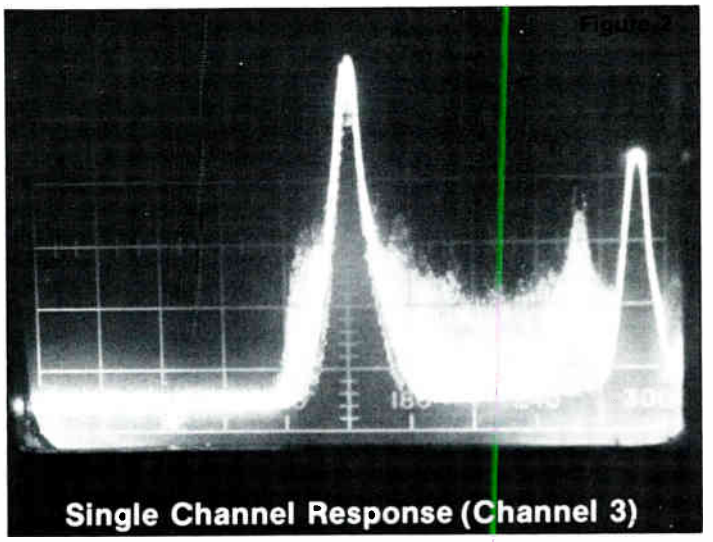
Having used our monitors prior to this as emergency demodulators, it's not too surprising that we could also use the IF output of a tuner. Considering the difference in baseband video and audio, versus the 45.75 MHz-41.25 MHz frequencies, it was a surprise that they were as clean as they really are. The best thing about this set-up is that it only requires a television which is readily available.

It has now been two months and we are still awaiting Channel 3 to come back on with full signal strength, and/or our Channel 15 input converters to arrive. I am glad to report that we have had no problems with our rig except for explaining to everyone who comes into the headend what they are looking at: our 14-inch Zenith color *input converter*.

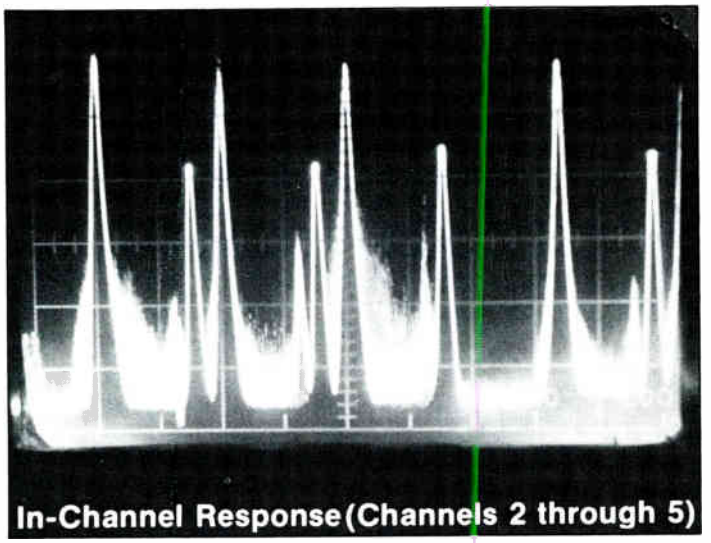
Robert Rotella, Jr., joined Cox Cable South Carolina a year and three months ago after completing an associate's degree at Tidewater Community College. Richard White has worked with the Myrtle Beach, South Carolina, system for 13 years and has a First Class FCC license.



Zenith 14-inch color television supplying IF input to Scientific-Atlanta 6150 processor (note missing input converter).



Single Channel Response (Channel 3)



In-Channel Response (Channels 2 through 5)

Every day more than 300,000 CATV subscribers enjoy a better, more reliable picture with fiber optic links made by Times Fiber Communications.

So do system operators. They have found that Times' fiber optic links are virtually "transparent" and deliver signals with no measurable degradation. By replacing coaxial trunks with fiber optics, more coaxial cable and amplifiers can be added to the end of the system—significantly increasing the number of homes passed.

We're the leading supplier of fiber optic links—satellite downlinks, headend-to-studio and hub-to-hub trunks that carry signals with no measurable distortion. We've put in more CATV fiber optic systems than any other company.

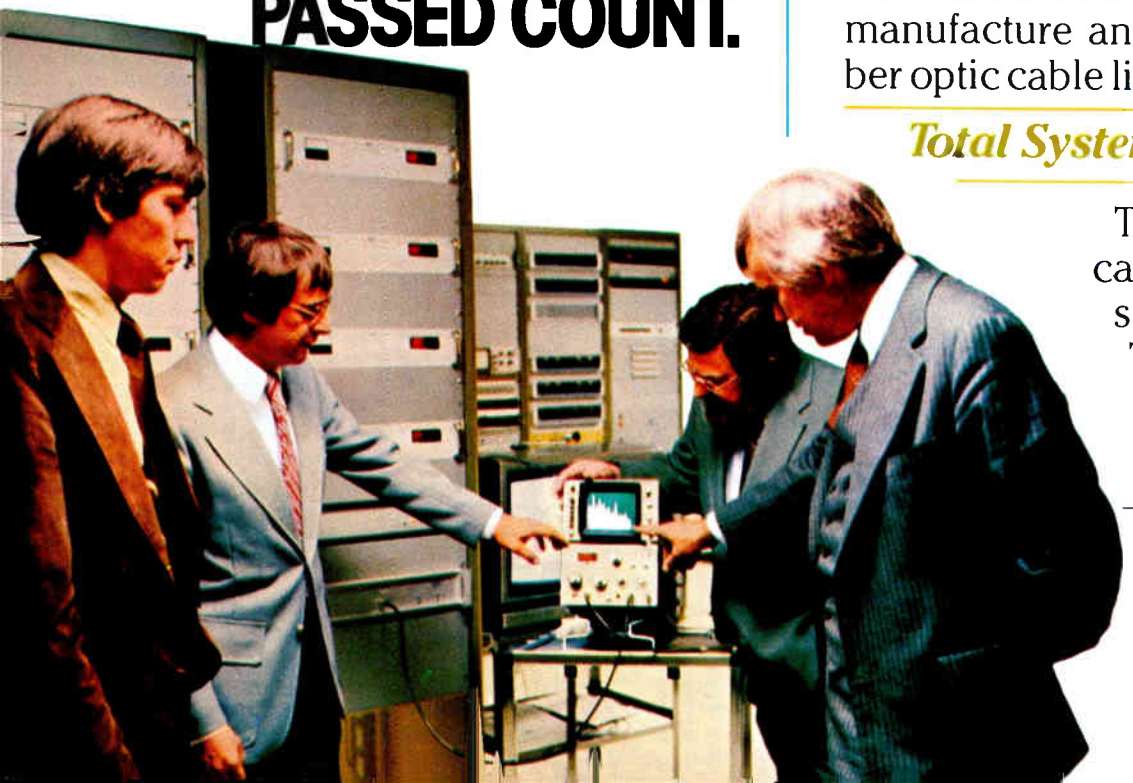
HOW FIBER OPTICS INCREASES YOUR HOMES PASSED COUNT.

Times officials examine new 7-meter satellite antenna at the company's Wallingford, CT headquarters plant. The TVRO is used for experiments and to test fiber optic satellite downlinks.

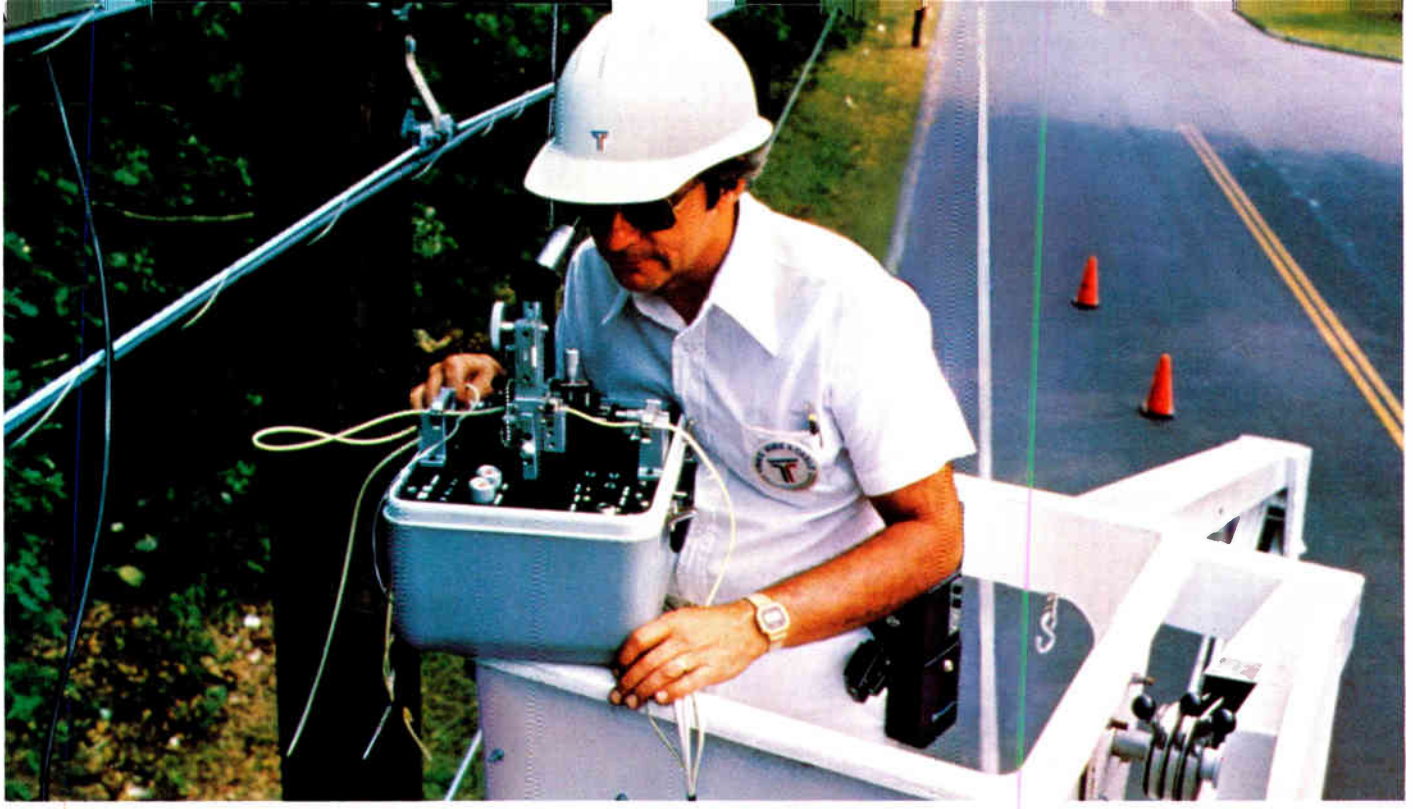
Why Times? Because we're totally committed to the CATV industry. We've been a leading U.S. manufacturer of coaxial cables for 30 years. We've pioneered almost every major technical trend in cables; and we were the first company to develop, manufacture and install reliable fiber optic cable links for this industry.

Total System Responsibility

Times provides total cable system responsibility because Times is a total manufacturer. Our new fiber



Officials check out new 9.5 km fiber optic satellite down-link at United Cable Television's headend in Plainville, CT.



A Times field engineer splices a fiber optic cable, during installation, with a portable fusion splicer. Times supervises every installation to assure technical integrity and practical performance.

optic facility is one of the most modern in America. We make our own glass preforms, draw our own fiber, strand our own cable—aerial/duct, armored burial, and indoor.

You get everything from a single source. We engineer our own optoelectronic components—and supply all other items necessary for complete systems.

Technical integrity and practical performance

You'll find our Systems Engineering Department has the experience and technical back-up to select and test the best cable configuration and components for optimum, cost-efficient operation. And we supervise the installation of every system to assure technical integrity as well as practical performance.

That's why leading operators like Teleprompter, Falcon, Storer, United, and Vision (who recently ordered a second link) choose Times. They know they can count on Times to make it easy, make it right, make it reliable.

So come to Times for practical fiber optics. Times Fiber Communications, Inc., 358 Hall Avenue, Wallingford, CT 06492. Call 203-265-8498.

See us at the NCTA Show—Booth #154

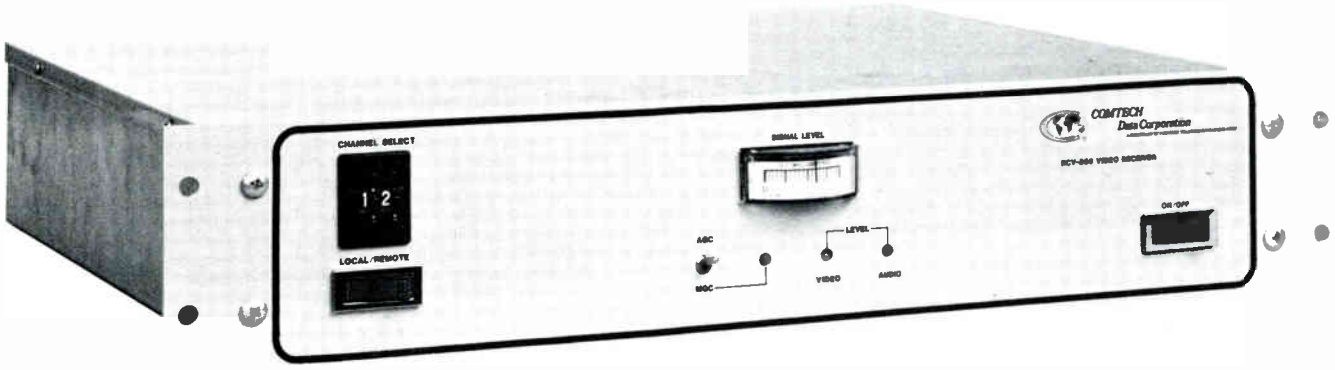
TFC

TIMES FIBER COMMUNICATIONS, INC.

Times Wire & Cable Div.

An Insilco Company

COMTECH DATA CORPORATION PRESENTS A NEW AGILE RECEIVER



NEW PRICE

- As low as a fixed tuned receiver
- Volume discounts

NEW FEATURES

- Digital tuning
- Polarity control
- Smaller size
- 6.2 Mc/6.8 Mc Switch Selectable Prog. Demod

NEW OPTIONS

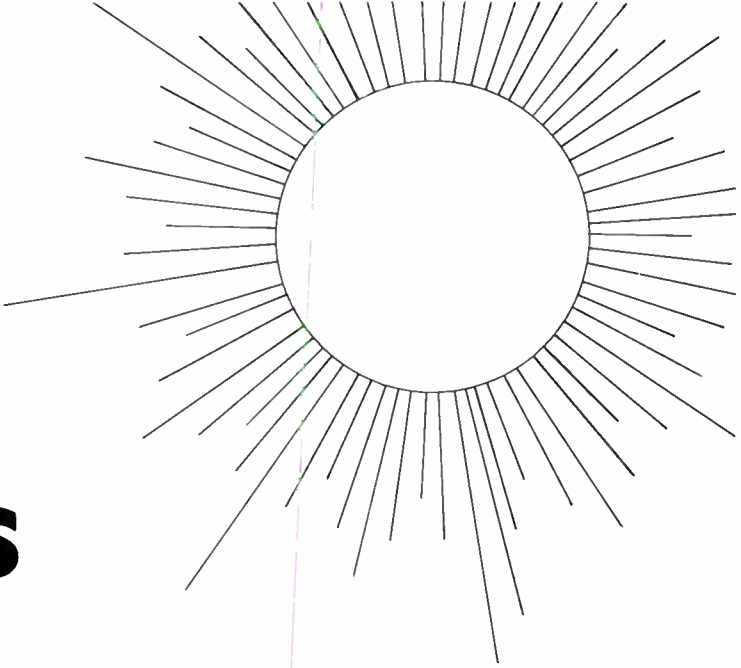
- Multi-channel audio
- Various remote tuners

Call us today for prices and delivery.

See Us At The NCTA Show—Booth #1126

COMTECH
Data Corporation
A SUBSIDIARY OF COMTECH TELECOMMUNICATIONS CORP.

613 S. ROCKFORD DR. • TEMPE,AZ 85281 • (602) 968-2433 • TWX 910-950-0085



Predicting Sun Outages

By Raymond Bostock Jr., engineer.

The sun is one of the solar system's great noise makers and twice a year, usually once in the spring and once in the fall, the sun shines directly into your satellite dish, masking your satellite feed for five or ten minutes with a deluge of noise.

You don't need a Stonehenge outside your headend to predict when a sun outage will occur. With the program in Table 1 and a TI 59/PC100A calculator, you can compute TVRO azimuth, elevation and sun outage date and time. The sun outage time is different at every dish location.

With this knowledge, you can warn your subscribers when a sun outage will occur and spare yourself subscribers' complaints and a moment of panic wondering what's happening at the headend.

Here are the specifics of the program. The A routine provides prompting messages for data entry and following entry calculates azimuth and elevation for satellite longitudes at five-degree intervals from 140W to 70W. The B routine also prompts data entry including a satellite longitude. Azimuth and elevation are then calculated for that longitude only. Routine C must follow routine B. It calculates two numbers. The first is the number of days before the vernal or after the autumnal equinox for peak sun outage. The second is Greenwich time for the outage. Twelve minutes must be subtracted in spring and added in fall.

This program uses the great circle equations and Napier's rules. In addition, the program uses the equations in Table 2.

Table 2

Elev. = 90+ arctan ((sin θ) ÷ (r/(rh) - cos 0)) r = 3960 h = 22,288

θ = arccos (cos Lat. TVRO × cos (Long. Sat.-Long. TVRO))
Lat. of sun's subpoint = 23.45 × sin (360t/365.25); t=° at vernal equinox

South declination of sun for eclipse by satellite = arcsin (sin (90-Elev.) × sinarctan (tan TVRO Lat./sin (Long. Sat.-Long. TVRO)))

Table 1

000	76	LBL	042	05	05
001	16	A″	043	91	R/S
002	69	OP	044	99	PRT
003	00	00	045	88	DMS
004	43	RCL	046	42	STO
005	51	51	047	11	11
006	69	OP	048	87	IFF
007	01	01	049	01	01
008	43	RCL	050	17	B″
009	52	52	051	43	RCL
010	69	OP	052	56	56
011	02	02	053	42	STO
012	69	OP	054	12	12
013	05	05	055	43	RCL
014	91	R/S	056	57	57
015	99	PRT	057	32	X:T
016	88	DMS	058	76	LBL
017	42	STO	059	11	A
018	10	10	060	25	CLR
019	39	COS	061	43	RCL
020	42	STO	062	12	12
021	01	01	063	75	—
022	43	RCL	064	43	RCL
023	10	10	065	11	11
024	38	SIN	066	95	=
025	42	STO	067	42	STO
026	02	02	068	13	13
027	69	OP	069	30	TAN
028	00	00	070	35	1/X
029	43	RCL	071	65	×
030	51	51	072	43	RCL
031	69	OP	073	02	02
032	01	01	074	95	=
033	43	RCL	075	35	1/X
034	53	53	076	22	INV
035	69	OP	077	30	TAN
036	02	02	078	85	+
037	43	RCL	079	43	RCL
038	54	54	080	58	58
039	69	OP	081	95	=
040	03	03	082	42	STO
041	69	OP	083	14	14

Continued on Page 48

Continued from Page 47

084	25	CLR	116	95	=	148	77	GE	180	61	GTO	212	10	10
085	53	(	117	42	STO	149	11	A	181	11	A	213	30	TAN
086	53	(	118	15	15	150	91	R/S	182	76	LBL	214	55	÷
087	43	RCL	119	69	OP	151	76	LBL	183	18	C″	215	43	RCL
088	48	48	120	00	00	152	12	B	184	22	INV	216	13	13
089	75	—	121	43	RCL	153	86	STF	185	86	STF	217	38	SIN
090	43	RCL	122	50	50	154	01	01	186	01	01	218	54	)
091	01	01	123	69	OP	155	61	GTO	187	91	R/S	219	22	INV
092	65	×	124	01	01	156	16	A″	188	76	LBL	220	30	TAN
093	43	RCL	125	69	OP	157	76	LBL	189	13	C	221	38	SIN
094	13	13	126	05	05	158	17	B″	190	25	CLR	222	95	=
095	39	COS	127	43	RCL	159	69	OP	191	43	RCL	223	22	INV
096	54	)	128	14	14	160	00	00	192	59	59	224	38	SIN
097	55	÷	129	99	PRT	161	43	RCL	193	75	—	225	42	STO
098	53	(	130	43	RCL	162	47	47	194	43	RCL	226	41	41
099	43	RCL	131	49	49	163	69	OP	195	15	15	227	55	÷
100	01	01	132	69	OP	164	01	01	196	75	—	228	43	RCL
101	65	×	133	01	01	165	43	RCL	197	53	(	229	46	46
102	43	RCL	134	69	OP	166	53	53	198	43	RCL	230	95	=
103	13	13	135	05	05	167	69	OP	199	01	01	231	22	INV
104	39	COS	136	43	RCL	168	02	02	200	65	×	232	38	SIN
105	54	)	137	15	15	169	43	RCL	201	43	RCL	233	65	×
106	22	INV	138	99	PRT	170	54	54	202	13	13	234	43	RCL
107	39	COS	139	87	IFF	171	69	OP	203	39	COS	235	45	45
108	38	SIN	140	01	01	172	03	03	204	54	)	236	95	=
109	54	)	141	18	C″	173	69	OP	205	22	INV	237	42	STO
110	35	1/X	142	05	5	174	05	05	206	39	COS	238	44	44
111	22	INV	143	22	INV	175	91	R/S	207	95	=	239	69	OP
112	30	TAN	144	44	SUM	176	99	PRT	208	38	SIN	240	00	00
113	85	+	145	12	12	177	88	DMS	209	65	×	241	43	RCL
114	43	RCL	146	43	RCL	178	42	STO	210	53	(	242	42	42
115	59	59	147	12	12	179	12	12	211	43	RCL	243	69	OP

Continued on page 50

Satellite Systems Science.

The Best Receiving Systems in the Industry.

Rely on Microdyne's Satellite System Science.
Microdyne offers excellent communication equipment including the best receiving systems in the industry.
We utilize the latest techlogy and quality components for optimum reception capabilities.

For more than a decade, Microdyne has manufactured satellite communications systems.
Our expertise is used for government, military, corporate and personal communications needs.
Our telemetry receivers monitor the present generation of domestic satellites in use and
we are recognized as a leading supplier of satellite receiving systems.

Rely on Satellite System Science from Microdyne. We have proven experience
manufacturing the most sophisticated, cost-effective communications systems in the industry.

Satellite Systems Science.

Microdyne Corporation / P.O. Box 7213 / Ocala, FL 32672 / (904) 687-4633 / TWX-810-858-0307

Microdyne Corporation

See Us at NCTA Booth #505

Continued from Page 48

244	01	01
245	43	RCL
246	43	43
247	69	OP
248	02	02
249	69	OP
250	05	05
251	43	RCL
252	44	44
253	58	FIX
254	00	00
255	99	PRT
256	22	INV
257	58	FIX
258	53	(
259	43	RCL
260	14	14
261	75	—
262	43	RCL
263	58	58
264	54	)
265	38	SIN
266	65	×
267	43	RCL
268	10	10
269	39	COS
270	95	=
271	22	INV
272	39	COS
273	42	STO
274	16	16
275	30	TAN
276	35	1/X
277	65	×
278	43	RCL
279	10	10
280	30	TAN
281	95	=
282	22	INV
283	38	SIN
284	42	STO
285	17	17
286	43	RCL
287	16	16
288	30	TAN
289	35	1/X
290	65	×
291	43	RCL
292	41	41
293	30	TAN
294	95	=
295	22	INV
296	38	SIN
297	85	+
298	43	RCL
299	17	17
300	85	+
301	43	RCL
302	11	11
303	95	=
304	55	÷
305	01	1
306	05	5
307	85	+
308	01	1
309	02	2
310	95	=
311	22	INV
312	88	DMS
313	58	FIX
314	02	02
315	99	PRT
316	22	INV
317	58	FIX
318	91	R/S
319	00	0
320	00	0
321	00	0
322	00	0
323	00	0

3641310032.	ALPHA	42
4137132217.		43
0.	DEG./DAY	44
1.014583333		45
23.45	MAX. DECL.	46
3613374000.	ALPHA	47
0.150868638	r/r+hs	48
1727174264.	ALPHA	49
1435224064.		50
3742353200.		51
2713374064.		52
2732312240.		53
6400000000.		54
3613374000.		55
140.	SAT. LONG. LIMITS	56
70.		57
180.		58
90.		59

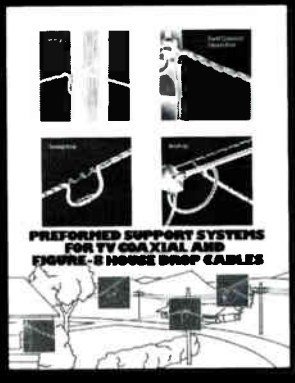
Raymond Bostock Jr. is a retired Air Force officer. He earned a degree in electrical engineering from Colorado State University in 1967 and worked for seven and a half years for EMCO CATV, Inc., in Manchester, Vermont.

PREFORMED goes by the numbers and takes the gamble out of ordering cable construction hardware.

Get the best in CATV cable construction hardware. Order only Preformed Line Products Company parts from your supplier. And, make sure you get what you ask for by ordering "Preformed" hardware by its catalog numbers. Preformed's hardware has been the leader in the CATV industry for over 20 years.

Specify the numbers below or send for our free CATV cable construction hardware catalog. It's the difference between choice and chance. Write to Preformed Line Products Co., P. O. Box 91129, Cleveland, Ohio 44101. Phone: 216/461-5200.

For 1/4" Galvanized Steel Strand specify:	
GDE-1104L	Galvanized Guy-Grip Dead-End for 1/4" Galvanized Steel Strand
GLS-2104	Galvanized Strand Splice for 1/4" Galvanized Steel Strand
GFDE-2121	Galvanized False Dead-End for 1/4" Galvanized Steel Strand
For House Drop Coaxial Cables specify:	
DE-1500	Galvanized Telegrip for RG-59/U Coaxial Cable
DE-3329	Stainless Steel Custom Dead-End for RG-59/U Coaxial Cable
DE-2525	Galvanized Dead-End for .051 Galv. messenger of Figure 8 RG-59/U Coaxial Cable
DE-2505	Galvanized Dead-End for .063- .072 Galv. messenger of Figure 8 RG-59/U Coaxial Cable
For protection of Strand and Cables, specify:	
Plastic Guy Guards, Plastic Tree Guards, Ground Wire Molding	



PREFORMED LINE PRODUCTS

Before you buy a ¾" editing system, compare its accuracy, picture quality, and speed to the Panasonic 9000 G-2 Series.

Panasonic combines the precision of direct drive with the speed of microprocessors for a picture you can't get with less sophisticated ¾" editing systems. This advanced technology is built into every NV-A960 Controller, NV-9240 Recorder, and NV-9600 Editing Recorder. The G-2 Series. Truly a second-generation ¾" editing system.

Accuracy and stability come naturally to this system. Both decks give you the accuracy of full direct-drive video head cylinders and capstan motors. The direct-drive capstan servo system improves time base stability to reduce wow and flutter to less than .12%. Direct drive also made it possible to move the head switching line into the vertical blanking area, which significantly reduces video noise. Add these features to our crystal-oriented HPF™ heads and you'll get an outstanding picture with horizontal resolution of 260 lines color, 330 lines B/W and a S/N ratio of 46dB color and 50 dB B/W.

Our electronic LED tape counters add to your accuracy and control with digital readouts in minutes and seconds – even in fast forward and rewind. They're far more accurate than old-fashioned mechanical tape counters.

The NV-A960 Editing Controller offers a long list of features you won't find on other units in its price class. Features like an error indicator, automatic lap time display, return to IN and GO to OUT point, flying edit capability, and a servo/lock indicator. A valuable combination of features that can help you beat the clock. And that's not all.

The NV-A960 address time indicators double as

Shown left to right: NV-A 960 Controller, NV-9240 Recorcer and NV-9600 Editing Recorder.

lap time indicators to measure the length of your inserts. They are accurate to the frame, or 1/30th of a second. That's more accurate than our major competitor. And that helps make *you* more accurate.

But what good is fast, accurate editing if you make more mistakes just when you're trying hardest to save time? That's where our automatic instruction error diagnostics comes in—another microprocessor advantage. It helps you find your errors fast by displaying a code that shows what you did wrong. And error diagnostics can keep you from compounding your mistakes, to help bring edit time to a new low.

A great edit and a great picture doesn't mean much if your dub looks like a dub. So Panasonic has two features to make sure that it doesn't: Our exclusive head amp frequency adjustment, which normalizes tape playback—plus separated luminance and chroma signals with direct transfer of chroma and a simplified circuit path for luminance.

All this and extraordinary versatility, too. The NV-9600 editing deck can detect time code on audio channel 1. And the entire G-2 Series can interface with any other Panasonic solenoid-operated viceo cassette deck. So you can edit from ½" tapes too. Plus, you can easily operate the G-2 Series anywhere in the world because a multiple AC power input is built in.

The microprocessor-based Panasonic 9000 G-2 Series ¾" Editing System. Compared with other systems below $20,000, there's just no comparison.

Panasonic.
VIDEO SYSTEMS DIVISION

Distortion Analysis In an HRC System

By M. Maqusi, consultant, GTE Products—CATV Division.

This article is concerned with investigation in distortion analysis aspects of a harmonically-related carrier (HRC) system proposed for application in cable television systems.

A general procedure of analysis is indicated for the computations of certain useful measures of distortion analysis in such a system: intermodulation and crossmodulation.

An HRC system designates a plan of carrier transmission in which the video carriers are generated by a master 6 MHz oscillator. We start with channel 2 at f_2 = 54 MHz, and count up based on a channel spacing (bandwidth) of 6 MHz. Such a scheme yields a frequency-locked set of carriers (e.g., N channels).

Two methods of implementation are possible:

- Coherent HRC system. In this case, the carriers are phase-locked (phase synchronism) as well.
- Noncoherent HRC system. Carriers are frequency-locked only.

Investigations

Certain investigations into prospects and problems of HRC systems have been conducted.[1] Based on these studies, some general comments are made.

An HRC system is proposed to reduce "triple-beat," or third-order intermodulation distortion (IMD) in general. In this regard, IM products fall "zero-beat" on carriers, or else they fall outside the N-channel spectrum.

In a system of 52 or 60 channels, the system spectrum extends beyond 400 MHz (UHF), and crossmodulation distortion (CMD) becomes a limiting factor, turning from amplitude crossmodulation (A-CM) to phase-crossmodulation (P-CM).

IM beats around the visual (video) carrier become insignificant compared to a regular non-HRC system.

Problems of channel direct-pickup (i.e., leakage of a strong on-air channel into a nearby HRC channel) may arise. The effects of such a problem may be minimized by locking the HRC channel to the indicated on-air channel. Use of set-top converters can also substantially reduce problems associated with direct pick-up.

Effects of cable group delay may cause some distortion problems.

The audio (FM) signal may be another constituent of distortion. Keeping the sound carrier at a significantly lower level compared to that of the video carrier minimizes such distortion.

The audio (FM) signal may be another constituent of distortion. Keeping the sound carrier at a significantly lower level compared to that of the video carrier minimizes such distortion.

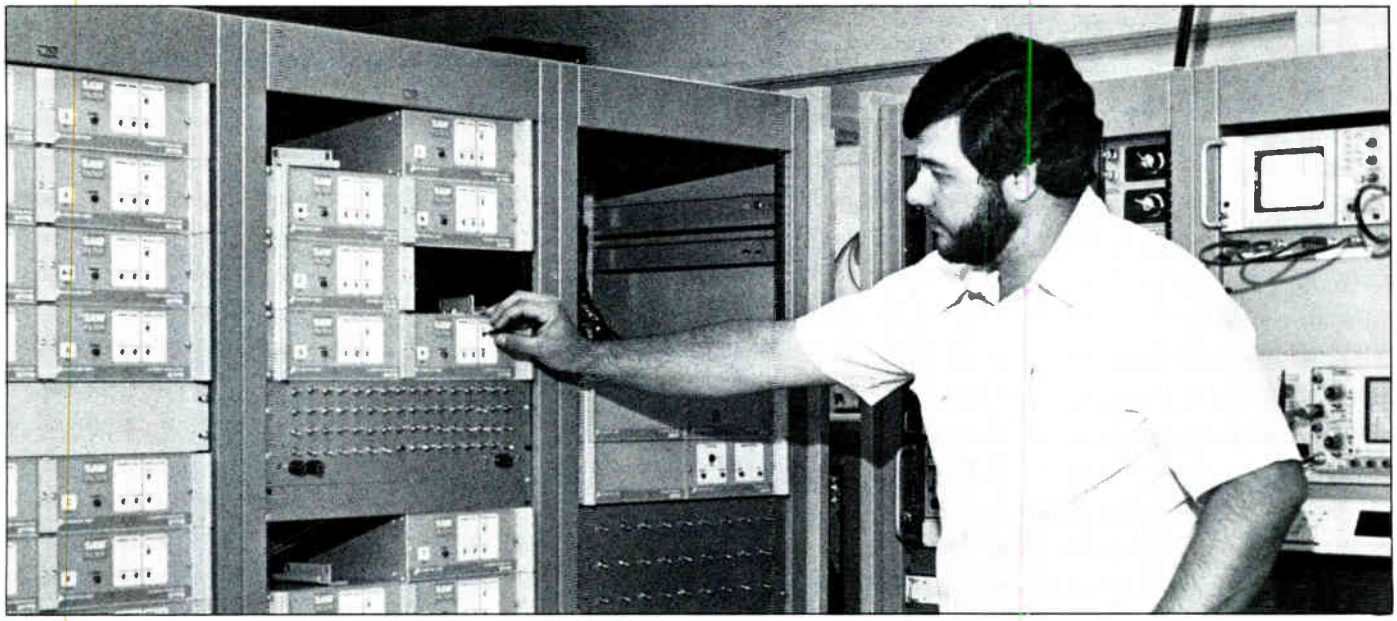
Methods of Analysis

Characteristic Representation

Two general methods are available for the distortion analysis of amplifiers involved in such a system.[2]

1. Power Series Method. In this case, the amplifier characteristics are represented by

Photo courtesy of CATV Division, GTE Products Corporation



$$y = \sum_{n=1}^{\infty} a_n x^n \qquad (1)$$

where x and y denote input and output quantities, respectively.

In practice a three-term series approximation is employed. Hence

$$y(t) = a_1 x(t) + a_2 x^2(t) + a_3 x^3(t) = y_1(t) + y_2(t) + y_3(t) \qquad (2)$$

The resulting model is frequency-independent (no-memory).

2. Voltera Series Method. This technique is based on a Voltera series representation:

$$y(t) = \int_0^{\infty} h_1(\tau_1)\, x(t-\tau_1)\, d\tau_1 + \int_{00}^{\infty\infty} h_2(t_1,\tau_2)\, x(t-\tau_1)\, x(t-\tau_2)\, d\tau_1\, d\tau_2$$

$$+ \int_{000}^{\infty\infty\infty} h_3(\tau_1,\tau_2,\tau_3)\, x(t-\tau_1)\, x(t-\tau_2)\, x(t-\tau_3)\, d\tau_1\, d\tau_2\, d\tau_3$$

$$+ \ldots$$

$$= y_1(t) t\, y_2(t) + y_3(t) + \ldots \qquad (3)$$

And, a three-term series is usually employed to approximate y(t) as indicated above. But the Voltera representation renders a somewhat generalized model which incorporates system nonlinearities and memory behaviors in the Voltera kernals:

$$\{h_1(t), h_2(t_1, t_2), \ldots, h_n(t_1, t_2, \ldots, t_n), \ldots\}.$$

Distortion Consideration

Two aspects of distortion are considered.

1. Intermodulation Distortion. In this case, we employ an input consisting of N unmodulated carriers; i.e.,

$$x(t) = \sum_{n=1}^{N} A_n \cos \omega_n t \qquad (4)$$

where $\omega_n = 2\pi f_n$, and

$$f_n = (n + 7) f_0, \qquad n = 2, 3, \ldots, N$$

$$f_0 = 6 \text{ MHz (master oscillator)} \qquad (5)$$

Select channel k (i.e., ω_K) and investigate the IM products generated onto ch-K by the other channels.

2. Crossmodulation Distortion. In this case, we select Ch-K unmodulated, and modulate the rest of the channels. Hence

$$x(t) = A_K \cos \omega_K t + \sum_{n=1, \neq K}^{N} A_n [1 + \beta_n \cos \omega_m t] \cos \omega_n t$$

where β_n = modulation index of ch-n.
$\cos \omega_m t$ = test message (information); $\omega_m << \omega_n$ for all n.

Investigation is made as to the amount of transferred modulation from other channels to Ch-K.

Distortion Analysis

Distortion analysis is based on a power series model for the amplifier. Using a three-term series approximation, system characteristics are described by

$$y = a_1 x + a_2 x^2 + a_3 x^3. \qquad (7)$$

Intermodulation Consideration

The system input is given by

$$x(t) = \sum_{n=2}^{N} A_n \cos \omega_n t \qquad (8)$$

where $\omega_n = (n + 7)\, \omega_0$, and $\omega_0 = 2\pi \times 6$ M rad/sec.

Consequently, the output is given by

$$y(t) = a_1 \sum_{n=2}^{N} A_n \cos \omega_n t + a_2 \sum_{n,K=2}^{N} A_n A_K \cos \omega_n t \cos \omega_K t$$

$$+ a_3 \sum_{n,K,p=2}^{N} A_n A_K A_p \cos \omega_n t \cos \omega_K t \cos \omega_p t$$

$$= y_1(t) + y_2(t) + y_3(t) \tag{9}$$

Trigonometric identities useful in rewriting (9) are:

$$\cos \omega_n t \cos \omega_K t = \tfrac{1}{2} [\cos (\omega_n+\omega_K)t + \cos (\omega_n -\omega_K)t]$$

$$\equiv \tfrac{1}{2} \cos (\omega_n \pm \omega_K)t \tag{10}$$

and

$$\cos \omega_n t \cos \omega_K t \cos \omega_p t = \tfrac{1}{4} [\cos (\omega_n+\omega_K+\omega_p)t + \cos (\omega_n+\omega_K-\omega_p)t + \cos (\omega_n-\omega_K+\omega_p)t + \cos (\omega_n-\omega_K-\omega_p)t]$$

$$\equiv \tfrac{1}{4} \cos (\omega_n \pm \omega_K \pm \omega_p)t \tag{11}$$

Hence, we now rewrite (9) as

$$y(t) = a_1 \sum_{n=2}^{N} A_n \cos \omega_n t + \frac{a_2}{2} \sum_{n,k=2}^{N} A_n A_k \cos (\omega_n \pm \omega_K)t + \frac{a_3}{4} \sum_{n,K,p=2}^{N} A_n A_K A_p \cos (\omega_n \pm \omega_K \pm \omega_p)t \tag{12}$$

We define sets of frequencies by

$$\Omega_1 = \{\omega_r = (r + 7)\,\omega_0 \,;\, r = 2, 3, \ldots, N\}$$

$$\Omega_2 = \{\omega_s = \omega_n \pm \omega_K \,;\, n, \quad K = 2, 3, \ldots, N\}$$

$$\Omega_3 = \{\omega_u = \omega_n \pm \omega_K \pm \omega_p \,;\, n, K, p = 2, 3, \ldots, N\} \tag{13}$$

where the ranges of s and u are defined by the indicated appropriate frequency relations generating the sets Ω_2 and Ω_3, respectively

For all $\omega_s \varepsilon \Omega_2$ and all $\omega_u \varepsilon \Omega_3$, either $\omega_s, \omega_u \varepsilon \Omega_1$; or else they fall outside Ω_1, the set of fundamental frequencies.

Consider any $\omega_s = \omega_n \pm \omega_K \varepsilon \Omega_2$.

Then $\omega_s = (n + 7)\,\omega_0 \pm (K + 7)\ \ \omega_0$

Hence

$$\omega_s^{+}[(n + K+7) + 7]\,\omega_0 \varepsilon\ \Omega_1 \text{ for } 4 \leq s = n + K + 7 \leq N$$

$$\omega_{\bar{s}}\,[(n - K-7) + 7]\,\omega_0 \varepsilon\ \Omega_1 \text{ for } 2 \leq s = n - K - 7 \leq N$$

Outside the indicated ranges of, ω_s & Ω_1, and falls outside the system channel spectrum. But over the indicated ranges, $\omega_s \varepsilon \Omega_1$ and coincides with a specific channel frequency. This forms what is called "zero-beat" intermodulation products.

By same virtues, we consider $\omega_u = \omega_n \pm \omega_K \pm \omega_p \varepsilon \Omega_3$, and again we can verify a case of either "zero-beat" intermodulation, or an IM frequency outside Ω_1 which constitutes no concern for channel distortion.

- IM products generate "zero-beat" frequencies with concerned system carriers.
- Carrier contains no information. Hence "zero-beat" IM products constitute no actual distortion.
- In a completely coherent HRC system, IM frequencies falling on a certain carrier add to the carrier level directly. In a noncoherent HRC system, the IM products still add to the selected "test" carrier, but on a phasor basis (i.e., IM products and carrier have same frequency and possibly different phase shifts).

INCOMPARABLE

RMS

'POWER·KING'™

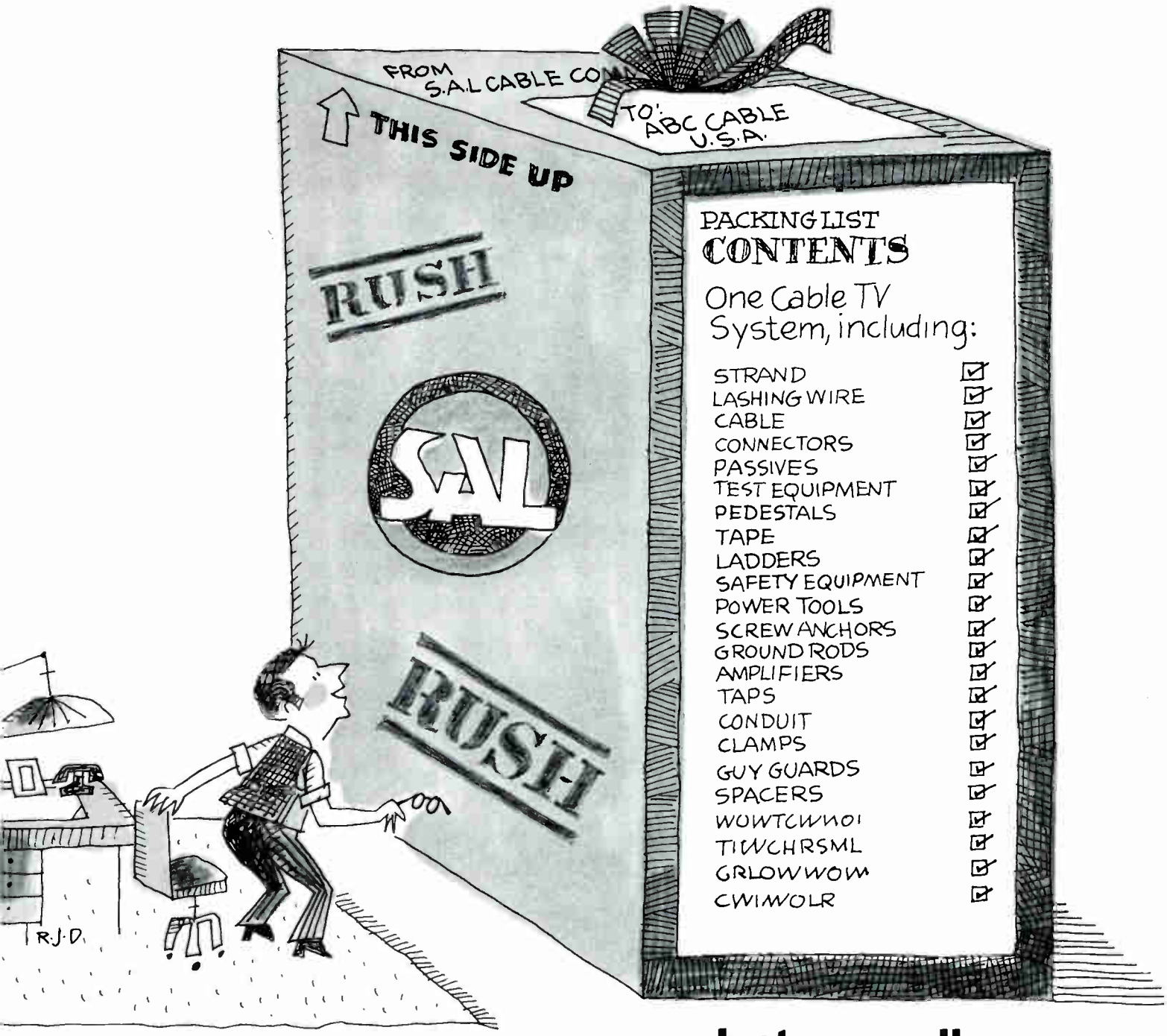
Econo-Series

MODEL PSE-30/60 AC REGULATED POWER SUPPLY

TELEPHONE OR WRITE
FOR IMMEDIATE DELIVERY

RMS ELECTRONICS, INC./CATV DIVISION
50 ANTIN PLACE, BRONX, N.Y., 10462

TOLL FREE (800) 223-8312
(Continental U.S.A., Puerto Rico, U.S. Virgin Islands)
(212) 892-1000 Call Collect (New York State)



Just one call does it all.

Everything you need to build and maintain your Cable TV system.

What you want, when you want it, where you want it.

S.A.L. Cable Communications, Inc.
Call Toll Free **NY:**800/645-9062, **ATL:**800/241-0992, **IND:**800/428-3268
SEE OUR BOOTH #157

Crossmodulation Analysis

To investigate crossmodulation, we select Ch-K for observation, and modulate all other N-2 channels by same modulating signal, say a single tone. The input is now given by

$$x(t) = A_K \cos \omega_K t + \sum_{i=2,\neq K}^{N} A_i [1 + \beta_i \cos \omega_m t) \cos \omega_i t \qquad (14)$$

In practice, we may set $\beta_i = \beta$, and $A_i = A$ for all $i = 2, \ldots, N, i \neq K$. The output is subsequently given by

$$y(t) = y_1(t) + y_2(t) + y_3(t) \qquad (15)$$

where

$$y_1(t) = a_1 A_K \cos \omega_K t = \sum_{i=2,\neq K}^{N} A_i[1+\beta_i \cos \omega_m t] \cos \omega_i t \qquad (16)$$

$$y_2(t) = a_2 A_K^2 \cos^2 \omega_K t + 2 a_2 A_K \sum_{i=2,\neq K}^{N} A_i[1+\beta_i \cos \omega_m t) \cos \omega_i t \cos \omega_K t$$

$$+ a_2 \sum_{\substack{i,j=2 \\ \neq K}}^{N} A_i A_j[1 + \beta_i \cos \omega_m t] [1 + \beta_j \cos \omega_m t] \cos \omega_i t \cos \omega_j t \qquad (17)$$

For small distortion, the contributions of $y_2(t)$ to CMD are neglected, and concern lies with $y_3(t)$, i.e.,

$$y_3(t) = a_3 \{A_K^3 \cos^3 \omega_K t + \sum_{\substack{i,j,p=2 \\ \neq K}}^{N} A_i A_j A_p [1 + \beta_i \cos \omega_m t] [1 + \beta_p \cos \omega_m t] \cos \omega_i t \cos \omega_j t \cos \omega_p t$$

$$+ 3 A_K^2 \cos^2 \omega_K t \sum_{i=2,\neq K}^{N} A_i[1 + \beta_i \cos \omega_m t] \cos \omega_i t$$

$$+ 3 A_K \sum_{\substack{i,j=2 \\ \neq K}}^{N} A_i A_j [1 + \beta_i \cos \omega_i t][1 + \beta_j \cos \omega_j t] \cos \omega_i t \cos \omega_j t \cos \omega_K t\} \qquad (18)$$

The output CMD signal may be generally written as

$$y_{cm}(t) = B_1 \cos \omega_K t + B_2 \cos \omega_m t \cos \omega_K t \qquad (19)$$

Hence, we consider terms in $y_3(t)$ which contribute spectral components at ω_K (carrier) and $\omega_K \pm \omega_m$ (sidebands). Extraction of such terms from (18) gives

$$y_{cm}(t) = \frac{a_3 A_k^3}{4} \cos \omega_K t + \frac{a_3}{4} \sum_{i,j,p=2}^{N} A_i A_j A_p [(1+\frac{\beta_i \beta_j}{2} + (\frac{\beta_i \beta_p}{2} + \frac{\beta_j \beta_p}{2}) + (\beta_i + \beta_j + \beta_p + \frac{3\beta_i \beta_j \beta_p}{4}) \cos \omega_m t].$$

$$\cos (\omega_i \pm \omega_j \pm \omega_p)t \quad |\omega_i \pm \omega_j \pm \omega_p = \omega_K$$

$$+ \frac{3^a 3}{2} A_K^2 \sum_{i=2,\neq K}^{N} A_i[1 + \beta_i \cos \omega_m t] \cos (\omega_i - 2\omega_K)t| \quad \omega_i = 3\omega_K$$

$$+ 3a_3 A_K \sum_{i,j=2,\neq K}^{N} A_i A_j [(1+ \frac{\beta_i \beta_j}{2}) + (\beta_l + \beta_j) \cos \omega_m t].$$

$$\cos (\omega_K \pm \omega_i \pm \omega_l)t \quad |\omega_K \pm \omega_i \pm \omega_j = \omega_K$$

$$+ a_1 A_K \cos \omega_K t \qquad (20)$$

The last term appearing in the equation above is due to a linear output term obtained from $y_1(t)$.

The conditions on application of the above equation are:

- $\omega_K \pm \omega_i \pm \omega_j = \omega_K$ sets a condition: $\omega_i = \omega_l$ or $i = j \neq K$.
- $\omega_i = 3\omega_K$ sets a condition: $(i + 7)\ \omega_O = (3K + 21)\ \omega_O$ or $i = 3K + 14$.
- $\omega_i \pm \omega_J \pm \omega_p = \omega_K$ sets four conditions: $i + j + p + 14 = K$, $i + j - p = K$, $i - j + p = K$, $i - j - p - 14 = K$.

In measurements of CMD, the previous set conditions dictate that only channels satisfying these conditions are of significance in such measurements. All other channels may be reasonably excluded.

By collecting terms of like frequency in (20), we can write a general form as

$$y_{cm}(t) = A[1 + \beta_{cm} \cos \omega_m t] \cos \omega_K t \qquad (21)$$

According to (21), a measure of CMD may be defined by

$$(CM)_O = \beta_{cm} \times 100\% \text{ (percent CM)} \qquad (22)$$

Under the assumption of equal modulation indices $\beta_i = \beta$, we may reformulate (22) by

$$(CM)_O = \beta_{cm}/\beta \qquad (23)$$

In practice, $\beta = 1$ may be selected for 100 percent modulation testing. In this case (22) and (23) give identical measures.

Further Simplification

Assume that $A_i = A$, $\beta_i = \beta$ for all $i = 2, \ldots, N$. Then (20) reduces to

$$y_{cm}(t) = a_3[\frac{A^3}{4} \cos \omega_K t + \frac{A^3}{4} \sum_{\substack{i,j,p=2 \\ \neq K}}^{N} (1 + \frac{3\beta^2}{2}) \cdot \cos (\omega_i \pm \omega_j \pm \omega_p)t$$

$$+ \frac{3}{2} A^3 \sum_{i=2,\neq K}^{N} \cos(\omega_i - \omega_K)t$$

$$+ 3 A^3 \sum_{i,j=2,\neq K}^{N} \left(1 + \frac{\beta^2}{2}\right) \cos(\omega_K \pm \omega_i \pm \omega_j)t]$$

$$+ a_3\left[\frac{A^3}{4} \sum_{\substack{i,j,p=2,\\ \neq K}}^{N} (3\beta + \frac{3}{4}\beta^3) \cos \omega_m t \cdot \cos(\omega_i \pm \omega_j \pm \omega_p)t\right.$$

$$+ \frac{3}{2} A^3 \beta \cos \omega_m t \sum_{i=2,\neq K}^{N} \cos(\omega_i - 2\omega_K)t$$

$$+ 6 A^3 \beta \cos \omega_m t \sum_{\substack{i,j=2,\\ \neq K}}^{N} \cos(\omega_K \pm \omega_i \pm \omega_j)t]$$

$$+ a_1 A \cos \omega_K t \qquad (24)$$

In considering CMD, some of the terms in (20), or equivalently (24) will disappear; e.g., for K = N, there is no $i = 3K + 14$ for $2 \leq i \leq N$.

Conclusions

This study concedes to two basic conclusions:

- Intermodulation products generate "zero-beat" frequencies with carriers, or else they generate frequencies outside range of interest. Interpreting IMD becomes ambiguous, and there is no need for that anyway.
- Crossmodulation becomes a limiting factor of performance. An acceptable level of perceptibility should be established on this basis. Measurement techniques will in general yield better means of assessing CMD, in comparison to analytical procedures which seem to be unwieldy and cumbersome.

It is further noted that effects of frequency-dependence in a system behavior must be taken into consideration for a system operating under a substantial number of channels. This is a consequence of operating the system at or beyond a high frequency range; e.g. 400 MHz.

1. Switzer, I., "A Harmonically Related Carrier System for Cable Television," *IEEE Trans. Commun.*, Vol. COM-23, pp. 155-166, January 1975.

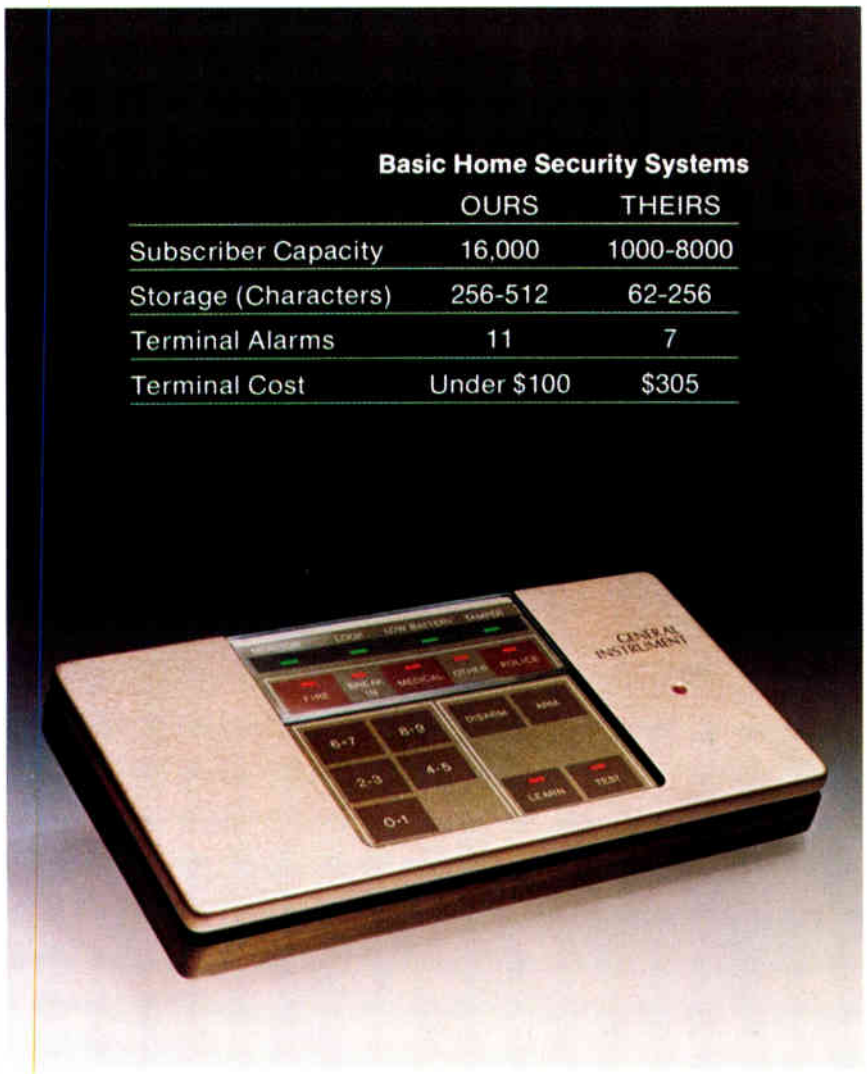
   Switzer, I., "Phase Phiddling,' 23rd Annual NCTA Convention Official Transcript, pp. 2-21, 1974.

   Krick, W., "Improvement of CATV Transmission Using an Optimum Coherent Carrier System," *1979 International Television Symp.*, Montreaux, Switzerland, May 27-June 1, 1979.
2. Maqusi, M., "Distortion Analysis in Cable Television Systems," Tech. Note, GTE Sylvania-Cable Television, El Paso, Texas, June 1980.

M. Maqusi is a consulting engineer to the CATV Division of GTE Products Corporation in El Paso, Texas. He received the following degrees from New Mexico State University: BS in electrical engineering (1969), MS in electrical engineering (1971), SCD in electrical engineering (1973), and MS in mathematics (1973).

JERROLD CABLE SECURITY.

A simple, one-on-one comparison can keep you from getting burned.



A simple comparison proves Jerrold's system does more to protect the cable operator as well as the homeowner.

Reliability. Two frequency-agile return channels make it more reliable. Together they circumvent problems from unwanted signals, or ingress, on the line. And if something goes wrong on one frequency, the system automatically changes to the other so your customer does not lose protection.

Marketability. In addition to standard fire, medical and police alarms, Jerrold Cable Security also offers 4 programmable alarms that can be tailored to the individual subscriber. And because it only uses 400 KHz bandwidth for the downstream channel, it doesn't take up a profitable video channel.

Cost. Just compare . . . feature for feature, dollar for dollar. We think you'll agree the Jerrold system is a real steal.

General Instrument Corporation,
Jerrold Division, 2200 Byberry Rd.,
Hatboro, PA 19040

Visit us at the NCTA Show, Booth # 100.

GENERAL INSTRUMENT

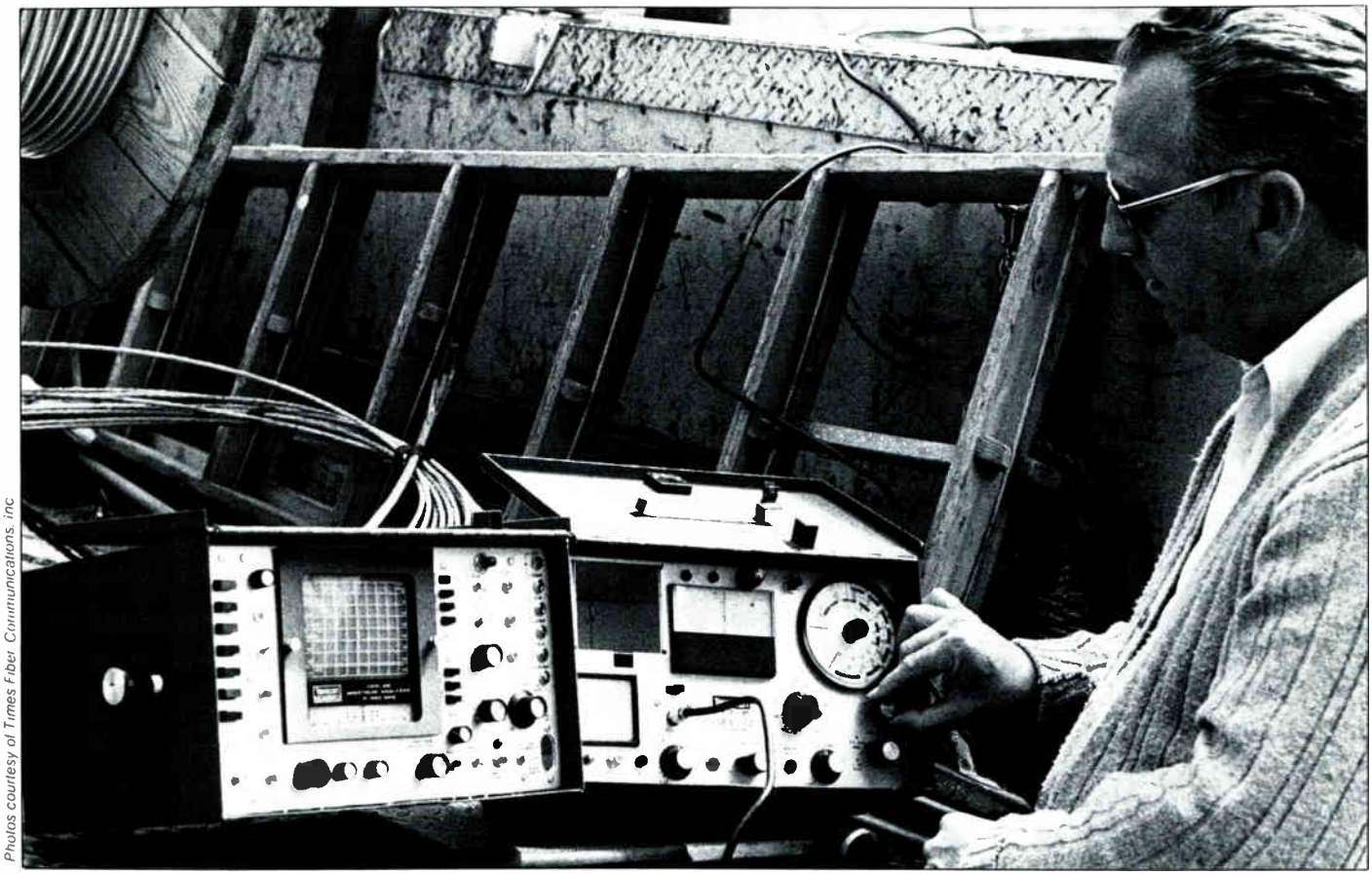
Stamping Out Signal Interference

By Raymond B. Kilmer, chief technician, Kingston Cablevision.

Early in 1979, Kingston Cablevision, a 14-channel system located 90 miles north of New York City, took its first step into pay television, offering Showtime on Channel G (157.25 MHz). As soon as the channel was in operation, Kingston was deluged with complaints of poor television reception on the pay channel. Viewers in the central area of the system suffered interference in the video portion of the signal. In some cases, the interference was so bad that it wiped the picture off the screen.

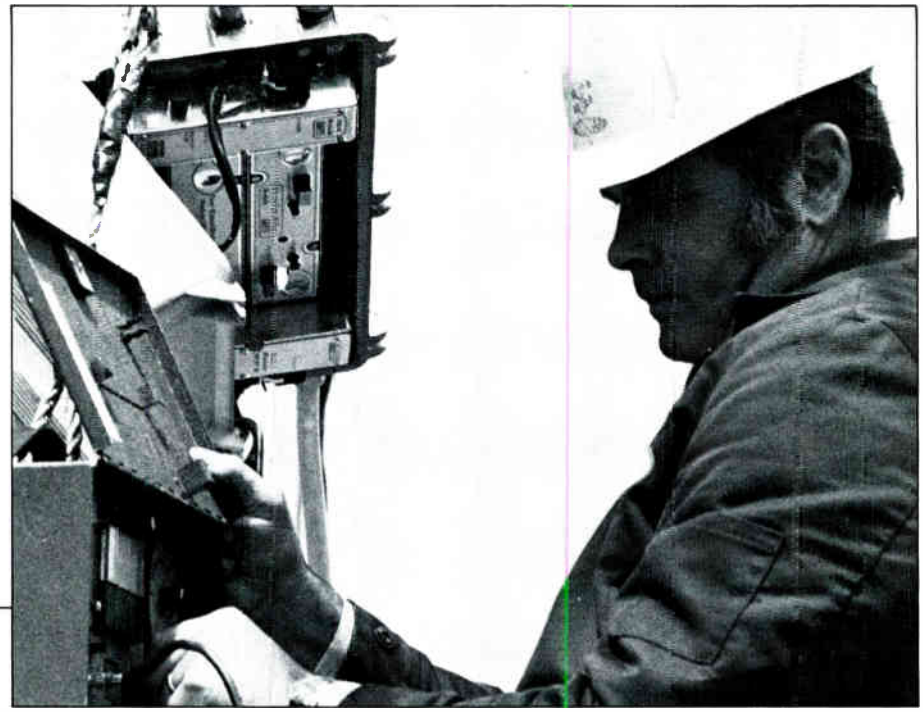
The complaints sparked a three-month search to find the cause of the interference. Once that was found, it took Kingston Cablevision five more months to find a product that would ensure quality reception on Channel G.

The problem was electromagnetic interference (EMI), a problem that Kingston Cablevision had hardly experienced in its 20 years of operation. Where was it coming from? A frequency allocation table for the city indicated that local police



Photos courtesy of Times Fiber Communications, Inc

Ray B. Kilmer performing feeder and multitap measurements.



A Kingston Cablevision technician measuring interference at a feeder amplifier.

broadcasts were probably creating the RFI signal pickup. The police broadcast at 151.79 MHz, and the closer subscribers were to the police transmitter, the worse EMI they suffered. The Kingston police department was contacted and agreed to a ten count test procedure of its frequency. Technicians used scanners to measure the output of drop cable in the homes where viewers had complained. The police signal interference was confirmed.

The next question was: how is the signal entering the system? Engineers at Kingston first thought that the signals entered at the headend or at the amplifiers, but the fact that the intensity of EMI varied from place to place in the system pointed to a different cause. Some areas of the system were far from the police transmitter and received little EMI. If the interference signal was entering through the trunk cable, the trunk would carry the interference to those homes as well. The same reasoning indicated that the signal was not entering at the headend. In all likelihood, the drop cable at the subscribers' homes was acting as an antenna and picking up the signal.

At the time, Kingston Cablevision used drop cable with 96 percent copper braid shield. The drop cable supplier was contacted and asked if he could supply a cable that had better shielding. The manufacturer supplied a sample of its best shielded drop cable and evaluations of the cable showed some improvement, but not enough to eliminate EMI on the pay channel.

A second manufacturer offered to supply a sample of its best drop cable, but Kingston Cablevision declined the offer because the product was essentially the same as the samples already evaluated. Ironically, the second cable manufacturer stated that other systems using its shielded drop cable were receiving complaints because of insufficiently shielded drop cable.

Meanwhile, the problem grew worse. EMI from the police broadcasts was limited to a two mile radius of the police transmitter. But as Channel G was expanded outside the range of police interference, viewers in outlying areas experienced different types of interference, including out of sync and EMI in the

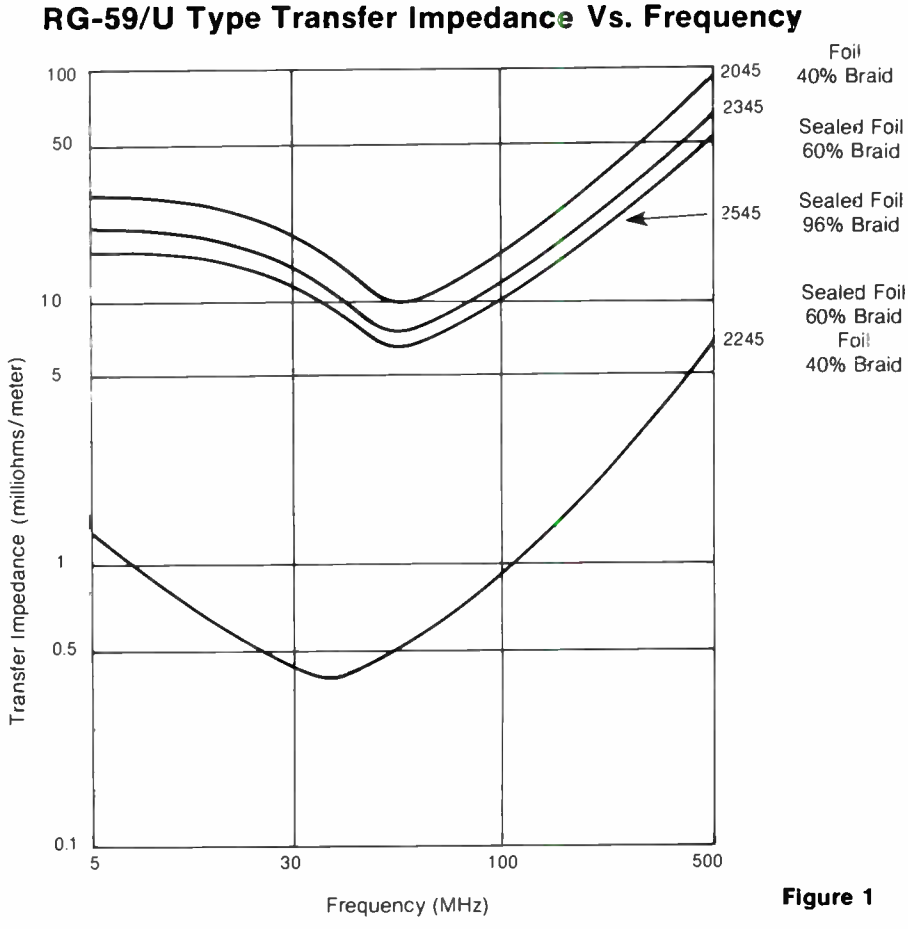
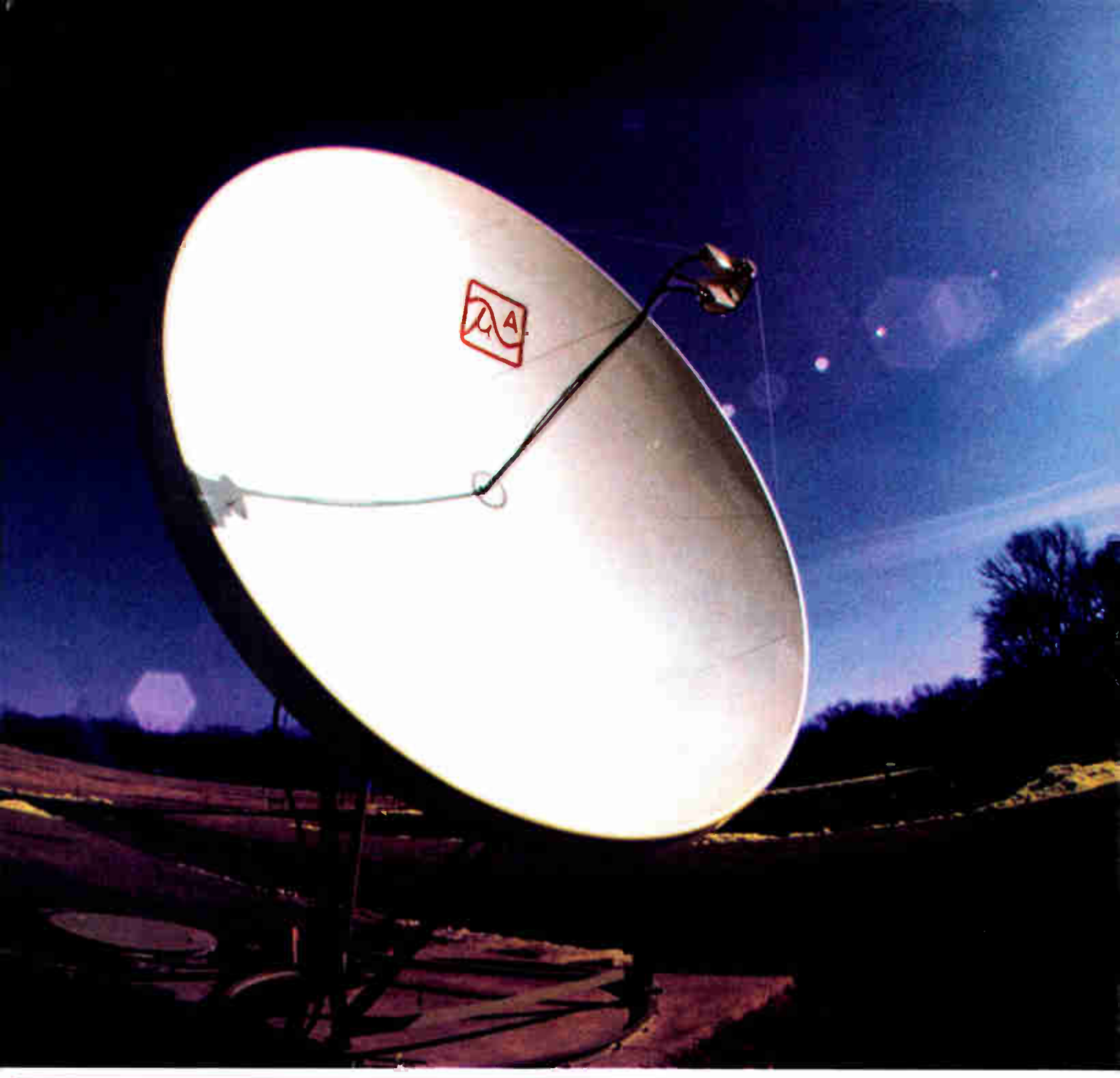
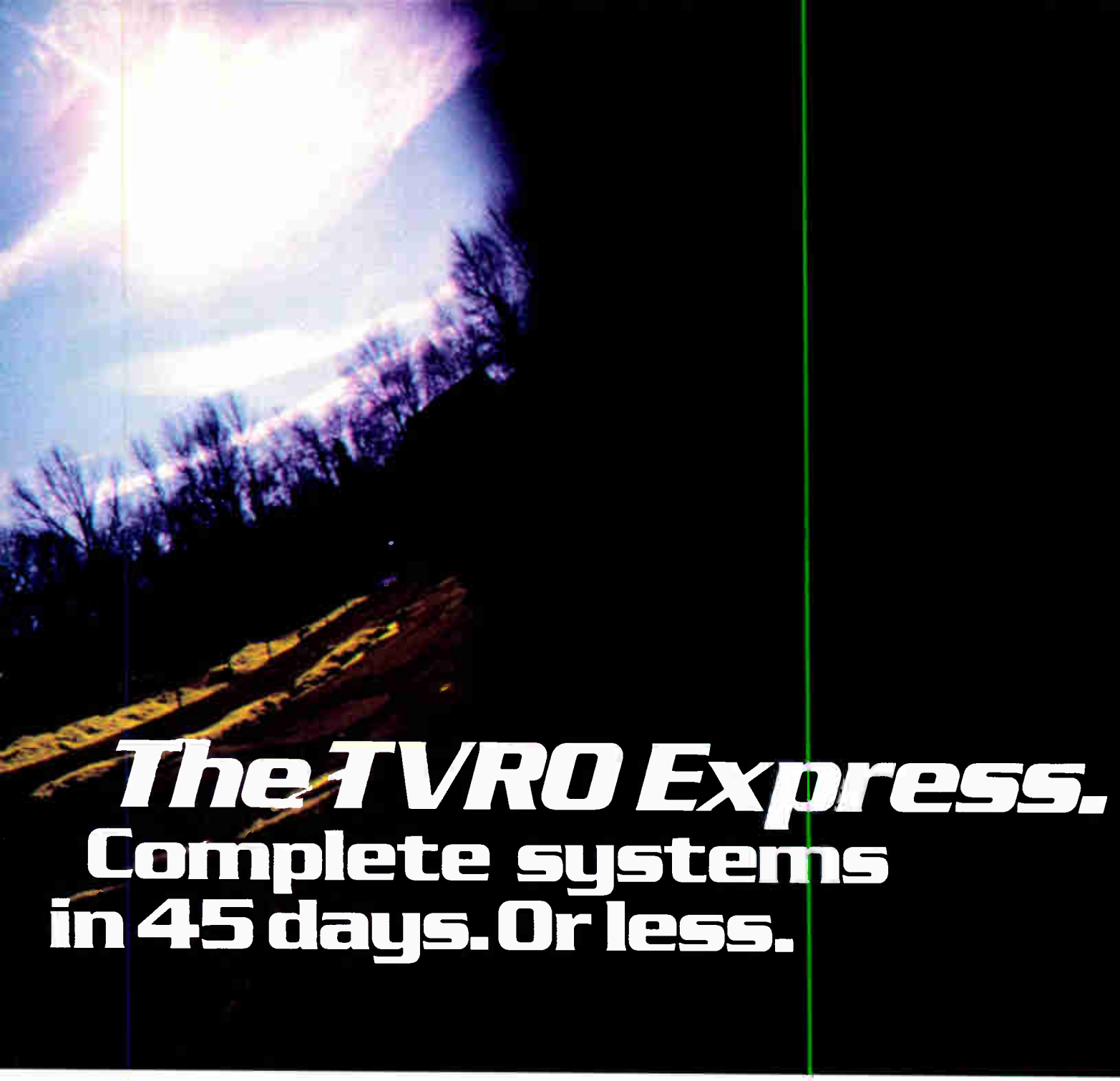


Figure 1



VR-3X: Tunes manually across 24 channels with a single screwdriver adjustment.
VR-4X: 24 channel frequency agility with remote tuning option. Optional automatic vertical/horizontal polarization switching.
Both feature Automatic Frequency Control ☐ Digital Demodulator with threshold extension delivers 3 dB extension when compared to 30 MHz IF bandwidth ☐ 4.5 MHz Subcarrier Composite of video plus program audio simultaneously feeds cable modulator and/or microwave system ☐ Options include in-chassis cable modulator that operates off receiver power supply and up to 4 audio subcarrier demodulators.

MAC sales offices located in Los Angeles • Denver • Dallas • Kansas City • Atlanta • Charlotte • Burlington • Toronto.



The TVRO Express. Complete systems in 45 days. Or less.

If you're expanding your video delivery system and want your new earth station equipment as soon as possible, call us. We have the TVRO systems you've been looking for.

And in less than 45 days, we can deliver your complete system. We have everything: antennas, receivers, cable modulators, LNAs, feed lines, power dividers and frequency coordination. All custom-designed with MAC technology to provide a cost-efficient, state-of-the-art operational system. As you probably know, we've already installed and serviced hundreds of earth station systems in the United States.

Our newest satellite receivers, the VR-3X and VR-4X, are frequency agile and have 24-channel capability. Both come as integral parts of our low cost, high performance TVRO system. Featured on both is a plug-in cable modulator option that you won't find on any other radio. It reduces rack space and clutter, simplifies wiring and costs substantially less than buying a separate modulator.

All MAC features are designed for configuration flexibility. Now and in the future. So you don't worry about having a system on your hands that's old before its time.

And since we provide single-source accountability for your total system needs, you can count on faster, better service. Because you won't be dealing with a horde of different suppliers, all claiming the problem is someone else's. Just call us. Our service engineers are on call 24 hours a day, seven days a week.

TVRO Express Service doesn't just mean fast delivery. It also means fast, efficient service after your system is installed.

For more information, contact Duke Brown at (617) 272-3100. Or write, 63 Third Avenue, Burlington, MA 01803.

See Us at the NCTA Show-Booth #652

Microwave Associates Communications

A MACOM COMPANY

audio and color portions of the signals. Investigation revealed numerous EMI sources: radio transmissions of Amtrak, Conrail and a local 24-hour all weather station, and even the passing of a train. As a train passed along the tracks, it created electromagnetic transmissions. In some cases, the passing of a train caused the television to go out of sync; in other cases, it wiped color from the screen. This EMI problem was viewed as a separate factor, affecting homes located far from other transmitters. The Amtrak/Conrail transmissions had to be isolated from other problems, and measurements of a spectrum analyzer proved this to be correct.

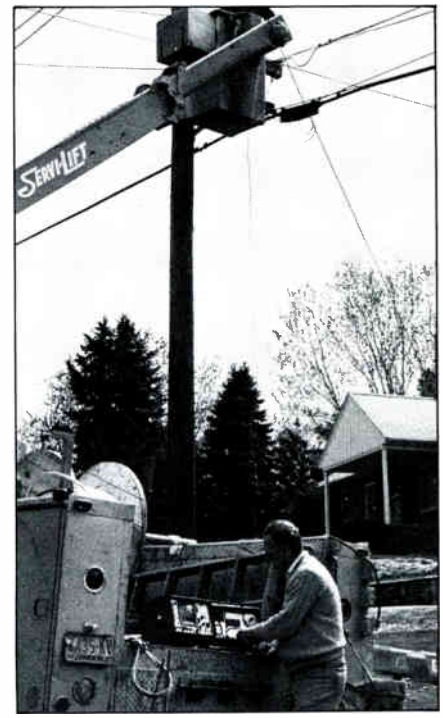
At one point, a local power company installed a paging system and subscribers within a mile of the company received interference in the video portion of their signal. The continued search turned up the last and hopefully final use of the frequency: radio transmission from boats on the Hudson River.

Eventually, Kingston compiled a list of EMI sources that intruded on Channel G:

Police 151.79 MHz
Local Paging System 157.74 MHz
Boats on River 159.30 MHz
Amtrak/Conrail 161.07 MHz

After searching for five months, Kingston Cablevision learned that Times Wire & Cable produces a double braid, double shield aluminum foil drop wire, the series 2200 Quad Shield Alumifoil®. It had the features needed: a sealed aluminum/polypropylene/aluminum tape, 60 percent aluminum wire braid, an unsealed polypropylene aluminum tape and a 40 percent aluminum wire braid, as shown in Figure 1 on page 63. The performance characteristics of Quad Shield Alumifoil® differed significantly from other drop cable brands.

Samples of Times Wire & Cable MI 2245 were obtained and a program was established to evaluate this cable and to further substantiate that the problem was drop cable. The location chosen for the evaluation was at the end of a trunk line where poor reception was being experienced. The signals on the trunk line were measured with the spectrum analyzer and the measurements showed that the EMI signal was not being transmitted with the trunk line. Measurements were also performed to determine whether the EMI signal was in the feeder line or at the multi-tap where the drop was connected. All of these points showed that interference signals were not present. So neither the trunk nor distribution system had measurable interference signals.



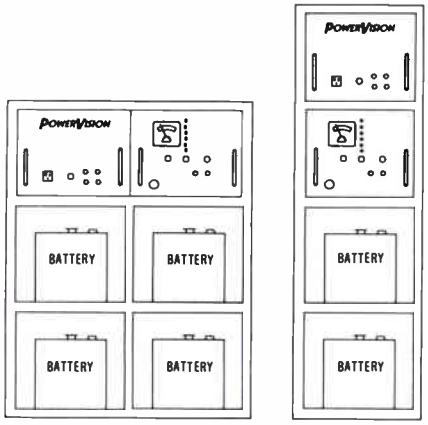
With reconnection of the ordinary drop wire, Kingston found that the EMI signals did reappear and were transmitted to subscribers' TVs. The drop was left active, running into the house, a new Quad Shield Alumifoil® drop was connected to the multi-tap and run into the house. The field strength meter showed definite, measurable EMI signals on the original drop and no measurable signals on the Quad Shield Alumifoil® drop. The

See Powervision Perform...

...At the NCTA Show, Booth 521, Los Angeles

Technical advantages are what make POWERVISION® first choice among CATV engineers and maintenance managers. In the cable system, POWERVISION can be counted upon for reliable standby operation for fully automatic, fast switchover — whatever the emergency. Don't sweat it, do routine service... and forget it!

Available for a wide range of pedestal and pole installations, POWERVISION standby power supplies feature modular design for convenient service, battery units on sliding trays for ease of service and inspection, temperature compensated battery charger with automatic time out, optional volt/amp meters, screened louvres for efficient ventilation, surge protection (standard MOV at no extra cost), status monitoring and up to five hours of standby operation time.



With over 3300 units in operation in the field, POWERVISION demand is still increasing and production is keeping pace for immediate delivery to CATV Operators with expansion needs and new systems to equip.

But, don't forget to call today for additional technical and pricing information on POWERVISION.

POWERVISION®...for reliable CATV standby power.

LESTER EQUIPMENT MFG. CO., INC. 2840 E. Coronado, Anaheim, CA 92806, Telephone (714) 630-2260

Finally, there's a coaxial cable supplier who understands the cable TV business

We should. We're Scientific-Atlanta. And for over 15 years now, we've offered a complete line of cable TV equipment from earth stations to set-top terminals, and everything in between.

Now we're making cable, too. A complete line of cable types and sizes that meet even the most demanding performance requirements — including cables for 400 MHz and above.

That makes us the *only full-line manufacturer of distribution systems for the CATV industry.* Before you make your next cable purchase, consider the special advantages that only we can offer you.

We can help plan your system. We offer special training programs to keep your field personnel informed on the latest installation techniques.

We won't keep you waiting for orders. We're tripling our cable production capacity to speed delivery times. We run our own trucking fleet to handle cable safely. And our cable performs.

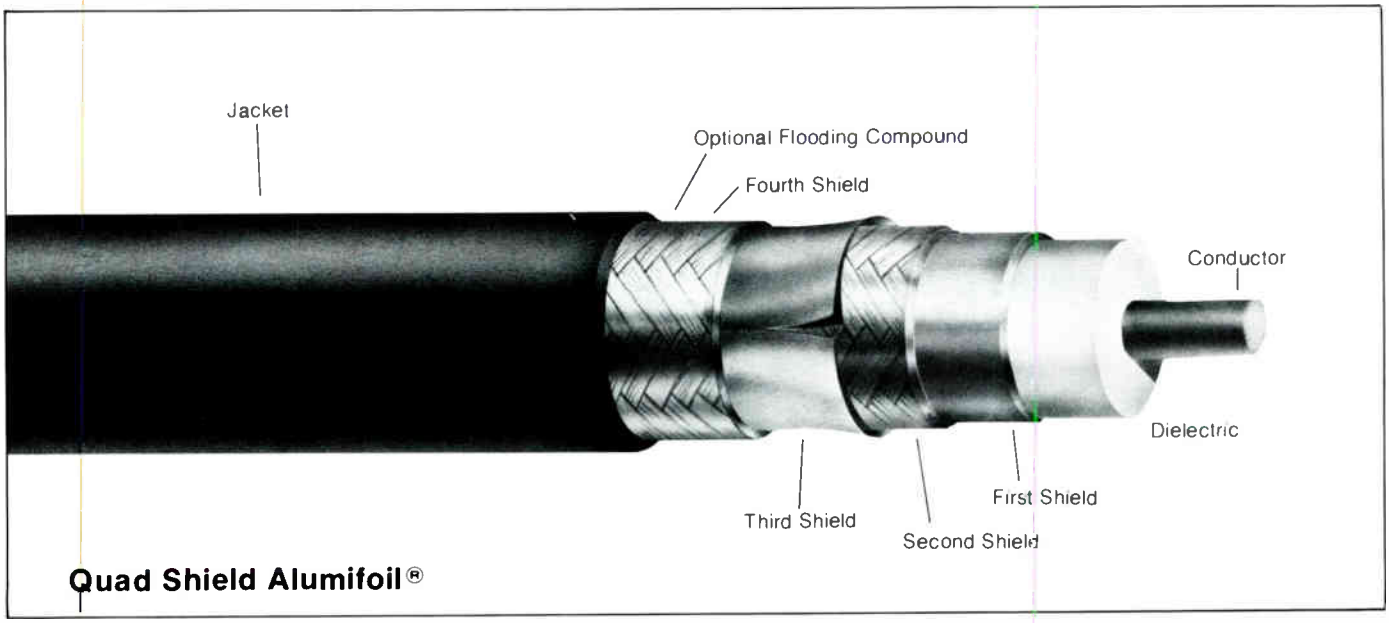
And here's a no-risk offer to prove it!

Buy a reel of Scientific-Atlanta cable. If it does not perform as well as or better than your present cable, return our invoice with a notation of the results of your comparison. We'll tear up the invoice. You keep the cable.

Write for more information on Scientific-Atlanta's complete line of coaxial cable products. Or call Dean Taylor toll-free (800) 528-3211.

Scientific Atlanta Communications
Box 105027 Dept. A-R
Atlanta, Georgia 30348

United States: One Technology Parkway, Atlanta, Georgia 30348. Telephone 404-441-4000, TWX 810-766-4912, Telex 0542898
Canada: 1640 Bonhill Road, Unit 6, Mississauga, Ontario, L5T 1C8, Canada. Telephone 416-677-6555, Telex 06983600
Europe: Horton Manor, Stanwell Road, Horton, Slough SL3 9PA, England. Telephone Colnbrook (02182) 3211, Telex 849406



Quad Shield Alumifoil®

spectrum analyzer confirmed this on a greater scale: the original drop had a considerable interference and the Quad Shield Alumifoil® drop EMI signal was over 90 percent less than that with the original drop. The problem was solved.

Kingston replaced the drop cables at the homes of subscribers who had complained of poor reception. Since then, Kingston has used it in all its new drop cable applications. At this point, approximately half of the system's 19,200 subscribers are served the Quad Shield Alumifoil® drop cable.

Kingston Cablevision also rewired its headend with the shielded cable, just to make sure the EMI problem wouldn't crop up again.

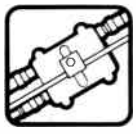
Raymond B. Kilmer is a member of the Society of Cable Television Engineers and has worked with Kingston Cablevision for 17 years. Kingston Cablevision, established in 1959, is currently owned by Plains Television of Chicago and Narragansett Capital Corporation of Providence, Rhode Island.

Get acquainted with the Supermarketplace® for CATV Equipment Supply!

NORTH SUPPLY®

North Supply Company • 10951 Lakeview Avenue
Lenexa, Kansas 66219 USA • Phone: 913-888-9800
Telex: 426388 • TWX: 910-749-6494
(800) 255-6458

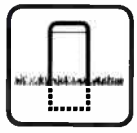
We're North Supply, introducing a product/service combination like you've never seen before!



Start with delivery. We ship from stock within 24-48 hours, surface freight prepaid and allowed. That goes for any size order, large or small.

Not only can we sell you equipment, we also offer a unique leasing program, featuring quick approval with no run-around. The North Supply Leasing Program means you can have the equipment you need immediately, without a large cash outlay.

And our product experts can give you sound advice in selecting components and designing systems. Access to this in-depth knowledge is as fast as a phone call.



We carry only the most up-to-date, brand name products, including:

- **Connectors**
- **Electronics and Earth Stations**
- **Splitters, Taps and Passives**
- **Underground Products**
- **Wire, Cable and Strand**

You save on storage and inventory costs, because North Supply warehouses these

products for you at 11 distribution centers coast-to-coast.

And, our computerized inventory control system monitors your order from entry to shipment.

For these reasons and more, North Supply is a source you'll want to get to know. Start by asking for your copy of our new fully illustrated Supermarketplace® catalog of CATV products.

Cable, hardware and more now available for immediate delivery. Call toll-free (800) 255-6458.

NORTH SUPPLY COMPANY®

See us at Booth #106, NCTA in L.A.

Microwave Revisted: New Applications On the Horizon

By Tom Keenze, vice president of engineering and operations, United Video, Inc.

Terrestrial microwave systems have been losing ground to competition from satellites and CARS systems. The current deregulatory environment, however, is creating opportunities for new services that are ideally suited for terrestrial microwave transmission. This article examines how terrestrial microwave services stand competitively with satellites and CARS systems and explores terrestrial microwave applications that are only a few years away.

Microwave television distribution systems for cable television evolved in the late 1960s and early 1970s, prior to satellite delivered signals, to fulfill a specific need: providing regional distribution of distant (independent, educational and network) TV stations to cable television systems at a reasonable cost.

A service was needed that could offer transmission of distant signals with reasonable reliability at a cost competitive with CARS-BAND (do-it-yourself) systems and telco systems. Based on investment requirements of that period to construct such service, several companies were able to create a business capable of producing sufficient cash flows with minimal risk.

The availability of this service made business plans feasible to construct cable systems in many markets, where without distant signals to sell, such feasibility would not have occurred.

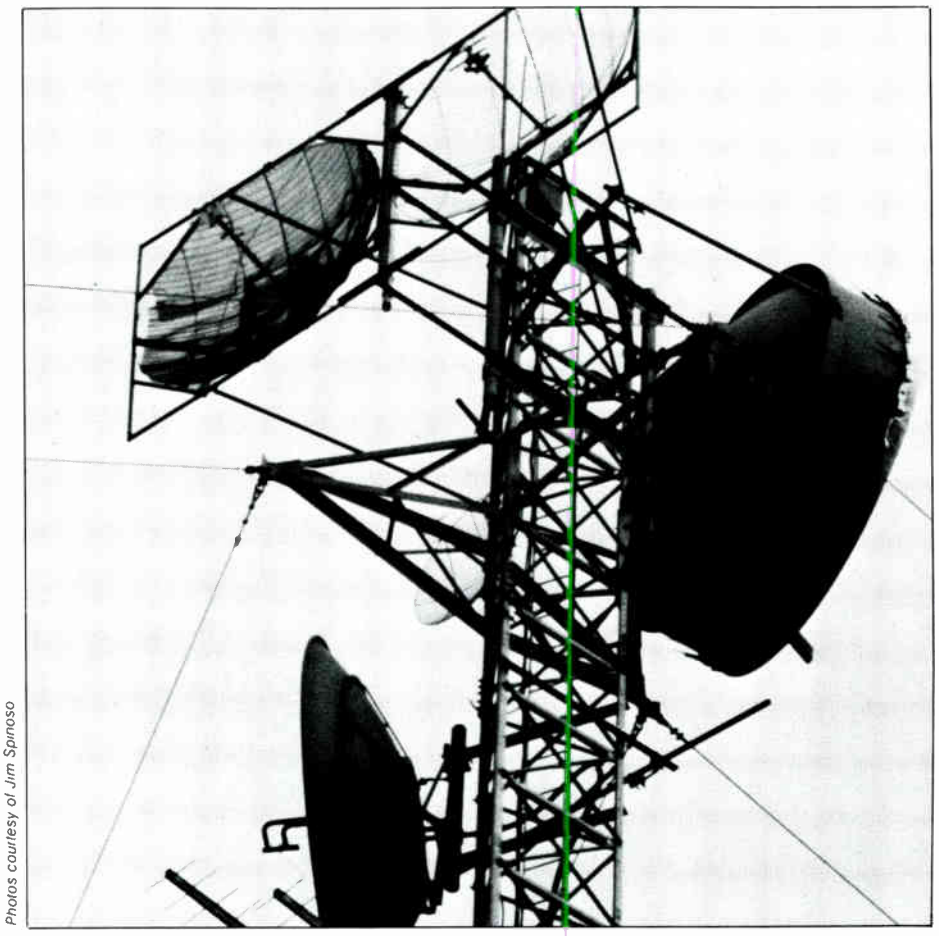
The systems did (and still do) carry various television signals to cable television systems long distances from the stations. They also did (and still do) serve to move an off-air pickup from fringe areas to Grade A or B signal contour areas for improvement of reception.

The systems did (and still do) serve to distribute FM stereo radio stations to distant cable television systems.

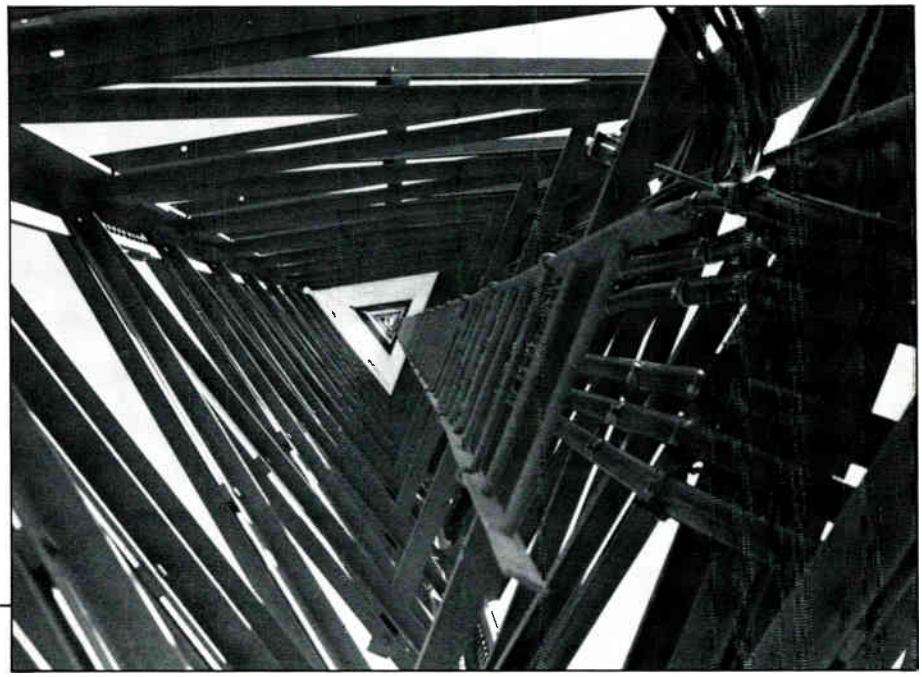
The terrestrial systems today continue to serve the same needs for cable television; but now alternative distribution systems are available. This has created new pressure on terrestrial microwave systems for improved reliability, quality and lower cost.

Satellite Competition

The primary competitor, of course, is satellites. In terms of reliability, satellites have proven to be extremely good. This is primarily due to a reduction in the



Photos courtesy of Jim Spinoso



An inside view of microwave transmissions: looking up into a 380-foot microwave tower at Mt. Springs, Texas.

probability of transmission propagation problems. That reduced probability occurs because: signals are only transmitted through about one mile of significant atmosphere going up and coming down, and frequency bans of 4 and 6 GHz are used.

In terrestrial microwave, propagation reliability at 6 GHz is, for practical purposes, just about as good as it would be for satellite paths. In many cases, particularly around major population centers, common carriers are forced to the 11 GHz band. Propagation in this band is severely hampered by rain. Economics prevent building repeaters close enough to overcome the problem. CARS band operators face an even more severe problem in having to use 12-13 GHz.

Another reliability consideration concerns the amount of electronics necessary to cover a given distance. With satellite distribution, there is only one microwave repeater (the satellite transponder) between origination and the cable television operator. In terrestrial systems, there may be many repeaters between the origination and the operator. This problem can be solved in terrestrial systems with use of automatically switched redundant systems. Unfortunately, economics prevents this from being practical. Cable television operators would like to have the reliability of redundant electronics, but are unwilling to pay for it. (Perhaps it is as much the reality of "bottom lines" as unwillingness.)

Satellite transponders are not infallible, however, and not all satellite services have access to "protected" service. Also, the satellites are subject (however remote it may be) to disaster. They can be destroyed by meteorites, or lost through major failures in control and station-keeping systems.

Today, many cable television operators are basing the economics of their business plans solely on satellite delivered services. If a satellite disaster of major proportions occurred, many operators would be severely hurt. A cable television operator not tied to terrestrial service might be hard pressed to survive an extended period without pay TV and distant independents. A terrestrial system could install tape equipment at the origination point and provide premium TV service on an interim basis at the expense of a less important channel.

Looking at the "quality" of signals delivered bears merit. Most cable television systems use a five-meter sateliite dish. If it is properly installed, the dish will deliver 51-52 s/n, at best. Terrestrial systems achieve much better s/n. At United Video, the longest haul is 17 hops and end-to-end s/n is better than 60 dB.

From a practical standpoint, most terrestrial systems must contend with delivering services that are picked up "off-air" and the quality is being compared to "closed-circuit" satellite feeds. Naturally, the satellite signals have a better s/n. Even though terrestrial systems can deliver better end-to-end s/n performance, the nature of an "off-air" pickup is such that the signal into the microwave system does not compare with "closed circuit" signals. The s/n of the "off-air" signal becomes the s/n the customer receives. Since s/n of the transmission system is higher than that of the signal being carried, the microwave system is "transparent" to the customer. This is not true with satellites. Satellite receive systems must overcome noise problems encountered in the transmission path.

CARS Competition

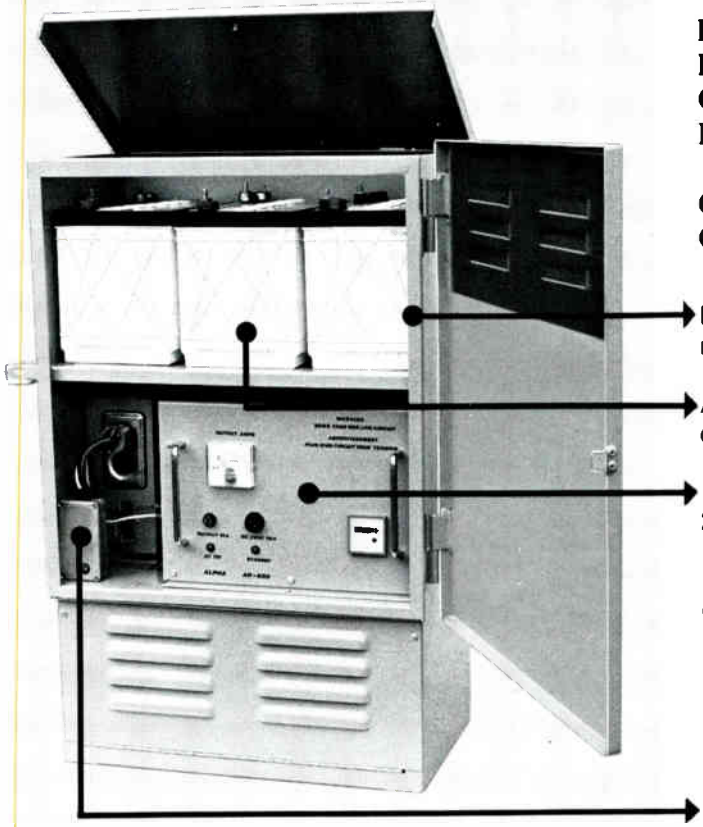
The secondary competitor, CARS systems, has been around as long as common carriers. CARS systems may be single channel FM (FML) or multi-channel AM (AML). Although FML systems are still being installed, AML predominates the market today. Because AML uses amplitude rather than frequency modulation, it generally introduces undesirable nonlinear distortions in transmitted signals. The economics of AML are the primary motivation for its use. AML is usually found in situations where it is necessary to transmit a large number of TV signals to several places with 15 miles of origination. In essence, these are used in lieu of multiple headends. FML, while offering superior performance, is much more expensive. It is used in situations where a small number of TV signals need transmission to a more limited number of receive points.

CARS systems offer even worse propagation characteristics than 11 GHz common carrier channels, therefore hops need to be closer (by five miles at least) to offer propagation performance equal to the 11 GHz common carrier band. The cost of hardware is approximately the same at 11 GHz common carrier gear. Some operators will choose "cheap" CARS equipment and tolerate poorer performance in their own systems than they would accept from a common carrier.

The thrust of this argument is that for equal propagation and signal quality performance, CARS systems cost more to install, unless an operator is willing to compromise on performance parameters in his system.

When your power goes off you keep on going

with an ALPHA stand-by power supply unit



PERFORMANCE AND RELIABILITY
FIELD PROVEN BY THOUSANDS
OF UNITS OPERATING
FROM COAST TO COAST.

COMPARE THESE ADDITIONAL
OUTSTANDING FEATURES.

- Epoxy coated aluminum enclosure for maximum durability.
- All batteries on top to keep vapours and corrosive emissions away from electronics.
- Inverter crystal controlled and line synchronized. 20-30 second time delay before synchronized retransfer to utility.
  Less than one cycle transfer time, even good enough to keep a computer up.
- Extended battery life due to temperature compensated float and equalize charging.
- Optional APM (Automatic Performance Monitor)
- Output filter complete with 3/8" connector.

ALPHA TECHNOLOGIES
A DIVISION OF GB ENTERPRISES, INC.
1305 Fraser St., D-6, Bellingham, Washington 98225 • (206) 671-7703
ALPHA TECHNOLOGIES LTD.
5676 Dorset Street, Burnaby, British Columbia • (604) 430-1476

See us at the NCTA Show—Booths 564-565

Another point involves cost of operation. Many cable television operators do not take into account the personnel cost involved in system operation. But, since manhours have to be spent for maintenance and repair, it is fallacy not to allocate salaries for specific jobs people do.

Other than personnel, all other operating expenses will be comparable with either CARS or common carrier system. CARS may even have higher electronics maintenance cost. At United Video, experience has shown that higher frequency equipment is less reliable than lower frequency equipment, even for the same model radio equipment.

CARS systems are competitors, but only where operators are willing to compromise performance and be unrealistic in assessing expenses. An operator also has to have people qualified to maintain the system and be willing to deal with all the operational and paperwork connected with operation of such a system.

Distributed Signals

Another problem facing the terrestrial carriers involves distributed signals. A number of the independent stations are "going STV," scrambling the signal during prime-time periods for over-the-air pay TV. Since FCC carriage rules impose severe restrictions on a terrestrial microwave carrier's options to replace portions of programming for its customers (and in some cases there is simply nothing else available off-air) this is a serious problem.

Economics and reliability notwithstanding, there are now product availability problems in some markets. The FCC imposed problems will probably go away, but the product availability problem will be difficult to solve. Granted, one might provide facilities to originate programming for closed-circuit networks, but are operators willing to pay for this? Also, many of the cable television systems are still 12 channels and channel availability for new services is a problem. Terrestrial microwave carriers will look at specific situations that will overcome this difficulty in "future applications."

Future Applications

In particular, terrestrial systems offer the following advantages over satellites: economical distribution for regional services, and abundance of channels available for this type of service. Satellites are fantastic for mass distribution of programming with national appeal, but are expensive for distributing information relevant only to a relatively small area of the country. The one regional satellite service for cable television (Fanfare) proved to be a total economic disaster. In fact, the target area for Fanfare (southwestern U.S.) probably is too large to do economically with new microwave construction as well. Had there been an existing terrestrial network available for use on an "overbuild" basis, Fanfare might have been successful.

There are many inviting opportunities for cable television and specialized common carrier operators to provide attractive (especially from a subscriber's viewpoint) services.

Fringe area pickup improvement. As satellite signals proliferate on cable systems, many operators who are in or even outside of fringe area coverage of "must-carry" or "significantly viewed" stations are facing increasing subscriber and political pressure to "clean up their act." Comments like this are often heard from city officials: "You can get Chicago like it's next door. Why can't you get good pictures from Memphis only 90 miles away?" This is an ideal application and one not suited for satellites.

Regional cable system interconnects. A very exciting possibility for regional terrestrial microwave is the interconnection of cable systems to form regional networks. Possibilities abound for cable networks distributing state sports (high school and collegiate), state news, pay-per-view programming of local/regional interest, among others.

Here is another possibility: redistribution of satellite services for cable with local/regional advertisements inserted. This offers exciting economies-of-scale. A large cable system, with staff and equipment to do so, could insert ads on a programming network such as CNN or ESPN and distribute these channels to smaller area systems. The distribution would be paid by ad revenues and eventually the network could share revenues with smaller operators. Several MSOs are actively pursuing this concept. The New Jersey State Cable Association recently funded a $75,000 study to see how systems in that state could interconnect. Gill Cable is doing this now in the San Francisco Bay area.

The concept will take time to develop, but in two or three years it should be part of cable television.

A side benefit for cable television operators for getting into networking is that it makes them look more like programmers than common carriers. An offensive posture on this upcoming issue of "creating" versus "passing along" signals (in the context of the definitions of a "common carrier") will certainly make networking look desirable. The economics will be very attractive to advertisers, as well.

Also, pay-per-view, when multichannel/addressable-security decoders become available at a reasonable price, will be capable of supporting such regional networks.

"At last, an MDS Downconvertor designed and built, from the inside out, for system profitability."

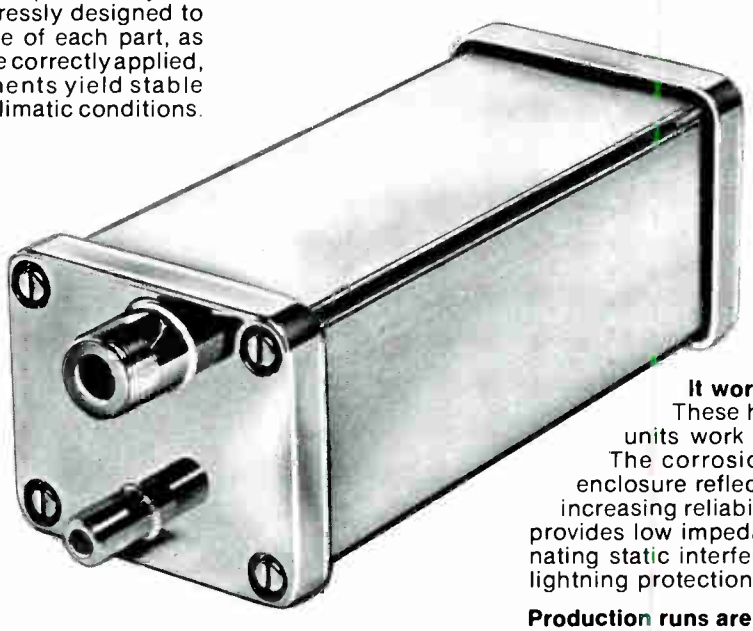
Jack Schnabel
Sales Manager
TEST, Inc.

Introducing TEST's Model 1K, the new, state-of-the-art, crystal-controlled microwave receiver.

Precision design, inside and out
Superb performance and dependability are the result of circuitry expressly designed to maximize the performance of each part, as well as the unit itself. These correctly applied, state-of-the-art components yield stable operation even in severe climatic conditions.

Moisture locked out
Long, trouble-free life is assured because moisture is positively locked out by the weatherproof gasket seals and the humidity-proof metal housing.

No detail overlooked
Even the connectors have been designed as an integral part of the housing. They provide exceptional R.F. and environmental characteristics.



Exclusive: Channelizing filters
Compare this new, stable crystal-controlled microwave receiver to **any** you've seen. Only TEST has incorporated channelizing output filters that free these units from off-channel interference and unwanted spurious responses.

Low-noise, high R.F. gain models available, too
Add more customers in weak signal areas using TEST's new low-noise, high R.F. gain models 10K, 20K and 30K. Sized the same as a 1K, these provide an extra 10dB, 20dB or 30dB of low noise R.F. preselector gain.

It works as good as it looks
These highly-tooled, compact units work as good as they look. The corrosion-resistant, all-metal enclosure reflects environmental heat, increasing reliability and stability. It also provides low impedance grounding, eliminating static interference while increasing lightning protection.

Production runs are now being scheduled.
Call me today at (213) 989-4535, or send the coupon below for more information on the complete TEST line of microwave receiving equipment.

Each Model 1K is ready to install and includes:

- **Matched power supply.** Mounted back-of-set, its design provides protection against man-made and lightning induced power line surges. An easily replaced fuse protects your investment and income.
- **Mounting hardware.** Installation is quick and simple with the unique, pre-attached, high-strength bracket. It securely attaches the unit to the mast with simple hardware.
- **Complete installation instructions.** Your installation personnel are provided a detailed instruction sheet with every unit.

See Us at the NCTA Show—Booth #301

TEST sells only to bonafide operators and their contractors.

TEST / Tanner Electronic Systems Technology, Inc.
16130 Stagg Street / Van Nuys, California 91409

YES. Please give me more information regarding the new line of TEST Downconvertors.

Name: _____ Title: _____

Company: _____

Street Address: _____

City: _____ State _____ Zip _____

Telephone: (____) _____

Regional low-power networks. With the recent low-power ruling from the FCC effectively deregulating TV translators, local TV stations are beginning to explore the concept of regional over-the-air networks. This is another application for regional terrestrial microwave systems.

Regional news distribution. Terrestrial distribution systems can also function as a "pipeline" for distribution of state news and paid political programs. In many places, large population centers are far removed from a state capital. For example: Springfield, Chicago in Illinois; Jefferson City, St. Louis, Kansas City in Missouri; and, Oklahoma City, Tulsa in Oklahoma. Terrestrial microwave could provide something akin to C-SPAN for cable systems in this situation. The interest is definitely there, as expressed in written requests from various cable television systems. The hardest part of providing this service is to establish or encourage establishment of video origination and production facilities in the state capitals.

Other regional applications. One can also speculate about regional data (vertical interval) transmission. There will be applications for teleconferencing circuits on a regional basis, too.

Potential impact of deregulation. The United Video systems are situated between major population centers: Chicago, St. Louis; St. Louis, Kansas City; Kansas City, Tulsa; Tulsa, Oklahoma City; Oklahoma City, Dalias; Dallas, Memphis; Houston, New Orleans. When FCC carriage rules are finally abolished, cable television systems in major metropolitan areas will probably want to "cherry-pick" TV programming from other nearby cities. Already, Kansas City has expressed interest in "cherry-picking" St. Louis, and vice-versa. The growth of cable systems in large cities will enable terrestrial microwave carriers to structure a reasonable tariff for service between major cities with no customers between, particularly when provision of service requires only an overbuild, rather than a new build.

The specialized video distribution networks created by United Video, and others, to serve the needs of cable television systems have definitely been adversely affected by competition — to a small degree by CARS systems, and to a large degree by satellite distribution systems. These changes have presented challenges to the economics and reliability aspects of terrestrial common carrier delivery systems.

Recently, Tulsa Cable had Arbitron run a survey of its 90,000 plus subscribers. The results showed KBMA, microwaved in by United via Terrestrial M/W, was the second most popular offering on the cable system. The winner was the local NBC station, but KBMA beat the local ABC, CBS, and ETV (the local independent, Channel 23, was just going on the air).

Unquestionably, regional independent TV stations can and do generate subscribers for cable systems. In the face of all the negatives one hears, terrestrial services have been, are, and will be a valuable asset for common carriers and their customers.

United Video is aggressively updating and improving its networks in order to maintain the highest quality and reliability feasible. It is also aggressively addressing the regulations which prevent it from competing economically in the marketplace.

Regulatory and developmental problems will continue to hamper terrestrial microwave services in the immediate future, but in two to three years the systems will be increasing their role in the cable industry.

Tom Keenze was promoted to vice president of engineering and operations at United Video, Inc., in January. He joined the firm seven years ago as manager of United's microwave system in Illinois and moved to the firm's head office in Tulsa, Oklahoma, in 1976.

Classifieds

Employment Opportunities

CMI Personnel Services

YOUR TOTAL EMPLOYMENT SERVICES NETWORK

EMPLOYERS . . . Let us help you to find the right job applicant.

JOB CANDIDATES . . . Let us help you to find the best position available.

- **WE** are an employer-paid personnel agency.
- **WE** represent HUNDREDS of POSITIONS and CANDIDATES nationwide.
- **WE** have a proven track record (cable TV, pay TV, STV, MDS, satellite, radio and TV).
- **WE** are an established firm (1971) which provides various services including research, cable system brokerage, publications and special reports, and we own and operate two cable TV systems.
- **YOU** can improve your chances of success when you employ our large full-time professional staff . . . in strictest confidence, of course.
- **YOU** can receive at NO CHARGE, our bi-monthly "Top Jobs & Candidates" bulletin, read by thousands in the communications field, by just writing or giving us a call.
- **YOU** can benefit from our counsel on how to interview and from our knowledge of the job marketplace, i.e., salary, benefits and other compensation relative to job descriptions, geographical differences and competing services/ technologies.
- **TOGETHER** we should be able to accomplish your objective, so let's get started TODAY.

COMMUNICATIONS MARKETING, INC.
PERSONNEL SERVICE

(714) 461-7891
2326 Tampa Ave., El Cajon, CA 92020

JIM YOUNG & ASSOCIATES, INC.

CABLE CAREER HOTLINE **1-800-433-2160**
In Texas, call collect: (817) 236-7187

- **FIELD ENGINEER** $27K
  FCC license, 50% travel, Midwest area.
- **OPERATIONS MANAGER** $40K
  3 years experience a must, Texas location.
- **ASSISTANT CHIEF ENGINEER** $24K
  Large system in South, train for Chief Engineer.
- **SECURITY SYSTEMS ENGINEER** ..... mid-$30s
  Set up security program, Northeast location.
- **REGIONAL ENGINEER** $27K
  5 years experience with FCC license, 50% travel, Southern location.
- **CORPORATE ENGINEER** $35K
  Medium-sized MSO in upper Midwest.
- **CHIEF TECHNICIAN** ..... to $25K
  Two-way system with major MSO, Midwest location.
- **TECHNICAL ASSISTANT** ..... low $20s
  Drafting—reproduction—purchasing, East Coast.
- **SYSTEM MANAGER** $20-22K
  Heavy in administrative duties, some technical duties, outstanding benefits, Southwest location.
- **CHIEF TECHNICIAN/PLANT MANAGER** ..... to $25K
  Major MSO in need of plant manager for large state-of-art system, Southeast location.
- **CHIEF TECHNICIAN** ..... in the $20s
  Expanding system in beautiful setting, Hudson River valley.
- **CHIEF TECHNICIAN** ..... to $22K
  52-channels, chance to learn state-of-the-art, Midwest location.
- **LINE TECHNICIAN** ..... $6.00 per hour & up
  Troubleshoot and sweep system with major MSO, Southwest location.
- **BENCH TECHNICIAN** ..... salary negotiable
  3-5 years experience, West Coast location.

All positions include benefits and moving expenses.
Call day, evenings or weekends for information about these and many other outstanding cable opportunities.

P.O. Box 79089 • Ft. Worth, TX 76179

CATV RECRUITERS FEES PAID

CHIEF ENGINEER

Degree plus 4 years CATV and/or communications experience may qualify for this position with a medium-sized single system operation. We need an individual that is experienced, innovative, aggressive and can get things done in a first-class manner. We offer a full package of benefits with excellent salary for the right person. If you think you can qualify, write to Box CED-0681-2. All replies held in strictest confidence. E/O/E.

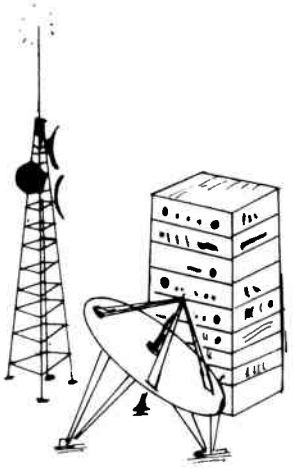
ENGINEERING • TECHNICIANS
OPERATIONS • FRANCHISING
SYSTEM MANAGEMENT
POSITIONS AVAILABLE

CAREER MARKETING ASSOCIATES

Jon Sather
Cable Television Specialist
5031 South Ulster Suite 430
Denver, Colorado 80237
(303) 779-8890

ara Associated Recruiters Agency, Inc.

Bringing Companies and Competent Personnel Together



CARL CHUCK SCOTT DENNIS
OLIVER MORRIS WARREN THOMAS

Contact us at The Bonaventure & The Biltmore or,

SEE US AT THE CONVENTION

Executive and Technical Recruitment
for the Telecommunications Industry

8388 Vickers Street
Suite 207
San Diego, CA 92111
(714)-279-4781

CATV MANAGER/TECHNICIAN
Collierville, Tennessee

Heritage Communications has an opening for a Manager in the Collierville, Tennessee system. Responsibilities will include supervision, design and construction of a new 54 channel 400 MHz plant.

Qualifications will include:

- Knowledge of all phases of CATV construction, operation of headends and earth stations, and system maintenance.
- Highly motivated with good people, administrative, organizational and technical skills.
- FCC first class license preferred.
- Strong technical and management skills required.
- Organizational abilities should be demonstrated through past experience.
- Graduation from a recognized technical school or equivalent CATV experience required.
- Must have a pleasant personality, relatively articulate and comfortable with writing and speaking skills.

Send resume to:

JUDITH GERMAN
PERSONNEL DEPARTMENT
HERITAGE COMMUNICATIONS, INC.
2195 Ingersoll
Des Moines, Iowa 50312
(515) 245-7579

LEAD TECHNICIAN

Must have strong hands-on, at least 3 years experience balancing Jerrold Starline 20 push-pull system. 200 miles of plant. Also need a number two man. Contact Wm. C. Grove (307) 635-7651 Cheyenne Wyoming.

LINE TECHNICIAN
SERVICE TECHNICIAN
CONSTRUCTION FOREMAN

Join our technical staff in sunny Florida! We are building a 700-mile, 400 MHz system. RCA experience preferred. Applicants must be experienced in systems operations and repair. Salary commensurate with experience. Contact:

Robert Brady
Director of Operations
Dade Cable Television
12232 S.W. 114th Place
Kendall, FL 33176
(305) 235-6784

REGIONAL MANAGER

Major MSO is looking for an individual to assume regional engineering responsibilities in Texas. Minimum 5 years experience in Cable Engineering and Microwave required. Degree preferred but not mandatory. 50% to 70% travel. Compensation in Mid $20's with bonus. Send resume to:

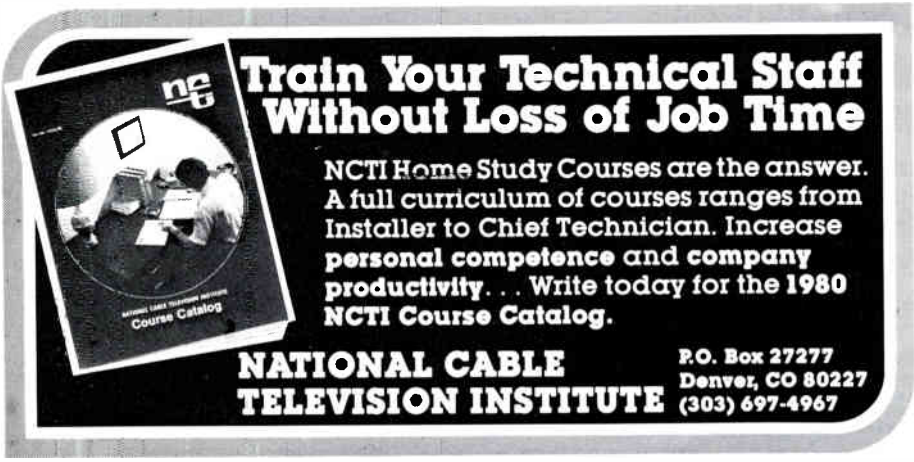
Box #CED 0681-1.

We are an Equal Opportunity Employer.

Address Blind Box replies to:
(BOX NUMBER)
c/o CED
P.O. Box 5400 T.A.
Denver, CO 80217

Professional Services

Business Directory



RMT ENGINEERING

CATV/MATV REPAIRS

60-DAY WARRANTY
10-15 DAYS TURNAROUND

FOR PRICES WRITE TO

625 E. TAYLOR AVENUE
SUNNYVALE, CALIFORNIA 94086
(408) 733-4830

INVENTORY REDUCTION SALE

Amplifiers: Phoenician I, Ameco T-2, Tocom Hybrid two-way trunk/bridger and line extenders. In addition passives new and used.

New TRW hybrids and semiconductors. Continental 32 ft. electric hydraulic bucket lift for ¾ or 1 ton pickup.

TVRO systems and components.

Contact: Westec Communications
7305 East Evans Road
Scottsdale, AZ 85260
Phone: (602) 948-4484

1—Telsta T-40B
on 72 GMC 5500.
1—Telsta T-36
on 72 Chevy C-50.
AUTO WHOLESALERS
(814) 942-0688

CATV PARTS IN STOCK!

Hybrid Chips

TYPE		BRAND
MHW1342	7 Pin-34db	Motorola
MHW1343	9 Pin-34db	Motorola
MHW1171	7 Pin-17db	Motorola
MHW1172	7 Pin-17db	Motorola

Quads

PHQ6202		PHI

Transistors

PT4612	Stud Mount	TRW
SS4312	To-39	Motorola

Also Matched Pairs

We love the competition—you enjoy the savings!

Call for prices on Sadelco meters, surge protection devices, splitters, matching transformers, attenuator, traps & notch filters.

We stock and cross reference many parts of the leading CATV manufacturers.

Electronics Ltd.
Temtron
SPECIALIST IN ALL TYPES OF ELECTRONIC COMPONENTS

15 Main Street
East Rockaway, NY 11518

TOLL FREE: 800/645-2300
NEW YORK: 516/599-6400

Jerry Conn Associates, Inc.
MANUFACTURERS' AGENT

WE WORK FOR YOU!

P.O. BOX 444
CHAMBERSBURG, PA. 17201
CALL TOLL FREE: 800-233-7117
IN PA. CALL COLLECT (717) 263-8258

For Sale

HYBRIDS UNLIMITED
Stocked for Immediate Shipment

ALL *TRW*® CA TYPES
ALL MOTOROLA MHW & SHW TYPES
"QUADS"
Complete Line of Replacement Components

Call or write today for the most complete replacement components catalog in the industry.

Toll-Free: 800-327-6690

BROADBAND ENGINEERING, INC.
1525 Cypress Rd., Jupiter, Florida 33458
(305) 747-5000

SUBSCRIBE TO
CED

USED AERIAL BUCKET TRUCKS

Most units completely rebuilt. Specializing in CATV use.
Telsta SU34s and T40s
Plus other makes and models.
(In the Boston area.)

(Call toll-free)
1-800-343-4614

Leo LeBlanc
(617) 893-3900
Colvins Inc. Auto Center
185 Prospect Street
Waltham, Mass. 02154

Out Of Sync

"Out of Sync" is a service provided by ***Communications Engineering Digest*** *to our subscribers. We will help you locate answers to all technical questions submitted. On urgent problems, or problems lacking in essential detail,* ***CED*** *may respond to you by phone prior to publication.*

Names and locations will not be published without written authorization. Send your questions, and possible solutions, to "Out of Sync," ***Communications Engineering Digest****, Titsch Publishing, Inc., P.O. Box 5400-TA, Denver, Colorado 80217.*

Judging from the number of letters we received about a recent column on system rebuilds, there is either a lot of rebuilding in progress, or the ones who are doing rebuilds are more than normally responsive to this subject.

The two letters printed below seem to be typical.

In response to a question concerning rebuilds in your March 1981 issue, I would like to offer the benefit of my experience when the system here at Kiski was rebuilt. We had exactly the same type of Plant: old BMT Pressure Taps by the bushel which we replaced with directional taps. At first we bought some plugs, but I discovered that since we were not going to use the inserts again, we could use these as a plug by simply breaking off the stinger flush with the housing, squirting the block full of silicone grease, and re-installing the insert. The F-connector was then crushed with pliers to prevent connection by installers. The sweep response using this method is surprisingly good, and removal of the insert's insertion loss will improve the pictures 100 percent.

I would advise replacement of drops, if possible, instead of splicing mid-span. A majority of our drops were old strip-braid type which had become water-soaked. The mid-span splice is also a potential trouble spot even when properly water-proofed. If you do not elect to replace entire drops, be sure that your crews cut on new F-59 fittings on each drop when splicing. This was the largest cause of trouble during our rebuild.

J. Scott Rupert,
System Manager
Liberty TV Cable, Inc.
Leechburg, Pennsylvania

Your question re the replacement of pressure taps strikes a common chord. We have a number of systems where we are doing the same thing. In fact, in one system built in 1966 the cable is so beat up we're rebuilding entirely.

However, we have several thousand subscribers still served with pressure taps, and we've developed a method by trial and error:

First, the addition of amplifiers is often required to provide proper levels with directional taps. Then great care must be taken with the actual replacement. Where we have a single pressure tap we cut the cable at that point, after removing the tap, and install the box. When there are two or more taps we look for the best tap; i.e., one where the cable has no radial breaks—a common problem with pressure taps. If they're close together, we'll just stretch things by using an extension connector, or sometimes even a splice and a piece of new coax.

Wherever a block is left on use a dummy plug with silicone for proper weatherproofing and radiation proofing; do not use an F-81 unless you also terminate it or cap it. Hope this helps.

J.J. Mueller
EMCO CATV, Inc.
Manchester, Vermont

Q. I have been hearing a great deal about using phase-locked and HRC processors and modulators in headends lately. It seems that almost everyone makes or sells them now. Are they really as good as some of the manufacturers claim, or is this just a hard sell to get systems to buy new headend equipment? If you have any information or comments, please pass them on.

A. While I cannot guarantee claims made by any of the equipment manufacturers, I can state that, where conditions existed to warrant the use of phase-locked headend equipment, it has worked extremely well for us.

The primary benefit of phase-locking one signal to another is an improvement in the appearance of a desired picture which is being degraded by an undesired television signal of almost the same frequency. One type of picture degradation which phase-locked equipment really helps to reduce is interference to a locally-generated cable channel by the direct pickup of an off-air (broadcast) television signal on the same channel. By locking the synchronizing pulses of the cable channel to the off-air sync, much of the visible interference from vertical and horizontal blanking pulses appears to be eliminated. Figure 1 shows this type of picture degradation.

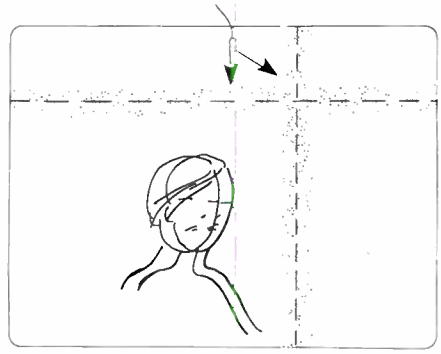
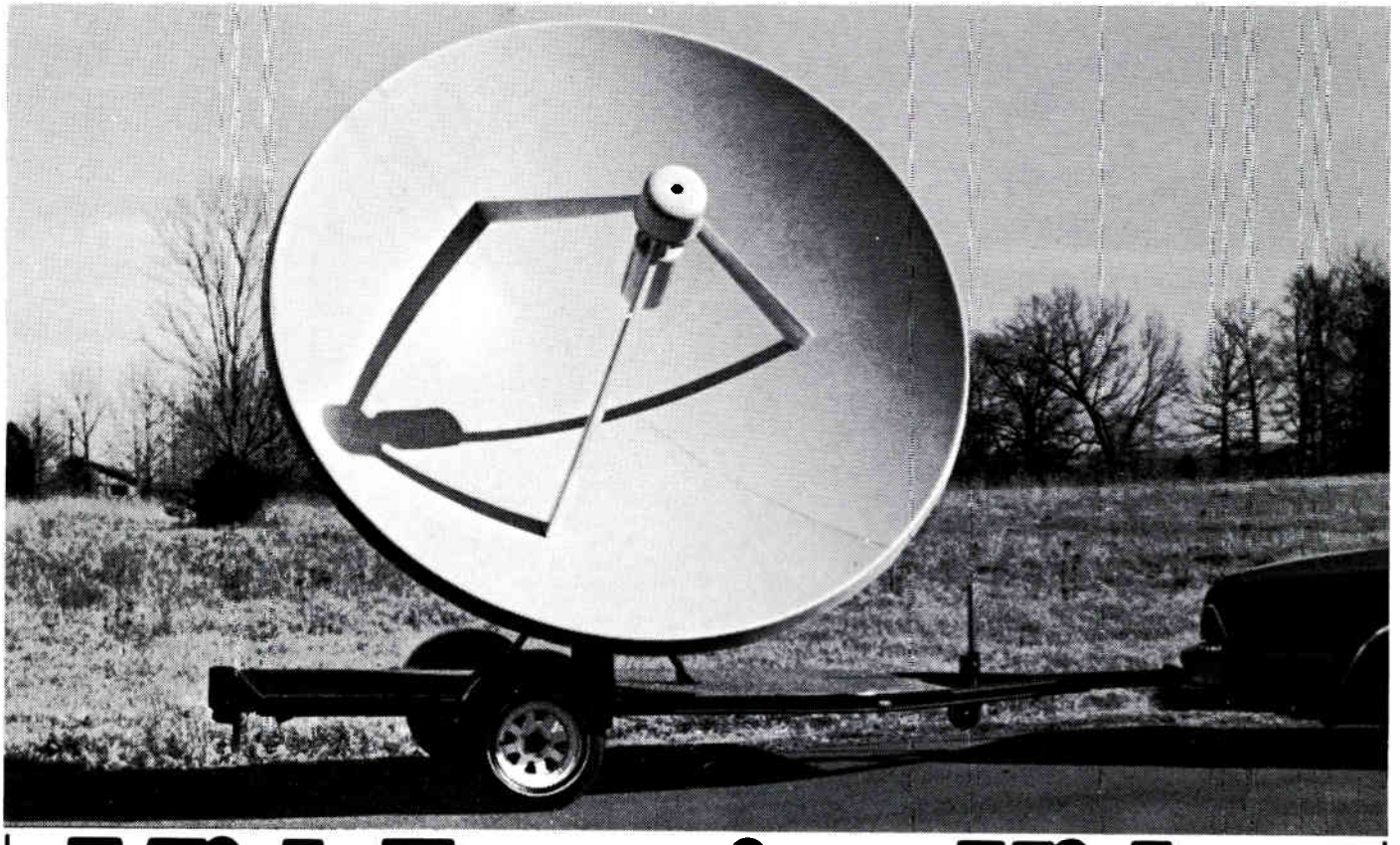


Figure 1

Horizontal and vertical blanking bars from undesired signal move through desired picture if not phase-locked.

Phase-locking does not eliminate the interference but, since the sync blanking pulses occur at the same time, the interference is usually not as noticeable in the pictures. This is called a subjective improvement in picture quality.

Harmonically-related coherent (HRC) equipment serves a similar purpose in quite a different way. Each HRC channel is locked to a master oscillator (comb generator) at precise 6 MHz spacings from adjacent channels. By using this method, cable signals are actually moved in frequency away from any potentially interfering off-air signal. For instance, if a locally-generated Channel 2 signal would be bothered by the direct pickup of an off-air Channel 2 television signal at 55.25 MHz visual, HRC can help you to use the channel. The visual frequency for an HRC Channel 2 processor is 54.00 MHz, so there is no direct frequency conflict. The Channel 2 picture on the cable would be 1.25 MHz below the off-air Channel 2 visual



Mid-America Video

● Attractive Demonstrator Units ● Complete Commercial Installations
● Unheard of Low Prices on Complete Systems ● Low Dish Prices
● Large Manufacturing Plant ● Meticulous Quality Control

HOME
Quantities of 3

Galaxscan Basic	$3695
Galaxscan Basic with Polar	$3995
Galaxscan Basic with 13' Polar	$4495
Galaxscan Home 13'	$4695

(Systems are complete with modulator, 120° LNA, and Galaxscan 450 receiver)

COMMERCIAL

Commercial 13'	$5775
Commercial 16'	$7745
Commercial 20'	$8995

(Includes: commercial mount, dish, LNA mount, 120° LNA, feedhorn, Comtec 24 channel receiver)

COMPLETE MECHANICAL PACKAGE
Quantities of 3

10' home with Polar	$1595
10' home with 13' Polar	$2295
13' home with 13' Polar	$2595
13' commercial	$2750
16' commercial	$3250
20' commercial	$4250

(Includes: mount, dish, LNA mounts, Rotor Motor, feedhorn)

DISHES

10'	$ 835
13'	$1150
16'	$1995
20'	$3777

(Discounts of up to 30% are available for quantity)

MICROWAVE ASSOCIATES LNA

1 LNA	$695
3 LNAs	$645 ea.
10 LNAs	$625 ea.
25 LNAs	$595 ea.
100 LNAs	$575 ea.

50 Db gain minimum
Galaxscan 660 Receiver 6268 audio, Comtech, KLM
All off shelf delivery

For Dealer and Distribution Information, Contact

MID-AMERICA VIDEO
P.O. Box 511 • (501) 753-3555
North Little Rock, AR 72115

frequency. This usually clears up the problem.

HRC processing can also have the advantage of causing composite triple beat (CTB) interference to be subjectively lower by from 6 to 10 dB, depending on who does the judging. In most cases, HRC headends can allow longer trunk amplifier cascades than with regular processors with about the same amount of objectionable picture degradation. Again, the signal degradation has not been eliminated, it is just less visible and less objectionable to subscribers.

Q. Why does the gain, or output level, of a trunk amplifier have no effect on the noise figure of that amp?

A. The noise figure of an amplifier is the amount of thermal noise which is contributed to signals passing through it. It is determined in manufacture and there is no way the user can change it.

Noise figure is determined in the first stages of an amplifier, not in the later ones which control the gain or output levels. Increasing the signal levels through an amplifier will change the signal-to-noise ratio, but will not change amplifier noise contribution.

Q. There seems to be a lot of controversy about 400 MHz systems versus 300 MHz systems. Each article seems to have a different viewpoint. Can you clarify the differences?

A. The January 1980 issue of the *IEEE Transactions on Cable Television, Volume CATV-5,* is devoted to 400 MHz technology and comparisons. The authors have covered the subject in much greater depth than I can in this column. I recommend that you get a copy and make your own comparisons and draw your own conclusions. If you are unable to obtain a copy from friends, try contacting the IEEE Service Center, 445 Hoes Lane, Piscataway, New Jersey 08854; (201) 981-0060.

Q. The December 1980 issue of *CED* mentioned the Society of Broadcast Engineers certification program and the fact that in SBE circles, the SBE certificate is given more credence than the FCC license. My firm is concerned about training installers and technicians to recognized, acceptable standards. To that end, we are interested in obtaining any information possible about the specific competencies covered in the SBE certification.

A. We have forwarded your request to the Society of Broadcast Engineers with a cover letter from us. Information should be to you by this time. For those of you who have questions for the SBE on its certification program or other subjects, you can contact the group at the following address:

Society of Broadcast Engineers, Inc.
Box 50344
Indianapolis, IN 46250
(317) 842-0836

Quite a bit of information on the SBE certification program and other broadcast related subjects may be obtained from subscribing to two broadcast publications. *Broadcast Engineering* and *Broadcast Managment/Engineering* may be provided free to industry oriented individuals and institutions. Write them on your company letterhead requesting their subscription qualification card. Send requests to:

Broadcast Engineering
P.O. Box 12901
Overland Park, KS 66212
(913) 888-4664

Broadcast Management/Engineering
295 Madison Avenue
New York, NY 10017
(212) 685-5320

Winegard CATV Division In Full Operation

Winegard and AEL CATV Division now combined to serve the Industry.

Robert Fleming
V.P., Marketing
The Winegard Co.

"Speaking for The Winegard Company, we are delighted to be a part of the CATV industry via acquisition of AEL's CATV Communications Division.

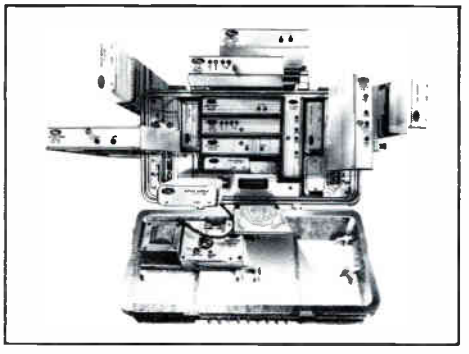
We are presently manufacturing the AEL line of distribution amplifiers, line extenders, power supplies, etc., which fit perfectly in with our 26 years of experience in producing television distribution system equipment.

It is our intention to build on the reliability of the AEL products and to become a major supplier in this industry. Quality and service are uppermost in our goals.

Bill Stone, already well known to many of you, is heading up our national sales offices. You will be hearing from Bill and his sales people."

W. E. "Bill" Stone
National Sales Manager
Winegard CATV Division

"Even after 30 years in the CATV business, I'm excited about the industry, and most happy to be associated with Winegard. I appreciate the serious commitment Winegard is making to the industry. In addition to reliable, quality equipment, the full resources of Winegard are involved . . . from engineering to production to marketing. We have the technology, the plant capacity, and all customer service functions in place to serve you. Now, we want your business, and we'll do what it takes to get it. I'll be seeing you."



Winegard 84 Amplifier Series.
400 MHz, Complete Modularity.

Meet Winegard CATV Sales and Engineering Staff at the NCTA Show, Los Angeles. Booth #102

WINEGARD®
CATV DIVISION
(FORMERLY AEL CATV COMMUNICATIONS DIVISION)

SALES OFFICES: P.O. Box 329, Montgomeryville, PA 18936 (215) 855-1535 (800) 523-2529

Intermod

Changing Jobs— New Musical Chairs

Have you noticed how many technical and management people in the cable television field are changing companies lately? It seems that every time I pick up a trade magazine or newspaper, there are people that I know who have changed jobs. If this many changes are taking place just among those that I know, there must be a real migration going on among the companies in our industry.

After a lot of discussions with people who have recently changed companies, and with a few who say they are about ready to make a change, I'm not a great deal more informed than before. It seems there are about as many reasons for the changing as there are people involved. There did seem to be some areas in common, but no single reason for the corporate musical chairs.

I had anticipated that more money would be the single biggest reason for the changes, and was about as wrong as could be. More money did play a part, but not nearly as much as expected. In fact, it was usually only after the subject was mentioned by me that it even came into the discussion.

The most often mentioned self-justification for leaving one company and joining another was that the new job would be "more of a challenge" than their old job. That it would offer "more chances to advance their knowledge and skills." A very close second reason given for changing to a different company was that they felt their old company offered them little chance for advancement. Many people felt that they were in a deadend job and that promotion or advancement could only happen if their boss either transferred or died, both of which appeared unlikely.

When those who worked for large companies were asked why they did not simply transfer to another job or system within the same company, every person except one stated that they would have preferred to do so, but transfers were not offered until the job offer with another company had already been accepted. Most stated that they did not have any way to determine which positions, if any, were open within their company. Of the few who said that they had applied for an internal transfer, most said that they did not hear whether their application would even be considered until several months later. By this time, their applications had already gone out to, and been accepted by, other companies.

This kind of delay makes you wonder why their companies did not respond sooner. Do you start to feel, as they did, that their companies wanted them to leave? Or maybe the companies thought that the applicants would forget that they had applied. Or, and this seems more probable, the companies didn't think about it at all.

One other thing which surprised me on the survey was the apparent lack of bitterness between the employee and the company that he had left. I did not check to see if the company was bitter toward the employee, but suspect that there must be some animosity. There was also little indication of bad feelings toward former supervisors or fellow employees. It seemed that everyone was pretty well satisfied with other system personnel, or at least they didn't wish to complain to me. The only negative words in this direction were that some felt their immediate supervisor did not, could not, or would not delegate enough responsibility and authority. However, no one seemed upset about it.

About half of those interviewed felt that their supervisors had provided adequate training and guidance to allow for promotion. The other half said that they had received little or no formal training in their systems or companies, just some on-the-job "do it or die trying" type instruction. Training, or lack of training, did not seem to be a factor in leaving a company.

I did find out one thing during these talks that made me happy. Salaries are getting higher and higher, particularly among the technical employees. Starting salaries for experienced techs and engineers seem to be much improved over the last few years. Some of those who have changed jobs tell me that their salaries have been almost doubled when changing to a new company. Of course, as several said, when you double nothing, it is still not very much.

I certainly hope the trend of paying higher wages continues. If it continues long enough, it won't be a trend any longer, it will be the standard. Who knows, a time may eventually come when management will finally recognize who really keeps that system operating, and how much their technicians are really worth to them. At least we can hope this will happen.

Glenn Chambers

Synchronous
COMMUNICATIONS, INC.

TIC-1000

TALKING INTERFACE CONTROLLER

Control frequency agile satellite receivers, time switchers (PIC-1000), etc. via telephone lines or CATV return trunk lines.

The TIC-1000 will automatically answer a phone call from any where, with a verbal response, give you a verbal status report on 24 inputs and allow you to change any or all of the 24 outputs.

Built-in programmable security codes eliminate unauthorized access and because the TIC-1000 is secure, it can function as an emergency override system at your headend.

PIC-1000

PROGRAMMABLE INTERVAL CONTROLLER

Control modulators, processors, or satellite receivers for time related switching.

The PIC-1000 controls four relays with form C contact configuration, the best possible format when used to control audio, video, or RF switches.

The computer generated seven day, real time clock, has one minute resolution and is the time reference for 1000 control intervals, (an interval is defined as a start and stop time). The PIC-1000 has six modes of operation and ultra efficient software for fast and accurate programming.

Four remote control inputs allow the TIC-1000 to switch any or all of the built-in relays. (A standby power supply is available for both the TIC-1000 and PIC-1000).

Synchronous
COMMUNICATIONS, INC.
7180 Wooded Lake Dr.
San Jose, Ca 95120
408-268-3714

TIC-1000 and PIC-1000 modules pictured together in RMC-100 rack mountable chassis.

Canadian Operators Prepare To File Pay TV Plan

TORONTO, ONTARIO—A consortium of 125 Canadian cable operators, led by Rogers Cablesystems (the nation's largest MSO), is making plans to answer the recent request by the Canadian Radio and Television Commission for national pay television proposals. The commission's decision, announced late last month, is perceived by most industry officials up north as a major stepping stone towards putting pay TV on the map in Canada, a country that is almost 80 percent wired and nearly 4.7 million subscribers.

The consortium, Pay Television Network Limited (PTVN), intends to file an application with the commission for a 30-hour-per-week pay television service, running four-to-five hours each evening. According to Rogers Cablesystems President Colin Watson, the proposed service would be similar in format to HBO or Showtime, with a slant towards Canadian-produced movies, specials and sports events. In order to get Canadian product on the service, the consortium will propose that 25 percent of the network's gross revenues be channeled into the hands of independent producers for home-grown product.

Fifty percent of ownership in PTVN will be divided among the members of the consortium, with the remaining half going to Canadian investors. Among the cable operators involved with the consortium are Cablenet, Cablecasting and MacLean-Hunter, three MSOs currently operating systems or applying for franchises in the U.S.

The commission's decision to allow applications for pay television services to be considered comes after nearly a decade of debate, public hearings and numerous inquiries over the concept. Industry analysts speculate that the success of the American pay networks, combined with the growth of motion picture production in Canada, are the main reasons behind the renewed call to get national pay TV off the ground and running. And pay television's dollar potential is now being looked upon as a way to provide a steady stream of funds to Canadian production talent, which in turn could produce material that could be sold to foreign markets, including the U.S.

According to CRTC policy analyst Karen Spierkel, the commitment applicants make to Canadian production in their pay programming plans will weigh heavily in any decisions made by the commission. Specifically, each applicant will have to stand up to three requirements: the percentage of on-air time devoted to Canadian-produced fare (especially in prime-time hours), the percentage of programming acquired or bought from Canadian sources, and the gross revenues spent on production or acquisition of Canadian product.

And if PTVN is among the first to respond to the commission's request, Spierkel adds, the nation's television networks (CBC, CTV and Global) will not be last in line, putting their cents into pay cable services. "There's no question that they will file applications. They're not unhappy with the call, and they're willing to develop proposals for pay and have them filed before the commission's deadline," says Spierkel.

If the consortium's proposal is approved by the commission, Watson says PTVN could begin operations at the earliest by next spring, at a start-up cost of $20 million. Transponder time for the service has already been assured, since the consortium owns a spot on Anik, Canada's domestic satellite system.

The filing period for applications ends next month, and public hearings on the proposals will take place in September and October. Predictions are that the commission could rule on any proposals submitted (including PTVN) by the end of the year.

Dutch Cable Firm Tests U.S. Market

DENVER, COLORADO—A Netherlands-based company that is a leading cable manufacturer in Europe is planning to introduce its line of air-dielectric coaxial cable in the United States. NKF Kabel B.V., a member of the Philips Group of companies, will make its American debut at the National Cable Television Association convention in Los Angeles.

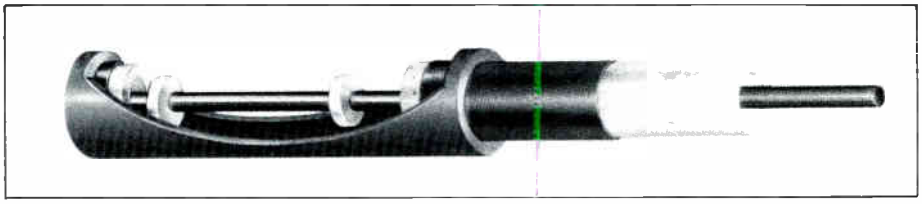
The trade name of NKF's cable is Bamboo. The cable received that name because its inner construction resembles bamboo: it is hollow. Instead of using a solid polythene dielectric, Bamboo cable uses air as its dielectric. The outer conductor is separated from the inner conductor by polythene discs that are molded at regular intervals over the inner conductor. A polythene sheath is then extruded over the discs in such a way that the discs and sheath fuse together at the points of contact.

The result is a cable with a low dielectric constant, 1.25 as compared to 2.3 for cable with a solid dielectric. The diameter of Bamboo cable is more than 35 percent smaller than the diameter of comparable solid-dielectric cable. The cable is also lighter and has a smaller banding radius.

The inner conductor of Bamboo cable is solid electrolytic copper. The outer conductor is a metallic foil, generally consisting of copper. The foil is folded smoothly and tightly around the dielectric in the longitudinal direction. In the unarmored version of Bamboo-Three, a coating is applied for watertightness between the outer conductor and the outer sheath. The outer sheath consists of a polythene and is extruded directly over the outer conductor. Bamboo cable can also be armored with two overlapping layers of galvanized steel strip and then an outer sheath of polythene or PVC.

Bamboo cable is available in four sizes: Bamboo-1.5, 7.25/28.9 mm; Bamboo-Three, 3.3/13.5 mm; Bamboo-Six, 1.7/6.9 mm; and Bamboo-Twelve, 0.72/4.75 mm.

Bamboo-1.5 is designed for supertrunking and offers attenuation of 1.5 dB per 100 meters at 230 MHz. Technical data for Bamboo-1.5 includes: characteristic impedance, 75 ohms; return loss between 20 and 400 MHz, better or equal to 26 dB; impedance regularity up to 20 MHz (50 nsec pulse), better or equal to 50 dB; DC resistance at 20°C for the inner conductor (0.7 ohm/km) and outer conductor (less than or equal to 1.6 ohm/km); nominal capitance, 49 pF/m; and transfer impedance at 200 MHz, less than 1 m ohm/m. Minimum bending radius is 300 mm.



NKF Kabel B.V.'s Bamboo cable.

Bamboo-Twelve is designed for use as subscriber connection cable. Unlike other Bamboo sizes, it uses a solid polythene dielectric.

NFK Kabel BV also offers a complete line of connecting products for its Bamboo cable.

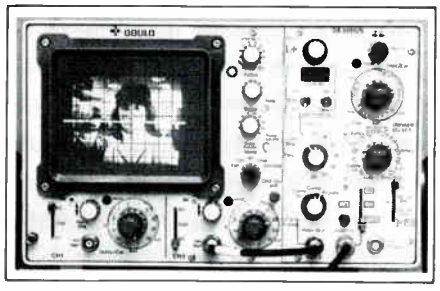
New Products

Test Equipment

Gould TV Monitor Oscilloscope Provides NTSC Waveform Display

A TV/monitor oscilloscope, the Gould OS3350/5, combines the performance of an NTSC 525-line waveform and picture monitor with that of a general purpose 40 MHz dual-trace scope in a single, compact package, according to **Gould, Inc.**

A timebase generator in the unit allows it to be used for line-by-line examination of 525-line waveforms or to display complete pictures. It accepts standard level composite video signals with or without sound-in-sync signals and provides five different triggering modes: line 15 through 21 in either field 1 or field 2; field; line repetitive; field selector; and line



The Gould OS3350/5 TV monitor oscilloscope.

selector. In line selector the chosen line is indicated on a three-digit LED display.

A multiturn vernier control provides triggering delays up to 90 μs, allowing parts of a line to be examined in detail. The displayed video signal can be clamped or not. When the unit is used to display a TV picture, the triggering point selected may be displayed as a bright-up line on the picture, enabling a direct relationship to be established between waveform and picture.

In conventional operation, the Gould OS3350/5 functions as a general purpose 40 MHz, 5mV/cm dual-trace scope with signal timebase control.

For information, contact Gould, Inc., Instruments Division, 3631 Perkins Avenue, Cleveland, Ohio 44114; (216) 361-3315.

Video

RCA Introduces Color TV Recording Camera

RCA Broadcast Systems has introduced a new television camera/video tape recording system that combines a compact broadcast-quality color TV camera and videotape recorder in one hand-held unit. The Hawkeye system includes a fully-integrated system of recording camera, full-feature studio video tape recorder, and editing capabilities.

The heart of the Hawkeye system is the single-unit recording camera, designated the HCR-1, which makes practical a one person in-the-field video production unit. The HCR-1 combines camera, recorder, microphone and batteries in a single, rugged weather-tight unit, weighing only 21.5 pounds including lens.

The camera portion of the field system is a three-tube unit using new high performance ½-inch Saticon or lead oxide pickup tubes. The camera viewfinder includes LED displays which indicate battery status, verify that the signal is on the videotape, display shooting time and warn the operator when the end of tape is near.

The Hawkeye system uses a baseband recording technique called Chroma Trak for recording on ½-inch video tape in standard VHS cassettes. Twenty minutes of recording time is provided on each cassette.

For information, contact RCA Commercial Communications Systems Division, Bldg. 2-7, Camden, New Jersey 08102; (609) 338-2839.

Amplifiers

RTS Systems Introduces Four-Distribution Amplifier

As part of its 400 MHz series, **RTS Systems** has introduced the model 424 distribution amplifier, with one balanced input and four independent, active, transformer-isolated outputs.

The 424 uses a separate amplifier for each output, providing an output channel-to-channel isolation of better than 60 dB at all frequencies, according to the company. The design also offers independent gain adjustment of 33 dB for

RTS Systems' model 424 distribution amplifier.

each channel without any change in source impedance.

Maximum output level from the 424 (any channel) is 22 dBm (all channels terminated in 600 ohms), or 25 dBu unterminated. At +4 dBm out, harmonic and intermodulation distortion (SMPTE method) are specified at 0.1 percent. signal-to-noise ratio is 70 dB at max gain, 85 dB at min gain, ref: 0 (zero) dBu @ 20 KHz bandwidth.

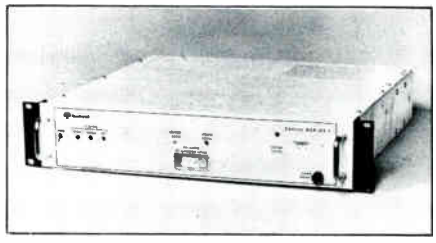
The input of the 424 is balanced and bridging; the impedance from each side to ground is 47,000 ohms shunted by 100 pf. Common-mode rejection is 40 dB or better throughout the audio band. The signal path is noninverting. Actual output source impedance is approximately 80 ohms.

For information, contact RTS Systems, Inc., 1100 West Chestnut Street, Burbank, California 91506; (213) 843-7022.

Receivers

Rockwell Introduces Three Satellite Video Receivers

Rockwell International's Collins Transmission and Data Systems Division has introduced three models to its family of SVR-4 satellite video receivers: the SVR-4A-1, the SVR-4T-1 and the SVR-4F. The receivers feature



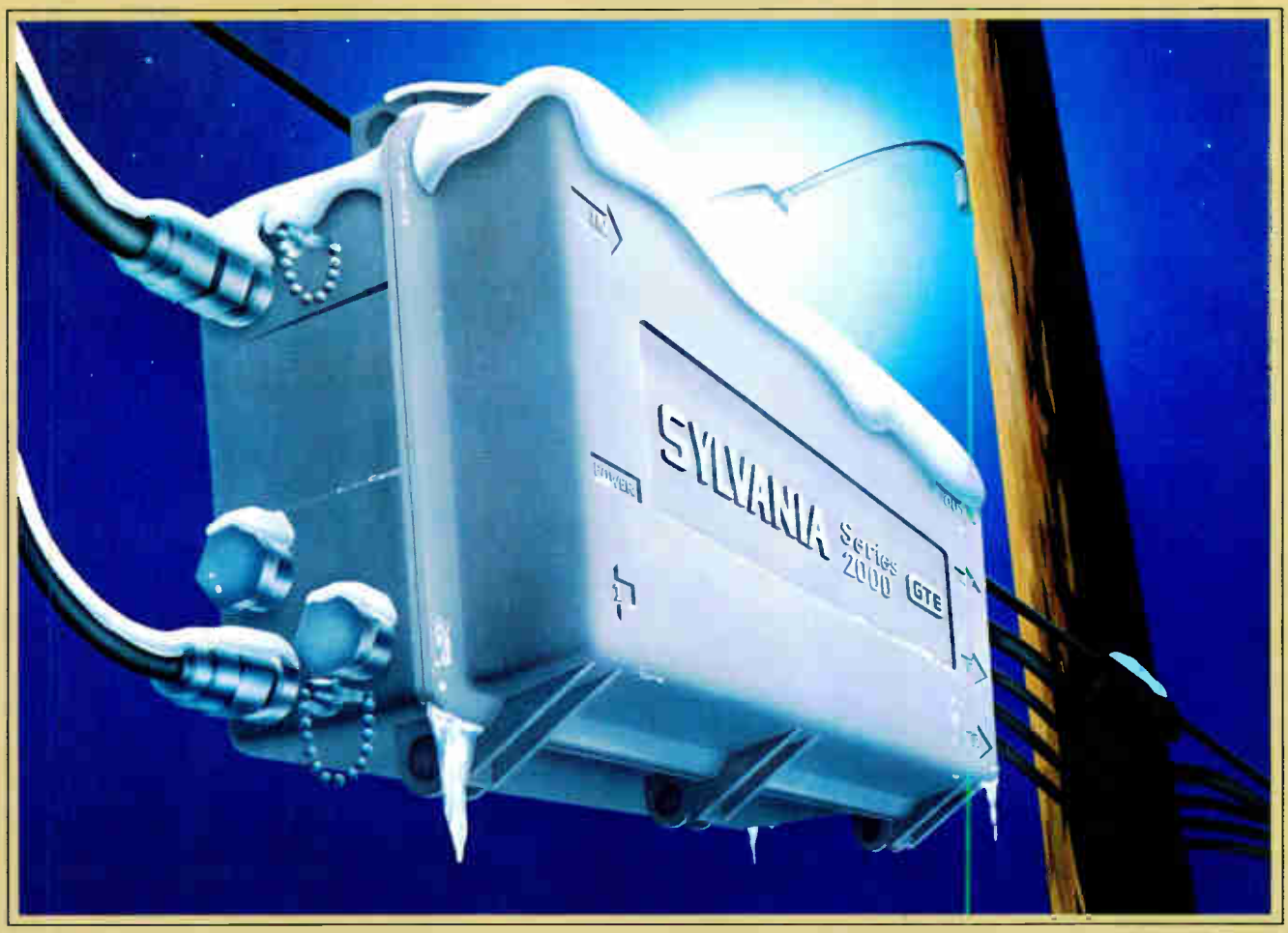
Rockwell's SVR-4T-1 satellite receiver.

threshold extension for both video and audio; two video outputs, plus a composite video and subscarrier output; and three standard audio subcarrier frequencies. The SVR-4 units meet EIA RS-250B and CCIR Rec. AA standards.

The SVR-4A-1 receiver is designed for easily accessible local or remote tuning. It has a front panel channel selector for local tuning, and for remote tuning, a rear chassis BCD interface. Channel selection in the 24-channel receiver matches the RCA satellite frequency plan. The odd numbered channels match the Westar satellite 12-channel frequency plan. A built-in RF coaxial switch automatically switches antenna polarities as required.

Manually tuneable, Rockwell's SVR-4T-1 receiver uses an RF design for continuous tuning over the total 3.7- to

The Sylvania 400 MHz line. The signal must go through.



Through rain and snow and sleet and the worst electrical storms, Sylvania amplifiers will deliver your signal.

Whether it's 300 MHz or the new 330 MHz and 400 MHz line, our amplifier stations are made to take a beating from Mother Nature—and come up winners.

If lightning strikes, you're safe. Our Amplifier Stations are equipped with extremely fast acting surge protection devices. What's more, our accurate level and slope control maintains stable output through summer heat and winter cold.

The corrosion-resistant, diecast aluminum housing with a unique, single metal-rubber gasket keeps the weather outside, and the efficient thermal design insures cool and reliable operation inside.

You can't take chances on equipment that will cut off your customers in mid-program. That's why you need Sylvania. We've put our reputation for quality on the line, a reputation that's been standing up to the elements since 1970.

Our new manufacturing plant, a 400 percent increase in staff and computerized customer services all help to make sure that you get reliable Sylvania products when you want them.

For complete details, contact your local Sylvania CATV Transmission Systems sales office. Or phone toll free 800-351-2345 within the continental U.S., except Texas. From Alaska, Hawaii and Texas, call (915) 591-3555 collect.

We'll come through for you.

Visit us in Booth 451 at the NCTA Show.

SYLVANIA CATV Transmissions Systems | GTE

4.2-GHz frequency band. It features continuous tuning without crystals or filters, provided by a front panel knob with channel indicator.

The SVR-4F model is a low cost, single channel receiver that can be retuned in the field by simply changing the RF channel filter. The channel change requires no special tools or test equipment. The RF design of the SVR-4F allows the local oscillator to be tuned continuously over the total 3.7- to 4.2-GHz frequency band.

For information, contact Rockwell International, Collins Transmission and Data Systems Marketing Department, P.O. Box 10462, Dallas, Texas 75207, (214) 996-7815.

Miscellaneous

Cablewave Introduces Semi-Automatic Dehydrator

A semi-automatic dehydrator designed for applications where periodic desiccator replacement is practical is now available from **Cablewave Systems**.

The SPD-10 dehydrator has an output capacity rating of 1.0 scfm (0.47 liters/sec.). Output pressure is factory set at 3-8 psig (0.21-0.56 kg/sq. cm) but may be readjusted in the field to operate anywhere between 2 and 15 psig. (0.14-1.05 kg/sq. cm). Differential is fixed at 5 psig (0.35 kg/sq. cm). A check valve prevents loss of pressure back through the compressor, and a standard low pressure alarm switch, factory set for 1 psig (.07 kg/sq. cm) offers SPST contacts for remote monitoring.

A high pressure safety relief valve protects transmission line components in case of excessive pressure buildup. The valve is set at 10 psig (0.7 kg/sq. cm); leak rate will keep up with the capacity of the compressor (1.0 SCFM).

A bleedoff orifice is located in the input connector fitting to the manifold block to bleed pressure from the canister so it is not under pressure when shut off, thereby allowing safe removal when it is necessary to restore the desiccator. It also allows removal of pressure from the head of the pump so it is not under load when the motor compressor is turned on.

For information, contact Cablewave Systems, Inc., 60 Dodge Avenue, North Haven, Connecticut 06473; (203) 239-3311.

JFW Industries Markets SPDT Coax Switch

JFW Industries, Inc., is marketing a new SPDT coax switch, the model 50S. The switch features: .5 to 500 MHz frequency range; 1.0 dB insertion loss maximum; 1.2:1 maximum VSWR; and isolation of 60 dB to 50 MHz, 50 dB to 250 MHz, and 40 dB to 500 MHz.

Standard control voltage is 26 volts at 30 milliamps, but other voltages can be supplied. RF connectors are standard. For information, contact JFW Industries, P.O. Box 226, Beech Grove, Indiana 46107; (317) 783-9875.

Security Enclosure Developed For Multi-Unit Dwellings

Cablemate Products, Inc., has introduced two products designed for the cable television industry.

The first product is the multi-subscriber security enclosure (MSE), which accommodates splitters and couplers for

A rain-proof model of Cablemate Products' multi-subscriber security enclosure.

homes, apartments and duplexes. The product features one-piece construction for time-saving installation and allows for fast subscriber audits. The MSE comes in four models: two rain-proof models and two models for indoor applications.

The second product is an aerial support called Cabletite™. The support offers a built-in stabilizer. Two sizes fit all cable diameters.

For information, contact Cablemate Products, Inc., Cable TV Products Group, 666 Sugar Lane, Elyria, Ohio 44035; (216) 365-9954.

Scientific-Atlanta Markets Cable TV Status Monitoring System

Scientific-Atlanta, Inc., has introduced a status monitoring/bridger switching system for the cable television industry. The series 6500 status monitoring enables the cable TV operator to monitor and identify system failures from the headend and to dispatch field service crews directly to the problem area, according to the company.

The bridger switching feature reduces reverse system noise by turning off all reverse feeders not in use at a particular time. The improved video signal quality allows live local programs to be transmitted from remote locations to the cable headend free of noise and then to be retransmitted to cable television subscribers. The bridger switching feature can also be used as a trouble-shooting device. By opening the return path one bridger at a time and monitoring the noise level, the defective amplifier can be readily located.

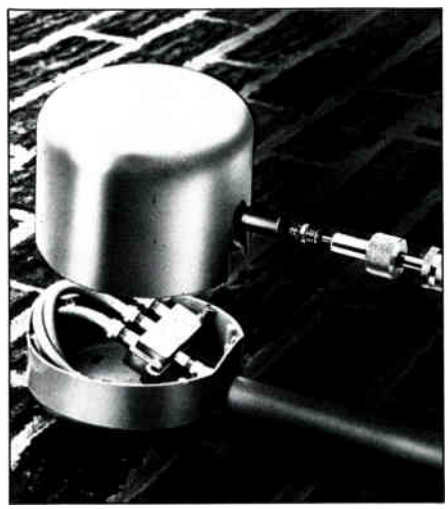
The series 6500 status monitoring/bridger switching system consists of a communications control unit located at the cable headend and amplifier status transponder modules installed in the trunk amplifier housings. The control unit includes a CRT terminal, microprocessor, message transmitter and receiver. The unit interrogates and evaluates replies from each status transponder module on a 24-hour basis. When acceptable power levels are not met, the control unit alarm sounds and vital information is displayed.

For information, contact Scientific-Atlanta, Inc., One Technology Parkway, Box 105600, Atlanta, Georgia 30348; (404) 441-4000.

Communications Supply Introduces Four Products

Communications Supply, Inc., is marketing four new cable products: a hand-held signal-level meter, a CATV security system, a high speed TRU system modem, and a new generation CATV power supply.

The Trim 1 signal-level meter weighs just five ounces and clips to an installer's belt. It is equipped with micro-switch tuneable between high and low bands and an internal potentiometer that can be adjusted to calibrate specific range of channels. It gives immediate go/no-go signal checks.



The lockable Securit System from Communications Supply.

New lockable Securit System prevents CATV signal theft and lost operator revenue. Easily installed at aerial transition points or to exterior walls, Securit System also allows faster subscriber audits and eliminates the need for callback service calls. Boxes are weatherproof and tamper-proof.

The high speed TRU system modem features plug-in TRX modules that allow greatly expanded operation capability at any single location. Typical applications include: domestic and industrial security,

tracs

TEXSCAN'S REMOTE ADDRESSABLE CONVERTER SYSTEM

It's a beginning and it's an end.
An end to theft of services

to connect and disconnect problems
(it's computerized)

to advertisers viewership questions
(Tracs polls for exact statistics)

to expensive set top hardware thefts
(the expense is on the pole)

to system leakage
(all 54 channels come into the house on channel 2, 3, or 4)

and to pay per view complexities
(one call to the computer and you are connected immediately)

The beginning of the end
of all your problems can start
today with a TRAC System.

For Distribution Equipment:
2960 Grand Ave.
Phoenix, Arizona 85061
(800) 528-4066

For Test Equipment:
2446 N. Shadeland Ave.
Indianapolis, Indiana 46219
(317) 357-8781

For Character Generators:
3855 South 500 West, Suite S
Salt Lake City, Utah 84115
(801) 262-8475

For Canada:
2750 Pitfield
St. Laurent, Quebec H4S 1G9
(514) 335-0152

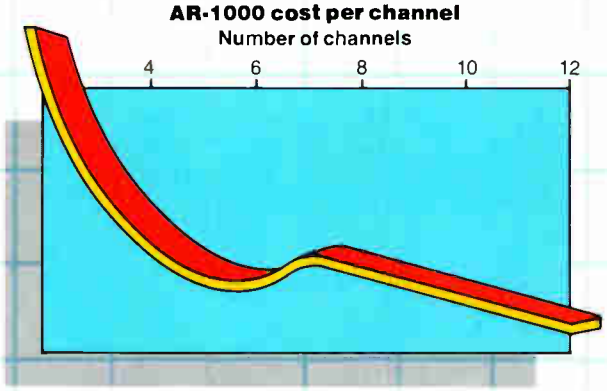
Texscan

Visit us at the NCTA Show—Booth #255

Avantek's AR-1000 brings satellite CATV receiver costs down to earth.

Get broadcast-quality picture plus savings of 20% or more.

With new satellite CATV transponders coming and more programming available, the cost of adding channels is a major consideration in selecting a receiver. Avantek has the answer in our new Simulchannel™ AR1000... the most advanced expandable multichannel receiver available. You save more and more with every channel you add to the AR-1000.



Use less space at your system's headend.

Imagine a six-channel receiver that fits into seven inches of a standard equipment rack, or twelve channels in just 14 inches. Compare that to bulky conventional receivers that eat up many times as much expensive space.

The secret is block downconversion to 1.2 GHz IF.

By combining the AR-1000 with Avantek's ACA-4220 LNA/downconverter at the antenna you can save the space and cost of a separate downconverter for each receiver. By downconverting to the industry's new standard, centered on 1.2 GHz, you avoid interference from broadcast signals, while the 940-1440 MHz frequency range lets you use less expensive, more flexible cable.

Years of experience helped Avantek build the most advanced satellite receiver.

Avantek has supplied LNAs, oscillators, downconverters and test equipment to CATV businesses for more than ten years. During that time, we've made only the highest quality equipment. That's why the AR-1000 has features such as full digital tuning, threshold extension, automatic frequency control and 40 dB dynamic range.

Learn how Avantek's AR-1000 can save you money and space.

Let us send you complete technical details. Then, ask us for a demonstration. We're sure you'll like what you see. Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051, (408) 496-6710.

Avantek

Please see us at NCTA—Booth #261

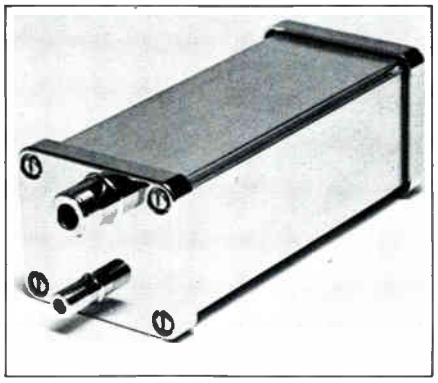
energy management and data transmission.

UPS 750 is the new-generation CATV uninterruptible power supply. It features a microprocessor-controlled solid-state inverter and fully floating power supply to eliminate power surges and thermal shock normally associated with switch-over. Features include complete status monitoring, interchangeable modules, reverse switching capabilities, and full circuit protection for maximum reliability. Pole or pedestal mount.

For information, contact Communications Supply, Inc., 319J Westtown Road, Westchester, Pennsylvania 19380; (800) 345-8286 (U.S.), (800) 662-2428.

TEST Announces MDS Downconverter

TEST, Inc., has introduced a crystal-controlled MDS downconverter that is equipped with a channelizing output filter. The filter frees the unit from off-channel interference and spurious responses. Called the model 1K, it includes a matched power supply that provides protection against man-made and lightning induced power line surges. The unit features a conversion gain of approximately 22dB and a 6dB typical noise figure. Input impedance is 50 ohms, unbalanced coaxial type "N" female connector, and output impedance is 75 ohms unbalanced coaxial type "F" female connectors. The unit is also available in low noise, high R.F. gain models 10K, 20K and 30K. Sized the same as the 1K, these models provide an extra 10 dB, 20 dB and 30 dB of low noise R.F. preselector gain. For information, contact TEST, 16130 Stagg Street, Van Nuys, California 91409; (212) 989-4535.



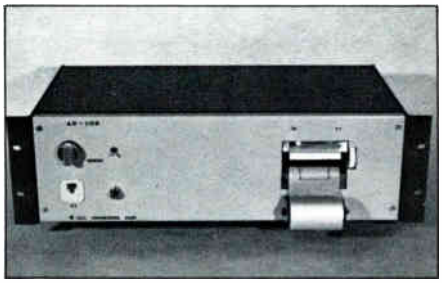
The model 1K crystal-controlled MDS downconverter from TEST, Inc.

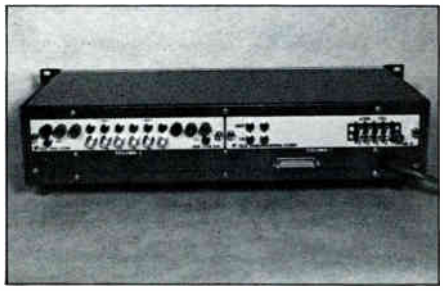
Tele-Engineering Expands Insert Product Line

Tele-Engineering Corporation has added two products to its commercial insert product line, an insert verification printer and an automatic insert unit.

The Ad Log verification printer will generate a printed record of the month, day, hour, minute and second of the commercial insert with corresponding advertiser and channel identification. A special memory buffer circuit allows monitoring of simultaneously scheduled commercials on up to six channels. The Ad Log interfaces with available videotape players and can be used in conjunction with automatic cue-tone activated commercial insertion machines. Features include a 20-character alpha numeric, 2.25-inch thermal paper printer; electronic clock with battery back-up, set by standard touch-tone telephone; test button for printout of time and "test"; and input from satellite and cable channel audio.

The other product is a cue-tone receiver that automatically inserts commercials from videotape player to local spot availabilities on satellite channels such as CNN and ESPN. Called the Ad Machine, it is a digital design, rack-mounted unit with a programmable read-only memory (PROM) chip. The basic unit has dual-channel capacity to receive cue-tones from any two satellite channels and insert commercials from two videotape players onto both channels. Models are available for up to six channel operation. The Ad Machine is available with touch-tone telephone and programmable video switcher (PVS) override options. The unit is compatible with available videotape players.





Tele-Engineering Corporation is marketing the Ad Log (above) and Ad Machine in its commercial insert product line.

For information, contact Tele-Engineering Corporation, 2 Central Street, Framingham, Massachusetts 01701; (617) 877-6494.

Catel Markets 450 MHz Video FM System

Catel has introduced a generation of video FM systems with 450 MHz capacity. Called the WFMS-3000, the system is a 70 MHz I.F. based system which covers the extended bandwidth of cable television super trunks, from 14 to 450 MHz.

According to Catel, a major feature of the new system is the modular design, with user-programmable options which allow the WFMS-3000 to be configured into a virtually transparent link for broadcast video, high speed PCM data, on coax, or analog fiber links.

Catel's WFMS 3000 video FM system.

The WFMS-3000 System is housed in a 19-inch by 5¼-inch EIA rack mount cabinet, with sufficient module space for dual modulators, dual demodulators, or mod/demod combinations for duplex operation.

Options are available for sub-carrier audio transmission, 124 ohm balanced video pairs, and DC battery bank operation.

For information, contact Catel, P.O. Box 1389, Mountain View, California 94042; (415) 969-9400.

Blonder-Tongue Expands MATV Product Line

Blonder-Tongue has developed a new line of MATV satellite signal receiving components, including a low noise amplifier (LNA), low noise converter and three different models of satellite receiving dishes.

A new modular headend for MATV systems was also developed. Designated Variflex System II, it is a plug-in modular approach simplifiying installation by eliminating interconnecting cables in medium and large MATV applications. The system consists of a broadband VHF/FM amplifier, with automatic and manual level controls, mounted on a base plate. The base accepts up to eight cartridges on non-adjacent VHF channel assignments. Amplified channel filters, passive channel filters, and UHF-to-VHF single channel downconverters are available. An input separator module can be added when a single broadband antenna is used to feed several filters. A locking security cover encloses the entire system. The system can achieve more than 50 dB input dynamic range (strongest signal in one band and weakest signal in another).

For information, contact Blonder-Tongue Laboratories, Inc., One Jake Brown Road, Old Bridge, New Jersey 08857, (201) 679-4000.

Ad Index

People News

★ **Wayne Knighton**, vice president and general manager of Chattanooga Cable TV Company, has been named executive vice president for cable of **Southmedia Company**. Knighton will be responsible for all cable operations of Southmedia Company, which is the parent company to Chattanooga Cable TV Company and has cable operations serving Rome, Georgia, and portions of Dekalb County, Georgia, which is in the metro-Atlanta area.

Wayne Knighton

★ **Gary L. Mizga** has been named executive vice president and general manager of **Minnesota Cablesystems-Southwest**. Cablesystems has been awarded franchises recently in five contiguous Minnesota cities. Mizga is a graduate of Michigan State University and recently has been a regional manager with Continental Cablevision, serving a seven-community area in Lansing, Michigan.

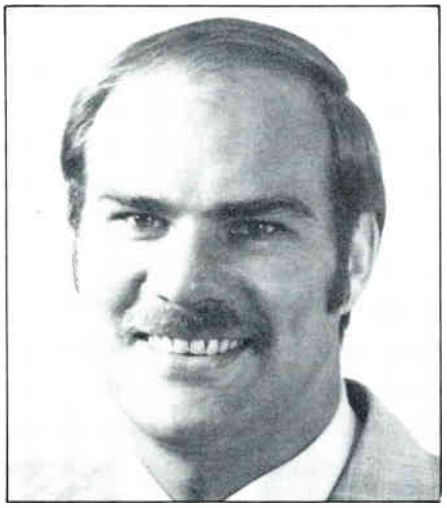
★ **Robert C. Corrao** has joined **Liberty Communications, Inc.**, as vice president and general manager of Liberty Cable Television in Portland, Oregon. Prior to joining Liberty, Corrao was vice president and general manager of Continental Cablevision's operations in Chicago and cable television marketing manager for Jerrold Electronics. For several years after receiving a BSEE from Rutgers University, Corrao worked as an electronic engineer for Hughes Aircraft Company. He later obtained an MBA in marketing and finance at Rutgers.

★ **James A. Krieger**, vice president of engineering for Cable TV of Coral Springs (Florida), has been given the additional responsibilities of director of corporate engineering projects for **Schurz Communications, Inc.**, parent company of the Florida system.

In addition to overseeing the engineering operation in Coral Springs, Krieger will be responsible for engineering projects at WATU-TV, Augusta, Georgia, another SCI subsidiary.

Krieger joined SCI in 1973 as a technician at its cable television system in Hagerstown, Maryland. He became chief engineer for Cable TV of Coral Springs in 1978 and was elected vice president of engineering in 1979.

★ **George A. Livergood** has been named vice president and general manager of **Theta Cable Television**. Livergood will be responsible for the entire technical and managerial operation of the 300 plus employees and 2,000 mile Theta Cable Television system. The Theta



George A. Livergood

system currently offers up to 29 channels of cable TV service with 2,200 miles of cable passing approximately 257,000 dwellings. A 1971 graduate of Kansas State University with a BSEE in electrical engineering, Livergood has been manager of operations with Theta Cable since February 1978.

★ **Larry Michel** has been appointed system manager for **United Cable Television of Western Colorado**, a subsidiary of United Cable Television Corporation.

Prior to his new position, Michel was director of marketing for United Cable Television of Bossier City, Inc., in Bossier City, Louisiana. He was responsible for total sales and marketing efforts for the system.

As system manager for United Cable Television of Western Colorado, Michel will be responsible for managing the cable TV system to provide quality service for local cable television subscribers.

★ **Donald E. McGraw** has joined **CBS Cable** as director of engineering; and **Martin J. Murphy**, as director of technical operations. Both men were formerly field operations engineers with the CBS Television Network and are veterans of 30 years with the CBS organization. They will report to Sidney Kaufman, vice president of operations of the basic cable program service.

★ **LRC Electronics** has promoted **William Down** to the newly created position of chief engineer. Down will be responsible for product engineering, new product development and application engineering. Prior to his promotion, Down was employed as an applications engineer.

★ **Marvin H. Mason Jr.** has been named staff engineer for **MetroVision, Inc**. His responsibilities include coordinating interactive, data and security services. He also serves as safety director and FCC coordinator. His experience in cable television includes three years as a system engineer at Cox Cable. He also served as a general manager of United Cablevision Corporation and as a sales engineer with Motorola. Prior to joining MetroVision, Mason spent a year as a district sales engineer for Magnavox CATV systems. Mason received a BS in engineering in 1964 from North Carolina State University.

Marvin H. Mason, Jr.

Donald Silverman has been named vice president, engineering, for **Local Digital Distribution Company** (LDD).

In his new position, Silverman, who has over 20 years experience designing communications systems for commercial and government applications, will be

responsible for the technical direction of LDD's systems, with emphasis on network design, systems engineering, applications, and research and development. He will also be responsible for program management.

Donald Silverman

Prior to joining LDD, Silverman served for four years as general manager of M/A-COM's Digital Communications Corporation's network systems and automation systems activities. From 1973 to 1977, he was at American Satellite Corporation where he was assistant vice president, systems and services, responsible for strategic plans, new business ventures and services.

Silverman also spent three years at the National Aeronautics and Space Administration's headquarters in Washington, D.C., as chief of systems, communications programs, and nine years as manager of advanced communications systems at RCA's ASTRO Electronics Division in Princeton, New Jersey.

Kenneth R. Lukasik has been named general construction/facilities support manager for **Centel Communications**.

Kenneth R. Lukasik

Lukasik will be responsible for coordinating the engineering, construction and operations for Centel Communications' metropolitan Chicago cable TV franchise.

In 1967, Lukasik joined Central Telephone & Utilities Corporation (Centel), parent company of Centel Communications, and held various positions in installation and repair at the company's Illinois telephone operations in Des Plaines. In 1977, he transferred to Centel's North Carolina telephone operations.

★ **Alexander H. MacDonald** was promoted to vice president of engineering for the **Wometco Home Theatre (WHT), Inc.**, subscription television system.

He is responsible for the management and coordination of all WHT engineering activities including systems design, field engineering, data link, communication and computer hardware systems as well as engineering coordination with television stations WWHT, UHF Channel 68 in Newark, New Jersey, its translator UHF Channel 60 on top of the World Trade Center and WSNL, UHF Channel 67.

★ The **Jerrold Division** of General Instrument has announced that **Frank Ragone** has been promoted to vice president of engineering for distribution products. Ragone, formerly manager of engineering services, has been with Jerrold for 30 years.

TRW: The answer to your growing concern.

Because of the incredible growth of the CATV industry, TRW has committed the resources necessary to double our manufacturing capacity each year for three years in a row!

In 1979-80, we doubled our capacity. In 1980-81, we're redoubling. And in 1981-82, we'll redouble again. So we'll be able to deliver over 2,000,000 modules to support your production requirements.

What else have we done for you lately?

In 1980, we introduced the CA3200 hybrid, (17 dB GAIN, 330 MHz BW) which increased channel capacity from 35 to 40, and improved dynamic range. Then came the CA4200 (17 dB GAIN, 400 MHz BW) with *another* jump to 52 channel capacity.

By the end of 1981, we'll be in production with the following: the CA4412 (13 dB GAIN, 200 MHz BW) for return amplification in 400 MHz systems; the CA4600 (34 dB GAIN, 400 MHz BW) to increase channel capacity from 35 to 52 channels; the CA5000 (18.5 dB GAIN, greater than 400 MHz, BW) + 5 dB increase in dynamic range. (Wider dynamic range increases length of trunk due to lower noise build-up and lower distortion build-up in cascaded amplifiers.)

These are just a few of our answers to your growing concerns. Are there any questions?

Contact TRW RF Semiconductors, 14520 Aviation Blvd., Lawndale, California 90260.

Visit Us at the NCTA Show-Booth #408

TRW RF SEMICONDUCTORS

An Electronic Components Division of TRW Inc.

In Orbit

Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders
CBN		24 hrs.	None	F1,#8
CNN		24 hrs.	None	F1, #14
Cabletext		24 hrs.	None	F1, #6 Vertical Blanking
C-SPAN	Weekdays	12:00 p.m./6:30 p.m.	195°/1#	F1,#9
ESPN		24 hrs.	None	F1,#7
Front Row		2:30 p.m./2:30 a.m.	481°/#	F1, #12 (E,C) F1, #10 (P,M)
HBO			Program 729°/# Scramble 835°/# Duplication 940°/# Take-2 E 592°/# Take 2 W 681°/#	F1,#24 F1,#22 F1,#23 F1,#20
June 1	5:30 p.m.	2:54 a.m.		
June 2	5:00 p.m.	2:15 a.m.		
June 3	5:30 p.m.	2:32 a.m.		
June 4	5:00 p.m.	3:42 a.m.		
June 5	5:00 p.m.	4:00 a.m.		
June 6	1:30 p.m.	4:33 a.m.		
June 7	2:30 p.m.	3:15 a.m.		
June 8	5:30 p.m.	3:36 a.m.		
June 9	5:00 p.m.	1:44 a.m.		
June 10	5:30 p.m.	2:05 a.m.		
June 11	5:00 p.m.	1:50 a.m.		
June 12	5:00 p.m.	3:13 a.m.		
June 13	3:30 p.m.	3:52 a.m.		
June 14	2:30 p.m.	2:36 a.m.		
June 15	6:00 p.m.	3:20 a.m.		
June 16	5:30 p.m.	2:20 a.m.		
June 17	5:00 p.m.	3:22 a.m.		
June 18	6:00 p.m.	2:09 a.m.		
June 19	5:30 p.m.	4:13 a.m.		
June 20	3:30 p.m.	3:50 a.m.		
June 21	3:30 p.m.	2:23 a.m.		
June 22	5:00 p.m.	2:35 a.m.		
June 23	5:30 p.m.	4:10 a.m.		
June 24	5:30 p.m.	3:40 a.m.		
June 25	5:30 p.m.	4:10 a.m.		
June 26	5:00 p.m.	4:47 a.m.		
June 27	2:30 p.m.	3:15 a.m.		
June 28	3:30 p.m.	3:12 a.m.		
June 29	5:30 p.m.	2:20 a.m.		
June 30	5:30 p.m.	3:18 a.m.		
HTN		8:00 p.m./10(11:00) p.m.	517°/#	F1,#21
KFIX		2-4 hrs./day	None	F1,#1
KTVU			None	F1,#1
	Weekdays	7:00 a.m./1:00 a.m.		
	Weekends	7:00 a.m./4:00 a.m.		
Modern Talking Pictures			243°/#	F1,#22
	Weekdays	12:00 p.m./5:00 p.m.		
	Weekends	7:00 a.m./12:00 p.m.		
The Movie Channel		24 hrs.	None	F1,#5 (E,C) F1,#11 (M,P)
Newstime		24 hrs.	276°/#	F1,#6
PTL		24 hrs.	None	F1,#2
Reuters	Weekdays	4:00 a.m./7:00 p.m.	None	F1,#18

Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders
Showtime			Program 576°/# Scramble 679°/# Off-line 753°/# Access 843°/#	F1,#12 (E,C) F1,#10 (M,P)
June 1	3:30 p.m.	2:00 a.m.		
June 2	3:30 p.m.	2:11 a.m.		
June 3	3:30 p.m.	2:25 a.m.		
June 4	3:00 p.m.	2:52 a.m.		
June 5	3:30 p.m.			
June 6				
June 7		3:00 a.m.		
June 8	3:30 p.m.	3:25 a.m.		
June 9	3:30 p.m.	3:13 a.m.		
June 10	3:00 p.m.	3:26 a.m.		
June 11	3:30 p.m.	2:59 a.m.		
June 12	3:00 p.m.			
June 13				
June 14		3:14 a.m.		
June 15	3:30 p.m.	3:35 a.m.		
June 16	3:00 p.m.	3:00 a.m.		
June 17	3:30 p.m.	2:44 a.m.		
June 18	3:00 p.m.	3:56 a.m.		
June 19	3:30 p.m.			
June 20				
June 21				2:35 a.m.
June 22			3:30 p.m.	3:11 a.m.
June 23			3:00 p.m.	4:00 a.m.
June 24			3:00 p.m.	3:52 a.m.
June 25			3:30 p.m.	3:00 a.m.
June 26			3:00 p.m.	
June 27				
June 28				3:34 a.m.
June 29			3:30 p.m.	3:40 a.m.
June 30			3:30 p.m.	3:35 a.m.
SPN		24 hrs.	None	Westar II, #9
SIN		24 hrs.	None	Westar III, #8
Trinity (KTBN)		24 hrs.	None	F1,#13
USA Network				F1,#9

Off-times are listed below. For on- times, see notes below.

June 1	2:30 a.m.	June 16	2:00 a.m.
June 2	3:00 a.m.	June 17	2:30 a.m.
June 3	4:00 a.m.	June 18	4:00 a.m.
June 4	3:00 a.m.	June 19	5:00 a.m.
June 5	4:00 a.m.	June 20	3:00 a.m.
June 6	1:00 a.m.	June 21	3:00 a.m.
June 7	2:30 a.m.	June 22	2:00 a.m.
June 8	2:00 a.m.	June 23	2:30 a.m.
June 9	2:00 a.m.	June 24	3:00 a.m.
June 10	1:30 a.m.	June 25	3:00 a.m.
June 11	3:30 a.m.	June 26	4:00 a.m.
June 12	4:00 a.m.	June 27	3:00 a.m.
June 13	3:00 a.m.	June 28	2:30 a.m.
June 14	3:00 a.m.	June 29	2:30 a.m.
June 15	1:30 a.m.	June 30	2:30 a.m.

USA Network. On-time is 7:30 p.m. weekdays, except June 4, 25: 7:00 p.m. Saturdays: 5:00 p.m. Sundays: 5:00 p.m., except June 14: 3:00 p.m.; June 28: 7:30 p.m.

Calliope. Weekdays: 6:30 p.m. to 7:30 p.m., except June 4, 25: 6:00 p.m. to 7:00. Saturdays: 10:00 a.m. to 1:00 p.m.

The English Channel. Tuesdays: 10:30 p.m. to 12:30 a.m., except June 9, 16: 10:00 p.m. to 12:00 a.m. Saturdays: 1:00 p.m. to 5:00 p.m. Sundays: 10:00 p.m. to 12:00 a.m.

WGN	Mon.-Thurs. Weekends	5:42 a.m./3(3:30) a.m. Ends 3:00 a.m. on Sun	None	F1,#3
WOR		24 hrs.	None	F1,#17
WTBS		24 hrs.	None	F1, #6
Women's Channel		24 hrs.	None	F1, #6 Subcarrier

E = eastern M= mountain
C= central P = pacific

All program times are listed for the eastern time zone, unless otherwise noted.

NEW ADVANCE TRAPS By Eagle

We've created a new generation of Super Traps for Multi Pay-TV Security.

Advanced technology for super band applications.
Until now, CATV state-of-the-art limited the use of traps to low and midband frequencies.

Now, due to a **technological breakthrough**, Eagle's New 5-Pole Advance Traps can be used at higher frequencies including **high band** and **super band**... all the frequency requirements you'll need for the foreseeable future.

No Video Degradation-
Minimal Audio Degradation On Adjacent Channels.
Advance Traps are designed for use with adjacent channels with little or no affect on the audio or video performance of adjacent channels. Clearly, your subscribers will receive exactly what they pay for.

Traps...Still the most reliable, flexible, and economical method to secure Multi Pay-TV Channels.
Traps from Eagle are time proven. And the more subscribers you add, the lower your investment.

With Advance Traps, you are assured of traditional Eagle quality. Our traps are **completely potted to prevent absorption**, are stable over wide temperature ranges (-40° to +140°F) and our machined and interlocked housing is stronger than standard traps with welded or soldered cases.

Advanced Traps from Eagle, we've created a new generation just when you need it.

For complete Advance Trap and Tier Filter specifications, call or write for our new security filter brochure.

Specifications-5-Pole Single Channel Traps

Model #	Rejection Depth	Lower Video	Lower Adj. Sound	Upper Adj. Video
5-NF 2-6, low band	-75db	.5db	-4db	-.5db
5-NF A-F, mid band	-75db	1.0db	-5db	-1db
5-NF G-I, mid band	-75db	1.5db	-6db	-1db
5-NF 7-13, high band	-75db	2.0db	-10db	-2db
5-NF J-W, super band	-70db	3.0db	-15db	-3db

EAGLE COMTRONICS INC.

CALL TOLL FREE TO ORDER
800-448-7474

NOTE:

See us at the NCTA Show—Booth #310

NEW ADDRESS AND TELEPHONE: 4562 Waterhouse Road, Clay, New York 13041 (315)622-3402;
In Canada: Deskin Sales • Montreal • Toronto • Vancouver (416)495-1412 770 Steelcase Road West, Markham, Ontario L3R2M4

INCOMPARABLE...

'POWER·KING'™ *Series*

STANDBY POWER SUPPLY

MODEL #PS-SB-3050
STANDBY POWER SUPPLY 30 V. or 60 V. (selectable), accommodates two (2) batteries. (4) batteries available.

MODEL #PS-ABP
AUXILIARY BATTERY PACK, "Piggy-Back" Housing to accommodate two (2) additional batteries. Use with Model #PS-SB3060 Standby Power Supply where total of four (4) batteries is required.

RMS CATV DIVISION

TELEPHONE OR WRITE
FOR IMMEDIATE DELIVERY

RMS ELECTRONICS, INC./CATV DIVISION
50 ANTIN PLACE, BRONX, N.Y. 10462

TOLL FREE (800) 223-8312
(Continental U.S.A., Puerto Rico, U.S. Virgin Islands)
(212) 892-1000 Call Collect (New York State)