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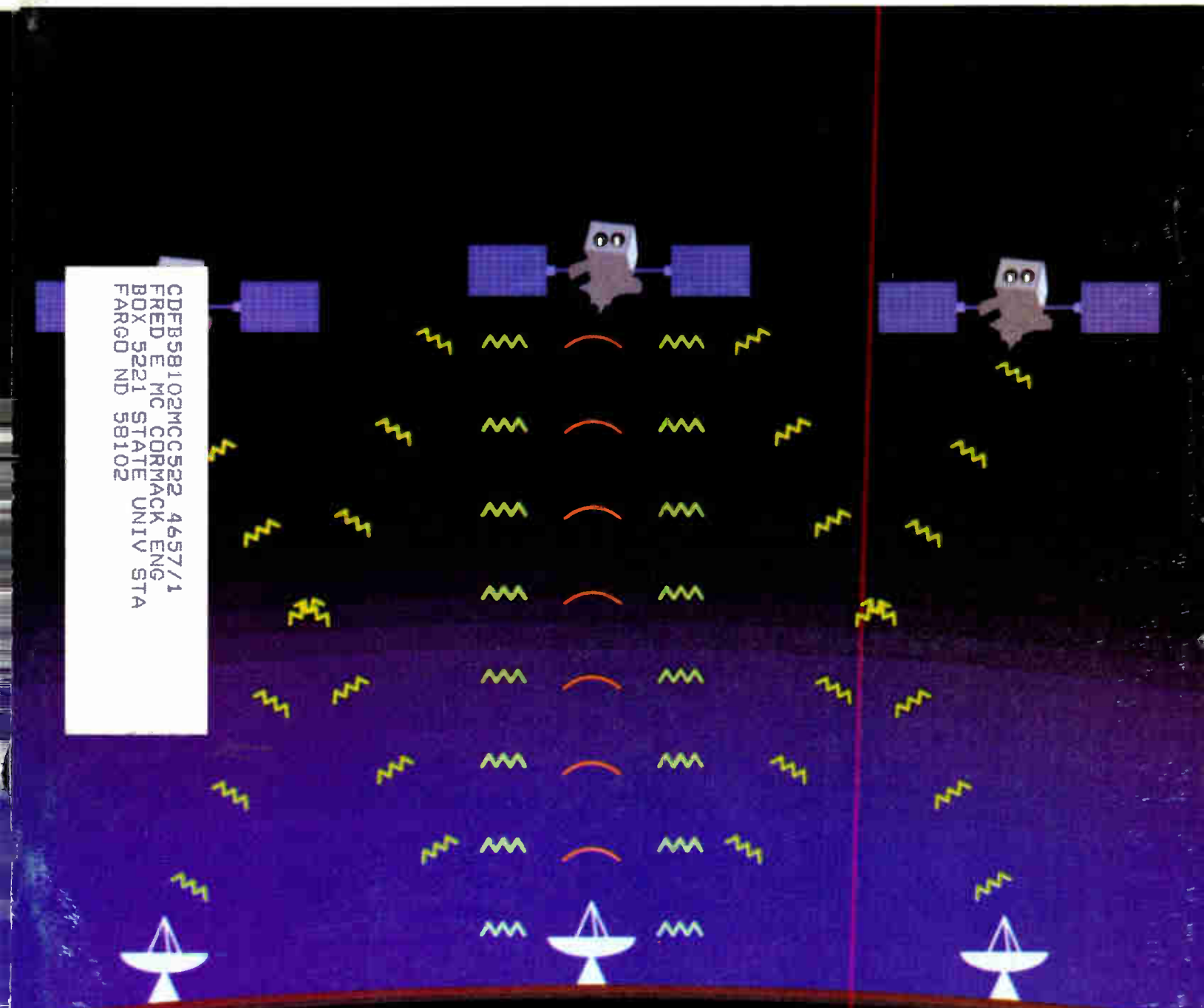
Communications Engineering Digest/The Magazine of Broadband Technology August 1981



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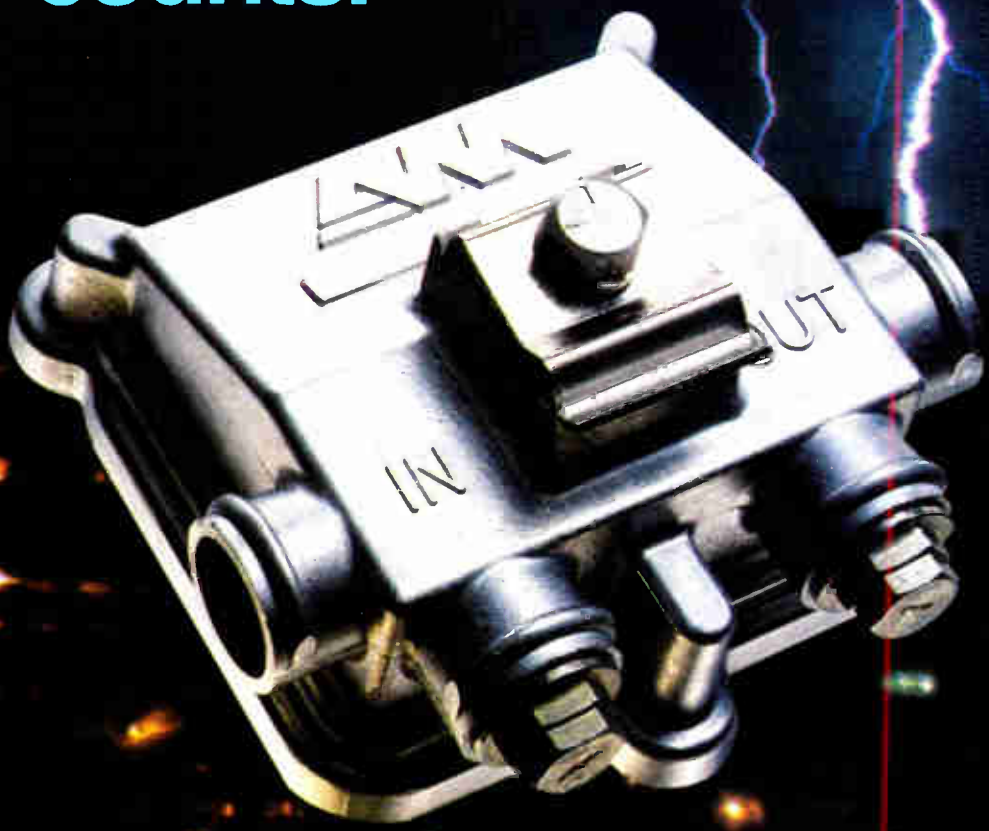

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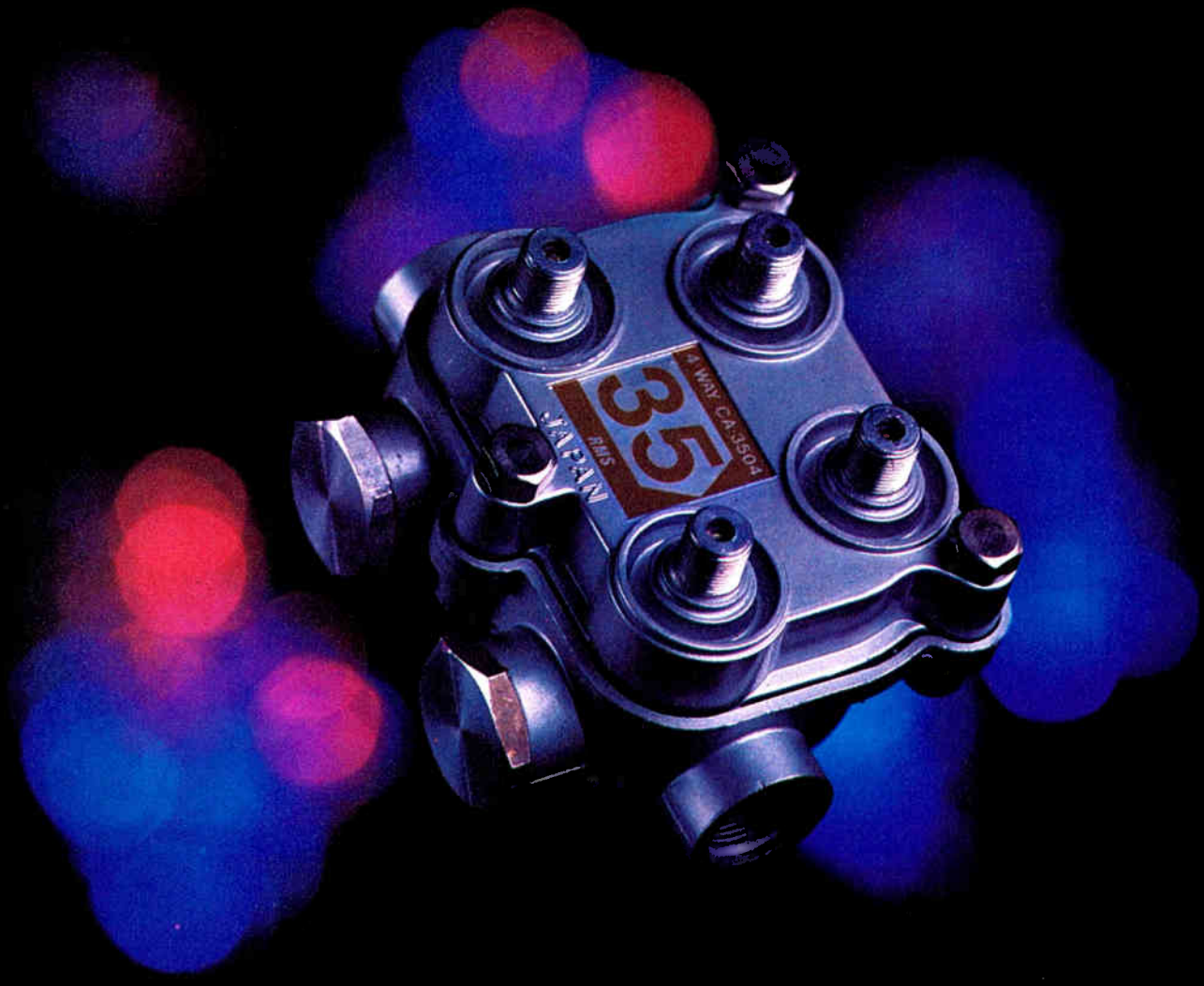

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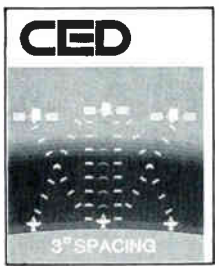

About the Cover

Uplink interference occurs by virtue of the finite gain of transmitting antennas in the direction of an adjacent satellite illuminating the receiving system in the wanted spacecraft. Downlink interference occurs by virtue of the finite gain of the receiving earth station.

CED (USPS 300-510) is published monthly by Titsch Publishing, Inc., P.O. Box Box 5400-TA, Denver, Colorado 80217 ' August 1981, Volume 7, Number 8 Subscription Price 1 year $20.00 2 years, $35.00 Canada and Mexico add $6.00, and other foreign subscribers add $12.00 per year Controlled circulation paid at Denver, Colorado **CED** is published on behalf of all parties, including the Society of Cable Television Engineers (SCTE) POSTMASTER Please send form 3579 to P.O. Box 5400-TA, Denver, Colorado 80217 BPA membership applied for May 1981

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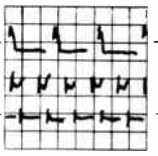

Neither Underground nor Overhead

Very soon there could be an alternative to underground or aerial construction of cable plants for delivering multiple channels of programming: a wireless television distribution system. For several months, bits of information have surfaced regarding development of what amounts to a high quality MDS system, with at least ten-channel capability. According to Ben Willie, president of Community Antenna Television Association, such a system will be tested outside of New Orleans within two months. Although Willie would not reveal the name of the company involved, he said it has received FCC authorization for experimental channels in the 3.0 GHz range. Salesmen for the company are testing the marketing waters, and Willie said they intend to offer the rights to use the service and the necessary transmitter for $250,000. The system will be totally addressable, with converters priced at around $100 each. The wireless system will transmit the signals line of sight from five to ten miles and one of the advantages is that it would not require a franchise. Areas without cable service or with low penetration levels are expected to be prime targets if the system proves to be feasible.

How about Raising your Hands?

Anyone who has even a remotely sensible system for counting the heads of cable subscribers is welcome to give it a try. The experts seemingly haven't a clue as to how many sets of eyeballs are staring at the medium. An example of the confusion is evident in May estimates of the cable audience released by A. C. Nielsen, Arbitron and the National Cable Television Association. Nielsen was the most generous of the three, claiming that 21.3 million homes are wired for cable (26.5 percent of all U.S television households). The NCTA took the middle road, coming up with 19.1 million homes (25 percent overall); and Arbitron gained the award for conservatism with 17.4 million (22 percent). All this causes a great deal of uneasiness for advertising agency executives who are courting clients for cable. But when faced with a ridiculous situation, wise men refuse to panic. The best example of that attitude is Arnie Semsky, senior vice president of the advertising agency Batten, Barton, Durstine and Osborn. When asked about the discrepancy, Semsky replied, "It's amusing."

Setting Standards

Both Telidon Videotex Systems and CBS have urged the FCC to adopt the North American Standard as the official guidelines for teletext in the United States. The North American Standard was announced at the Videotex '81 conference in Toronto on May 20 by representatives of TVS, CBS, the Canadian Department of Communications, the French Broadcasting Authority, and American Telephone and Telegraph Company. According to the TVS filing, there are five crucial areas in the North American Standard that should be adopted in the U.S.: part 1), television stations are given the authority to provide teletext services; 2) a variable format and asynchronous system are specified as well as a description of the elements of each data line; 3) the use of vertical blanking interval lines ten through 18 are authorized; 4) a data transmission rate is set at 5.727272; and 5) the timing of the signal pulse is specified and there is a requirement that the teletext signal not degrade any portion of the regular program signal. Both filings urge immediate steps toward a rulemaking on establishing a U.S. teletext standard.

Slicing the Spectrum

When the FCC eventually sits down to sort out the applications for DBS systems and establish permanent rules, there is one aspect of the proceeding that is of utmost importance to Home Box Office. Although primarily known as the pioneer deliverer of pay TV product by satellite, HBO still transmits over microwave to more than 100 affiliates in Pennsylvania, New Jersey, New York and Connecticut. HBO is concerned about possible interference to these microwave links from DBS transmissions. In order to avoid the problems, HBO has proposed a system to share the 11.7-12.7 GHz frequencies between DBS, fixed satellite services (FSS) such as Satcom I, and fixed terrestrial services (FS). Under HBO's plan, the frequencies between 11.7 and 12.2 GHz would be exclusively allocated to FSS; 12.2-12.45 would be allocated to both the FS and FSS on a co-equal basis; and 12.45-12.7 GHz would be utilized by DBS on a primary basis, but the FS could also use the band if no interference problems existed. A final suggestion would be for the FCC to authorize other frequencies (such as 18 or 23 GHz) to the FS.

Who Owns Space?

The International Telecommunication Union World Administrative Radio Conference on geostationary satellites (Space WARC for short), which will be held in 1985 and 1987, may require difficult policy choices. The conference is expected to consider and possibly change the international arrangements whereby nations and organizations use the geostationary satellite orbit for radiocommunications during the late 1980s and early 1990s. To get ready for the international get together, the Federal Communications Commission has voted to establish a public advisory committee. The committee is intended to bring together a broad range of persons who are knowledgeable about issues presented by the Space WARC and is expected to share appropriate information with the more narrowly focused committees of other agencies. Among other considerations, the advisory committee would be expected to: estimate the demand for communication services for the late 1980s and 1990s and examine the kinds of facilities needed; indicate the impact of new technology on the communications environment; consider the potential effects of various Space WARC outcomes; and assess U.S. options for the conference, considering such questions as which radio frequency bands, if any, should be planned? Are other ITU arrangements able to be pursued? If a plan or planning process is to be pursued, what is to be its nature, what details are to be specified and on what basis? The answers probably will not be known for a long time.

Flooding to the Source

Last fall, the Reader's Digest Association purchased a controlling interest in the Source Telecomputing Corporation. The influx of capital into the company was expected to position STC as a major provider of software to the cable industry. The Source, which is the generic name for more than 1,200 electronic services, will be utilized by a substantially increased subscriber base in the very near future, company officials have said. To prepare for this onslaught, the staff of STC has been expanded by 60 percent in the past three months—from 57 to 96 employees. "We expect STC's current subscriber base of 10,000 to more than double within 12 months," said STC President Marshall Graham.

Seminars

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.

3: Sheldon Satin Associates is holding a seminar on "Evaluating and Counseling Your People" at La Mansion Del Rio, San Antonio, Texas. Contact Robin Toltz, (212) 267-3560.

4-5: "The Restructuring of the Telecommunications Industry" is the topic of a seminar sponsored by the **Yankee Group** to be held in New York City. Contact Marjorie Sugarman, (617) 725-1100.

5: "Evaluating and Counseling Your People" is the topic of **Sheldon Satin Associates'** seminar to be held at the Fairmont Hotel in Dallas, Texas, and the Marriot Hotel in Saddlebrook, New Jersey. Contact Robin Toltz, (212) 267-3560.

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.

7: Sheldon Satin Associates' seminar on "Evaluating and Counseling Your People" will be held at the Hyatt Regency, Memphis Tennessee.

9-12: The **New York State Cable Television Association's** summer conference will be held at the Holiday Inn on Grand Island, New York. Contact Fred DiMaggio, (518) 463-6676.

10: Sheldon Satin Associates' seminar on "Evaluating and Couseling Your People" will be held at the Parker House in Boston. Contact Robin Toltz, (212) 267-3560.

10-11: Two one-day seminars on the satellite industry—"Satellite Technology for the Nontechnical Manager" (Aug. 10) and "Programs and Marketing Opportunities" (Aug. 11)—sponsored by **"Satellite News"** will be held at the Colonnade Hotel, Boston, Massachusetts. Contact Stacey Evans, (301) 986-0666.

11: A meeting of the **Southern California Cable Club** will be held at the Pacifica Hotel in Los Angeles. Contact Bruce Kaufman, (213) 278-5644.

11-12: The **Yankee Group** is sponsoring a seminar on "The Restructuring of the Telecommunications Industry" in Palo Alto, California. Contact Marjorie Sugarman, (617) 725-1100.

11-13: The **1981 Construction and Utility Equipment Exposition** will be held at the Johnson County Airport in Olathe, Kansas. Contact DJM, Inc., (305) 685-3766.

14-16: SPTS '81 will be held in Omaha, Nebraska, this year. Contact SPTS, (405) 396-2574.

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.

18-19: "Managerial Development in the Television Industry" is the topic of a workshop sponsored by **Coaxial Analysts** at the Peachtree Plaza, Atlanta, Georgia. Contact Lynette Anderson, (303) 778-7700.

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.

19-21: The 3rd Annual Satellite Communications Users Conference, sponsored by "**Satellite Communications**" magazine, will be held at the Regency Hotel, Denver, Colorado. Contact *Satellite Communications*, (303) 988-4670.

19-23: The **Rocky Mountain Cable Television Association** is holding its annual meeting at the Ramada Snowking Inn, Jackson Hole, Wyoming. Contact Al Carola, (307) 362-3773.

20-22: The Southern Cable Television Association convention and trade show, the **Eastern Show**, will be held at the Georgia World Congress Center, Atlanta, Georgia. Contact the group at (404) 237-8228

21: The **Missouri Broadband Communications Association's** "First Annual Manager's Meeting" will be held at the Osage House, Lake of the Ozarks. Contact Charlie Broomfield, (314) 635-1915.

23-26: CTAM '81, the annual conference of the **Cable Television Administration and Marketing Society**, will be held at the Copley Plaza Hotel in Boston, Massachusetts. Contact Lucille Larkin, (202) 296-4219.

24-28: The **Society of Photo-Optical Instrumentation Engineers** will hold its 25th annual international technical symposium and exhibit at the Town and Country Hotel and Convention Center, San Diego, California. Contact SPIE, (206) 676-3290.

27-28: A two-day seminar entitled "Understanding Telecommunications Technologies for Non-Engineers" is being sponsored by **TeleStrategies, Inc.**, at the Marriott Hotel, Saddle Brook, New Jersey. Contact TeleStrategies, (703) 734-7050.

31-September 4: The **Community Antenna Television Association** is sponsoring a technical training seminar on system distribution, problems, failures, tests and measurements at the Regency Plaza Hotel, Minneapolis, Minnesota. Contact the CATA Engineering Office, (305) 562-7847.

SEPTEMBER

1-3: A **Jerrold** technical seminar will be held in Quebec, Canada. Contact Len Ecker, (215) 674-4800.

1-3: Information Gatekeepers, Inc., is holding its Fiber Optics Exposition '81 West at the Hyatt Regency Embarcardero in San Francisco, California. Contact the firm at (617) 739-2022.

9-11: The **New Mexico Cable Television Association** annual convention will be held at the Roswell Inn, Roswell, New Mexico. Contact Oscar Davis, (505) 538-3701

9-11: A conference on "Cable Television: An Advertising and Marketing Tool," sponsored by the **University of Wisconsin Extension**, will be held at the Concourse Hotel in Madison, Wisconsin. Contact Barry Orton, (608) 262-2394.

10: The **Bay Area Cable Club** is holding a meeting at the San Francisco Press Club, San Francisco, California. Contact Diane DiSalvo or Lou Soucie, (408) 998-7333.

14-16: The **Wisconsin Cable Communications Association** will hold its annual fall convention at the Radisson LaCrosse Hotel, LaCrosse, Wisconsin. Contact Tom Hanson or Lynne Walrath, (608) 256-5299.

15-17: The **American Newspapers Publishers Association** is holding a seminar on "Electronic Publishing" at the Fairmont Hotel in Dallas, Texas. Contact ANPA, (703) 620-9500.

16: The first annual **Paul Kagan Associates**-sponsored conference on "Cable TV Franchise Law" will be held at the Mayflower Hotel in Washington, D.C. Contact Paul Kagan Associates, (408) 624-1536.

21-25: ISS '81, the international symposium on switching, will be held in Montreal, Quebec. The symposium is sponsored by Region 7 of the Institute of Electrical Engineers, the Canadian Society of Electronic Engineers and the Canadian Telecommunications Carriers Association. Contact John Benet, (514) 761-5831.

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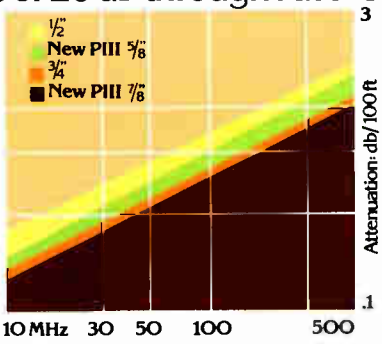
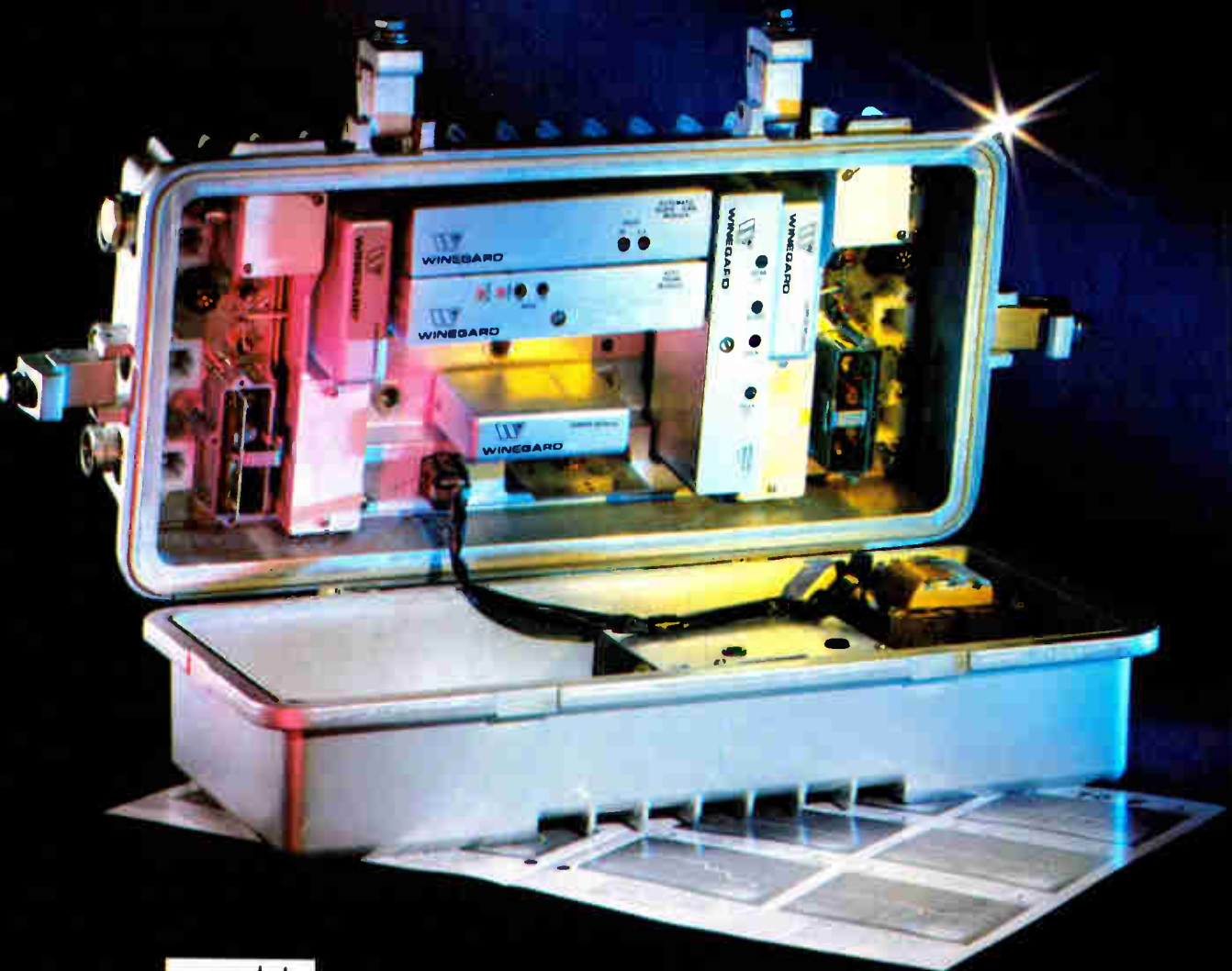
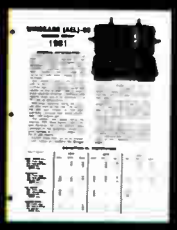


Several things on your CATV





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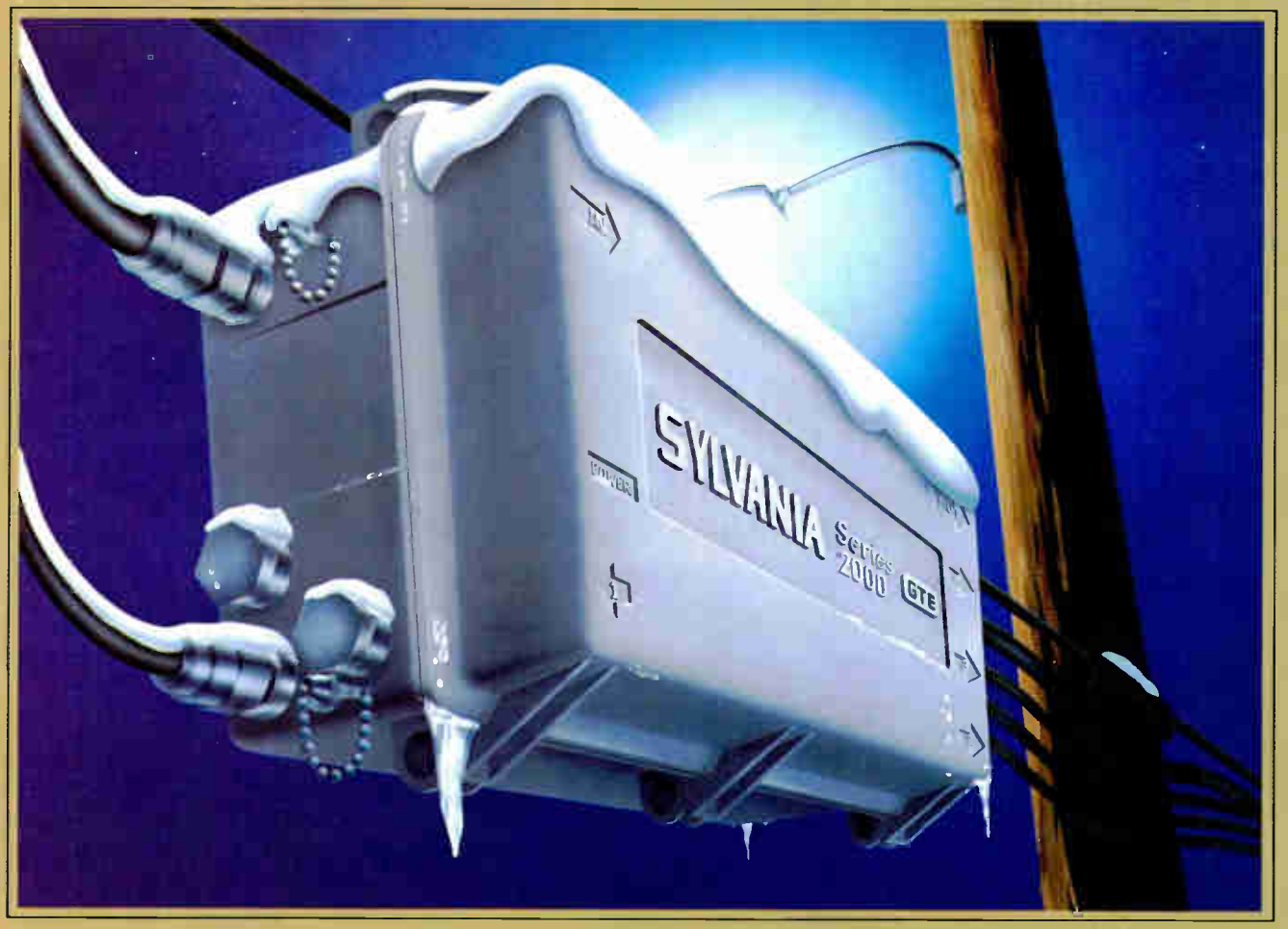

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Editorial

Ferris Returns

Former FCC Chairman Charles Ferris, now with the Washington office of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, created quite a stir when he showed up in Boston representing Cablevision Systems in that and other franchising efforts. And, now that Ferris has been retained by the National Cable Television Association to assist with copyright matters, there may be some broadcast and programming interests out there who wish they would have treated the former chairman with a little more respect during his tenure at the commission.

Ferris debuted in his new role with testimony before the Kastenmeier Subcommittee on Courts, Civil Liberties and the Administration of Justice, which is taking another look at the 1976 Copyright law it crafted only five years ago. Ferris came down hard against proposals to abolish the compulsory license for cable television which that law established and said that reimposing syndicated exclusivity and distant signal rules would be detrimental to the continued development of a sound communications policy. In fact, Ferris described the syndicated exclusivity rules, which were done away with while he was in office in a move recently upheld by the courts, as a "disaster."

Ferris told the subcommittee that further scrutiny of the complex issues would only reveal recycled solutions seeking, but again failing, to find problems. "I do not believe that the circumstances of 1981, any more than the circumstances of 1976, justify the imposition of a system requiring thousands of often futile negotiations prior to importation of distant signals by cable systems," Ferris said, "nor do I believe that the efforts of the FCC to free cable from baseless regulatory restraints should be undone by legislative reimposition of these same limits.

"I am concerned," he explained, "that the imposition of such schemes may have the undesirable effect of fostering concentration of ownership in this currently competitive industry. Because the number of transactions, each of which imposes some costs on the parties thereto, is related to the number of cable systems negotiating such rights, actual cost savings may be achieved by combinations of firms negotiating as one. It may be that certain independent bodies, analogous to ASCAP or BMI in the music industry, may be formed. But if such an organization is not created, or until it is, I fear that the system owners may have an incentive to merge with other systems.... I do not believe the arguments in favor of full copyright liability warrant such a result."

It comes as no surprise that Ferris has taken such a tack, since during his chairmanship at the commission, he continually pressed for follow through on the broadcast/cable economic inquiry begun under the previous administration and which eventually led to the elimination of the signal carriage and syndicated exclusivity rules. It should also be of no surprise that Ferris is beginning to find himself working in cable. Ferris is not known generally as one who carries around a grudge; but maybe those other media interests should not have attempted to beat him up so frequently both publicly and in print.

Pat Gushman

CED

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Satellites

Competition Intensifies In DBS Filings

WASHINGTON, D.C.—What began as a one-horse race in the open field of direct broadcast satellite services has turned into a mad scramble with 14 companies proposing some form of DBS system. The filing deadline with the Federal Communications Commission for the first wave of applications was July 16. When the deadline passed, Satellite Television Corporation, a subsidiary of Comsat which filed the first DBS proposal last December, had a host of competitors.

Heading the list of new applicants are CBS, Inc., and RCA Americom. Both communications companies have included the new wrinkle of high-definition television (HDTV) in their proposals.

The completed CBS system would consist of three channels transmitted by four satellites with the combined footprints capable of covering the entire country. The first channel would provide advertiser-supported services through local CBS affiliate stations that would be retransmitted by terrestrial links. The other two channels would be devoted to entertainment, educational and cultural services.

One aspect of the CBS proposal is the plan to experiment with HDTV. Earlier this year, CBS showcased the future of television with a demonstration of the new technology in Washington, D.C. The key element to HDTV is an expansion of the number of scanning lines from the standard 525 to 1,125. Combined with an increased length-to-height aspect ratio of 5:3 (current broadcast television has a 4:3 ratio), the system adds a revolutionary quality to television images.

RCA's proposal also involves four of the new high powered satellites, and the carrier has announced its intention of providing six video channels. Estimates of the cost of RCA's proposed system run close to $760 million. The company stated it would not originate the programming and would function only as a conduit for transmission. Two of the six channels proposed would be capable of offering HDTV, according to the filing.

CBS and other companies have "strongly opposed" both the setting of interim standards for DBS and the acceptance of applications before the necessary orbital slots are granted at the upcoming 1983 Regional Administrative Radio Conference. However, since the FCC is moving ahead despite the objections, CBS filed "to assure spectrum availability."

The FCC must now sort through the various competing applications and determine which will be granted approval under the interim provisions.

PSSC Studying Creation Of Ku-Band Network

WASHINGTON, D.C.—The Public Service Satellite Consortium is working under contract to NASA to develop a network of satellite earth stations operating at Ku-band (14/12 GHz). The 14/12 GHz communications satellite network would be used for public service applications and supported by public service organizations. It would utilize Ku-band equipment previously provided by NASA for experiments with CTS, and experimental satellite jointly owned and operated by the United States and Canada. Some 35 experimenters used CTS to test satellite-assisted methods of communications in health, medicine, libraries, education, government, law, arts, humanities, science and technology.

Since June 1979, when CTS ceased its useful life, many public service users have begun operational service on commercial satellites. However, since U.S. satellites operate at 6/4 GHz, experimenters who acquired their own ground stations capable of interfacing with the 14/12 GHz satellite, had to retire their CTS ground equipment. Other CTS earth stations acquired by NASA were put in storage.

With the launch of SBS 1, a Ku-band satellite owned and operated by Satellite Business Systems, and the Canadian Ku-band satellite ANIK B, two satellites now existing which are capable of being used with existing but unused Ku-band earth stations.

PSSC's project to establish and manage a Ku-band network will utilize that 14/12 GHz equipment previously provided by NASA or acquired by public service users for use with CTS. PSSC will identify and contact CTS users, determine which PSSC members or other public service users could benefit and would be ready to test the use of 14/12 GHz technology. The next steps would be to acquire time on Ku-band satellites, assist "ready" users, determine which existing equipment could be modified to work with the proposed Ku-band network, determine what U.S. networks could be served by existing Canadian suppliers of public service programming, arrange uplinking of programming, supervise technical components and conduct management and technical evaluation of the network.

News

CableBus Takes Major Role In Portland Cable Security

BEAVERTON, OREGON—CableBus Systems Corporation intends to play a major role in the development of cable alarm monitoring in the Portland metropolitan area. CableBus alarm monitoring equipment was recently included in the Liberty Cable Television bid for the Metropolitan Area Communications Commission (MACC) franchise proposal.

Liberty and CableBus have also signed a letter of intent to work together toward developing cable alarm service on Liberty's two-way interactive cable system, which will use CableBus CableAlarm™ interactive home terminals and DEC computer-based headend monitoring equipment.

CableBus already operates a pilot system at The Landing Condominiums, a planned development in Portland, operating on Liberty's two-way cable system. The system provides a 24-hour monitoring of alarms from intrusion, fire, smoke, and medical emergency.

Cablesystems Pacific, recently awarded the Portland eastside franchise, and Liberty Cable Television, operating on Portland's west side, have committed to a full two-way cable trunk link between their systems and east and west Portland. A fully integrated system could eventually include the MACC franchise area, due to be awarded the fall, 1981, and the Vancouver/Clark County area, recently awarded to Cox Columbia Cablevision.

According to Peter Cass, president of CableBus, CableBus' primary objective is to promote an integrated operational cable alarm program for the Portland area. To do this, CableBus is maintaining its relationships with all actual and potential cable systems represented in the area. The original pilot program at The Landing and the planned development of cable alarm service on the Liberty two-way cable plant is the first major step

toward providing alarm monitoring capabilities to the general public.

A major portion of the CableBus long-range plan includes cooperation with local existing alarm installation and monitoring companies, municipal and county police forces, municipal and rural fire departments, and local 911 and emergency service providers. The assistance and cooperation of these local specialized service providers is essential to the maximum effectiveness of the cable-based alarm services to local residents.

Business Notes

★ **RCA**'s third and fourth domestic communications satellites, Satcom III-R and Satcom IV, are now scheduled for launch from NASA's Kennedy Space Center in Florida on October 15 and December 3, respectively, according to John Williamson, director of public affairs, RCA Americom.

★ More than 75 miles of ¾-inch and ½-inch Lumifoam III coaxial cable manufactured by **Times Wire & Cable** will be used to rebuild twin systems operated by United Cable TV of Illinois Valley, Inc. The systems, founded in 1951, now has 14,000 subscribers. It is being upgraded from 212 MHz to 300 MHz and will be compatible with a similar rebuilt stage completed two years ago. It will expand from 12 channels to 28.

★ **North Supply Company** and **RCA Cablevision** have signed a distribution agreement that gives North full distribution rights to RCA's line of CATV products. The national distributor also opened a new distribution center at the Airport Industrial Park in Memphis, Tennessee. The new 30,000 square-foot structure, one of ten others across the United States, will be connected to North's Lenexa-based headquarters through Northstar®, a computerized inventory and order entry system. The distribution center will also serve as an order assembly unit for North's distribution system. Equipment from several manufacturers will be brought directly to the Memphis facility and will be gathered into shipments for the ten locations across the nation.

★ **M/A-COM, Inc.,** has formed a new company, MACOMNET, Inc., to sell, install and service low-cost private corporate satellite communications networks to the nation's business community for the interactive transmission of voice, video and data. M/A-COM has recently received orders in excess of $4 million from several companies for private communications networks and related equipment, which brings the total backlog to an excess of $70 million for this type equipment. This backlog includes orders for more than 215 earth stations which will be used for digital business communications applications.

★ **RMS Electronics, Inc.,** has agreed in principle to acquire Kenyon Magnetics Inc. The New Jersey-based manufacturer of high quality ferro resonant transformers and other magnetic devices will provide RMS with a broader capability in its expanding line of Power King power supplies for the CATV industry. RMS plans to introduce a noninterruptable power supply suitable for use in both the CATV and data processing field in late 1982.

★ **E-COM Corporation** of Stirling, New Jersey, has entered into a manufacturing and marketing agreement with Communications Equity Corporation of Toronto to produce and distribute its advanced digital and RF communications modems and terminals. **Communications Supply, Inc.**, of West Chester, Pennsylvania, a CEC subsidiary, will be the exclusive source for these E-COM products in the United States.

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NCTA on Aeronauticals: Justification Lacking

The wind in Washington, D.C., is blowing toward the establishment of a rigid channelization plan to regulate the use of aeronautical frequencies by cable television operators. To counter this, the National Cable Television Association has proposed a two-point alternative to channeling based on the idea that cable television is a closed system. The specifics of the NCTA filing to the Federal Communications Commission have such bearing on cable television operators that CED is printing the NCTA filing in Docket Number 21006 in its entirety. The letters of noted cable television engineers Sruki Switzer and Archer Taylor, which prompted the NCTA filing, were printed in June CED.

The National Cable Television Association, Inc., by its attorneys, hereby submits comments in response to a letter filing associated with the above-captioned proceeding. The letter filing[1] was made subsequent to expiration of the normal pleading cycle[2] in the FCC's Further Notice of Proposed Rulemaking[3] (*Further Notice*). NCTA is the principal trade association for the cable television industry.

Introduction

The cable television industry has always recognized and been committed to the implementation of procedures designed to ensure the operational integrity of the aeronautical navigation and emergency communication frequencies. Underscoring this commitment has been the participation of the cable industry in scientific studies to determine the scope of the interference question and preparation of the numerous comments which NCTA has previously filed in this matter. NCTA unequivocally supports the efforts of the commission to develop appropriate rules to ensure both air safety and the continued growth and expansion of the cable television industry.

NCTA intends to respond, by these comments, to the issues raised in the letter from I. Switzer to Archer S. Taylor dated March 3, 1981 and included in the formal record in this proceeding. In addition to specifically proposing a system of frequency offsets for cable television systems using harmonically related carriers (HRCs)[4] in the 108-137 and 225-400 MHz bands, the Switzer letter generally embraces a regime of technical regulatory oversight which is at odds with both the massive research compiled by the commission's Advisory Committee in this proceeding and the stated goals of the commission as enunciated in its *Further Notice*.

Furthermore, informal discussions with the commission's staff have revealed that the Switzer proposal may well have triggered staff interest in and support for a full scale channel offset plan for the cable industry.[5] NCTA is justifiably concerned that Switzer's *ex parte* comments, which address only the narrow issue of efficient frequency offsets for the limited number of HRC systems, may be seized upon as the basis for commission adoption of a mandatory channelization plan. In addition, opportunity for comment on the narrow issues raised by Switzer has been limited and the parameters of the chan-

[1] FCC Public Notice No. 07947, March 12, 1981.

[2] Reply Comments in this proceeding were due July 10, 1980.

[3] *Further Notice of Proposed Rulemaking in Docket 21006*, 76 F.C.C. 2d 311, released March 24, 1980.

[4] HRC is a reference to Harmonically Related Carrier systems. These are systems which use a method of generating video carriers for use on cable television systems. In this system a master oscillator is used which has a fundamental frequency of 6.0 MHz. The output of the oscillator is high in Harmonic energy. The channel carriers are derived as multiples of the 6.0 MHz master oscillator.

[5] Concededly, the idea of a full scale channel offset plan is not being advanced for the first time in this proceeding. The Switzer proposal is a re-formulation of various channelization plans previously considered and abandoned by the commission mainly because the advent of new cable technology negated the need for such a restrictive spectrum use plan. *Report and Order in Docket No. 21006*, 65 F.C.C 2d 813, 815 (1977).

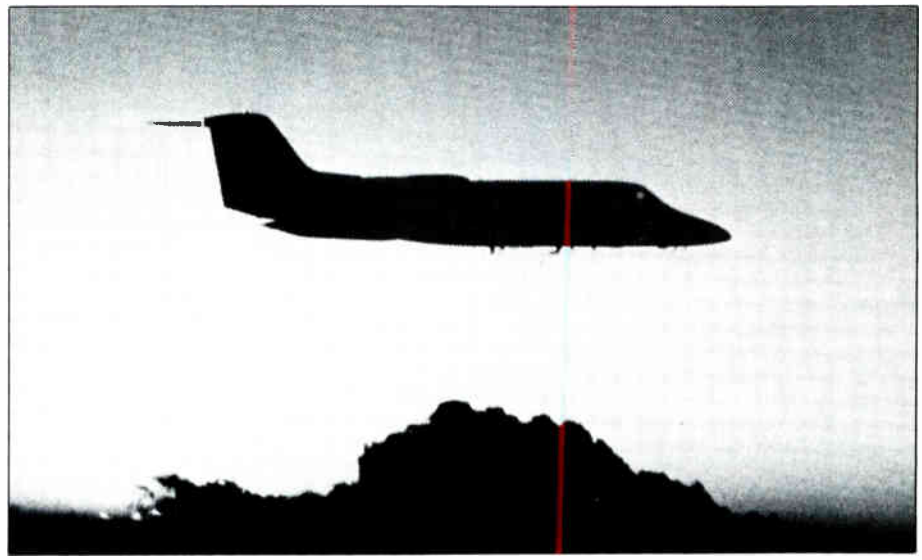
[6] In its Comments filed in response to the commission's *Further Notice* in this proceeding, NCTA submitted to a six point plan designed to provide for more equitable signal leakage rules while ensuring that interference to the aeronautical frequencies would not develop. NCTA's six point plan was specifically drafted to accommodate the findings advanced in the commission author-

For Signal Leakage Plan

nelization plan apparently contemplated by the FCC have not been specified nor released for comment. No cost benefit analyses of either the Switzer HRC plan or a broader channelization plan have been conducted, nor any rationale for abandonment and complete disregard of a record including over four years of research and analysis provided.[6]

NCTA strongly opposes the adoption or consideration of any frequency channelization plan for the following reasons:

1. The evidence, amassed by over four years of research and analysis submitted in this proceeding, as well as that of the Joint Advisory Committee[7] in its *Report,* clearly demonstrates that a channelization plan incorporating offsets on aeronautical communications channels is not required.
2. Despite unsubstantiated FAA accusations to the contrary, cable systems operate as closed transmission systems with severly limited leakage and/or interference potential.
3. The few (four) documented cases of cable television signal leakage resulting in interference to aeronautical frequencies have been little more than squelch breaks[8] which do not interfere with communications on the aeronautical bands and certainly do not constitute, or even approach the dimensions of a life threatening situation.
4. Implementation of a channelization plan would be an expensive, burdensome and, most importantly, totally unnecessary requirement which would impede the orderly development of cable service and the public realization of its benefits.



Rather than a channelization plan which would diminish the full utilization of the potential offered by cable television technology, NCTA proposes the adoption of a two part plan which would implement the basic recommendations of the commission's Advisory Committee. NCTA's plan would not impose upon them the kind of burdensome, costly, and unnecessary regulation inherent in any channelization plan. NCTA urges the commission to follow the recommendations of its own Advisory Committee and draft regulations designed to ensure that cable systems continue to operate as "closed systems." The commission should direct its efforts toward securing a carefully monitored

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ized *Advisory Committee Report*. At the conclusion of these same Comments, NCTA petitioned the commission for, "...the opportunity to comment upon any changes which will directly, or ultimately, affect CATV operators. We urge the commission, after taking into account all the comments and reply comments of all participants in this proceeding, to give due consideration to the issuance of a second *Further Notice* that proposes specific rules upon which more specific comments can be made prior to final adoption." See *Comments of the National Cable Television Association*, in response to the *Further Notice of Proposed Rulemaking* in Docket 21006 (hereinafter NCTA's Comments), see *Final Report of the Advisory Committee on Cable Signal Leakage* presented to the FCC and released on January 24, 1980 (hereinafter Advisory Committee Report). See NCTA's *Comments, supra*, in response to *Further Notice*, at 20.

[7] A list of the organizations represented on the Advisory Committee included: the Federal Communications Commission; National Telecommunications and Information Agency (NTIA); Federal Aviation Administration (FAA); National Cable Television Association; and the Aircraft Owners and Pilots Association (AOPA).

[8] Squelch is the term applied in radio communications to the muting or silencing of a channel when no message is being received. This muting prevents the operator from hearing the empty channel noise which is present in the absence of a signal.

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Argument

I. A Cable Channelization Plan Based on Offsets for Systems Using Harmonically Related Carriers is not Justified by the Record Evidence Adduced in this Proceeding and Would Impose Undue Economic and Technical Restraints on Cable Systems.

The Switzer comments narrowly focus on the feasibility of frequency offsets for systems using HRCs in the 108-136 and 225-400 MHz bands. The plan was apparently offered as a means for overcoming the difficulty of obtaining waivers of the existing regulations even where a reasonable engineering showing has been made. By including the Switzer letter in the record of this proceeding the FCC has implicitly, if not explicitly, recharacterized the proposal as having possible nationwide implications. NCTA is concerned that the commission may adopt an expanded version of the technique described by Switzer[9] as a nationwide cable television channel offset plan.[10]

The system of channel frequency offsets described in the Switzer comments and later addressed by Mr. Archer S. Taylor in his comments dated March 18, 1981 is, at first blush, a clever technique for enabling an HRC system to meet the *existing* requirements for frequency offsets from aeronautical frequencies. The difficulty with the proposal, however, concerns not its apparent feasibility, or applicability for the limited number of HRC systems either planned or in operation, but its appropriateness as a matter of federal regulatory policy. Ironically, newer systems in major urban centers, because of their use of modern hardware, advanced construction techniques and a large percentage of underground construction, are the least likely of all systems to exhibit measurable levels of signal leakage. In fact, an FCC spot check of new major market cable systems demonstrated not a single case of signal leakage in these situations. In short, this more than four year old proceeding has provided no technical or factual evidence that offsets are needed, let alone a specific method for offsetting HRC systems.

To the contrary, the results of extensive research commissioned by the FCC and submitted to it on November 1, 1979, demonstrate incontrovertibly, that cable television systems are not a notable source of aeronautical interference and that, accordingly, frequency offsets are

[9] The Switzer letter is a technical discussion of a method for making an HRC system work with specific frequency offsets in a particular city. This letter is addressed to another engineer and is focused quite narrowly on a discussion of the frequencies which needed to be avoided on a cable system in Chicago and how an HRC could be made to offset in that particular situation. The Switzer letter also points out that this set of offsets may create additional conflicts which will have to be fixed. The technique which Mr. Switzer outlines for offsetting is HRC system, could be used as a basis for offsetting all HRC systems. This letter addresses this point and points out that this is *not* a desirable or necessary alternative to either the existing rules or more enlightened ones.

[10] Support for "channelization" may be attributable to political pressures to resolve this matter quickly. See letter, to Senator Ernest F. Hollings, chairman, Subcommittee on Communications, from FAA Administrator, Langhorne Bond, dated November 17, 1980. See, also letter from Congressman John D. Dingell, chairman, Commerce Subcommittee on Oversight and Investigations, to FCC Chairman Charles D. Ferris dated February 26, 1981. These letters obfuscate the issues of signal leakage by raising to an emotional level the question of what the FCC is doing to promote air safety and cautioning that "aviation safety not be needlessly sacrificed. . . ." *Id.* NCTA is certain that the commission is aware of the severe nationwide media criticism of the FAA over the past several years for its failure to approve and certify an on-board aircraft detection system for planes to use when flying in the low visibility situations. It's not too far-fetched to surmise that FAA's assiduous attempt to apprise Congress of the "dangers" of cable television signal leakage, is merely an effort to ward off criticism and show that it (the FAA) indeed is doing something to promote safety.

not required in order to assure aeronautical safety. Moreover, the distinguished professional committee[1] that conducted the study advocated a *relaxation of leakage criteria* for cable systems. In its *Further Notice* the commission explicitly concurred with the conclusions of the Advisory Committee by noting that, "implementation of these regulations [the interim rules] is a significant burden on cable operators as well as the staff of the commission, the Federal Aviation Administration and the Department of Defense. Furthermore, these regulations unnecessarily hinder the full utilization of the potential offered by cable television technology. (*Further Notice,* at para. 6.)"

The commission then went on to "propose to adopt a new set of rules for prevention of airspace interference due to cable signal leakage *based essentially on the proposals of the Advisory Committee" (Id.* at para. 8, emphasis added), suggesting a relaxation of the newly adopted rules.

If the commission abandons the solid recommendations of the Advisory Committee in favor of the illusory panacea of a channelization plan based on offsets for systems using HRCs, the possibility exists that it will be imposing unnecessary hardships on cable systems even greater than those present in the now discredited interim rules. The commission has not conducted even the most cursory cost/benefit analysis of the impact full-scale channelization would have on traditional and HRC cable systems. This is a particularly egregious omission in view of the Advisory Committee's findings that cable is already over-regulated in this regard. Furthermore, the commission has provided no analysis of the impact such a channelization plan would have on the realization of national communications objectives, and specifically, in the delivery of cable television services to the public.

Rigid channel plans, like the Switzer HRC proposal, will hamper cable television's technological advancement to an even greater degree than the commission has determined the interim rules already have. The cable industry is going through a period of rapid technological evolution, with new services and delivery methods emerging on an almost continuing basis. Cable has a vital interest in helping to advance the state of the art in such techniques as bandwidth compression, teletext transmission, two-way interactive service, high-definition television, high speed data transmission and others. The realization of these advancements in the technology of communications requires, however, a regulatory environment conducive to innovation, a market structure which encourages competition, diversity and an adequate financial base. The later two criteria have been met but are now threatened by the imposition of an inflexible technically untested and innovation inhibiting channelization scheme. The inherent inflexibility in a channelization plan will invariably discourage manufacturers, engineers and distributors from continuing to push for exciting new developments in video and enhanced services.

II. Cable Systems are Basically Closed Transmission Systems and Have Never Caused Life-threatening Interference to Aeronautical Frequencies or Interference Which Approaches the Level Generated by Other Users of the Spectrum.

Throughout this proceeding, the emotionalism engendered by a discussion of any issue even tangentially related to airline safety has prevented all parties from engaging in a solely rational and analytical inspection of possible cable interference to aeronautical frequencies. The grossly over-stated claims of cable interference advanced by the FAA simply do not withstand dispassionate scientific scrutiny. Simply put, cable television does not pose a threat to air safety. The commission has accepted the determination made by its Advisory Committee that " . . . the results of the research

[1] For a full listing of all the individual members of the Advisory Committee, see *The Final Report of the Advisory Committee*, at pp. 107-109.

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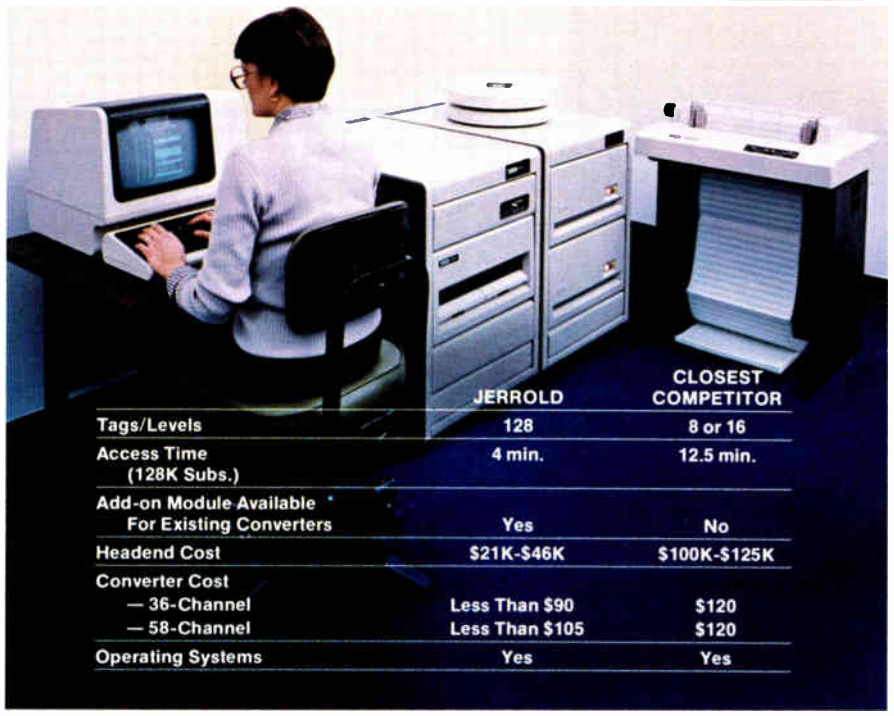

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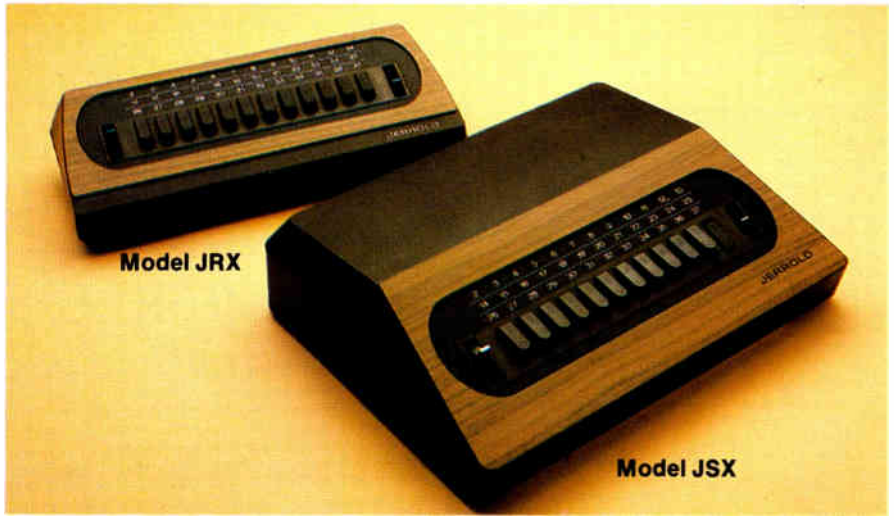

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program indicate that most modern cable systems, which generally are built with due regard for system integrity, do not exhibit excessive signal leakage." (*Further Notice,* at para. 6.) Proof of the totally innocuous nature of cable interference to aeronautical frequencies comes from the results of a "worst case scenario" signal leakage test conducted by the commission's Advisory Committee.

"At least under the controlled conditions of this experiment, a small number of artificially created leaks, each about 40 times greater in power than the largest leaks discovered in operating cable systems, was insufficient to cause harmful interference to ground-air communications services, although in some circumstances such leakage fields could be detected in the airspace." (*Further Notice,* at appendix B (6).)

Ironically, as NCTA pointed out previously, the FAA is one of the major propagators of aeronautical frequency interference.[12] The FAA blithely ignores its own in-house operational difficulties and chooses instead to mount an unjustified campaign against cable operators.

In addition to the FAA itself, there are literally thousands of potential sources of interference which have been identified by the FCC and the FAA over the years.[13] And, most importantly, cable has been one of those often cited as having caused interference and never has that interference, where it has occurred, been classified as "harmful." The four documented cases[14] of cable television interference to aeronautical frequencies over the past five years should be put in their

[12] The FCC's Field Operation Bureau (FOB) compiles quarterly statistics on interference complaints received nationwide. From the first quarter in 1977 through the first quarter in 1981, FOB received 912 complaints of aeronautical frequency interference. Of these complaints, approximately 230 were cases of air-to-air interference and only 1 (one) was by a cable system.

[13] For example, according to the FCC's inspection branch, FM radio broadcasts, particularly individuals operating with pirate radio stations are the most common cause of serious air traffic control interference. Also, technology keeps producing new interference sources like the recently detected incidental emissions from industrial heat-sealing equipment used to seal plastic bags in New York City. Two years ago, a drug store optical scanning cash register interfered with communications at Andrews Air Force Base outside Washington, D.C. "The Electronic Traffic Jams," *New York Times,* May 4, 1981.

[14] See NCTA *Comments, supra* at Appendix A and, (NCTA's *Further Reply Comments,* filed July 31, 1980. *1976 Harrisburg, Pa.,* case was one of non life-threatening interference propagated by an outdated "pressure top" system which has subsequently been overbuilt to today's advanced technology and industry wide signal leakage monitoring and

(Continued on page 28.)

proper perspective: the interference did not cause aircraft failure, but resulted only in aircraft communications' receivers having their squelch momentarily operated.[15]

III. NCTA Proposes the Adoption of Rules Which Implement the Basic Recommendations of the Commission's Advisory Committee and Serve as an Alternate to any Contemplated Channelization Plan.

One of the remarkable achievements of the Advisory Committee was the establishment of a method for determining from ground based measurements, whether a particular cable system would cause interference to aeronautical frequency users. (See *Advisory Committee Report* at 10.) The formula devised for testing a cable system's interference potential[16] specifies a method for discerning leaks and relates the results of the tests and frequency of the measurement to the total cable system. Thus, each leak identified above a certain value would be noted as well as the percentage of the system which was checked. This percentage is important as it allows an accurate assessment of the system's potential for interference even if only a small portion of the system is measured. Moreover, as formulated, the methodology contains an inherent conservative bias. For instance, the greatest confidence level is achieved through measurement of the entire system, with more limited measurements requiring more stringent operation to meet the threshold safety levels.

This formula and the approach to regulation which it suggests bears out the NCTA's contention that cable television is a "closed system." And the fact that there have been only four cases of perceived cable-related interference in the last 25 years indicates that those exceptions do not contradict or disprove the general rule; nor do they support abandoning that characterization of cable and the concomitant regulatory framework. Furthermore, the Advisory Committee also pointed out that " . . . it can be expected that cable television systems using modern leakage prevention equipment

(Continued from page 27.)

correction program; *1977 North Wilkesboro, N.C.*, case was closed when further investigation revealed that the main source of interference was caused by the operation of citizens radio (CB) equipment; *1978 Oxnard, Calif.*, case was one in which the cable system immediately removed a carrier detected causing intermittent interference to air-ground communications in the area of the system. The commission closed the Oxnard case one month after the repairs were made by the system operator; *1980 Wilmington, N.C.*, case revealed that any signal leakage was minimal and not the product of direct CATV system leakage, but that of radiating elements in the cable headend tower.

[15] Additionally, it should be noted that all complaints were about interference to voice communications and that *no cases* of interference to aeronautical radionavigation frequencies have been reported. Interference to voice communications, such as squelch breaks, from non-cable sources is not uncommon and the phenomena is readily accommodated by switching to another frequency.

[16] See *Further Notice*, at Appendix A(1). The formula developed by the Advisory Committee for calculating leakage indices for cable systems was designed to establish a predictor of a cable system's ability to leak signals which could be *detected* in the airspace above the cable system being measured. The level of leakage which is *detectable* in the airspace (not necessarily a high enough level to cause interference) could be calculated using the formulas previously mentioned. This formula allows for a biasing based on the percentage of cable system which is checked. This bias allows for very accurate calculations if a high percentage of the cable system is measured but skews the calculation against the cable system if lesser percentages of the system are measured. This results in a conservative result in the application of this formula to a wide range of cable systems.

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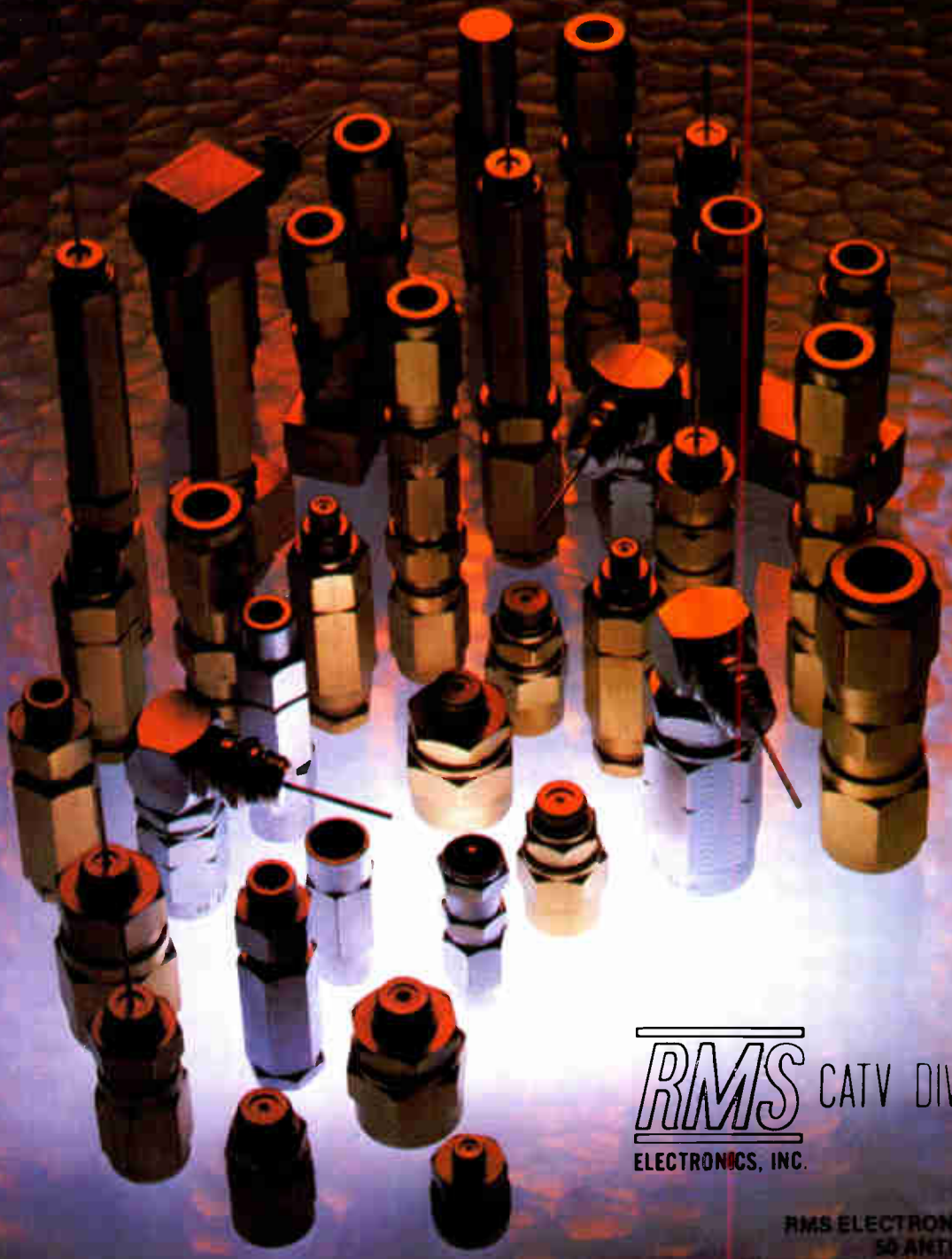

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and techniques would not cause aeronautical radio interference." (Advisory *Committee Report* at 99.) The NCTA believes that the commission acted prudently when it authorized the Advisory Committee to research the technical dimensions of that question. To ignore the evidence produced by a team of eminently qualified researchers would amount to a substantial waste and misuse of administrative resources. The futility of that effort would be even more apparent were the commission to abandon the Advisory Committee's recommendations in favor of an untested solution which has not even withstood adequate comment.

The NCTA therefore proposes the following two-point plan:

1. Establish a definition of what is a closed system and require careful monitoring to establish compliance with the minimum standards devised for acceptance as a "closed system"[17] both initially and at regular intervals of at least once a year. This should be in accordance with the formula recommended by the Advisory Committee.
2. Allow systems which meet the above requirements to use whatever frequency and power levels they choose, while requiring systems which do not meet the above listed criteria to comply with the current rules *as amended* by the Advisory Committee including allowing frequency offsets where appropriate.

The proposal outlined above, accomplishes the objectives of : 1) ensuring safety of aircraft and the public; 2) meeting the needs of the FAA for secure and interference free aeronautical frequencies; 3) eliminating government regulation and cost in those situations where such intervention is unnecessary; and 4) providing the cable industry with the technical flexibility critical to innovation and experimentation. It is also possible, under this proposal, to build in safeguards against the rare, but possible, occurrence of a "catastrophic" event which could moot efforts to ensure against signal leakage, i.e., a car knocking down a utility pole and causing a break in the cable. The consequences of such an occurrence can be accommodated or nullified by establishing the proper index in the initial formula to take into consideration a significant increase in leakage.[18] Alternatively, the commission could require technical safeguards such as the

[18]For a catastrophic failure to affect the ability of a cable system to cause harmful interference to aeronautical facilities would require a series of the most improbable circumstances: 1) the cable system would have to be within close proximity to an airport; 2) the break would have to come near the end of a long section of cable plant (a single break would not cause "harmful" interference and if it came near the beginning of the cable, any down stream leaks would be shut off due to the break, thus reducing the total amount of energy leaked into space); 3) an aircraft would have to be using the affected frequency at that particular airport at that particular time; 4) something would have to prevent the aircraft from using one of its numerous backup frequencies. If all of these events coincided with a break in cable, then cable leakage *might* be detectable in the airspace until the cable operator notices the problem of a broken cable and shuts off the critical channel. Moreover, even assuming the unlikely coincidence of all these events taking place, the net result would not preclude use of the frequency by the aircraft. Rather, as noted in the discussion at p. 11, *supra*, such interference results only in momentary squelch break.

[17]A "closed system" would defined as one which could demonstrate that its leakage index did not exceed the criteria:

$$10 \text{ Log} \cdot I_{\infty} \leq 64 \text{ or,}$$

$$10 \text{ Log} \left[\frac{1}{\theta} \sum_{i=1}^{n} E_i^2 \right] \leq 64$$

θ = percentage of cable plant measured expressed as a decimal.
E = electric field intensity in microvolts/meter at 3.0 meters from the i^{th} leak.

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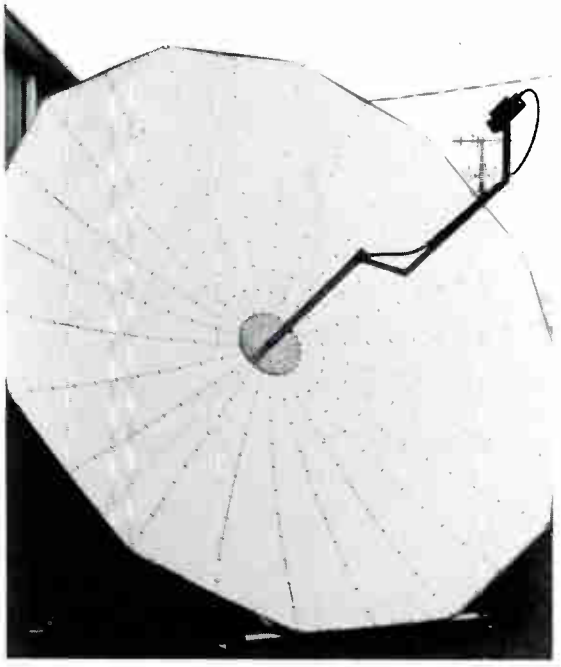

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use of "continuity detectors" to automatically shut off critical frequencies upon a loss of continuity in the system. Either or both of these mechanisms used in combination, or various other alternatives available to the FCC, could be used to address concerns of the effect of a break in the cable system. Finally, the NCTA's proposal has yet another advantage: it would encourage the cable operator to build and operate a "closed system" in order to decrease his regulatory burden, thus meeting the public interest in promoting air safety and the national policy objectives inherent in deregulation of private industry.

Finally, NCTA's proposal is consistent with the recommendations made by the Advisory Committee and with the cable industry's relative position vis-a-vis other potential interference sources. Given the Advisory Committee's conclusion that cable is one of the least cited sources of aeronautical frequency interference, implementation of any cable channelization plan is unsupported. If the commission's intent is to eliminate interference from any source, then further proceedings which would address and remove more serious broadcast and interference to aircraft caused by other aircraft should certainly take priority over any cable channelization scheme.

Conclusion

Due primarily to unrelenting political pressure being exerted on the commission by the FAA, indications are that the FCC's staff is attempting to resuscitate and reformulate a channelization plan for cable television systems based on *ex parte* material included in these lengthy proceedings long after the time for adversarial comment had expired. Adoption of a cable channelization plan based on offsets for systems using harmonically related carriers is not justified by the record evidence adduced over the last four and one-half years of research, analysis and comment. It would be contrary to the conclusions and recommendations of the commission's own Advisory Committee which found that cable systems have not been a significant source of aeronautical interference.

The Advisory Committee recognized that cable systems are basically "closed" systems which do not pose a threat to air safety. The four documented cases of cable television interference to aeronautical frequencies over the past 25 years, have amounted to little more than squelch and certainly have not caused any life-threatening situations. Rather than place new regulatory constraints on cable operators, the commission has a responsibility to seek to eliminate more serious sources of interference to aeronautical frequencies like that generated by broadcasters and aircraft-to-aircraft operations.

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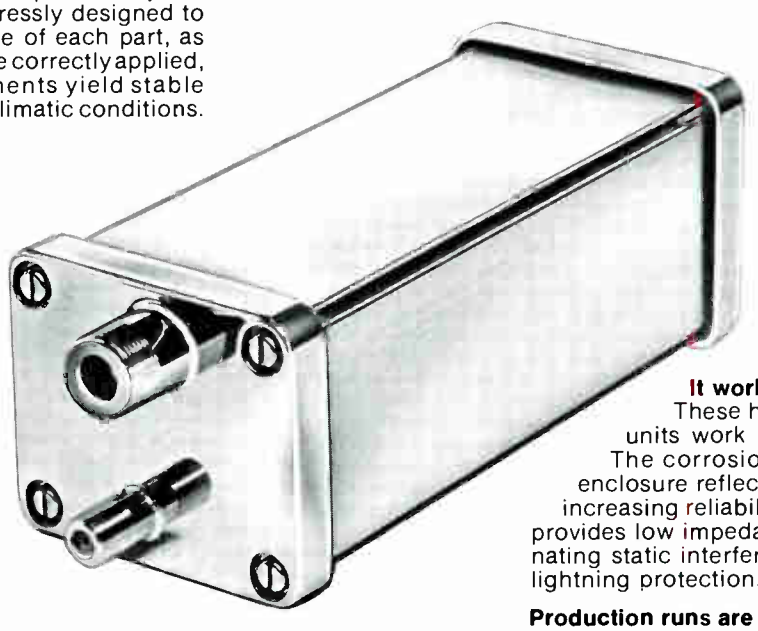

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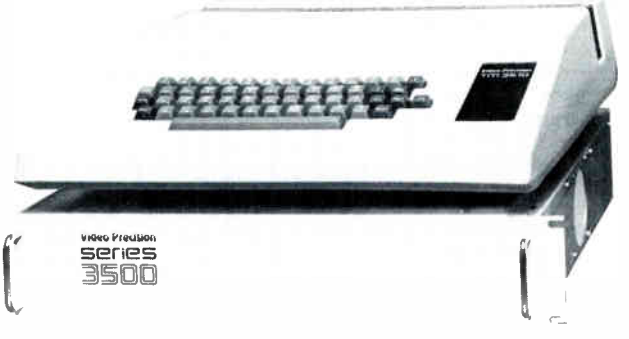

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The Impact Of 3° Orbital Spacing

By Walter H. Braun, Director, Systems and Advanced Technology Engineering, RCA Americom Communications, Inc.

This article discusses the impact of 3° orbital spacing upon satellite distribution of cable television programming. Included are preliminary results of: experiments designed to establish an appropriate protection ratio for cable video transmissions; and calculations indicating expected levels of interference at 3° spacing.

The conclusions of these exercises indicate that a 3° orbital spacing for C-band domestic satellites will not have a deleterious impact upon program distribution to existing (4.5-meter) cable earth stations. Recommendations are made concerning appropriate protection ratios, use of three-meter antennas and optimum spacecraft deployment schemes.

The Federal Communications Commission, in December 1980, dramatically set a course for the domestic satellite business. Its grants of orbital assignments and launch authorities provide a framework encouraging the orderly development of our industry. Among the issues addressed by the commission's order was the recognition that the geosynchronous orbital arc is a finite resource that must be used efficiently. One approach to satisfying this requirement is reduction of spacing between adjacent C-band satellites from the present 4° to 3°.

This article examines the impact of such a reduced spacing upon cable television distribution via domestic satellites.

Engineering Considerations

The most important measure of picture quality in a satellite television link is signal-to-noise (S/N) defined as the ratio, in dB, of the peak-to-peak picture (luminance) signal to RMS weighted noise. Expressed in equation form by:

$$S/N = C/N + FMI$$

where

S/N=signal-to-noise ratio
C/N=carrier-to-thermal noise ratio in the link
FMI=frequency modulation improvement

Typically, cable television systems operating with current United States domestic satellites realize an S/N on the order of 50.0 dB at the earth station. The primary determinants of C/N are the thermal noise contributions of the up and downlinks of the satellite system; however, the video receiver at a cable earth station is also exposed to the interfering effects of undesired signals which may simultaneously occupy the same bandwidth as the desired carrier, as shown in Figure 1 on page 36.

These originate from three major sources:

- Internal interference (C/I_{int}) within the satellite caused by noise or signals in adjacent or cross-polarized transponders which penetrate into the desired transponder. The level of this interference is established by the skirt selectivity of the transponder filters and the cross-polarization performance of the earth satellite link.
- Terrestrial interference (C/I_{terr}) from microwave systems operating in the 4.0 GHz band.
- Adjacent satellite interference (C/I_{adj}) from co-frequency signals of neighboring satellite systems, the level of which is primarily a function of the receiving antenna's off-axis discrimination.

Total carrier-to-interference (C/I_{tot}) defined as the ratio, in dB, between the power of the wanted signal and the power of all

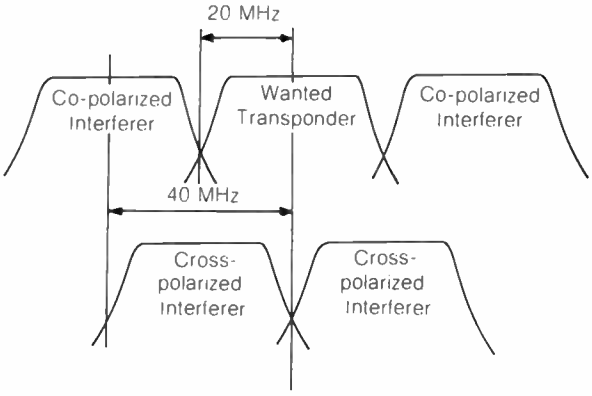

Figure 1

Transponder Frequency and Polarization Plan

interfering signals as measured at the input to the earth station receiver, is expressed in equation form as:

$$(C/I_{tot}) = C/I_{int} \oplus C/I_{terr} \oplus C/I_{adj}$$

where

C/I_{int} = 26 dB for frequency reuse spacecraft

C/I_{terr} = 25 dB the typical level for which frequency coordination is accomplished

C/I_{adj} = adjacent satellite interference

$\oplus$ = power summation

This article examines the (C/I_{adj}) ratio with 3° spacing and its impact upon cable video transmissions.

The next section presents results of subjective testing accomplished at the RCA Laboratories for the purpose of establishing reasonable protection ratios (minimum required C/I_{tot}) for cable video services.

Protection Ratio

An appropriate protection ratio for cable television services can only be determined via extensive subjective testing. The unique nature of the color video signal, and the complex physiological and psychological processes involved in human perception of color images combine to make the effect of an interfering signal on a color television transmission analytically intractable and highly subjective, i.e., veiwer dependent.

RCA has ongoing programs investigating the nature of characteristics of video signals. The most recent efforts explored

Wanted Signals and Interfering Signals

Wanted Signals

(1) Still slide (red flower on green background)

(2) High quality videotape (Rose Bowl Parade)

(3) EIA Standard color bars

Interfering Signals

Full Transponder:

(1) Full transponder FDM/FM (1872 channels)
(2) EIA Standard magenta field
(3) EIA Standard color bars
(4) Off-air scenes

Narrowband: **Table 1**

(1) 56 kbps BPSK

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subjective judgements of color video interference effects by groups of viewers. This involved controlled introduction of various types and levels of interfering signals as viewers indicated on data sheets the points associated with:

- Just Perceptible Interference (JPI), defined as that level in which the viewer first notices an anomaly in the picture.
- Just Objectionable Interference (JOI), defined as that level at which the viewers will turn off a program they desire to watch because the picture is intolerable.

A description of the test conditions and results follows. Note that data reduction efforts are still under way and the results presented here are preliminary.

Test Conditions

The wanted signals and interfering signals (all with audio subcarrier and energy dispersal) are shown in Table 1 on page 36. Transmission parameters used for the wanted signals (all located in the center of the transponder) are shown in Table 2 below.

Transmission Parameters

	Peak Deviation (MHz)	IF BW (MHz)	C/N (dB)
Case I:	10.8*	30	11.9
Case II:	10.8*	30	15.9
Case III:	6.7	17.5	19.2
Case IV:	6.7	17.5	25.2

*Presently used for Satcom video transmissions

Table 2

Tests were conducted at the RCA Laboratories in a dark room. All signals were displayed on a 25-inch RCA XL-100 television set. Viewers were seated four to six feet from the screen.

There were ten participants; five male and five female. Of the total, two were expert and the remainder were inexpert viewers. The preliminary experimental results are shown in Table 3.

Preliminary Experimental Results

Full Transponder Interferers:

Average Required C/I (dB)	Cases			
	I	II	III	IV
JPI	14.6	15.9	18.6	17.7
JOI	5.7	3.9	6.3	5.5

Narrowband Interferer:

Average Required C/I (dB)	Cases			
	I	II	III	IV
JPI	19.5	19.3	21.9	21.3
JOI	11.4	7.6	13.1	11.1

Table 3

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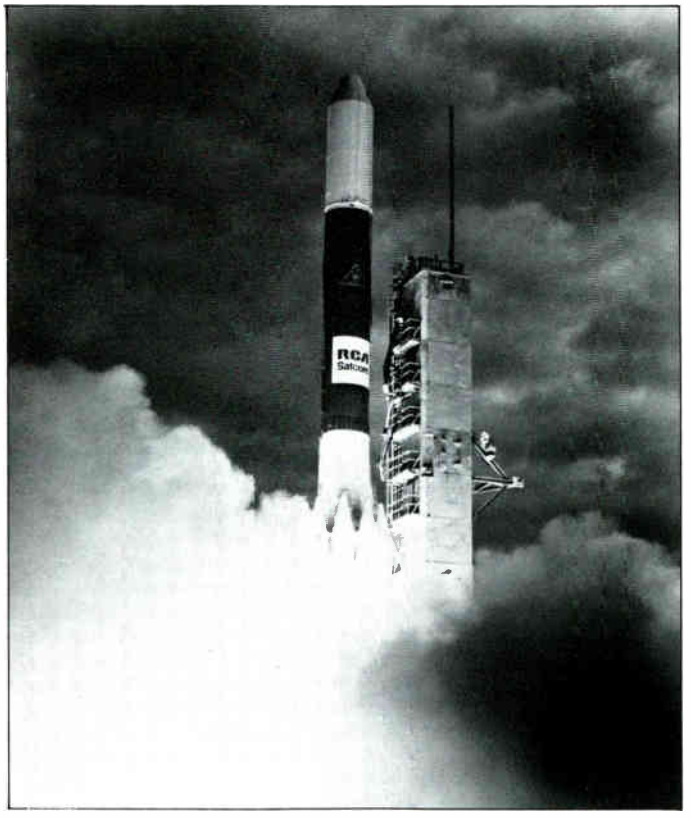

Preliminary Conclusions

- A protection ratio (C/I_{tot}) of approximately 18.0 dB would be satisfactory for cable television service.
- Narrowband signals were found to be the worst interferers requiring, on average, the highest protection ratios. However, the level of narrowband signals in operational systems is considerably below the power which might introduce interference in adjacent satellite transmissions because such signals operate with substantial transponder backoffs.
- Reduction of the peak deviation from 10.8 MHz in Cases I and II to 6.7 MHz in Cases III and IV resulted in a greater susceptibility to interfering signals. Pursuing this, we ran some abbreviated tests using overdeviation techniques (peak deviation 13.7 MHz) and discovered that the required C/I for Just Perceptible Interference was reduced (improved) by 8.0 dB. Changing Satcom video transmission parameters to make the signal more rugged and less susceptible to interference may be appropriate. More experiments are planned on this point.
- Waveform monitors show the effects of interfering signals well before (10 dB) the picture does. Protection ratios predicated upon meeting parametric measurements would need to be considerably higher than the recommended level of 18.0 dB.

Adjacent Satellite Interference

Figure 2 on page 42 illustrates the mechanisms of adjacent satellite interference. There are two contributions:

- Uplink interference occurs by virtue of the finite gain of transmitting antennas in the direction of an adjacent satellite illuminating the receiving system in the wanted spacecraft. This energy is then reradiated into the receiving earth station.
- Downlink interference occurs by virtue of the finite gain of the receiving earth station in the direction of an adjacent satellite.

Clearly, a most critical parameter is the earth station antenna discrimination, the ratio in dB between maximum gain on boresight and gain in the direction of an adjacent spacecraft. Earth station antenna gain decreases monotonically with increasing angle off boresight (the FCC requirement is $32-25 \log \theta$, where θ is the angle off-axis). Thus, greater separation

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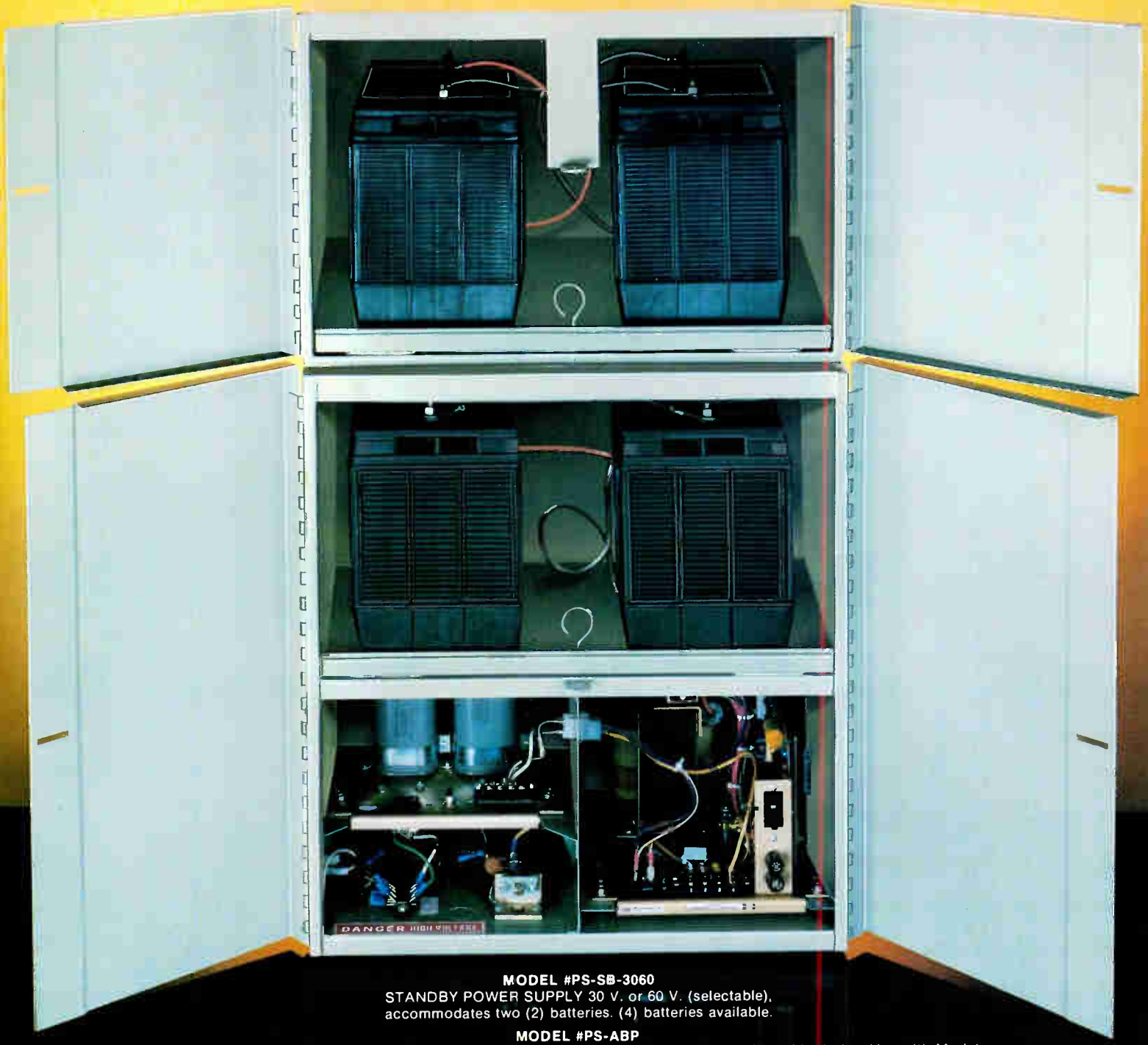

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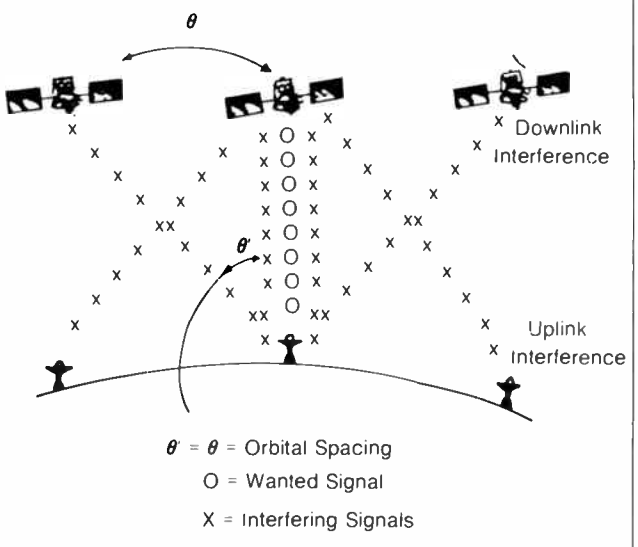


Figure 2
Interference Mechanisms

between satellites implies greater discrimination and concomitantly lower interference.

There also exists a cross-polarization advantage of approximately 4.0 to 6.0 dB in the off-axis (sidelobe) region of earth station antennas. This compares to 30-40 dB cross-polarization discrimination on-axis. An antenna oriented to receive a given transponder from a spacecraft (e.g. horizontal) will attenuate the energy of a co-frequency transponder in an adjacent satellite in accordance with the 32-25 log θ characteristic; however, if the co-frequency transponder is orthogonally polarized (e.g. vertical) it will encounter an additional attenuation of 4.0 to 6.0 dB.

Frequency plans of 24-transponder satellites utilize staggered transponder center frequencies to minimize internal interference (see Figure 1).

This ameliorates the interfering effect of frequency interleaved transponders in adjacent satellites as well. Additional improvement for television transmission is realized because the bulk of the energy in a video signal is concentrated near the center of the transponder at the carrier frequency .

Expected Interference Levels

The expected total C/I ratio for 4.5-meter facilities at 3° satellite spacing is 17.2 dB (see Table 4). This assumes no advantage due to cross-polarization discrimination (XPD) in the sidelobe region. The subjective testing discussed previously indicates that this would provide satisfactory performance for cable television distribution via satellite. Thus, the impact of 3° spacing on 4.5-meter cable systems would be a modest reduction in system margins with no perceptible degradation of the video signal.

Off-axis cross-polarization discrimination of cable earth stations offers a means of recovering lost system margin. Optimum placement of satellites at 3° spacing would call for spacecraft having orthogonal polarizations and frequency interleaved transponders on uplinks and downlinks to be located adjacent to one another, i.e., transponder 10 on one satellite would be horizontal on the uplink and vertical on the downlink, whereas in the adjacent spacecraft transponder 10 would be vertical on the uplink and horizontal on the downlink. Table 4 shows total C/I ratios that could be expected as a function of off-axis XPD for 4.5-meter and three-meter antennas and a beam edge EIRP of 33.0 dBW (provided by RCA Satcom III-R at 131° for all CONUS except southern Texas, Florida and New England). By way of comparison, the predicted C/I_{tot}, assuming no XPD advantage for 4.5-meter earth stations at 4° spacing, is 19.2dB. (Declaratory Ruling and Order, Federal Communications Commission, 15 December 1976, Authorization of Receive-Only Small Earth Station Antennas.) Therefore, while 4.5-meter dishes will provide satisfactory performance at 3° spacing, margin can be recovered as a function of XPD off-axis and it makes a dramatic impact upon performance with three-meter antennas.

RCA plans further studies on the subject of interference to and from video signals. Of particular interest is an evaluation of the impact of high-speed (50 Mbps) services on orbital spacing.

Table 4

Beam Edge EIRP

33 dBw

3° Satellite Spacing

Cross-Polarization Discrimination (off-axis)	4.5m		3.0m	
	C/I_{adj}	C/I_{tot}	C/I_{adj}	C/I_{tot}
0	18.8	17.2	14.2	13.6
4	22.3	19.4	18.0	16.7
6	23.8	20.1	19.8	17.9

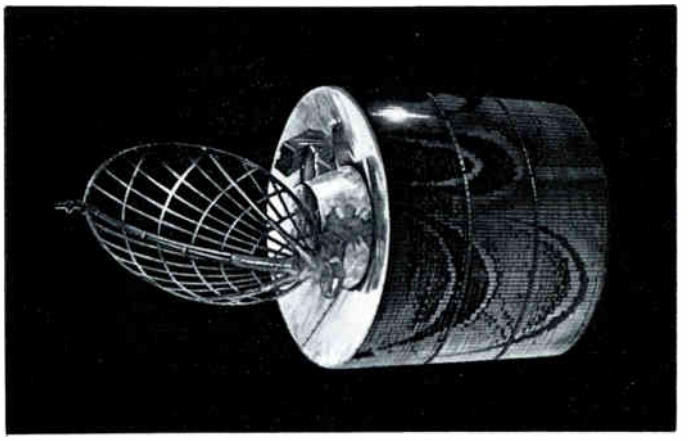
Conclusions

Spacing domestic C-band spacecraft at 3° will not degrade cable television distribution via satellite to 4.5-meter facilities. System margins will be slightly reduced but overall performance will be satisfactory.

Cross-polarization discrimination (XPD) in the sidelobe region of earth station antennas offers a means of improving system margins at 3° spacing. Modest levels of XPD provide significant improvement in protection ratios. Optimum orbital deployment for use of this feature calls for adjacent satellites to be completely cross-polarized relative to one another on both up and downlinks and to be homogeneous, i.e., to have approximately the same EIRP.

Three-meter antennas will not provide satisfactory protection ratios with 3° satellite spacing unless off-axis discrimination of these antennas is superior to the FCC minimum of 32-25 log θ.

Revising video transmission parameters (overdeviation) offers a means of reducing susceptibility of video signals to interference.



William Braun has served as director of systems and advanced technology at RCA Americom since October 1979. He joined RCA in 1972 after leaving the Air Force. Braun earned a BEE at Rensselear Polytechnic Institute in 1967 and a masters in electrical engineering at the same institute in 1969. He also holds an MBA from Rutgers.

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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.*

Q. I have heard that many new cable systems are using automatic gain control (AGC) and automatic slope control (ASC) at every trunk amplifier location. In our systems, we use AGC/ASC at every other trunk amp location and they seem to hold very well. Why should systems go to the added expense of installing extra control amp modules if they are not required?

A. To properly answer your question, a little theory may be helpful.

AGC/ASC amplifiers are designed to compensate for changes in cable attenuation due to temperature fluctuations. Cable attenuation is directly related to cable temperature and, as cable temperatures rise, attenuation increases. The opposite holds true when cable temperatures drop. Cable attenuation changes due to temperature variations can range from about .10 percent to about .13 percent per degree Fahrenheit (°F) per dB of nominal attenuation, depending on the type of cable used. Many cable system designers use an average change figure of .11 percent per °F per dB nominal.

The attenuation spacing between two "typical" trunk amps is usually considered to be about 22 dB at 68 to 70°F. To see how much temperature would affect the spacing of one amplifier, the following formula could be used.

$$\Delta_{att} = V_c \times \Delta_t S_a.$$

Where:

- Δ_{att} = Total change in cable attenuation from nominal (70°).
- V_c = Cable attenuation variation over temperature as specified by the manufacturer (in percent).
- Δ_t = Amount of temperature increase/decrease from nominal.
- S_a = Amplifier spacing (in dB) at the highest frequency carried on the system.

If you were in a system which could experience extremes of temperature from -40° in winter to +120° in the summer, you could expect the following signal level change to occur at each trunk amplifier input:

From -40°F to -120°F = $160° \Delta_t$
.0011 x 160° x 22 = 3.872 dB Δ_{att}

This does not seem like very much change for the amount of temperature variation. Many single amplifiers will tolerate this much variation with no apparent picture degradation. However, if this were extended to a 20 amplifier cascade, the attenuation would change by 77.44 dB, which no system would be able to tolerate. Of course, this assumes no AGC or ASC at all.

On the other hand, very few systems will ever experience a temperature swing of 160°. And, in the unlikely event that this much variation would occur, a 20 amplifier cascade with no AGC or ASC is so poorly designed that other problems would have cost you your subscribers already.

With an AGC at every other amplifier, your system is probably as stable as is needed for all normal temperatures. You may need to balance the system at least twice each year, but this usually poses no real hardships. In fact, it may let you see and correct minor problems before the subscribers can even see them. Should an AGC unit fail, you would have a long run without any control. This is one of the main reasons for AGC at every amplifier. Should an AGC fail, the next few amps will give all the control needed until the problem can be located and repaired.

One problem which can happen with AGC at every amp is that, should an amp which uses IC chips fail, the gain drops to unity. Within two or three amp stations, this failure is not apparent on a signal level meter. The only problem which is visible is an increase in system noise. The pictures will be snowy, but the signal levels will be normal. This can lead to some really frustrating troubleshooting unless you perform signal-to-noise (relative) measurements.

To get back to your question, which you thought I had forgotten, the only answers are ambiguous. If you live in a temperate area, if you keep all your AGC/ASC modules completely operational, and you balance your system at least two times each year to coincide with the expected extremes of temperature, you can probably expect to have good control of the variations.

If you don't want to be bothered with seasonal level setting, or don't want to chance some subscriber complaints from AGC failure, then you should put an AGC/ASC amplifier at every trunk amplifier location.

Q. I would like to know the formula for converting dBmV into watts or milliwatts. Can the standard Ohm's Law formula $\frac{E^2}{R}$ be used? Will this work for all cable signals?

A. The Ohm's Law formula $\frac{E^2}{Z}$ will give you the power in watts where E in volts and Z (impedance) in ohms are known. To convert watts to milliwatts, one milliwatt equals 10 watts.

To convert dBmV directly into watts, the following formula may be used:

$$\left(\log^{-1}\left[\frac{dBmV}{20}\right]\right)^2 \times \frac{10^{-6}}{Z}$$

If desired, dBmV may be converted into volts separately, or a conversion chart used, and then use the formula to determine watts. Two other formulas which may be of interest to you are shown below.

To Convert dBmV into Volts

$$\log^{-1}\left(\frac{dBmV}{20}\right) \times 10^{-6} = E_{(volts)}$$

To Convert Watts into dBmV

$$20 \log \left(\frac{\sqrt{Z \times P}}{10^{-3}}\right) = dBmV$$

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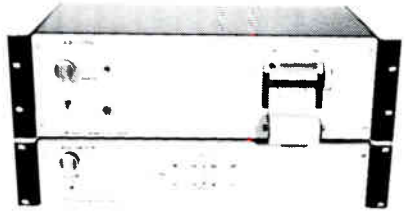

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The Pacesetters

Most people probably think that engineers are leading the race in the development of cable television technology. That is not entirely true. Though engineers design the equipment and the systems, they are not setting the pace.

The people who are leading the race have little expertise in electronics and engineering. Instead, the pacesetters are masters in the world of words. Collectively, they are known as "the franchisers." In the last few years, they have had more impact on developing new technologies than most engineers or scientists.

More and more, cable television design technology is being originated in the minds of those who are developing franchise proposals for the few remaining extremely large cities that have not yet awarded a cable television franchise. If this seems to be a classic case of the horse before the cart, you may be right. However, technology has almost always gone in the direction of the most money, and the money, at least that money which will be spent to build some of these supersystems, is in the amount of new technology proposed.

A very few years ago, most system operators didn't even want to discuss dual cable, much less anything greater. Now dual cable systems are becoming almost commonplace and systems with three or more trunk cables are being proposed. Many of the other high technologies, such as extended bandwidth, security systems, subscriber poling, vertical interval signals and others, were also conceived by franchisers. In many cases, they were proposed before they were tested and proven to work. Engineers should probably take this as proof of the franchisers' faith in their ability to develop and deliver.

In this way, franchising people (and the massive investments that follow the award of a franchise) are making a tremendous contribution to the development of cable television technology. Engineers are generally reluctant to release a product until they have tested it half a dozen times to make sure it will work. Franchise proposal deadlines and commitments are forcing engineers to bring new technology on line more rapidly and fulfill what a decade ago were the wild dreams of the future.

Once the last major franchise is tion to other things, the pressure will be off engineers to make leaps and bounds in engineers to make leaps and bound in cable technology. Engineers will go back to their usual way of doing things, and the further development of cable television will be much slower.

This slowdown, should it occur, may allow some of the old timers, like myself, to catch up with existing technology.

Glenn Chambers

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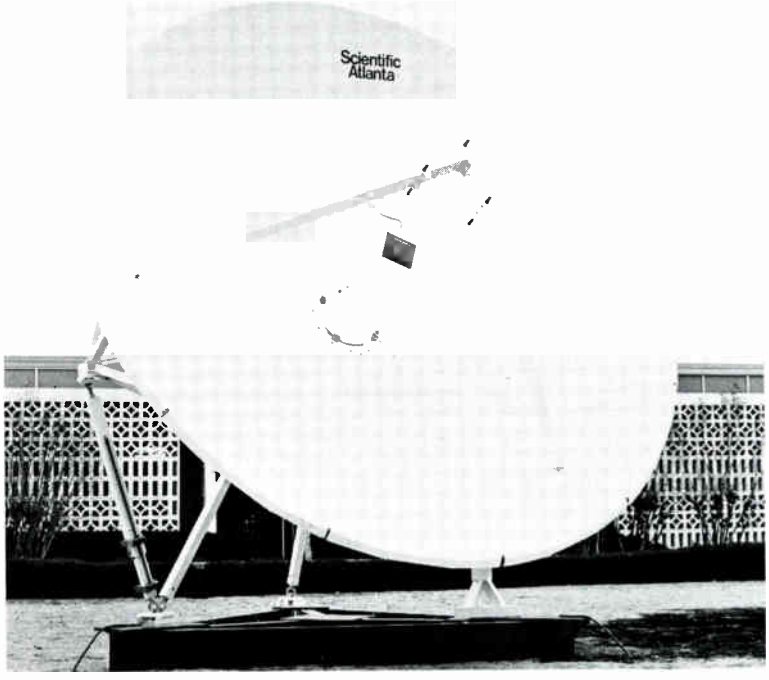

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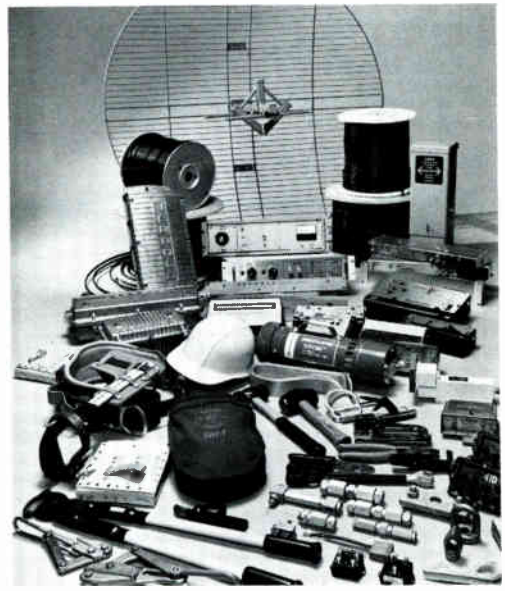

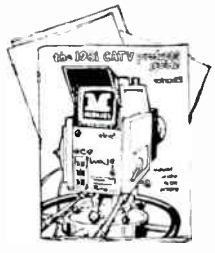

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International News

French Government Reaffirms Videotex Support

WASHINGTON, D.C.—The new French government has announced that it will vigorously pursue recent videotex and teletext successes in the United States.

In a message to Antiope Videotex Systems, Inc., the newly-named minister of Post Office, Telecommunications and Telediffusion, Louis Mexandeau, said "The recent success of French technology in the United States constitutes the first stages of a continued and vigorous action on the part of French industry."

Those sucesses include, according to Mexandeau, "The adoption of the Antiope standard for broadcast teletext tests being conducted on the West Coast by CBS, NBC, Group W and KCET-TV; the positive results achieved recently in May with regard to a compatible standard between Antiope, Telidon and AT&T; and the orders obtained in the United States and Europe by French interactive videotex terminal manufacturers."

Antiope Videotex Systems, Inc., is also supplying a teletext and transmission system to Dow Jones, Inc., for its cable news services and has signed a joint venture agreement with the *Louisville Courier-Journal* for development of a commercial cabletext system.

Mexandeau further stated that "research, industrial development and new business efforts abroad, tailored to overseas market requirements, will not only be pursued but increased."

"Wall Street Journal" Links Asian Cities Via Satellite

HONG KONG—The—*Asian Wall Street Journal* is now using the Intelsat IV satellite to simultaneously produce the regional business daily in Hong Kong and Singapore.

"This makes the *Asian Journal* the first English-language daily newspaper with same-day printing and distribution in two Asian centers by means of satellite facsimile equipment," said John C. Orr, the paper's publisher. The *Wall Street Journal* now has ten U.S. plants transmitting or receiving page facsimile by satellite.

Satellite transmission enables the *Asian Journal* to distribute the paper in Singapore at noon on day of publication. Previously, it hadn't been generally available in Singapore until the next day. The satellite edition also is designed to improve delivery in certain other Aisan countries and Australia. In addition, it makes the *Asian Journal* the only morning newspaper available in Singapore with closing New York Stock Exchange quotations, plus the latest news and financial information from North America.

Mounties Seize Earth Station

CORNER BROOK, NEWFOUNDLAND—On June 11, the Royal Canadian Mounted Police, at the request of the Canadian Radio-television and Telecommunications Commission (CRTC), seized satellite receiving equipment from Shellbird Cable Limited here. The cable television company has been charged under the Broadcasting Act with receiving and distributing a Public Broadcasting System signal from an United States satellite.

Shellbird Cable has pleaded not guilty to the charges.

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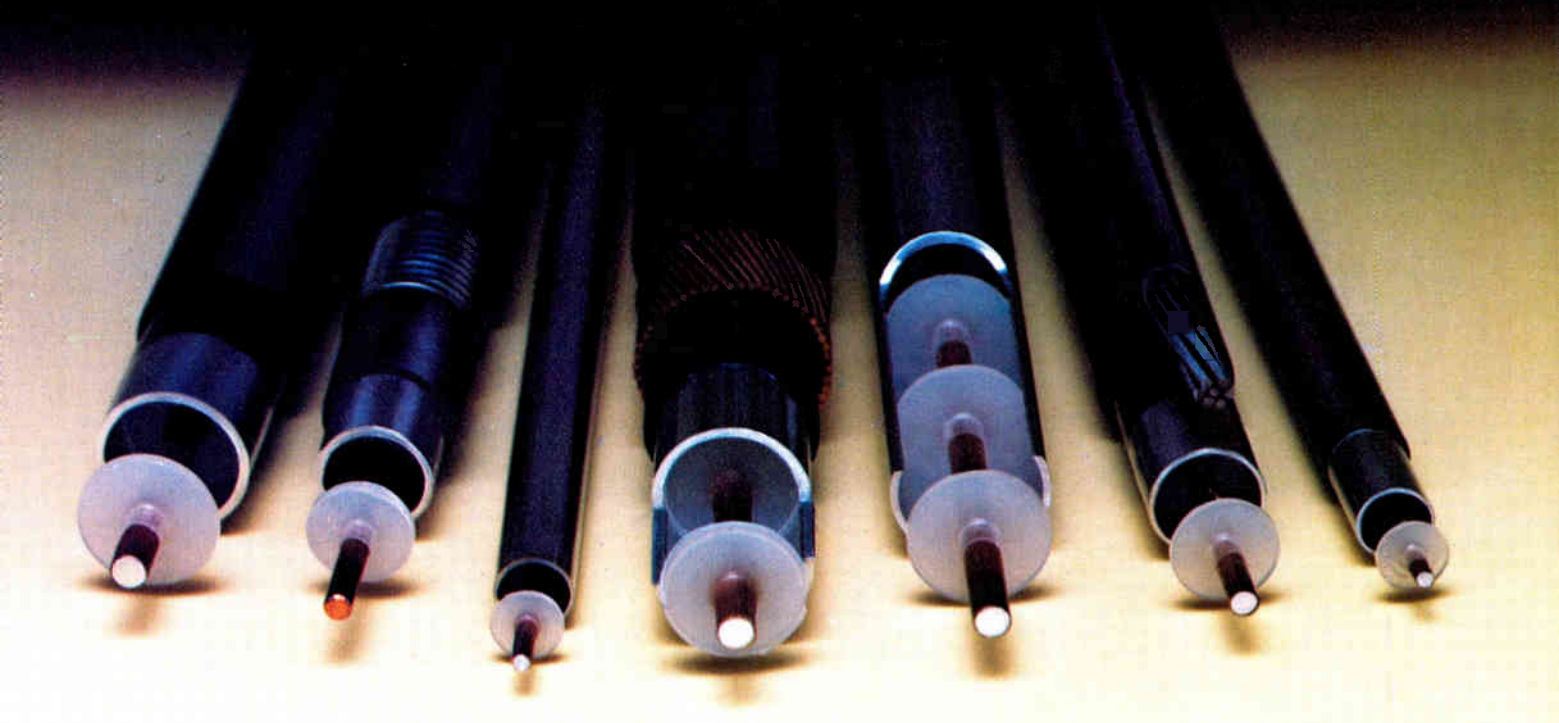

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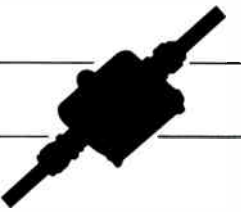

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Poleline Introduces Electronic Measuring Wheel

Poleline Corporation has introduced the "Polewalker," an electronic measuring wheel for reliable outdoor measuring under the most adverse terrain conditions.

Accurate within three percent, the Model #PW-20 can be either walked or "pulled" behind a vehicle. Featuring an LCD electronic "read-out," the #PW-20 automatically records up to 10,000 feet without resetting, plus continuous "read-out". The ⅝-inch LCD lettering (black on gray) is clearly visible in the brightest sunglare. An "on-off" toggle switch and "reset" button switch is built into the LCD. Special design prevents "false read-out" in reverse wheel direction. Operates on four AA cell batteries (included) with expected battery life of approximately one year.

Optional models #PW-21, 15-foot LCD coil-type extension cable permits remote operation of LCD meter from inside vehicle. It can be placed on dashboard or placed on seat. LCD meter is removable for protective storage when not in use. Quick disconnect cable connectors are featured.

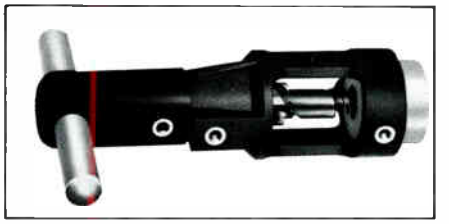
Made of ¾-inch tubular aluminum, the "Polewalker" frame has a folding handle that compacts to easy hand-carry size of nine inches wide x two feet long. Built-in "kick stand" provided for upright positioning when not in use. "Non-bounce" solid rubber wheel is three feet in circumference and 11¼ inches in diameter. Special designs prevents "side-drifting" to assure accurate measurement.

For information, contact Poleline Corporation, a subsidiary of RMS Electronics Inc., 50 Antin Place, Bronx, New York 10462, (800) 223-8312, (212) 892-1000.

Ben Hughes Announces Stripping/Coring Tool

Ben Hughes Communication Products Company has introduced the SCT series, designed to strip and core all foam polyethene cables, from the first to third generation, in one simple operation. With the tool steel blade as the only moving part and no adjustments required, the only maintenance required is occasional lubrication of the blade. The tool strips and cores in about the same time it takes to just core the cable. The SCT tool will prepare the aluminum sheathed coaxial cable with a squared off end without distortion or knurled end for a better electrical contact with the connector. The SCT series is available from all Cable-Prep distributors from the .412 to the .875 sizes.

For information, contact Ben Hughes Communication Products Company, P.O. Box AS, Elm Street, Old Saybrook, Connecticut 06475; (203) 388-3559.



The SCT tool from Ben Hughes strips and cores polyethene cables.

VITAL SIGNS™

Make 8,640,000 Measurements Per Day With Texscan's On-Line ATE System

Making more than 100 measurements per second, Vital Signs helps predict problems before they become failures and saves time, manpower and money in correcting system malfunctions.

Vital Signs transponder modules interface with most CATV distribution amplifiers and are internal on the Theta-Com XR2+ and 'T' series. Each module performs up to 8 individual measurements including, signal levels, AC/DC voltages and currents, temperatures, and reverse bridger switching and status.

A computer controlled interrogator monitors each transponder location in turn and alerts the system operator if a fault is found. Isn't it time you had your own Vital Signs system? Vital Signs is available now. Call today for price and delivery.

#1—1/30/81

There's a representative near you:

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South Western—(214) 867-1049
(713) 466-8153

Southeastern—(813) 962-2752
Northeastern—(201) 821-7422
Midwestern—(812) 334-2241
(612) 933-8922

Texscan

Texscan Corporation
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Indianapolis, Indiana 46219
(317) 357-8781

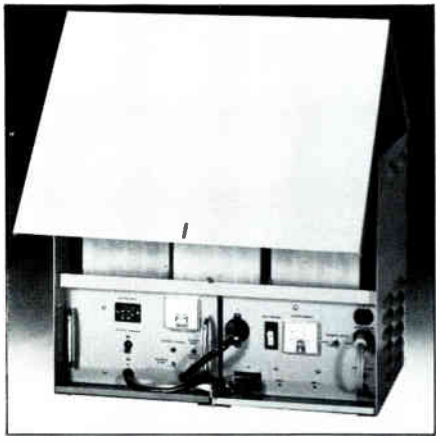
Texscan Theta-Com CATV
2960 Grand Avenue
Phoenix, Arizona 85061
(800) 528-4066

Texscan MSI
3855 South 500 West, Suite S
Salt Lake City, Utah 84115
(801) 262-8475

Power Supplies

Cable & Computer Provides Power Supply Monitoring

Cable & Computer Technology, Inc., has developed an optional status/performance monitor system for use with the series 90 standby power supply. The monitoring system consists of a module



The series 90 standby power supply from Cable & Computer Technology.

which, when added to the series 90 power supply, updates it to a series 91 with full status/performance monitoring capability; a headend transmitter/receiver module; a headend computer system which includes a CPU, floppy disk storage, a video terminal and line printer; and a customized software program. The system continuously monitors battery operation and condition, charger operation and the condition of the inverter electronics. The headend computer polls the power supplies in the system and can force any power supply into the battery mode at any time to check total performance. If any condition exists that prevents proper operation of the inverter, or if the batteries are below established limits, the power supply will not switch to the battery mode and will remain on line power, according to the company. Alarms are generated in the event of a malfunction, or if the battery voltage low limits are exceeded. The monitoring system also provides a record of maintenance history, downtime, operating time and addresses. For information, contact Cable & Computer Technology, Inc., 1501 South Harris Court, Anaheim California 92806; (714) 937-1341.

Construction Equipment

UEC Manufacturing Expands Bucket Truck Line

A new bigger Skyjacker has joined the family of hydraulic aerial units manufactured by **UEC Manufacturing**. The new Skyjacker has a 42-foot working height and 20-foot side reach. Like its predecessors, the 32-foot and 37-foot working height Skyjackers, it is an elbow boom unit, with the final 9.5 feet of the boom fiberglass, rated up to 69 kv.

The new Skyjacker introduces an option of double powering which UEC will make available on all Skyjackers and the sister unit, the Skyvan, the telescoping hydraulic aerial lift. Standard will be electric/hydraulic operation, with the optional pump/PTO controlled from the basket for emergency powering. The 42-foot Skyjacker will put in a day's work from the power pack and recharge while driving from point to point. Emergency power can be supplied by turning to pump/PTO, then starting the engine from the basket by UEC's Electro/Start.

For information, contact UEC Manufacturing Company, P.O. Box 54979, Oklahoma City, Oklahoma 73154; (405) 528-3479.

Miscellaneous

Cablewave Systems Markets Feedthrough Adaptors

Cablewave Systems, Inc., has announced new fused feedthrough adaptors, developed for application in electronic equipment such as frequency counters requiring protection from large input signals. They give the equipment user more latitude by freeing him from concern with possible damage to an expensive front end when power input levels are not specifically known—a blown fuse costs just a few cents and takes seconds to replace, according to the company.

The adaptors are 50 ohms. VSWR is 1.75:1 max., DC to 2.0 GHz, including fuse—much lower than VSWR obtained with alternative protection methods. Standard fuse supplied is ⅛ ampere with a blow time of 0.01 second (⅜ ampere with blow time 0.1 second available on request).

Connector interface dimensions are in accordance with the latest revision of MIL-C-39012, SMA Jack to SMA Jack (P/N 705483-001), "N" Jack to SMA Jack (P/N 705486-001), and BNC Jack to SMC Jack (P/N 701938-002) configurations are available.

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

Communications Supply Expands Product Line

Communications Supply, Inc., has added three new products to its distribution line: the TRU-500 digital/RF interface; the E-COM cable/digital remote unit; and an uninterruptable power supply.

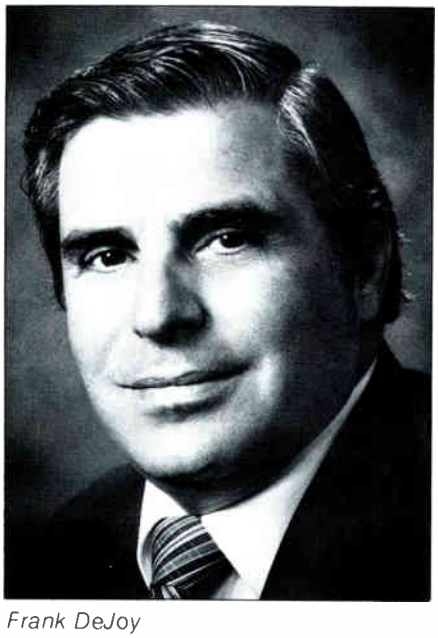
Designed for strand or pole mounting, the TRU 500 interface will accomplish basic cable TV and pay TV control for up to eight subscribers. Additional capabilities which may be remoted from the TRU-

People News

★**Teleprompter** has appointed **George Livergood** to the position of vice president/regional manager of the Southwest region.

Livergood will direct the operation of all Teleprompter cable television systems serving the Southern California District and the Rocky Mountain District. At the same time, he assumes the position of president of Theta Cable, Teleprompter's Los Angeles cable television system where he has been vice president since January.

Prior to joining Theta as manager of operations in 1978, Livergood was director of engineering at Communications Systems, Inc. In this position, Livergood was responsible for evaluating cable television systems prior to acquisition, designing new systems and installing earth stations, as well as overseeing the operations of 37 cable television systems. Earlier, he was chief engineer with Sammons Communications of Kansas, Inc., and an engineer with Platte County Communications. He started his career as a field engineer with C-COR Electronics, Inc., supervising construction of specific systems in Pennsylvania, Ohio and Indiana.



Frank DeJoy

★**Frank DeJoy** has joined **Suburban Cablevision** as vice president of engineering. DeJoy was most recently employed by Warner Communications as a corporate staff engineer. He also worked in the pioneering development of the Hughes AML microwave system, while employed at Teleprompter. He subsequently became national microwave supervisor at TPT.

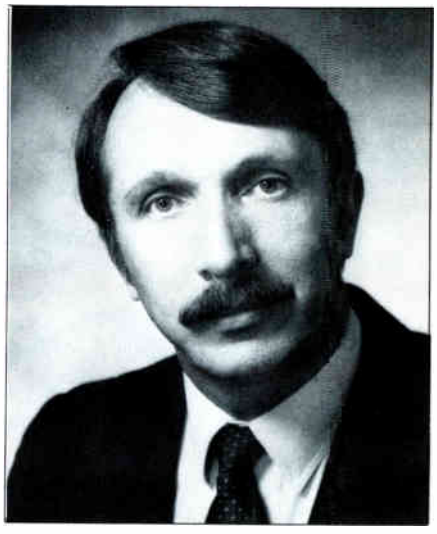
★ **Barry C. Kerr** has been appointed Southeastern regional manager for **Colony Communications**. Kerr will be responsible for operations and management of Colony's Hialeah, Florida system, known as Dynamic Cablevision of Florida, Inc. Kerr joined Colony in January 1978 as chief technician for its MDS operations in the Boston area and was later named technical manager for MDS operations nationwide. He began his cable career as a technician with Comcast Company's Meridian, Mississippi, system in 1970 and held a number of positions in the technical, marketing, operations and management areas before joining Colony.

★ **Viacom Communications** has named three new regional managers for engineering: **Fritz Baker**, **Del Heller** and **Pete Petrovich**.

As Eastern regional manager of engineering, Baker will be responsible for providing technical support for Viacom's cable systems in Long Island, Nashville, Cleveland, Dayton and the new cable franchises located near Milwaukee. These systems currently serve over 131,000 subscribers with nearly 3,000 miles of cable plant. Baker joined Viacom Communications Corporate Engineering Group in May 1980 and has been responsible for planning system rebuilds and new systems for Viacom's recently obtained cable franchises. Prior to joining Viacom, he was chief engineer for Audubon Cable Systems in New Jersey.

Heller has been named to the newly created position of Pacific Northwest regional manager of engineering. Based in Lynnwood, Washington, Heller will be responsible for Viacom's systems in and near Seattle and Everett, Washington and Salem, Oregon. These systems currently serve over 100,000 customers with 1,600 miles of plant. Heller had been regional engineer for the Seattle area since 1976. He began his career with Viacom Communications in 1971 with the company's East Bay California operations, and in 1975 he joined the company's engineering group where he established a training program for Viacom's technical employees.

Petrovich, California regional manager of engineering, will be based in Dublin, California, and will be responsible for Viacom's California systems, which currently serve over 230,000 subscribers with 2,700 miles of plant. Petrovich joined Viacom Communications in 1978 with the corporate engineering group and has been responsible for planning and licensing the company's new microwave, satellite and two-way communications facilities. He previously served as manager and Western region engineer for Basil Cable Systems' Los Angeles operations.



Herb Biddle

★**Falcon Cable TV** has named **Herb Biddle** as director of corporate construction. Biddle is responsible for all construction of the company, including the designing and building of all Falcon's new systems. A 20-year cable veteran, he is a member of the Society of Cable Television Engineers.

★Lester Kamin, president of Lester Kamin and Company, a Houston-based cable TV brokerage firm, announced today that **Jerry Wilkinson** has been named executive vice president of **Cable Career Consultants,** an L.K. & Co. subsidiary. Prior to joining the firm, Wilkinson was general manager of Harte-Hanks-owned Valley Cablevision in Albuquerque, New Mexico.

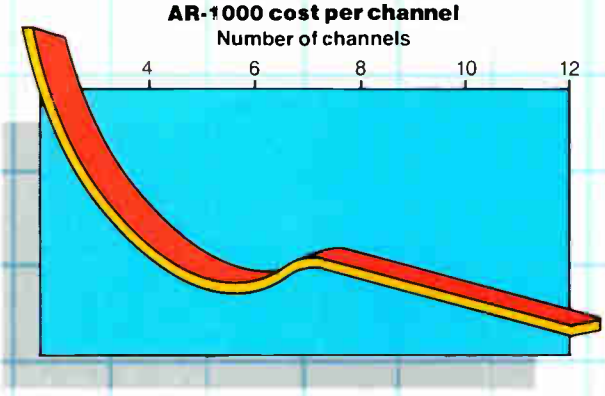
★ **Quincy Cablesystems,** a Massachusetts subsidiary of American Cablesystems Corporation, has appointed **Almis J. Kuolas** project engineer. A 1974 graduate of the University of Toronto, Kuolas holds a bachelor's degree in physics and is a member of the IEEE and the Society of Cable Television Engineers.

He comes to Quincy Cablesystems from Rogers Cablesystems, Ltd., where he was engineering manager, charged with responsibility for design and construction of new headends, along with special mocrowave projects, residential security systems and the maintenance of bi-directional programming facilities. Kuolas will be responsible for the final design and construction of the Quincy cable system.

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.

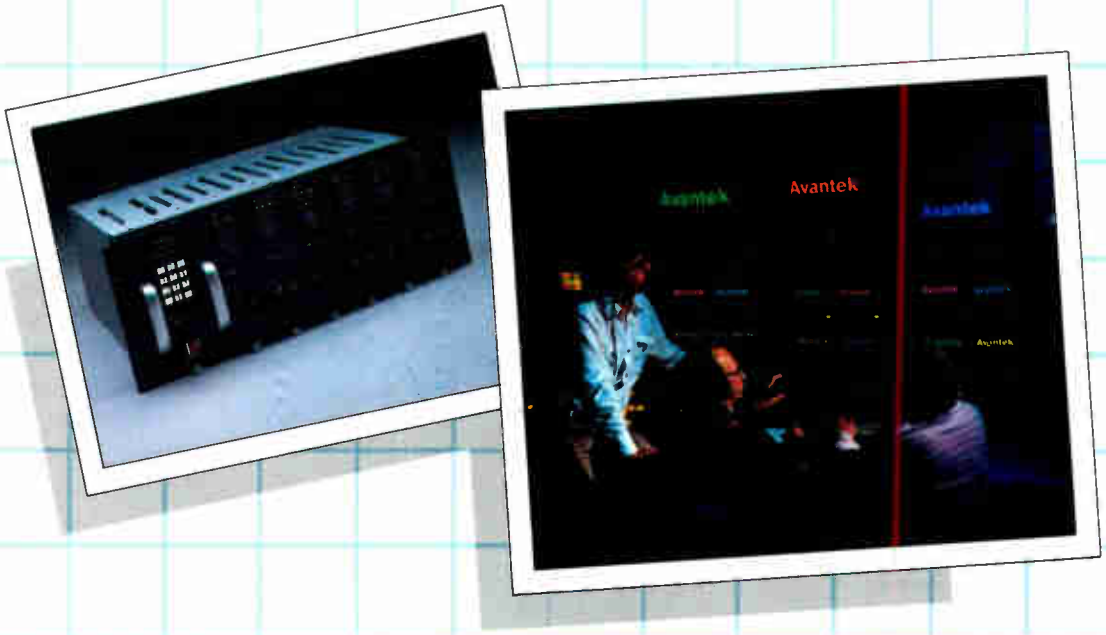
By combining the AR-1000 with Avantek's ACA-4220 LNA/downconverter at the antenna you can save the space and cost of a separate downconverter for each receiver. By downconverting to the industry's new standard, centered on 1.2 GHz, you avoid interference from broadcast signals, while the 940-1440 MHz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

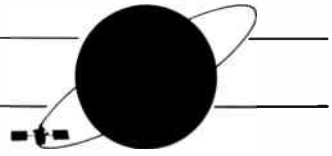
Learn how Avantek's AR-1000 can save you money and space.

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

In Orbit



Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders
ARTS		9:00 p.m./12:00 a.m		F1,#1
ACSN	Mon., Wed., Fri. Tues., Thurs. Weekends:	7:00 a.m.-5:00 p.m 7:00 a.m.-7:00 p.m 7:00 a.m./noon	192°/#	F1,#16
AETN	Mon.-Sat. Sunday	4:00 p.m./7:00 p.m. 4:00 p.m./6:00 p.m.		F1,#16
BET		11:00 p.m./2:00 a.m.	018°/#	F1,#9
Bravo		8:00 p.m./6:00 a.m		Comstar D-2,#3H
Cabletext		24 hrs	None	F1, #6 Vertical Blanking
CBN		24 hrs	None	F1,#8
Cinemax		24 hours	None	F1,#20/23
CNN		24 hrs	None	F1, #14
C-SPAN	Weekdays: 9:30 a.m./6:00 p.m Saturday: Noon/5:00 p.m			F1,#9
ESPN		24 hrs	None	F1,#7
Escapade		8:00 p.m./6:00 a.m		Comstar D-2,#4V
GalaVision				F1,#18

HBO

Program		F1,#24	
729°/#		F1,#22	
Scramble		F1,#23	
835°/#		F1,#20	
Duplication			
940°/#			
Take-2 E			
592°/#			
Take 2 W			
681°/#			

August 1	3:30 p.m.	3:22 a.m.
August 2	3:00 p.m.	1:09 a.m.
August 3	5:30 p.m.	2:15 a.m.
August 4	6:00 p.m.	2:19 a.m.
August 5	5:00 p.m.	1:39 a.m.
August 6	6:00 p.m.	3:33 a.m.
August 7	5:00 p.m.	4:17 a.m.
August 8	3:00 p.m.	4:17 a.m.
August 9	2:30 p.m.	1:55 a.m.
August 10	5:30 p.m.	2:21 a.m.
August 11	5:30 p.m.	2:53 a.m.
August 12	5:00 p.m.	3:15 a.m.
August 13	5:30 p.m.	2:36 a.m.
August 14	5:30 p.m.	4:30 a.m.
August 15	2:30 p.m.	4:55 a.m.
August 16	3:30 p.m.	1:35 a.m.
August 17	5:00 p.m.	2:58 a.m.
August 18	5:00 p.m.	2:21 a.m.
August 19	5:30 p.m.	2:22 a.m.
August 20	5:00 p.m.	2:54 a.m.
August 21	5:00 p.m.	3:42 a.m.
August 22	3:00 p.m.	4:57 a.m.
August 23	3:00 p.m.	1:40 a.m.
August 24	6:00 p.m.	2:15 a.m.
August 25	5:30 p.m.	2:13 a.m.
August 26	5:00 p.m.	2:39 a.m.
August 27	5:30 p.m.	2:39 a.m.
August 28	5:00 p.m.	4:07 a.m.
August 29	3:00 p.m.	3:45 a.m.
August 30	3:00 p.m.	2:51 a.m.
August 31	5:00 p.m.	3:00 a.m.

HTN	7:00 p.m./2:00 p.m.	517°/#	Westar III, #7 (E,C,M) F1, #21 (P)
Lifestyle	24 hours	None	F1,#3
The Movie Channel	24 hrs	None	F1,#5 (E,C) F1,#11 (M,P)
Modern Satellite Network	Weekdays: noon/5:00 p.m. Weekends: 8:00 a.m./1:00 p.m.	243°/#	F1,#22
National Christian Network	6:00 a.m./8:00 p.m	073°/#	Comstar D-2, #4V
National Jewish Network	Sunday: Noon/4:00 p.m.		F1,#16

Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders
Nickelodeon		8:00 a.m./9:00 p.m	311°/# (E,C,M) 519°/# (P)	F1,#1
PTL		24 hrs	None	F1,#2
Private Screenings		Fri.-Sat., 12:00 a.m./3:00 a.m.		Westar III,#7
Reuters	Weekdays	4:00 a.m./7:00 p.m	None	F1,#18
SIN		24 hrs	None	Westar III, #8
Showtime		24 hrs	Program 576°/# Scramble	F1,#12 (E,C) F1,#10 (M,P)
SPN		24 hrs		Westar III, #9
Trinity (KTBN)		24 hrs		Comstar D-2, #9V

USA Network F1,#9

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

August 1	1:00 a.m	August 17	1:30 a.m
August 2	3:00 a.m.	August 18	2:00 a.m.
August 3	3:30 a.m	August 19	1:00 a.m.
August 4	3:00 a.m	August 20	4:00 a.m
August 5	2:30 a.m.	August 21	4:00 a.m
August 6	3:00 a.m	August 22	3:00 a.m
August 7	4:00 a.m	August 23	2:30 a.m
August 8	3:00 a.m.	August 24	1:30 a.m.
August 9	3:00 a.m.	August 25	3:00 a.m
August 10	3:00 a.m.	August 26	1:00 a.m
August 11	2:30 a.m.	August 27	4:00 a.m.
August 12	2:00 a.m	August 28	4:00 a.m
August 13	4:00 a.m	August 29	3:30 a.m
August 14	5:00 a.m.	August 30	2:30 a.m.
August 15	4:00 a.m	August 31	1:00 a.m
August 16	1:30 a.m		

USA Network: On-time is 7:30 p.m. weekdays, except August 5, 12, 13, 20, 27: 7:00 p.m. Saturdays: 5:00 p.m. Sundays: 7:00 p.m., except August 2: 4:00 p.m., August 16: 7:30 p.m.; August 23: 5:30 p.m.

Calliope: Weekdays: 6:30 p.m. to 7:30 p.m., except August 5, 12, 13, 20, 27: 6:00 p.m. to 7:00 p.m. Saturdays: 10:00 a.m. to 1:00 p.m.

The English Channel: Tuesdays: August 4, 25: 10:30 p.m. to 12:30 a.m.; August 11, 18: 10:00 p.m. to 12:00 a.m. Saturdays: 1:00 p.m. to 5:00 p.m. Sundays: August 2: 6:00 p.m. to 8:00 p.m.; August 9: 5:00 p.m. to 7:00 p.m.; August 16: 5:30 p.m. to 7:30 p.m.; August 23, 30: 10:00 p.m. to 12:00 a.m.

WGN	24 hrs		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

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Last Twice As Long Under Most Corrosive Conditions

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