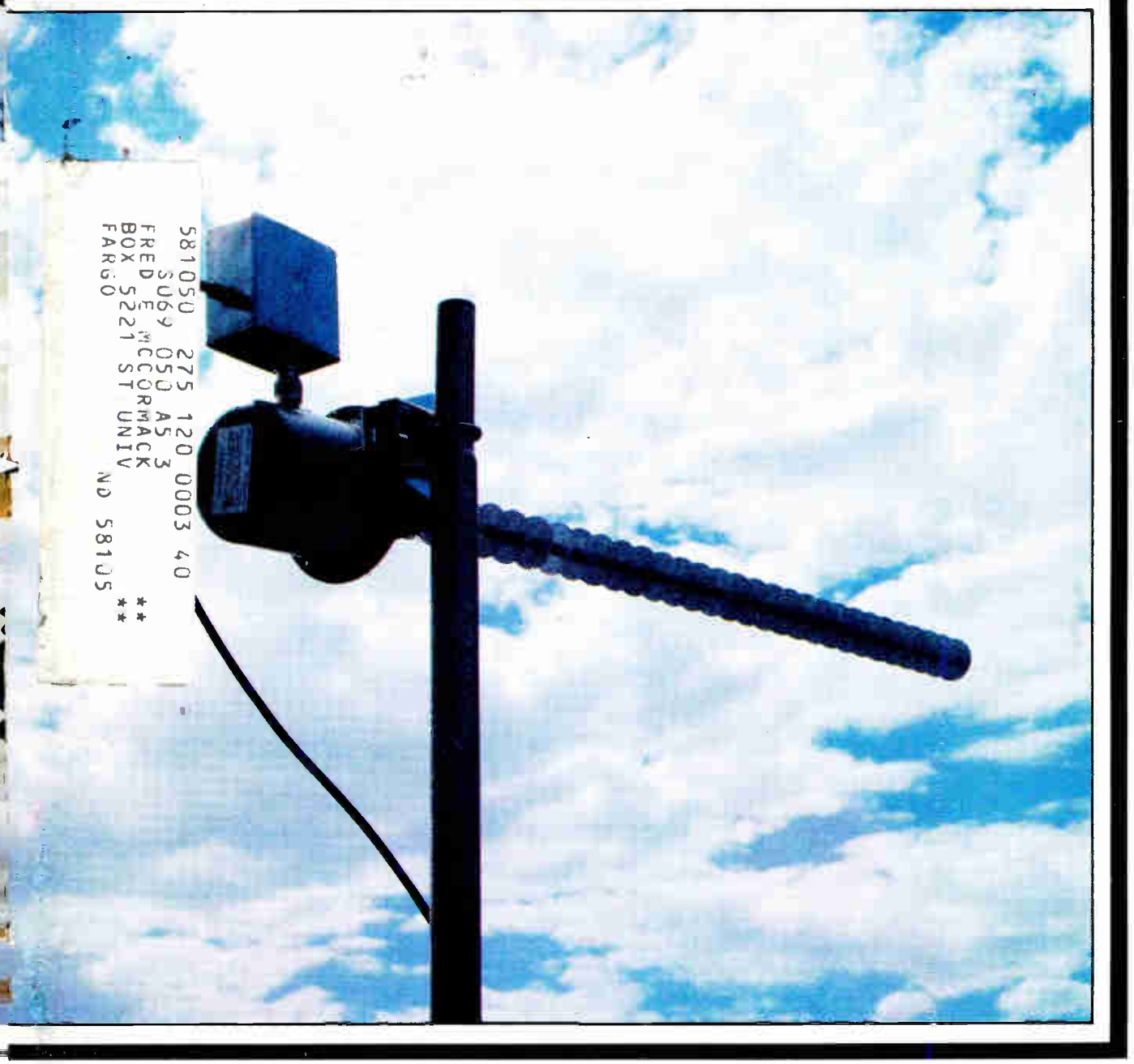
C-ED

CATV System Leakage
MDS Applications in Cable



Communications-Engineering Digest
Reporting the Technologies of Broadband Engineering

October 1979
Volume 5, No. 10

Oak stages a seminar in print. Session 1...

Six steps to becoming a converter expert.

New Econo-Line Thirty shown

Step 1. Evaluate your present and future needs. Will the converter you select accommodate your present channel needs and will it handle expected future channel expansion? The "right converter" should still be the right converter five to ten years from now.

Step 2. Compare systems—Block converter or conventional converter? A low-cost block converter shifts a block of CATV channels to a corresponding block of VHF channels. This approach may work where a handful of additional channels are needed, but is not recommended for use in a strong signal area. *For optimum performance, a block converter should never shift channels to UHF,* as many subscribers have sets with non-detented or poor UHF tuners. A conventional or channel-by-channel converter offers a knob or series of buttons to allow your subscribers direct-channel selection without touching the channel knob on their TV set. Though more costly, this converter is best suited for most systems. In the long run, channel-by-channel converters reduce complaints of interference and tuning difficulty.

Step 3. Compare companies. Is the company selling the converter the same company that designed and built it? CATV converters are precision devices that must be closely monitored for quality at *every* stage from drawing board to final testing.

Step 4. Compare warranties. How strong is the warranty being offered? Are you being offered the same warranty as other buyers? Check the length of coverage, what services it includes and what service turnaround time is promised. Don't accept unwritten promises.

Step 5. Compare quality...then price. Only after all of the above considerations have been carefully evaluated can you begin to compare price. A low-cost converter is the "right buy" *only* if it meets the needs of your system.

Step 6. Call Oak. We'll send you literature on the complete line of Oak channel-by-channel and block converters, as well as other tips on how to select the best converter for *your* system. We'll also prove to you that Oak protects your system from lost revenue better than any other manufacturer. For your information packet, call our Locator Operator toll free at 800-323-6556 (in Illinois 800-942-6345) and ask for the CATV information desk.

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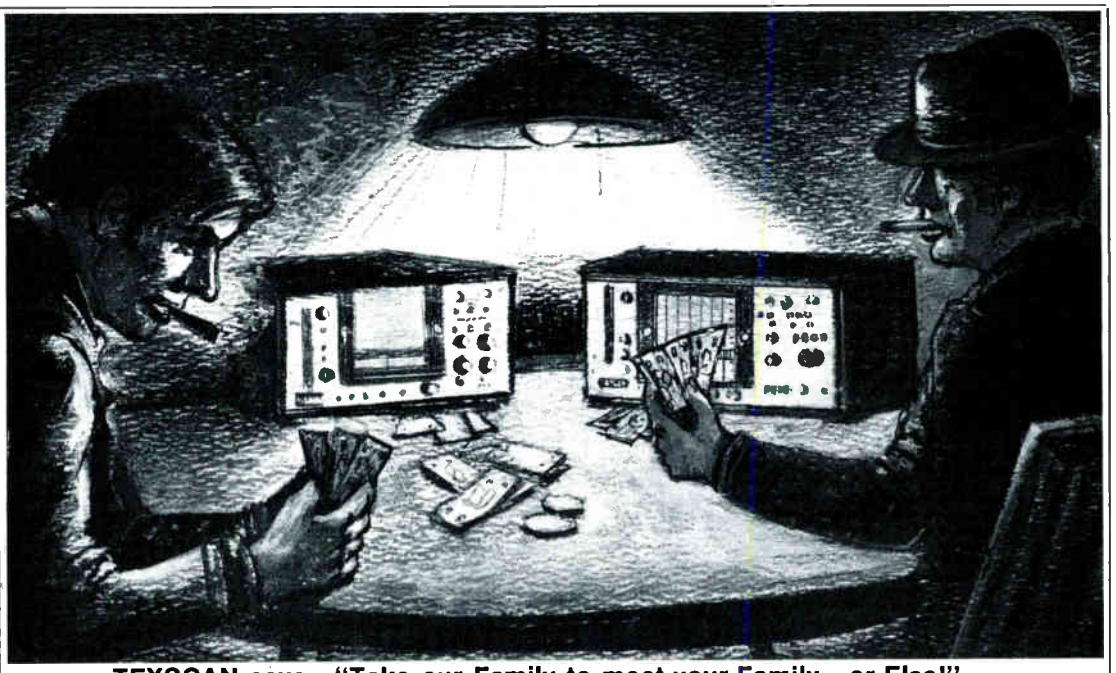
Texscan Corp. provides a full range of CATV products; line amplifiers, passives and test equipment. Texscan also provides industry technical training seminars.

The goods are produced in

Indiana and Arizona, with full national marketing services via direct regional sales personnel.



TEXSCAN says—"Take our Family to meet your Family—or Else!"

MUG SHOTS OF "THE FAMILY!"

TFC-7

Frequency Counter

The tuned frequency counter is wanted for system proof of performance, video demodulation & precise, counted variable marker functions.

This versatile instrument provides both preselector/stripper functions with a broadband 5-300 MHz counter.

Description:
- All channel performance
- 0 dBmV sensitivity
- Accurate
- Variable gate time

Wanted for $1900

VSM-5A

Spectrum Analyzer

The VSM-5A is wanted for complete spectrum analysis requiring phase lock and narrow resolution bandwidths. This instrument is capable of all FCC proof of performance measurements except system flatness.

Description:
- 4-350 MHz
- Crystal markers
- Amplitude calibrator
- −50 dBmV sensitivity
- Battery operated portable

Wanted for $4,500

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"Simo" Sweep

The simosweep twins are wanted for precise system alignment and balance.

Description:
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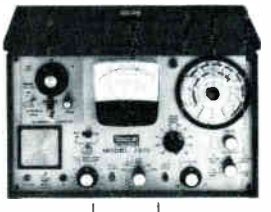
- ±0.25 dB flatness } **T**
- Remote triggering
- Battery operated
- Long persistence
- Variable frequency marker } **R**
- Storage interface

Wanted for: "T" $1,195
"R" $2,295



7271

Field Strength Meter

The 7271 is wanted for accurate level measurements. The new (pat. pend.) peak detector and rotary attenuator are identifying marks for this accurate (typically ±0.5 dB) instrument. The Ni-Cad battery provides more than 8 hours use on a charge.

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Wanted for $950

These instruments have "records" of proven reliability under adverse field environments. They have been on the loose for at least 5 years.

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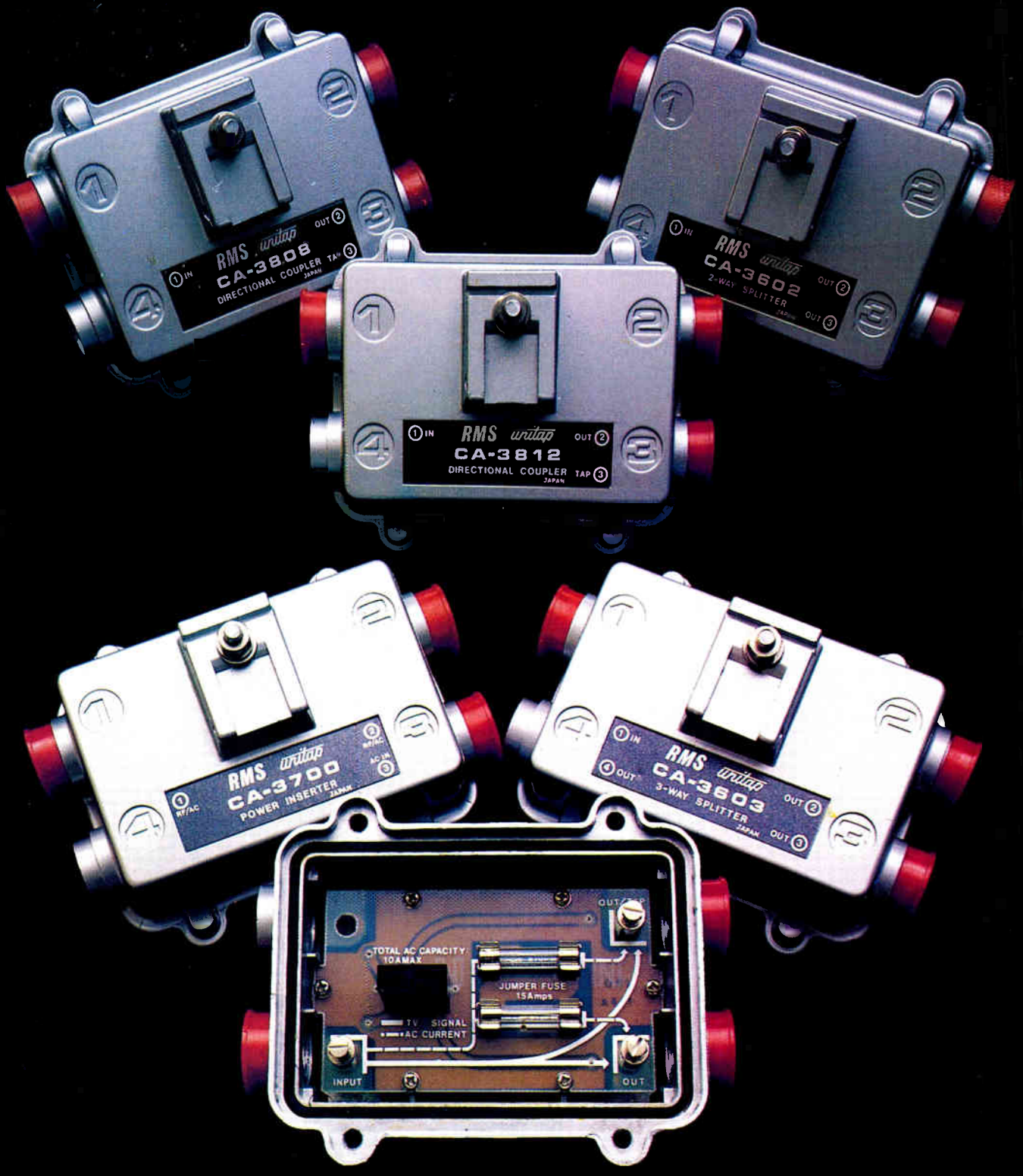

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Canada Representative: Deskin Sales Corp

C-ED News at a Glance

WASHINGTON, D.C.—The **FCC will host a demonstration of two electronic mail services for the deaf** on Tuesday, October 9. The two systems are **demonstration projects funded by the Department of Health, Education, and Welfare** (HEW) as enhancements or potential replacements for the system of teletypewriters now used by deaf persons to communicate over telephone lines. One system that will be demonstrated is being operated by the Deaf Community Center of Framingham, Massachusetts, funded by the HEW Telecommunications Policy Office. The system used is the commercially available Hermes Message System, which was developed by Bolt, Berensk & Newman Inc. of Cambridge, Massachusetts. The second system has been developed by SRI International under a contract from the HEW Bureau of Education for the Handicapped. This system includes an interconnection between a computer at SRI in California and another company at Gallaudet College in Washington, D.C.

WASHINGTON, D.C.—The Commerce Department's **National Telecommunication and Information Administration (NTIA) has** published a report that discusses an **improved version of the agency's Program Wagner**, which is **a computer program** used **to calculate radio and radar ground-wave fields** over irregular terrain. The report describes the extensions and modifications of the original program and presents a comparison of computed field strength values with actual measurements over nine paths at frequencies ranging from 120 kHz to 50 MHz. Entitled "Ground Wave Propagation over Irregular Inhomogenous Terrain: Comparisons of Calculations and Measurements," the report was written by Randolph H. Ott, Lewis Volger, and George A. Hufford, all for whom are on the staff of NTIA's Institute for Telecommunications Sciences. Boulder, Colorado.

WASHINGTON, D.C.—Explaining that in markets where channels are available, "We should not create an artificial scarcity to serve the interest of the initial applicant," **the FCC has decided to abolish its "one-to-a-community" rule for STV.** This will permit more than one STV service in a community, as long as there are four conventional TV stations in operation. Elimination of this rule, said the commission notice, will increase program choices for consumers. In addition to eliminating the one-to-a-community rule, the commission decided that a cut-off procedure for STV applications was unnecessary. It was also decided that STV operators would be allowed to decide for themselves whether or not to standardize their systems or to offer decoders compatible with whatever other systems serve the market.

The FCC said that the three remaining issues presented in the Dec. 1, 1977, inquiry and rulemaking, as well as additional STV matters not raised previously, **would be the subject of a further rulemaking notice**—whether the FCC should allow consumers to purchase rather than lease decoders; whether it should consolidate proceedings in which an applicant is involved in two mutually exclusive hearings, one seeking a construction permit for a new conventional station and the other for an STV authorization; and whether the commission should establish criteria for comparing two competing STV applications as well as for comparing applications for a new TV station, when one proposes conventional use and the other STV operation.

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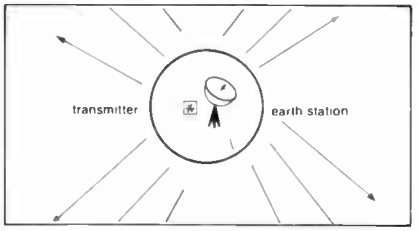

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FEATURES

DEPARTMENTS

OPINION

Cover: Our October issue of C-*ED* features a typical MDS downconverter atop a single family dwelling. Photograph by Judith L. Schwall.

Editor's Letter

This October issue of *C-ED* features various approaches to the MDS market. Diane Hinte of TEST outlines an inexpensive method of reaching subscribers. That story begins on page 26. Fred Finn of Microband Corporation discusses MDS as a third transmission alternative to pay cable and STV. That article, beginning on page 30, discusses the advantages of MDS delivered pay-TV. Our third feature article on MDS explores the selection of home MDS receiving equipment. And you'll find that story on page 42.

We are pleased to announce that Judy S. Lockwood has been named director of marketing for Titsch Publishing, Inc. In her new position, Lockwood will be responsible for corporate marketing and promotional campaigns in general. She will also be responsible for marketing the company's communications trade publications in particular. These publications include *Communications-Engineering Digest, CableVision, MobileTimes, Two-Way Radio Dealer, The Mobile Radio Handbook, CableFile,* and the soon to be launched television programming monthly, *WATCH, Television in the Eighties.* Lockwood previously was publisher of our mobile radio publications, now a part of the Communications Division. She recently returned from a six-month maternity leave.

Paul A. FitzPatrick

Cross Modulation—An Overrated Specification

By Michael F. Jeffers
Vice President, Engineering
Jerrold Electronics Corporation

The measurement of cross modulation has for years been the major determinant of the third order distortion present in a CATV system. In recent years, composite triple beat has been used as a comparison measurement, particularly in systems that carry more than twelve channels.

A cross modulation measurement is unique in CATV because the distortion results in double sideband components. All other intermodulation measurements, such as harmonic distortions and all forms of second or third order distortions, give a single sideband component. Double sideband can be represented in vector diagram form in Figure 1. Figure 1a shows the sidebands as they would be seen on a spectrum analyzer. Depending on how these two distortion sidebands relate to this carrier, they can appear as amplitude modulation (Figure 1b) when the resultant vector is in line (parallel or zero degrees) with the carrier vector or as phase (or frequency) modulation (Figure 1c) when the resultant of the sideband vector is 90 degrees (perpendicular) to the test carrier vector. The sidebands can also appear as a combination of amplitude and phase modulation when the resultant is at an angle between zero and 90 degrees. A spectrum analyzer measures only the magnitude of the component, not its phase relationship to the test carrier. An envelope detector will measure the amplitude variations of the resultant; this will be an accurate measure of the magnitude of the distortion components only when the resultant is pure amplitude modulation.

As was stated above, all other distortions (excluding hum) fall into the sideband of the pure test carrier as a single sideband component. This is denoted in Figure 2a. The resultant vector has both amplitude and phase modulation (Figure 2b) and its magnitude can be determined with either an envelope detector or a spectrum analyzer.

At Jerrold, we have quantified every post amplifier circuit commonly used in the CATV industry for cross modulation by simultaneously measuring with an envelope detector (using the standard NCTA method) and with a spec-

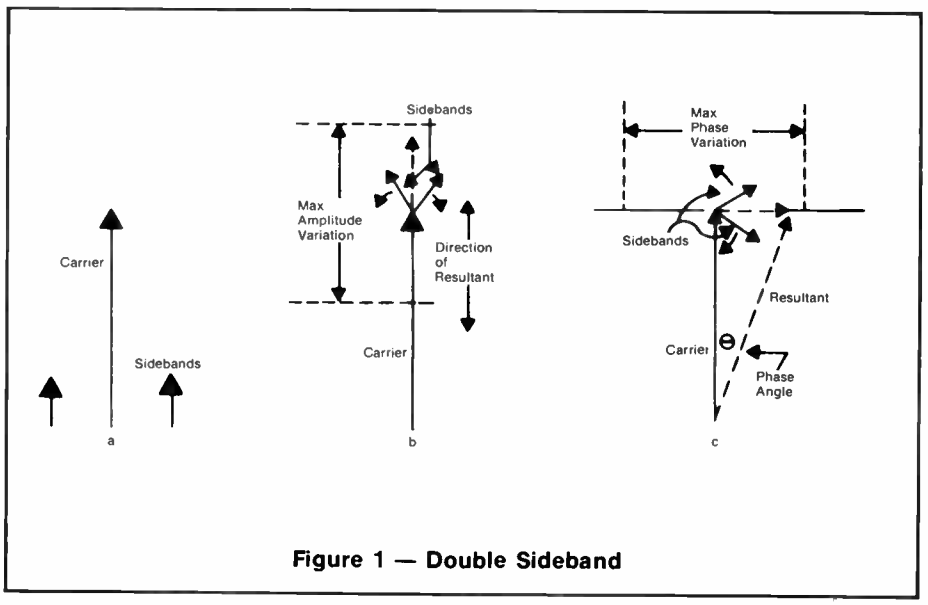

Figure 1 — Double Sideband

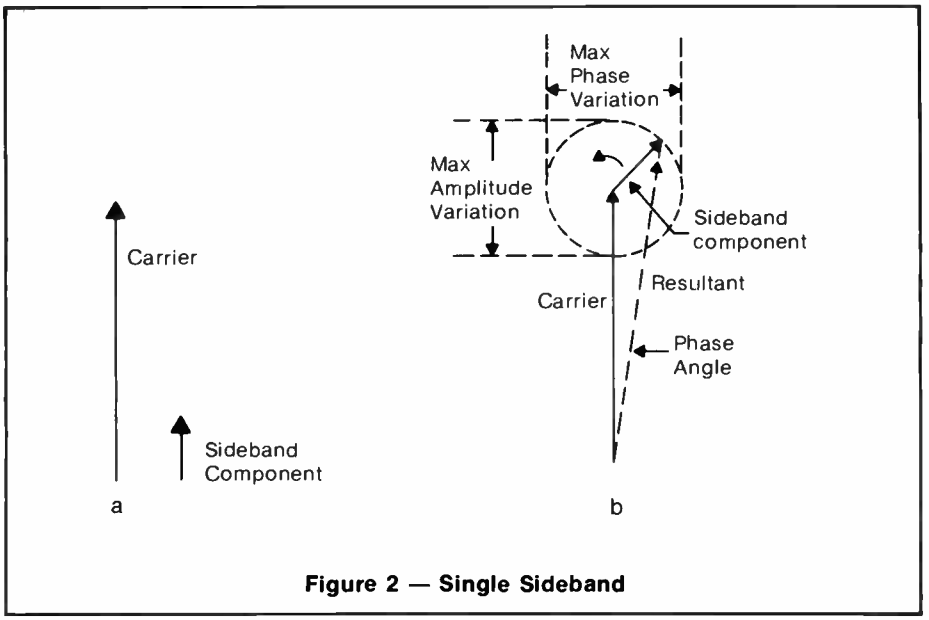

Figure 2 — Single Sideband

trum analyzer. A spectrum analyzer will agree accurately with an envelope detector when both are measuring a low percentage of pure amplitude modulation (no phase modulation). To achieve correspondence between the methods for square wave modulation, add a 10 dB factor to the reading of the 15 KHz sidebands shown on the spectrum analyzer. For example, if the sideband is -65 dB from reference carrier, then the cross modulation level of a pure amplitude modulated signal is -55 dB.

A synchronous 15 KHz 100 percent square wave modulation was used on all channels except the reference CW test carrier. The test carrier was varied in frequency from channel 2 to W. Figure 3 shows a plot of an average post amplifier. All devices tested followed the same pattern; namely, envelope detector readings improved and spectrum analyzer readings worsened as the frequency of the test channel increased. It can be noted that the two methods agree at low frequency, indicating a pure amplitude modulation condition which shifts toward pure phase modulation as frequency increases. Since the spectrum analyzer is an accurate measure of the magnitude of the distortion components independent of phase and the envelope detector measures only the amount of amplitude modulation, the phase angle can be calculated. This is also plotted in Figure 3.

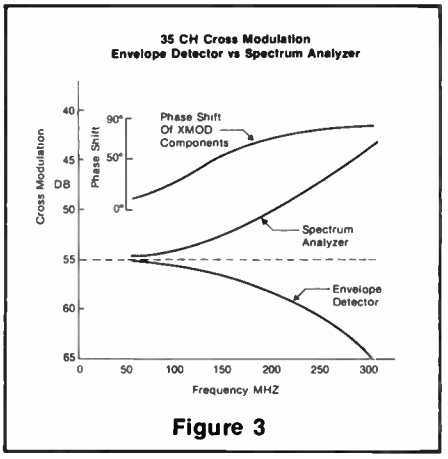

Figure 3

An examination of the graph shows that a disparity of 20 dB exists at 300 MHz between the readings by the two methods. One device tested measured a difference of 37 dB.

Since cross modulation is defined as the amplitude variation caused on one carrier by the signal modulation on another—an envelope variation—then an envelope detector must be used to measure this specification. A spectrum analyzer will not normally measure cross modulation accurately. Further, since an envelope detector cannot normally determine the magnitude of the cross modulation distortion components, it is a weak technique.

I recommend that we de-emphasize or eliminate this meaningless specification and rely totally on composite triple beat as the measure of third order distortion in cable systems.

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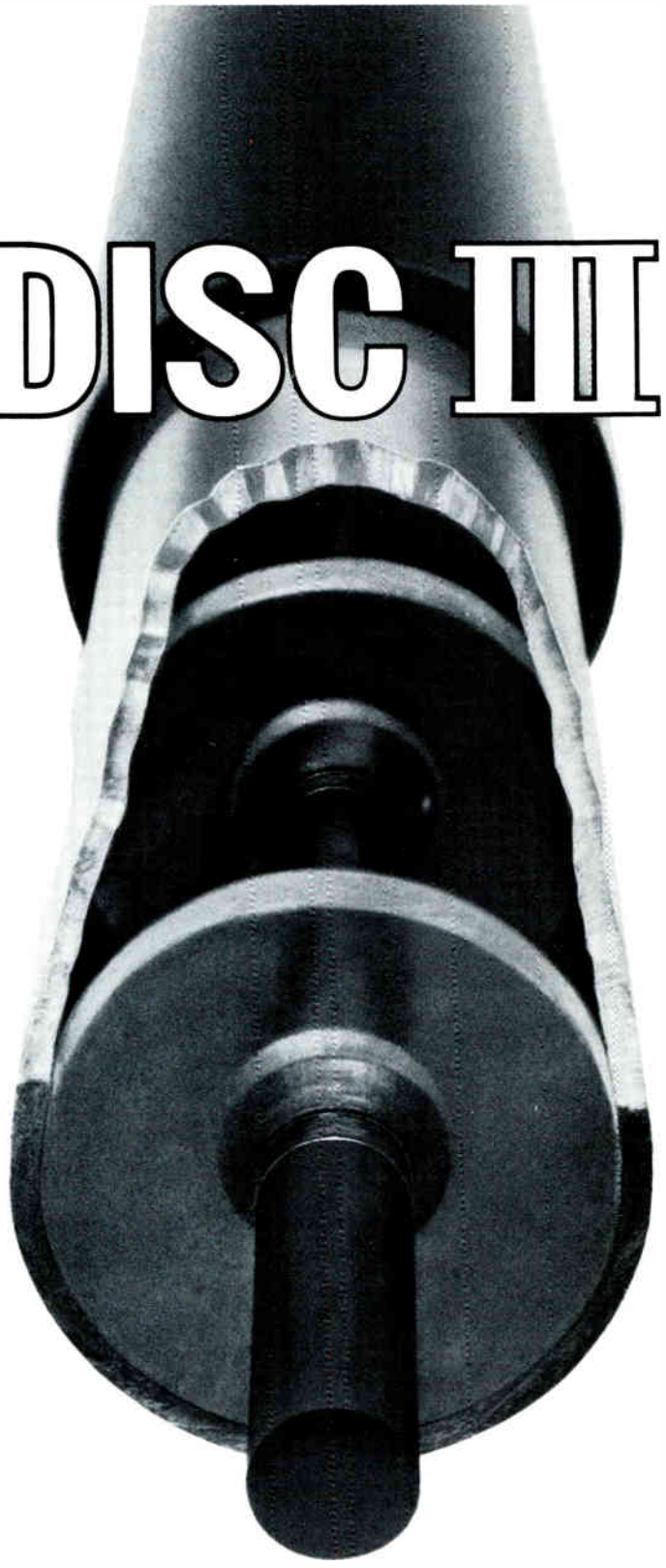

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FUSED DISC III establishes the standard for low-loss CATV Systems. FUSED DISC III cable provides an average loss improvement of 12% over other cables.

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SCTE To Expose Cable

WASHINGTON, D.C.—The SCTE has launched a major manpower development and recruiting program. Introduced in July, the first phase of the effort includes contact with nearly 500 universities, colleges, trade and vocational schools inviting participation in the SCTE Technical Manpower Resource Pool.

Correspondence has been directed to the engineering or technical department within the school, with a follow-up mailing to job placement advisors and counselors. Participation by schools and graduating students costs nothing.

Engineering and technical students graduating from any two- or four-year school will send one copy of a resume, prepared to a suggested format, to SCTE. Cable operators and suppliers may then call for copies of resumes on hand, either for a one-time charge, or prospective employers may subscribe for a 12-month period and receive copies of new resumes received automatically, once a month. The resume format requests information on education, job experience, skills, FCC licenses held, willingness to travel on the job and willingness to relocate.

The SCTE staff will not evaluate or edit resumes before distributing them. Expenses of contacting these students as prospective employees is solely the responsibility of the interviewing company. SCTE is able only to act as an initial contact point between the graduates and the cable industry. Only these newcomers are eligible to participate in the program. This is not a job placement program for people already employed in cable television.

The second phase of the manpower recruiting program will include initial distribution of approximately 250,000 brochures to trade and vocational school job placement counselors, encouraging students to consider cable television as a career opportunity. The cost of developing and distributing this brochure will be about $10.00. Industry support is being solicited to offset this expense since SCTE does not have the budget to currently produce this material and will receive no direct monetary income from the project.

Phase three includes establishing a scholarship program. SCTE hopes to announce the details at the 1980 Annual Membership Meeting, February 6 in Phoenix, Arizona. It is hoped that SCTE will be able to award at least one

Ken Gunter, Secretary of the SCTE.

$500.00 scholarship to a fourth-year engineering student and ten $100.00 scholarships to second-year vocational and trade school students. Funds for these awards will be raised from the sale of SCTE Senior and Member plaques. All monies over and above the expense of these plaques will go into a special savings account for the scholarships. Senior members have already provided approximately $1,100.00 toward the program by the purchase of their Senior Member plaques.

Phase four affects people already employed in the industry. A major university system has received a formal proposal requesting the award of continuing education units (CEUs) for attendance at SCTE's technical meetings. It is hoped that the accumulation of a number of these CEU's will lead toward recognition of a particular level of expertise in cable system operation. The same university is developing an extensive questionnaire to be released later this year as part of SCTE's industry-wide technical manpower study.

The program is the result of ideas submitted by SCTE members and the willingness of the officers and directors to execute the program. Companies interested in contributing to this program are invited to contact SCTE Secretary Ken Gunter at UA-Columbia, (915) 655-0634. The initial distribution will be followed with additional mailings as funds come available. Names of the schools receiving the mailings will be included in a master computer file so that this information can be used for future industry-recruiting programs.

Tech Programs at Southern

ATLANTA, GEORGIA—SCTE members George Fenwick and Doyle Raywood were SCTE's featured speakers at the Southern Cable Television Convention in Atlanta, Georgia on September 10. This marked the fourth consecutive year that SCTE has been invited to participate in the Southern show.

Fenwick repeated the talk he presented at the SCTE Colorado Springs meeting on Preventive Maintenance. His specialty is converter maintenance and repair, and his talk aroused a lot of interest.

Doyle Haywood shared information on new techniques for system testing using mini-computers with already existing in-house test equipment. This topic is of growing interest among cable technicians and engineers.

Charge It

WASHINGTON, D.C.—The Society of Cable Television Engineers has announced the privilege of using VISA or Master Charge credit card billings for the payment of dues, registrations for SCTE-sponsored meetings and seminars or the purchase of any of SCTE's dozen-plus cable industry-oriented publications or videotape programs.

The initial response to this latest membership benefit has been overwhelming.

Insurance Options?

WASHINGTON, D.C.—SCTE is exploring the pros and cons of introducing an insurance program to its members. One possibility would be a group health program that moves with the member, regardless of employment circumstances. There are additional programs under consideration and SCTE members can expect more information before the end of the 1979 membership year.

Besides looking into insurance, SCTE is also investigating discount rental car privileges for members. Many membership organizations offer such privileges and with SCTE's numbers growing, these programs are possible.

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The new CHANNELCUE is the most flexible and convenient to use programmable switcher today. Its crystal controlled capability allows you up to 2,552 switch functions per week on as many as 8 channels. CHANNELCUE is an A/B switcher with an internal pre-programmed color character generator to provide a video message during non-programmed hours. It's designed to prevent unauthorized carriage of programming from earth station transponders, and to provide for switching to substitute programming for network nonduplication and syndicated exclusivity protection. CHANNELCUE will switch any video/audio source, including your existing origination equipment - add an external relay and it will switch RF too. It's tone modules will switch upon a command originated by a satellite programmer. For more details of how you will benefit with CHANNELCUE, call today 713/961-7348.

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Cable Services Temporarily Bumped

PISCATAWAY, NEW JERSEY—At press-time, *C-ED* learned that after experiencing some stabilization problems with the Satcom II, RCA was forced to bump four cable television programming services from vertical transponders on Satcom I in order to accommodate message traffic.

The industry has often discussed the problems which might result from the failure of one or two transponders and its impact upon the daily programming mix cable system operators provide their subscribers. But, the possibility of losing control of an entire bird ahead of its life expectancy has often sent chills through programmers and systems operators alike.

"It was a scary thing, until we found out what was going on," said one network executive who was obviously annoyed at having been given about ten minutes notice that he was going to be preempted.

Preempted from transponders 3, 7, 9, and 21 were the recently launched all-sports channel created by ESPN, United Video's transmission of WGN, the C-SPAN feed of the House of Representatives, and Southern Satellite's Satellite Program Network.

The transponders were preempted at approximately 11:30 a.m. (EDT) on September 13, and returned at approximately 6:30 p.m. ESPN, the newest service on the bird, was not restored until 7:35 p.m.

RCA technicians were able to correct the attitude pitch control of Satcom II, but one spokesman said that the subsequent testing of the bird took most of the time. Almost every function of the communications satellite is redundant, but when it is necessary to switch to back-up gyros, traffic must temporarily be taken off.

RCA has contingency plans to make use of capacity on Canadian satellites Anik/Telsat should a major and lengthy problem occur for cable services, or some of its message traffic. Obviously, TVROs would have to be reoriented.

RCA Files To Launch F-4

PISCATAWAY, NEW JERSEY—Citing high demand, RCA American Communications, Inc., has filed with the FCC an application for authority to launch its Satcom IV communications satellite in June of 1981. RCA Americom had previously filed an application to construct this satellite as a ground spare. It was requested that Satcom IV be positioned at 83 degrees west longitude.

"Our projections clearly show that growth in all areas of our business is more than adequate to support this application," said RCA Americom's president, Andrew F. Inglis. "Revenues for RCA Americom have grown at a compounded rate of more than 50 percent annually. Moreover," Inglis added, "this growth rate has been experienced in all of our marketing areas—commercial communications service, video/audio services, government communications services and Alascom services."

As presently scheduled, Satcom IV would carry commercial private leased channel, government services, and broadcast TV and radio traffic. RCA Americom indicated that no other carrier has filed for the 83 degree slot required for Satcom IV.

In its filing, RCA Americom indicated that Satcom IV would be essentially the same in design as Satcoms I, II and III, with certain component improvements.

Academic Credits Offered for SCTE Seminars

ATLANTA, GEORGIA—The Society of Cable Television Engineers (SCTE) has scored a first for the cable television industry, this time in the academic arena. In cooperation with the University of Alabama's Division of Continuing Education, SCTE will award continuing education units (CEUs) for attendance at its technical meetings across the nation.

The announcement was made by SCTE President, Harold Null and Executive Vice President, Judith Baer last week at the southern Cable Television Association's annual meeting in Atlanta.

According to Baer, "The CEUs will be awarded through the College of Engineering, the College of Commerce and Business Administration and the School of Communications." Baer continued to explain that SCTE will work with a university coordinator, selected on the basis of academic credentials, at each seminar.

The CEUs will be issued consistent with the definition and as authorized by Standard IX of the Southern Association of Colleges and Schools to every participant in the SCTE event. According to Dr. Tom Moore, University of Alabama, CEU credit will begin with SCTE's "System Construction" seminar to be held in Hartford, Connecticut, November 26-27.

Congressional Members Attend Southern Show— Via Teleconferencing

ATLANTA, GEORGIA—The Great Southern Cable Exposition, which has established itself in recent years as one of the major events on the cable television industry calendar, scored another first—a press conference via satellite featuring "a stellar group of public policy makers."

Linked with the convention center here via satellite, microwave and MDS technology were House Communications Subcommittee Chairman, Lionel Van Deerlin; ranking minority member on the Senate Communications Subcommittee, Barry Goldwater; banking minority member of the House Communications Subcommittee, James Collins; and Federal Communications Commission Chairman, Charles Ferris.

While seated in the House television studios in the Rayburn House Office Building, the four congressional leaders answered questions from a panel of communications journalists at the convention in Atlanta. The feed was one-way video, two-way audio. During the one-hour press conference, transmitted over the C-SPAN network, the four agreed that prospects for passing significant communications legislation this year or next were very slim.

In addition to the video presence of congressional leaders and commission chairman, the Southern Cable Television Association (SCTA) hosted Congressman Charlie Rose (D-NC) who predicted that the decade of the '80s would be one of political turmoil as "we will re-examine the relationship of the people and their government. "We can no longer provide an uninterrupted flow of goods and services from

Washington," Rose explained as he talked of the role of the Cable Satellite Public Affairs Network which carries the television feed of the House of Representatives to more than 500 communities.

Referring to the recent controversy during which House Speaker Tip O'Neill accused some members of "hamming it up" for the TV cameras, Rose said. "We are refining the process of Congress. Maybe we will cut out some of the needless chatter. It is a sign the process is working," he added. "Encourage your subscribers to watch, to write their congressmen, and their speaker."

Rose was addressing the more than 700 registered attendees at the Southern Show, the largest attendance in the history of the convention. Exhibitors, attempting to obtain space at the last minute had to be turned away. "Plans are already underway to expand the exhibit space for next year," according to Ron Roe, newly-elected vice president of the SCTA.

Reduced AM Channel Spacing?

WASHINGTON, D.C.—The Federal Communications Commission is considering a proposal to reduce the AM channel spacing from 10 KHz to 9 KHz in order to provide additional AM stations.

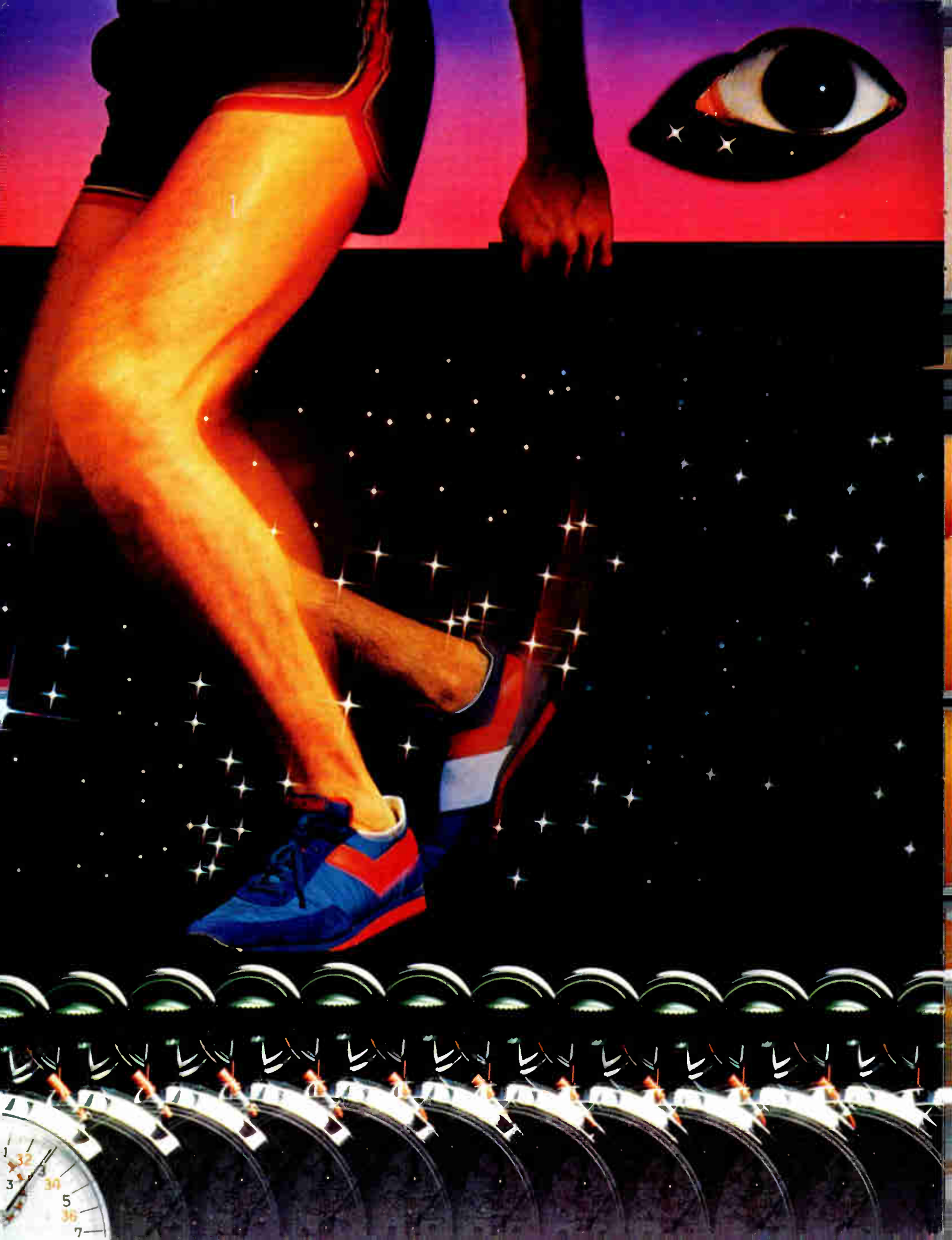
Currently, an AM broadcast station must operate on one of 107 AM broadcast channels. These channels are spaced in successive steps of 10 KHz, starting with 540 KHz and continuing through 1600 KHz. Within these channels each station operates on a designated frequency. This means that it transmits its electrical impulses at a certain number of "cycles" (electrical vibrations called "waves") per second or "hertz". These emissions are measured in kilohertz. A kilohertz is a short way of denoting a thousand of these waves per second. Therefore, to pick up a particular station, a receiver must be tuned to that station's frequency. By making the spacing between channels 9 KHz instead of 10 KHz, additional stations can be assigned on the newly created channels.

The proposed change in channel spacing is not an issue that can be decided solely by the United States. It is a matter which must be considered by Region 2 of the International Telecommunications Union, which includes countries from North and South America and the Caribbean. A Region 2 Broadcast Conference is scheduled for March, 1980. The rest of the world already uses 9 KHz channel spacing for AM broadcasting.

Many of those who filed comments on the proposal are concerned about the following items:

- The opportunity for more nighttime service
- Greater minority ownership
- More efficient use of the radio spectrum
- The possible diminished quality of reception that may occur if 9 KHz spacing is adopted
- The obsolescence of existing elec-

See our card on page 15.



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tronically tuned solid-state receiver ■ Whether the market can financially support the addition of new stations without adversely affecting existing stations.

SCTE Awards 2,000th Member

ATLANTA, GEORGIA—Dennis Horn, system manager for Camp Lejeune Cablevision, Tarawa Terrace, North Carolina, has been honored as the 2,000th member of the Society of Cable Television Engineers (SCTE). Horn was honored at a special awards ceremony at the Southern Cable Television Association's annual meeting in Atlanta last week. The presentation was made by SCTE Executive Vice President, Judith Baer. Accepting for Horn was Allen Kirby, vice president for operations, Telenational Communications, Inc., the parent company of Camp Lejeune Cablevision.

In making the presentation, Baer noted, "This is indeed a significant day for SCTE. In just three years, we have grown from a small, fledgling, low-profile organization of 350 members to a large, vital organization that is leading the industry in cable television education and information services."

Alan Kirby (left), accepting for himself and Dennis Horn, receives commemorative plaque from Judy Baer, SCTE.

Direct Satellite Services For In-Room Entertainment

HOUSTON, TEXAS—The first installation and operation of a direct satellite delivered in-room entertainment service to a hotel was completed on July 21, by Video Vista, at the Ramada Inn West, Houston, Texas. Showtime was the programming selected by Ramada Inn West.

Video Vista, a Houston-based company, is the first to market this concept to the hotel industry, and received the first license issued in this medium. Video Vista provides installation and all related satellite receiving equipment along with complete in-room merchandise materials. The system offers a wide variety of guest viewing material, allowing each hotel to select its programming.

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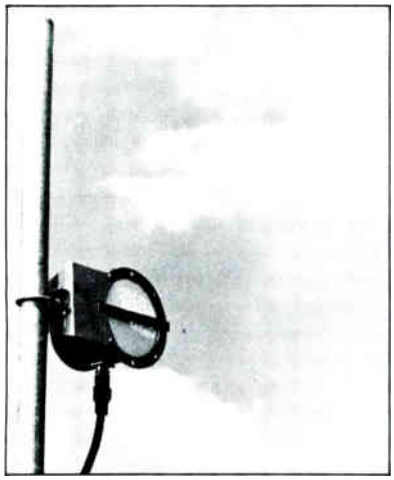

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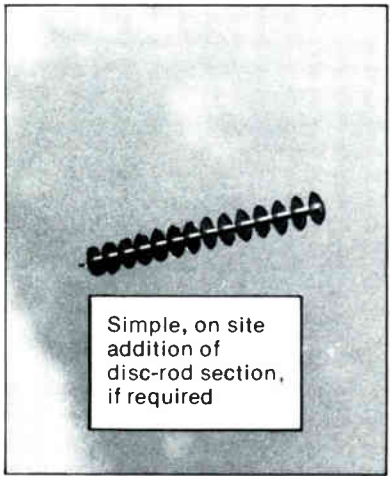

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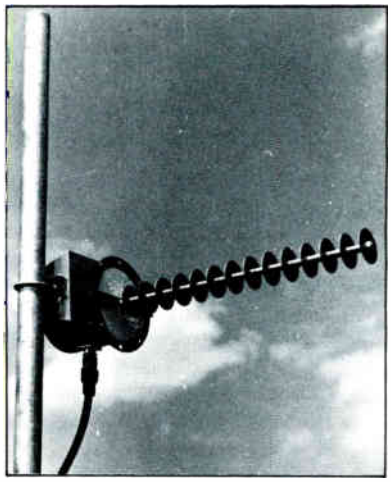

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87 MPH WIND + ½" ICE:	3 ft. - lb.	20 ft. - lb.
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Carter On Cable

By Pat Gushman
Washington Bureau Chief

A few hours before press time we were summoned to the White House to be briefed on a message being sent to Congress in which President Carter announced his support for reformation of telecommunications regulation. Two weeks earlier, while participating in a satellite/cable-interconnected and fed press conference, Senator Barry Goldwater (R-AZ), Representative Lionel Van Deerlin (D-CA), Representative James Collins (R-TX) and FCC Chairman Charles Ferris agreed that there was not much chance of passing any legislation this year or next.

Nevertheless, domestic policy man Stuart Eizenstat, inflation fighter Fred Kahn, domestic policy staff communications advisor Rick Neustadt and Dale Hatfield of NTIA were on hand to explain why communications legislation has been elevated to an administration priority. The President's message had focused on how telecommunications fits into the whole initiative toward regulatory reform, stated as one of Carter's highest national priorities.

"Where the marketplace can work, we can get the government out of making marketplace decisions. Where regulation is needed, we must ensure it is well managed," stated the President. "Legislation is needed to eliminate needless regulatory controls, encourage competition and innovation, and keep telephone service affordable throughout the country."

Emphasis was placed on telephone service and all of the related common carrier issues with obvious impact on cable TV. It is a redefinition of the complex relationship between the regulated monopoly of AT&T and the emergence of new competitive forces.

From the President's statement: "Two critical changes have occurred since 1934. First, there have been extraordinary technological advances. In addition to the wired network, the telephone companies and new, competing firms are using satellites, lasers, microwave, and miniature computers to provide more and more systems and services for business and homes. The new technology makes it possible to hold meetings, transmit messages, do research, bank, shop and receive a widening variety of information and entertainment—all through electronics. In the process, the technology has invalidated the old assumption that all aspects of telecommunication's service are natural monopolies. Second, FCC and court actions over the last decade opened portions of the industry to competition. Despite these far reaching developments, the statutory framework has remained unchanged, and regulatory changes have come slowly."

The President commended Chairman Ferris for working hard on this effort, but said the Act itself needs changing. He urged the Congress to press forward and enact a bill which incorporates several basic principles: (1) competition should be encouraged and fully competitive markets should be deregulated, (2) restrictions based on out of date market divisions should be removed, (3) universal availability of basic telephone service at affordable rates must be maintained, (4) appropriate jurisdictional boundaries should be set, (5) the FCC should be given the authority to develop efficient means of assigning nonbroadcast frequencies, (6) the antitrust laws should remain applicable as before, (7) the technical quality of the telecommunications network should be protected, and (8) public participation in regulatory decision making should be encouraged.

How You Can Make MDS Work For You

By Diane Hinte, Sales Manager
T.E.S.T., Inc.

The pay-TV boom is here! Software is better than ever and many people truly enjoy entertainment in their own home without the hustle and bustle of traffic, cold popcorn, sticky theater floors and people stepping on their toes. Phones are literally ringing off the walls in pay-TV systems all around the country asking for premium programming. Now!

Suppose you have a small cable system in Kansas that has about 800 subscribers and suddenly you're faced with demands from non-cabled areas around your community asking for that "special channel?" What can you do to fulfill those requests? Today, there is a new medium for bringing home viewing to subscribers that has exploded in major cities around the country. Multipoint Distribution System, better known as MDS, has become a comparatively inexpensive way to transmit and receive signals via microwave through the air to reach subscribers.

Depending on transmit power and the sensitivity of receiving equipment, a customer radius of up to 40 miles "line of sight" may be served by a single transmitter. Whether or not MDS can be used in conjunction with an existing cable system involves technical and economic questions.

Since MDS is "line of sight" and that terrain has to be acceptable for both sending and receiving signals with few obstructions, checking over the topography in terms of large buildings and trees is a must. Microwave does not go through, but bounces off or stops at large objects. Do your geography homework and see if you may not have a similar kind of situation to work for you. (See Figure 1.)

It comes as no surprise that there is some legal red tape involved in getting started in MDS. First, you must decide what you want to do. Do you want to be the transmitter-owner common carrier or the party doing the programming and installation in your community? Unfortunately, the rules say that you may not do both.

As a non-broadcast common carrier service, the primary purpose of MDS is to deliver "special television" programs to specific locations. The service is under the common carrier rules and the revenue aspect of these rules must be adhered

to. This means that over 50 percent of the revenue must be derived from sources other than the common carriers operation.

Various common carriers, such as Microband Corporation of America in New York, have MDS transmitters all over the country and applications pending for more. First, find out if the area you have in mind is available before you start filling out papers and spinning your wheels. The Common Carrier Bureau of the FCC in Washington, D.C. has a book available containing every application granted, applied for and pending for transmitters all over the United States. A quick call to them would provide a lot of answers.

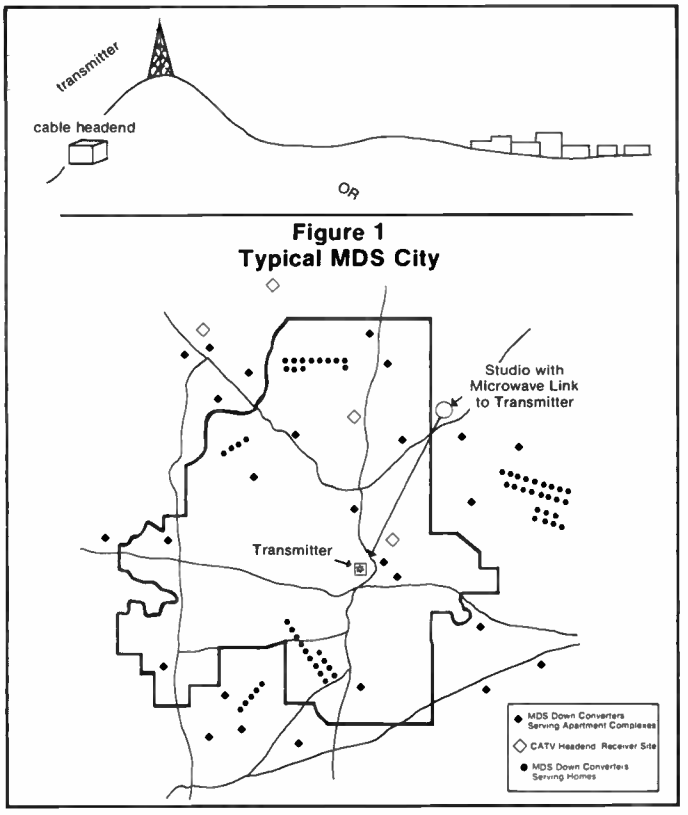

Figure 1
Typical MDS City

After papers are filled out and an application filed, it takes approximately six to eight months for approval. In some places there are five or six applications for the same area, so the FCC has its hands full. You may want to use the services of an experienced attorney to help you push the application through sooner.

The other part of the MDS picture is the programmer/installer. The common carrier usually has an omni-directional 10 watt transmitting antenna which radiates power approximately 20-25 miles. However, receiving a good saleable picture has to do with, once again, "good line of sight," antenna height and receiving equipment.

An MDS system is broken down into three parts: the transmitter (which we have already covered), the program source and the receiving equipment. Since you are more than likely a cable system operator, you may already have an earth station that you are using to receive programming off the satellite or perhaps you are using local origination from your headend via video tapes. Economically, smaller cable systems that cannot support an earth station on their own might have some neighboring systems that would be interested in sharing the cost of the receive site. The transmission of the pay programming from a central earth station via MDS could not only carry the programming to the individual headends, but could also serve all the non-cabled homes using receivers. (See Figure 2.)

Antenna Height Work Sheet for MDS Systems

The following instructions may be used to determine obstruction clearance between the transmitter and a receiver location. The instructions include the calculation for the curvature of the earth and the formula for the first fresel zone radius.

T = Transmitter height above MSL
R = Receiver tower base above MSL
O = Obstruction height above MSL (including trees and buildings).
D = Path distance in miles
d1 = Distance from "T" to "O"
d2 = Distance from "O" to "R"
EB = Earth Bulge
FH = First fresel zone radius
TH = Tower height needed

T = _____ ft R = _____ ft O = _____ ft

D = _____ miles d_1 = _____ miles d_2 = _____ miles

$EB = 2/3(d_1 \times d_2) =$ _____ ft

$FH = 1316 \frac{d_1 \ d_2}{(d_1 + d_2)\ 2150} =$ _____ ft

$TH = (O + EB + FH) - \frac{d_2}{d_1} (T-O-EB-FH)-R =$ _____ ft

Example:
T = 1485 ft. R = 1264 ft O = 1310 ft.
D = 19 miles d_1 = 17 miles d_2 = 2 miles
$EB = 2/3(17 \times 2) = 22.7$ ft.

$FH = 1316 \frac{17 \times 2}{(17 + 2)\ 2150} = 19.7$ ft.

TH = (1310 + 22.7 + 19.7)-2/17(1485-1310-22.7-19.7)-1264
= 1352.4 - 15.6 - 1264
= 72.8 ft.

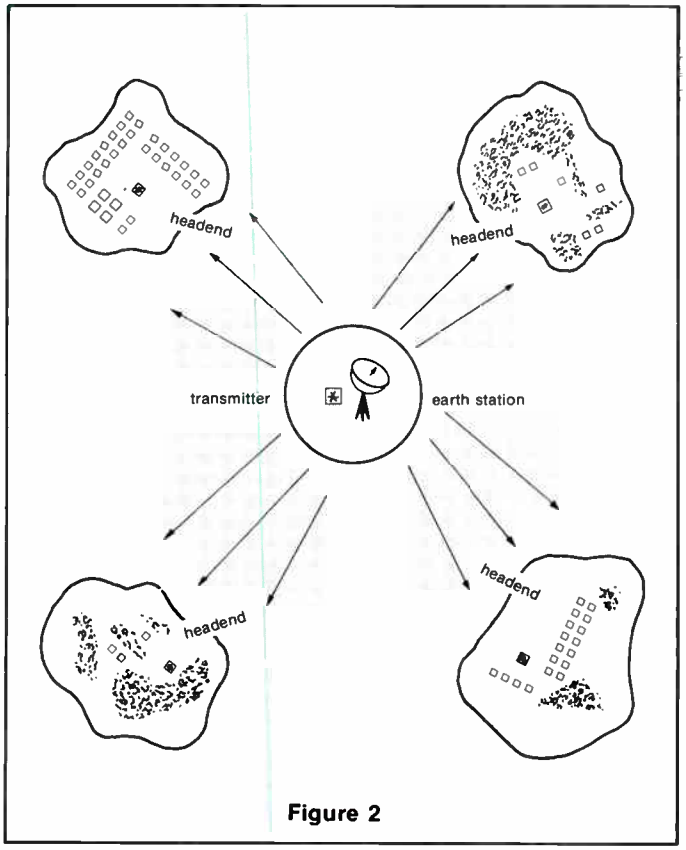

Figure 2

There are several manufacturers of equipment to receive MDS at 2150 to 2156 MHz. The typical installation includes a microwave antenna or parabolic dish, a downconverter to convert this frequency to VHF and a power supply. Along with various types of mounting hardware such as masts, guy wire, tools, assorted nuts and bolts, ladders, field strength meters, etc.; the downconverter and antenna are to be mounted on a subscriber's roof or on a nearby tower. You more than likely may already have most of this equipment, being ahead of the game. Equipment costs vary as do the performance of the units. You will find that the noise figure of the downconverter plays a critical role in picking the right equipment for the right application.

Presently there are units that range from crystal control (some people feel these are more stable) to units that have free running oscillators (some people feel these are more reliable). The prices vary from $380.00 for a crystal controlled downconverter to $32.00 in quantities. Most manufacturers offer a volume discount so the more you buy, the less you pay. Antennas are just as diversified. Starting at 11 dB in gain and selling for around $12.00, they go to larger antennas that have 21 dB gain and sell for about $23.00, to still larger dishes selling for up to $200.00. Power supplies are used in conjunction with downconverters and range in price from $14.00 for a variable fine tuning power supply to $75.00 for a frequency locked loop.

Equipment needs depend solely on application and therein lies the bottom line—how much is it going to cost? The more sensitive receiving equipment is, the more expensive. But certain equipment is required in areas where the distance from the transmitter might not give the subscriber a saleable picture using the less expensive gear. The price would be about $150.00 for that particular installation. The closer to the transmitter and the higher the receive sight, the less sensitive equipment may be utilized for a cost of $70.00 up to $100.00 per subscriber for equipment.

Based on a 10 watt antenna and clear line of sight, Chart A is a good guide line.

Chart A

Downconverter	Receive Antenna	Distance from 10 watt trans.
8 dB noise figure	11 dB gain	up to 8 miles
20 dB gain typical	16 dB gain	10-12 miles
	21 dB gain	15 miles
4 dB noise figure	11 dB gain	up to 10 miles
30 dB gain typical	16 dB gain	10-20 miles
	21 dB gain	25 miles

There are other considerations involved in using MDS. For one thing, MDS is a one-channel service. Technology has not advanced nor has the FCC decided on more then one channel at a time, so this medium would truly be for premium channel viewing only.

A common carrier charges to lease time from them within a 24-hour period. In some systems, the programmer pays per subscriber to the common carrier, either a percentage or a fixed amount of money.

Can MDS be used economically with cable in a rural area? Chart B is a cost table.

Chart B

Common Carrier (transmitter) costs:

Transmitter only: $16,800 (EMCEE).
Antenna, tower, installation: apprx. $15,000.

Installer/Programmer Costs:

Earth Station 5-meter dish: $10,000.
Low noise amplifier (less than $4,000, Scientific Communications).
MDS receivers — downconverter, antenna, power supply: $70.00-$200.00 per sub.
Programming: from $3.95 to $9.95 per subscriber — depending on program source.
Plus trucks, labor, ladders, office, general overhead.
Common carrier fees: from 20¢ per subscriber per month or approximately $27.00

Revenue costs:

Installation charge to subscriber: $25.00 industry minimum up to $325.00.
Deposit for equipment: special installations (larger dishes, towers, etc.) excess cost direct to subscriber.
Monthly subscription fee: from $13.00 to $26.95 per month with perhaps a six-month contract min.

Many of the costs are variable and all possibilities must be weighed. The addition of an MDS service may make a difference between having or not having an earth station in your cable system, thereby producing additional revenue from your cable subscribers as well. MDS is a whole new ball game with lots of ways to go and options to use. **C-ED**

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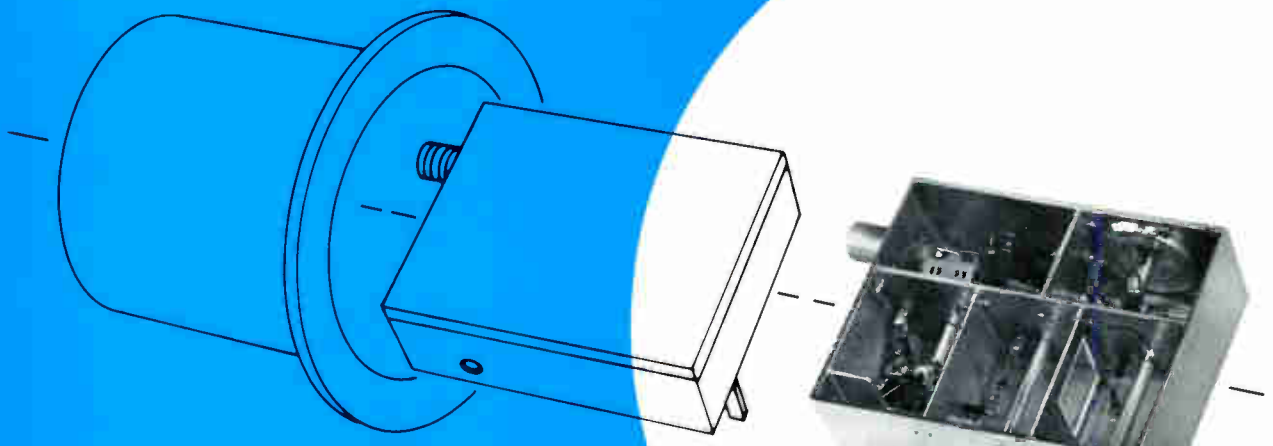

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Standard Communications

MDS, A Complimentary Alternative With A Future

By Fred Finn
Vice President, Corporate Development
Microband Corporation of America

With all the recent discussion concerning the technology and economics of STV and pay cable, a third transmission system is beginning to receive increased attention. Many cable operators, faced with spiraling interest charges and escalating costs of CATV construction, have turned to MDS as a means by which to increase their revenues without engaging in costly system expansion to serve unprofitable areas. Other operators anticipating franchise battles have become MDS customers to provide pay-TV so as to establish a local nexus within the community and "prime the market" for the introduction of full cable service.

Let's look at the dollars involved. When MDS was started in 1971, licensees were forced to use equipment developed for instructional television which cost as much as $1,500.00 per reception unit. At this level, only very large complexes could profitably be served. Now, just five years since the first MDS station went into commercial operation, the cost of a complete downconverter/antenna receiving package has been reduced to as little as $100.00, and these costs may be lowered.

The $6,000.00 plus per mile costs paid up-front to construct a coaxial cable system above ground, before one subscriber is hooked up, are not incurred by MDS retailers. MDS retailers can recover most of the capital expenses of the reception equipment as part of the installation fee which is charged to hook up subscribers. Also, unlike cable, there is no expense for the signal to "pass" non-subscribers and no interminable delays resulting from local franchising uncertainties. Many cost-conscious operators have used the MDS feed providing HBO, Showtime, Madison Square Garden, etc., to serve their cable system instead of installing earth stations. This transmission method presents cost advantages, particularly for small operators.

By providing pay-TV over MDS, the operator is able to

Fred Finn, vice president of Corporate Development.

establish product recognition, derive revenues and establish a market presence which places him at a competitive advantage with respect to other potential resources of pay-television programming. Speaking of other means to provide pay-TV, what are the dollars and cents of MDS versus STV?

The comparative finances of the over-the-air TV business are reasonably simple to establish. The primary concern for STV, MDS or pay cable is the delivery of acceptable signals to an individual customer's TV set. The cost of MDS and STV reception equipment is comparable as is the cost of obtaining program material. Therefore, the main differences are the costs of transmission time. The average cost for UHF/STV transmission time is approximately $400.00 per hour. With MDS, it may average only about $27.00-$30.00 per hour—less than 7 percent as much.

The lower transmission charges have the effect of opening up smaller markets for MDS. The $400,000-$500,000 investment usually required to establish a profitable MDS pay-TV business is dwarfed by the investment required to establish an STV station or even to extend cable to all the remote, low density locations within many operators' service areas. Most indications are that STV operators reach the breakeven point at the 35,000-55,000 subscriber level.

The breakeven for an MDS pay-TV vendor in a typical city has been indicated to be 4,000-5,000 subscribers. While there may be a dozen cities in the country having a population of 1.5 million where a five to ten percent household penetration would yield 50,000+ subscribers, (a realistic objective for STV), there are scores of cities with a population of 100,000 where a five to ten percent penetration over MDS would yield a potentially profitable business.

Even considering the main difficulties posed to MDS retailers—line-of-sight reception constraints and equipment delays—MDS delivered pay-television is increasingly being viewed as both an important adjunct to cable television operation as well as an on-going business itself.

Pay-TV is seen by most MDS common carriers as just the beginning. The revenues derived from this service have enabled MDS carriers to put in place a nationwide network of satellite interconnected stations available for the provision of various forms of business communications. One such form of communication is the transmission of information stored in computer data banks to the television set—Teletext.

Teletext operations are now current, or about to start, in at least six countries: the United Kingdom, Germany, Sweden, Japan, France and Canada. While all the methods employ digitally coded systems for information transmission, the results achieved and the techniques applied are considerable. Some systems such as the British Ceefax are designed to transmit digitally coded information during the vertical blanking interval on the television set, thereby permitting the simultaneous transmission of Teletext and traditional pay or entertainment programming. The French system, Antiope, on the other hand, was designed to transmit either during the vertical interval or full field, thereby utilizing the entire channel for data transmissions.

MDS operators have been active in the first steps of implementing these technologies in the United States. Micro TV, Inc., the Philadelphia MDS licensee, in conjunction with Satellite Syndicated Systems, introduced Cable Text this year. At present, it is contemplated that the service will provide an alternative to the telephone company for the distribution of nationally programmed news to cable operators where cable television systems are located far from leased news telephone lines. News information is transmitted during the vertical blanking interval of WTCG. The service will bring nationally programmed news from such sources as UPI, Reuters and AP to cable operators and their subscribers. Operators will lease the required decoder from the carrier for approximately $50.00 per month with future plans including installation of the decoder in the subscriber's home.

Microband Corporation of America recently conducted a demonstration of the Antiope system in Washington during the National Information Conference and Exposition sponsored by the Information Industries Association. The purpose of the test was to determine the compatibility of Antiope, Teletext and MDS.

This experiment was accomplished by installing an Antiope editing console and data multiplexer, known as a Didon, in the program path at the MDS station and an MDS receiving antenna and downconverter on the roof of the Sheraton Park Hotel. (See Figure 1.) The output of the downconverter was then demodulated at the exhibit booth and fed into an Antiope decoder and TV display.

Prior to the demonstration, various quantitive measurements were taken to determine whether the error rate performance of the system was affected by different program sources and to determine the best method of demodulation. A pseudo random bit generator was installed in the Didon at the station, and the output of the station's RF monitoring system was fed back to a bit error rate test set through different demodulators. (See Figure 2.) An attenuator was installed after the station's downconverter, and the signal level feeding the second converter and demodulator was reduced until a satisfactory bit error rate was achieved. The results of this test indicated that error rate performance was

MDS: What It Is

MDS was created by the FCC in 1963 when it set aside spectrum for the use of common carriers in the provision of local distribution services to the public. However, the rules as originally adopted restricted the maximum bandwidth of any channel to 3.5 MHz (thus effectively ruling out video transmission). As a result, no construction permit applications were made until seven years later when the bandwidth authorized was 6 MHz. Thereafter, the commission adopted operating rules and began issuing construction permits. The first MDS station (Microband's Washington, D.C. facility) was licensed and commenced commercial operations in August of 1973.

A typical MDS system consists of a fixed station transmitting omni-directionally in the 2150 MHz range to unlimited numbers of fixed receivers located around a metropolitan area. The intelligence transmitted is supplied by the customer, often the local cable operator, and may consist of private television, high speed computer data, facsimile, teletext videodata, slowscan or freezeframe video, control information, or any other communication adaptable to analog or digital radio transmission. Generally, it is delivered to the MDS station via satellite and/or by point-to-point microwave (although it may also be originated directly at the MDS station).

The MDS signal is intercepted by directional receiving antennas, downconverted from the microwave frequency to a lower frequency, and then fed (on an unused channel) to a standard television set or to a data terminal or facsimile device. The range of the transmission is usually 25-30 miles depending on the power and elevation of the transmitter, the size and characteristics of the receiving antennas and the existence of a line-of-sight path between transmitter and receiver.

Two 6 MHz channels have been allocated for MDS in the top 50 markets, although no second channel has yet gone on the air. In smaller markets, a 6 MHz and a 4 MHz channel have been authorized. Through these channels, MDS operators are able to provide very low cost, alternative broadband local distribution facilities. At the present time, the industry is licensed to provide service in some 70 markets in the United States. Forty additional stations are expected to be operational by the end of this year.


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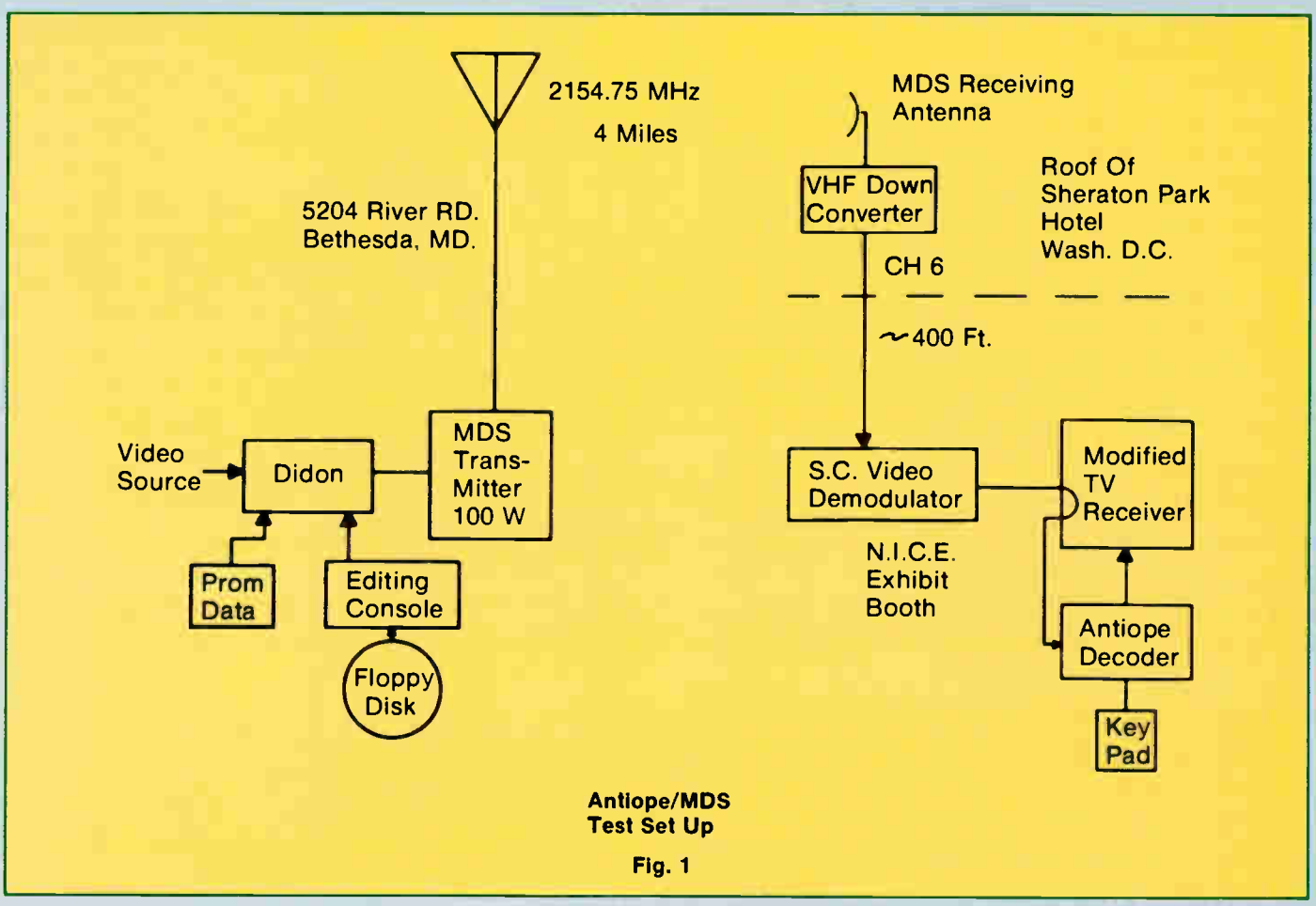
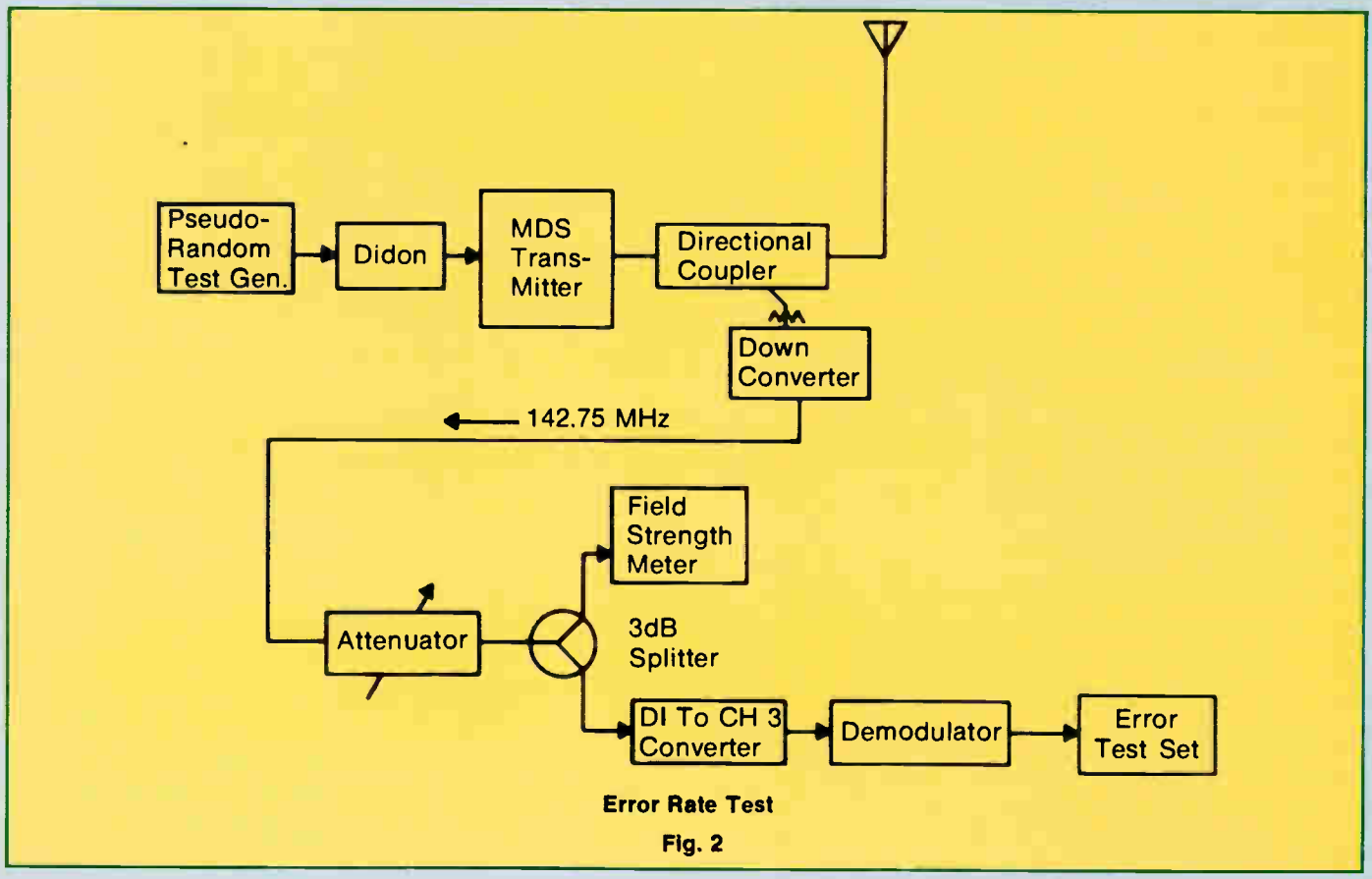


Antiope/MDS
Test Set Up

Fig. 1



Error Rate Test

Fig. 2

not significantly affected by program source and led to the choice of a commercially available demodulator.

After the test at the station, the demodulator and the error test set were taken to the roof of the Sheraton Park Hotel. The demodulator was installed after the downconverter and tuned to Channel 6. With the demodulator output feeding the error test set, the error rate was determined to be satisfactory.

After the preliminary transmission tests were completed, Microband conducted tests over a very limited portion of the system. A 60-page magazine was generated using the installed editing console. The data for the magazine was stored in a floppy disc, and the disc was then continuously read to provide information to the Didon. A second magazine, 20 pages in length, was stored in programmable read only memory (PROM), and transmitted through a second Didon data port on alternate scan lines along with the 60-page floppy disc magazine. Access times were measured using three line per field vertical interval transmission and a 32 line per field transmission. Lines 17, 18 and 19 were used for the 32 line transmission. Access times varied from five seconds for the former, to less than one second for the latter. It is important to emphasize that these preliminary tests made use of a very small percentage of the system's capability. The use of full field transmissions will dramatically reduce access times to greatly expanded storage bases. For example, it is anticipated that 1,000 pages can be accessed with a two-second mean access time.

During the course of the demonstration, information concerning weather, crop forecasts, airline flight information, financial statistics and horse racing results were transmitted over the MDS station, updated and displayed in the convention center.

The initial results indicated that Antiope and Teletext are compatible with MDS transmissions for the wide area distribution of data retrieval services.

The potential markets which Teletext will serve are as broad and varied as the imagination of those who will employ this new service. While the initial emphasis is being placed on the marketing of Teletext services for business uses, there are many commercial adaptations which could, within a reasonable period of time, be applicable to the home market.

In the case of Antiope, the page consists of 24 rows of 40 characters each. A 25th row of the page header contains control bits. These control bits allow the operator to display the number of pages being transmitted, the title of the magazine, the date and time. With mean access times ranging from two seconds to twenty seconds, a magazine may contain from 1,000 to 10,000 pages or more.

Considering the recent successes scored by specialized weekly magazines and the proliferation of magazine-formatted programming over commercial television, there are many who believe this to be a potential future market to be tapped by MDS operators employing one of the developing Teletext services. As the cost of news magazine print, paper and traditional means of delivery continue to escalate, newspapers and magazines distributed over the airways will become increasingly economical.

Just as cable operators have recognized the advantages of using MDS delivered pay-TV to expand their service areas, operators may find increasing cost savings in the delivery of Teletext and related programming over MDS as we begin the decade of the 1980s. **C-ED**

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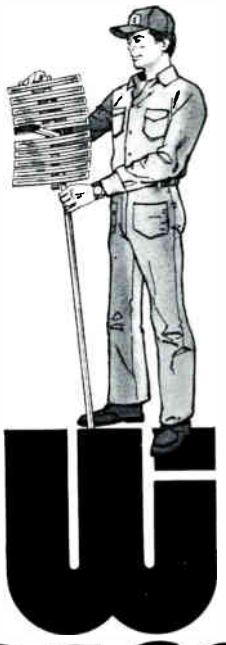

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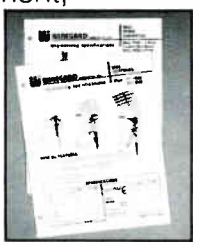

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Precise Location of CATV System Ingress and Egress

By Warren L. Braun, P.E.
President
ComSonics, Inc.

CATV system signal carriage necessitates excellent RF isolation from the external environment. Shielding discontinuities in the system permit ingress of undesired interfering signals which can contaminate system signal quality. Likewise, radiation of system carriage via shielding defects can cause illegal interference with external communication signals. The source and probable location of these CATV system defects is reviewed, and a technology and apparatus for their rapid location is discussed.

Cable television (CATV) systems are generally constructed with coaxial cable with a continuous external sheath, coupled with well-shielded amplifiers and passive devices to assure a maximum isolation from the external electromagnetic environment. Unfortunately, the planned shielding integrity of the system is rarely achieved over the entire plant, even at completion of construction. Furthermore, the system's integrity deteriorates from then forward over a period of time due to known factors, some of which are not subject to the control of the system operator. Stated simply, CATV systems can radiate signals which they carry while still functioning in a normal fashion. While most of this radiation is of relatively low level and of little apparent consequence, there is a precise limit at which this radiation becomes a violation of FCC rules. FCC rule 76.605(a)(12), specifically states that the system's radiation shall not exceed:

Frequencies	Radiation Limit (Microvolts/Meter)	Distance (Feet)
Up to and including 54 MHz	15	100
Over 54 up to and including 216 MHz	20	10
Over 216 MHz	15	100

Because these radiation criteria are contextual with other FCC CATV technical standards, it has been erroneously assumed that the radiated field limits apply only to the "three test locations" cited in the FCC rules. Nothing could be further from the truth. The FCC CATV radiation standards apply to all parts of the CATV system, every day of the year, not just at "proof time." Consistent with its other concerns for efficient utilization of the electromagnetic spectrum, the FCC rightfully places a high priority on the detection and elimination of unauthorized radiation, and the FCC's legal jurisdiction for enforcement in this area is well established.

Should the system's radiation approach or exceed the FCC limits it is quite likely that some clever individuals will help themselves to free CATV service. Marginal radiation standards interfere with non-subscriber TV reception in fringe reception areas creating public relations problems.

Via the system shielding flaws, the CATV system will receive varying degrees of interference with its own signal carriage. The sources of this interference are as manifold as the signals present in the external electromagnetic environment, including strong FM, TV, two-way radio and CB transmission. The latter interference source is particularly troublesome due to poor harmonic suppression of the transmitters and the substantial number of units.

In addition, power line noise may ingress where the cable sheath current is high. In two-way or sub low systems, short wave transmissions pose a serious ingress problem.

From the foregoing we conclude:

- The CATV system shielding integrity must be such as to always meet the minimum FCC radiation limits standard. This is mandatory.
- Such shielding integrity standards must be maintained plant-wide.
- To assure such plant-wide system shielding integrity, a surveillance program must be implemented, applicable to the entire plant.
- Plant-shielding integrity should be checked at frequent intervals, preferably on a continuous basis, covering the entire plant.
- Such surveillance should be cost efficient, preferably utilizing non-technical personnel.

Although it has been indicated that FCC radiation standards are to be met as a minimum, good engineering practice will set shielding integrity standards at least 20 dB higher (greater isolation), for a variety of reasons, principally to deal adequately with ingress problems. With two-way plant operation, this higher standard becomes mandatory.

Beyond legal and interference standards, there is a pragmatic, sensible reason to determine each source of leakage, as almost all such system flaws provide a point of entry for moisture. This may lead to potentially serious long-term damage to cable and equipment.

Some CATV system operators regard the legal requirement to measure system radiation a nuisance and perform minimum perfunctory measurements. However, they miss two very important points: the operator has a legal requirement to access and assure the shielding integrity of the entire plant; and there is sufficient economic justification to locate and fix sources of leakage to minimize the moisture damage to the plant.

For these reasons, there is a compelling need to devise the best possible shielding integrity analysis system which can be field implemented easily on a cost efficient basis. It is recommended that such a system be capable of detecting fields 20 dB lower than FCC standards to assist in the location of system shielding flaws at their inception.

Sources of Shielding Integrity Loss

There are a myriad of reasons for failure of the system's shielding integrity. The major causes are:

- Poor workmanship, primarily improperly fitted and installed connectors.
- Loose cable fittings, due in part to "connector swaging." Connectors must have an internal sleeve to maintain good long-term shielding efficiency.
- Physical damage to cable.
  —Cable kinked on installation leading to early failure of the sheath integrity.
  —Tree limbs rubbing on sheath causing sheath fracture. Adequate plastic protective sleeves minimize this damage.
  —Human damage including tree limb cutting and bullet holes.
- Warped or incorrectly tightened amplifier or device covers.
- Failure of "F" connectors to maintain adequate shielding, usually associated with "bargain" connectors. Long ferrule connectors greatly relieve this problem.
- Drop cable failure at connectors due to improper makeup or wind flexing. Fracture of sheath at house due to mechanical configuration of cable seizure device and at grounding block termination.
- "Wedding Ring" (radial) cracks at cable expansion loops.

All these flaws possess a common denominator. The radiating (coupling) aperture is highly variable and often temperature sensitive. This aperture is coupled to an indeterminant length of external cable sheath, which, upon being excited behaves very much like the unterminated long wire antenna it is. It is often many hundreds of wavelengths long with a relatively small attenuation per wave-length.

The nature of this field pattern with its characteristic "standing waves" confuses the uninitiated individual attempting to locate the precise source of the leakage. This complicates the location of the flaw, and sharply constricts the acceptable methodology for locating such flaws.

Methodology for System Integrity Flaw Location

Shielding integrity flaws can be detected by either of two concepts. One can deliberately radiate an external signal from a mobile communications transmitter in the immediate vicinity of the cable, while a second operator notes the level of this signal at some convenient point in the system. This method has been used quite successfully to locate system flaws, although it is cumbersome and expensive to implement.

A simpler method involves noting which part of the system is affected by radiation and which is not. Although this appeals to the uninitiated, it is totally unrealistic to implement.

Since we must measure the system radiation for legal purposes, and since the same flaw applies to both ingress and egress mechanisms, this paper will analyze egress measurement technology exclusively.

In measuring egress of CATV signals from the system, it will be helpful to analyze the following chart of two terminal voltages to be measured from a dipole at FCC radiation limits (0 dBmV = 1 millivolt across 75 ohms):

TV Channel	Dipole Reading in dBmV
2	-35.2
6	-38.7
7	-45.2
13	-46.8

Conventional methods of measuring this signal are:

1) CATV signal level meter with a minimum scale sensitivity of -30 dBmV, coupled with a preamplifier of known gain, coupled with a dipole. Entire package requires calibration prior to use.
2) Specialized precision field strength meters. Utilizing these devices with a calibrated dipole leads to very accurate measurements. All of these devices are cumbersome and expensive, requiring a trained operator.
3) Spectrum analyzers with preamps and a calibrated dipole. Although this technology will work, it is quite evident that it will be expensive to implement.

Each of these systems possesses a distinct disadvantage, i.e., they cannot discriminate between an egress signal and one normal to the external electromagnetic environment. The spectrum analysis method fares a bit better in this regard, but in the very busy electromagnetic environment of most urban areas, this can be compared to the problem of visually selecting a particular yellow taxi in traffic full of them.

In addition to the discrete carriers in the external environment, there is the very real problem of moderate to severe power line noise masking the signals to be measured. Further, if we are to measure signals to a standard 20 dB lower than required by FCC standard, all of the prior technology becomes questionable.

Receiving systems with greater sensitivity requires smaller predetection bandwidths to achieve acceptable signal-to-noise ratios. These narrow receiver bandwidths are incompatible with the detection of the wide band signals carried on the CATV system. Also, with variable tuned instruments, receiver tuning stability becomes a problem.

All these problems can be greatly alleviated by placing a special precoded carrier on the CATV system, coupling this with a fixed tuned receiving system to detect the egress of this signal. With fixed tuning, the receiver bandwidth can be made quite narrow, substantially reducing the power line noise masking problem and assuring accurate detection of the egress signal. The receiver "mistuning" problem is also eliminated.

An additional problem remains to be solved. As stated previously, the radiated field varies in a cyclic "standing wave" pattern, superimposed over the usual 1/D field versus distance relationship. The radiated field varying in both 1/D and cyclic fashion simul-

taneously renders localization of system flaws difficult and tedious.

This difficulty can be ameliorated to a substantial degree by a combination of near and far field detection technology. As is well known, the near field of any radiant flux is composed of electric flux, magnetic flux and an electromagnetic radiation field. The radiation field becomes the dominant factor beyond a few wavelengths, decaying at a 1/D rate.

However, at closer distances, the electric and magnetic flux dominates increasing at $1/D^2$ to $1/D^3$ rate, providing a greatly enhanced ability to detect the precise location of the RF leak in the cable system. Unfortunately, the usual dipole or other far field aperture is not well adapted to this task. The aperture best adapted to the detection in this near field region is the small aperture loop antenna ($R \leqq 0.10$). With this tool, coupled with a receiving system of adequate sensitivity, the task of precise location of cable system shielding flaws becomes realistic, accurate and quite rapid.

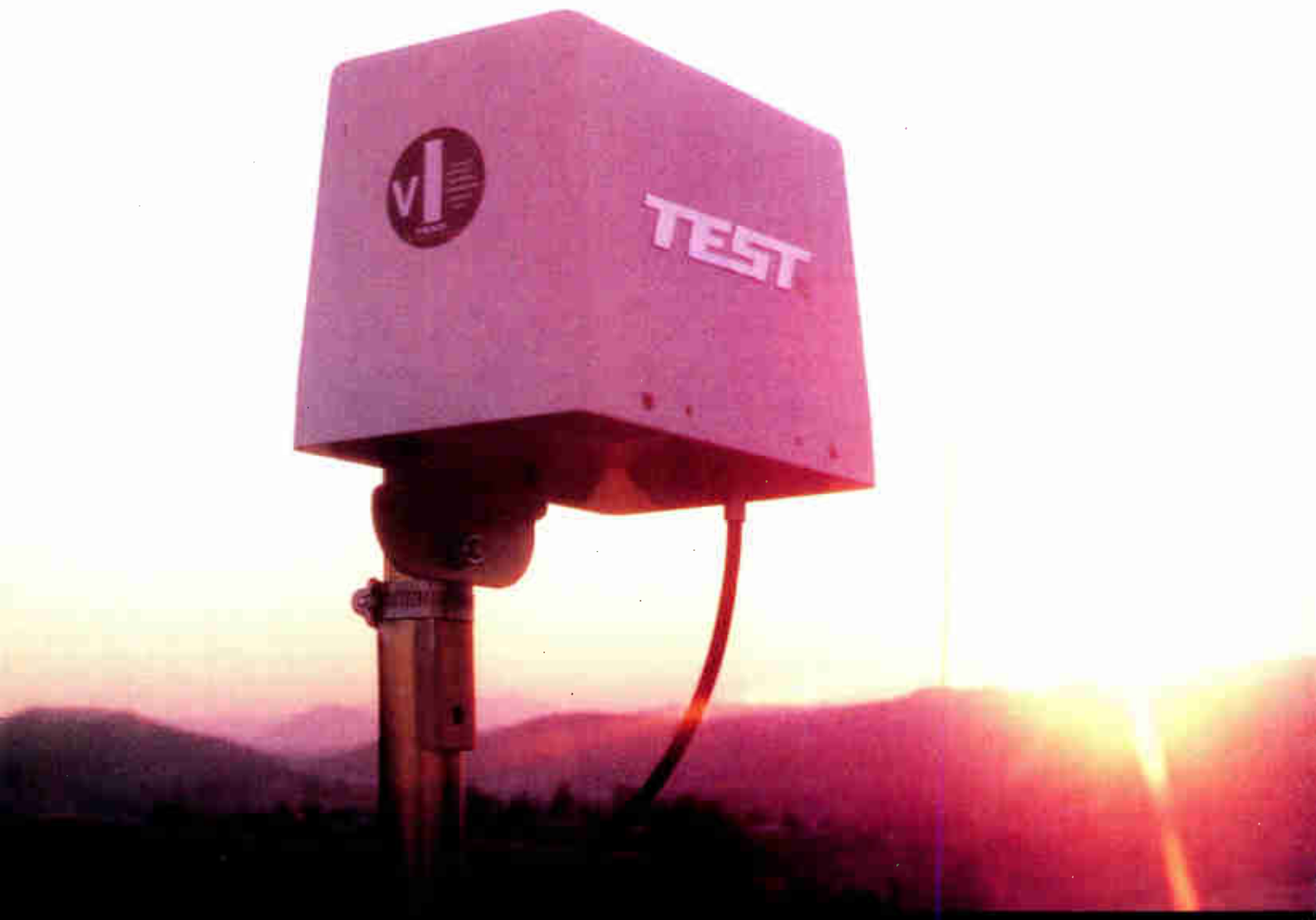
Hardware Solution

The optimum hardware solution would incorporate at least the following features:

a) A CATV system compatible signal source modulated in a unique fashion to permit immediate aural recognition of such modulation, i.e., modulation unique to the device, not duplicated in the external electromagnetic spectrum.

b) The receiving system to be utilized in conjunction with the signal source of a), should possess the following properties as a minimum:
   - —the receiver should be fixed tuned, preferably crystal controlled to assure accurate detection of the egress signal.
   - —should have sharply limited predetection bandwidth to reduce the masking power line noise and improve detection sensitivity.
   - —the receiver should be equipped with a small loop antenna to facilitate induction field discrimination for precise fault location.
   - —such receiver should be light weight and battery powered.

c) The system should be amplitude modulated to facilitate the easy discrimination of field strength changes. In addition, the inherent signal-to-noise of very weak signals is superior in the AM system. C·ED



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Selection Of Home MDS Reception Equipment

By Dean R. Ericson, Director/Pay Television
American Television and Communications Corporation, and
Donald E. Smith, Chief Technician
Denver MDS/HBO

As recently as early 1979, the cost of technically acceptable MDS reception equipment virtually eliminated the potentially lucrative single-family market as a high priority MDS target. With installation costs exceeding $300.00 (equipment plus installation labor), MDS-delivered television product was clearly geared to a very narrow luxury market. Consequently, most commercial MDS operators targeted their efforts to multi-family properties (apartments and condominiums) and to hotels, motels, hospitals, and other types of commercial properties.

Over the past year, reception equipment costs have plummeted (in part due to the entry of several new ventures into the market) and MDS operators are exploring a range of pricing and marketing strategies which bring the price to the consumer down to the point where operators are thinking "mass-market."

As the single-family business has developed, and operators begin to commit substantial capital to profitably create and maintain a single-family subscriber base, decisions regarding the types of home equipment to utilize become increasingly critical.

The purpose of this article is to describe the considerations for making these decisions.

An overriding objective for selection of MDS home reception equipment is to design a standard equipment package which can be used to provide adequate signal quality to all homes which:

- are within 20 air miles of the 100-watt MDS transmitter; and
- have line-of-sight to the transmitting antenna from some point on the home.

In addition, pricing and marketing considerations require that equipment costs be kept under $100.00.

MDS Reception Equipment Package Options

A complete MDS equipment package consists of five types of components.

The Antenna—The antenna is tuned to the MDS transmission frequency. It collects as much of the transmitted signal as possible and delivers it to the downconverter. Four types of antennas are available for home use:

- Tuned cavity with directors;
- Tuned horn;
- Solid two foot parabolic dish; and
- Parabolic "butterfly" receiver.

The Downconverter—The downconverter converts the MDS frequency to a VHF channel frequency which is not dedicated to an off-air signal. The general types of downconverters which are available for home use include:

- Crystal controlled;
- Frequency steered (AFC); and
- Manually fine tuned.

The Power Supply—The type selected depends mainly upon the type of downconverter utilized. Four types of power supplies are appropriate for home use:

- AC power supply, used with crystal-controlled downconverter;
- DC power supply, used with crystal-controlled downconverter;
- Variable DC power supply, used with voltage-controlled down converter; and
- Variable DC power supply with automatic frequency control; used with voltage-controlled downconverter.

The "A/B" Switch—The "A/B" switch provides 60 dB of isolation to prevent the MDS signal, which has been downconverted to a VHF channel, from being radiated by the subscriber VHF antenna. It also prevents interference between off-air VHF channels and the MDS channel at the TV set. Manufacturers produce "A/B" switches using ordinary toggle, slide, or push designs.

Roof Mounting Hardware and Connectors (side mount or tripod, drop cable, antenna/downconverter connectors, and grounding block)—Installation of a home MDS reception package is very much like installing a standard TV antenna as far as mounting hardware is concerned. Several manufacturers produce a full range of standard installation products.

Configuring the Package: Design Criteria

There is clearly a wide range of equipment options available to construct a "standard installation package" which is inexpensive enough for single-family applications. The equipment package design which is appropriate in one area may simply not be preferable in another market, depending upon local conditions. However, there are eight

broad design criteria which, if tailored and incorporated in the design decision, should produce an equipment package which can provide adequate, reliable service to the single-family customer.

Weather Resistance—The receiver, downconverter, mounting hardware, connectors, and cables located outside the home must be capable of withstanding temperature extremes, sun, wind, ice loading, precipitation, and other atmospheric conditions peculiar to an area.

External Appearance—All equipment mounted external to the home must have size, color, shape, and reflectivity characteristics which minimize the visual impact of the installation. Particularly in newer communities where developers and homeowner associations administer covenants and architectural controls, equipment and equipment sitting on the roof must be sensitive to these local restrictions.

Within Home Appearance—Since the "A/B" switch, power supply, and connector box are to be mounted in the living area, these pieces of equipment must have size, color and shape attributes which do not intrude upon the living environment.

Within Home Durability—The subscriber has relatively little direct contact with the equipment. However, the "A/B" switching mechanism must be capable of withstanding repeated customer use without damage or deterioration.

Simplicity—Ease of Operation—The "A/B" switch, in particular, must be operated with ease by the average subscriber. Switch labeling must unambiguously identify VHF and MDS positions. If manual fine tuning is a feature of the equipment package, it should have a relatively narrow tuning range. Ideally, the equipment package will not provide the customer with any fine tuning option, simply because many subscribers cannot operate the equipment properly and end up generating service calls.

Conversion Channel Options—Downconverters may be constructed to convert the microwave transmission frequency to one or more VHF channels. The assignment of commercial broadcast channels to the VHF band often dictates the most preferable downconverter frequency. One such frequency may be chosen for the entire MDS market-place. However, the operator may desire to have a variety of VHF channel assignments available. Accordingly, a downconverter with more than one fixed channel available may be preferred.

Ease of Installation—The entire package must be configured to minimize installation difficulties. In particular, all mounting hardware should require a minimum amount of securing to the home.

Signal Reproduction Quality—The signal from the MDS transmitter must be delivered to the television receiver with maximum gain and lowest noise, above the television's minimum threshold for reception. This is obviously a critical design criterion, as the customer typically expects nothing less than a "perfect picture" from his MDS equipment.

Selecting the Equipment

Figure 1 suggests which design criteria are important to the selection of the various MDS home reception package components.

Figure 1

	Weather Resistance	External Appearance	Within Home Appearance	Within Home Durability	Simplicity Ease of Operation	Conversion Channel Options	Ease of Installation	Signal Reproduction Quality
Antenna	●	●					●	●
Down Converter	●	●				●	●	●
Power Supply			●	●				
"A/B" Switch			●	●	●			
Roof Mounting Hardware and Connectors	●	●					●	

The antenna, downconverter, and mounting hardware external to the home must, obviously, be selected with these elements in mind. In addition, it is advisable to select these components such that the roof installation is relatively unobtrusive and streamlined.

The reception package components which come in direct contact with the subscriber (power supply, "A/B" switch, and manual fine tuning apparatus) must be durable, simple to operate, and aesthetically pleasing within the living environment.

From an installation point of view, all components which do not come "prepackaged" from the vendor can impact the ease of installation. In particular, roof mounting hardware should require a minimum of connection points.

The gain and noise characteristics of the antenna and downconverter are obviously most critical to the signal reproduction qualities of the equipment package.

So, what types of equipment best meet these design criteria? A precise answer depends, of course, upon characteristics of the MDS service area and other local factors. However, some general guidance can be drawn from the authors' experience in two MDS systems for selection of the key electronic components of the MDS reception package.

MDS antennas compare as follow on the key criteria outlined above:

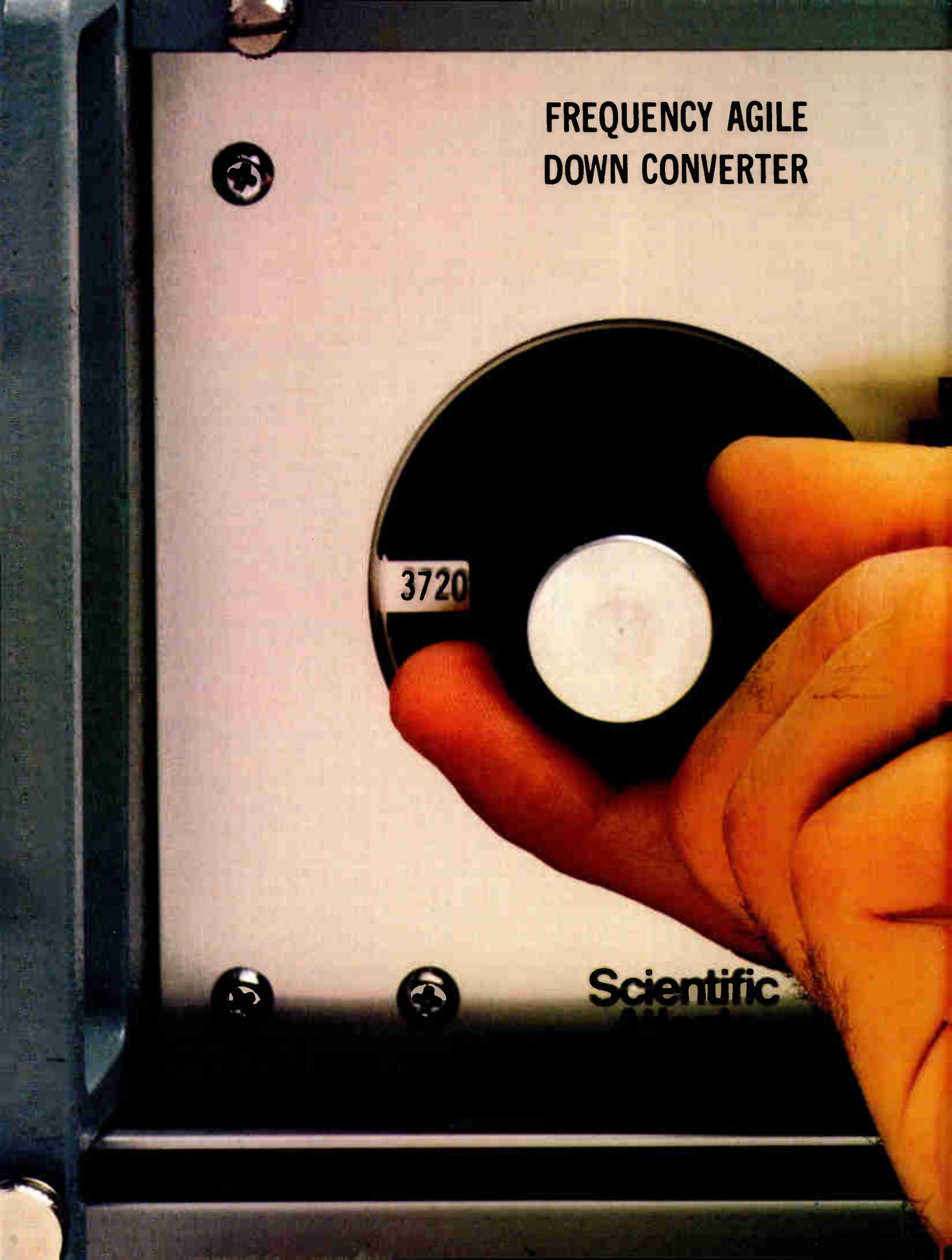
	cost	weather resistance	external appearance	ease of installation	signal reproduction quality
tuned cavity with directors	$ 18±	good	fair-good	easy	good (18 dB)
tuned horn	$ 25±	fair	fair-good	easy	fair (16-17 dB)
solid 2' parabolic dish	$100±	good	poor	difficult	excellent (21 dB)
parabolic "butterfly"	$ 18±	good	fair	easy	good (19 dB)

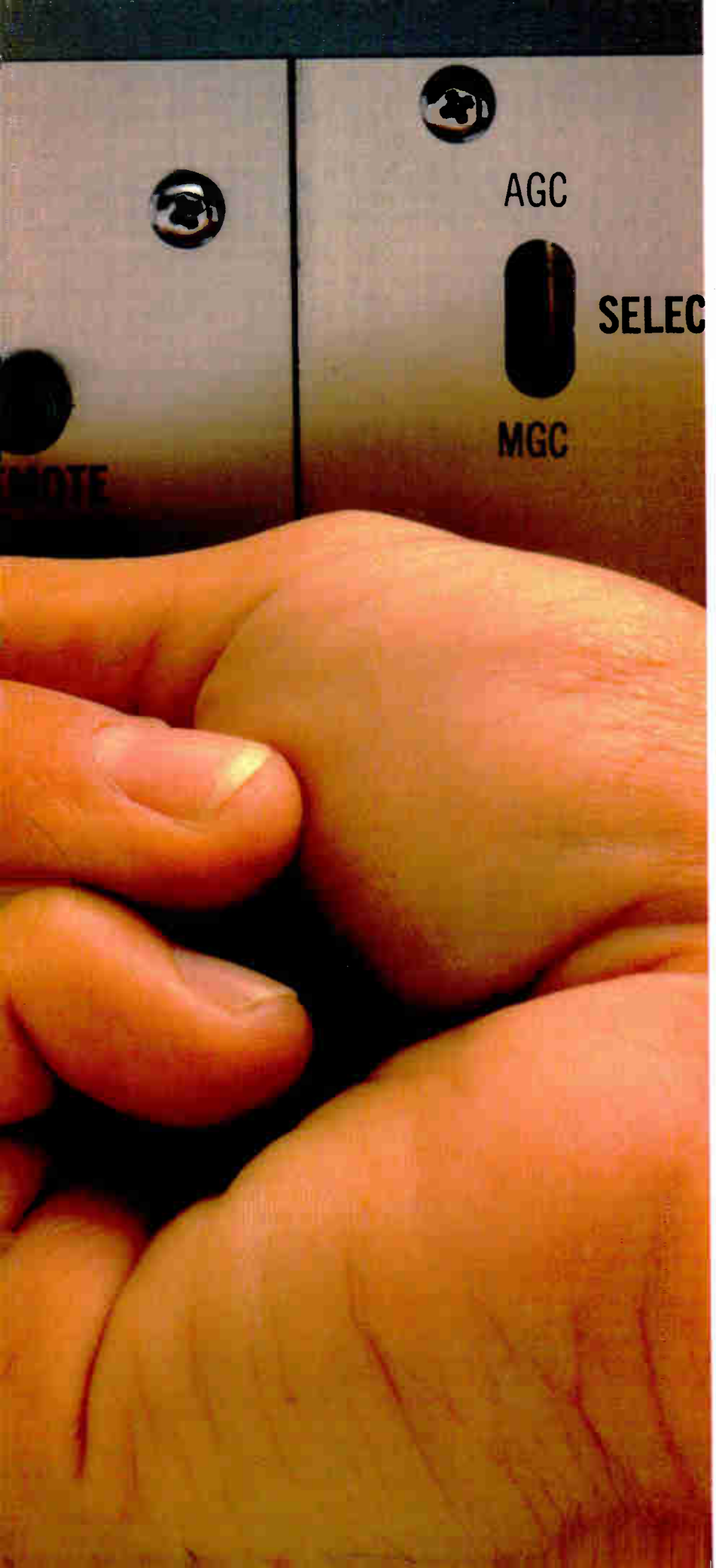
Thus, the tuned cavity with directors is the preferable antenna design, all key criteria considered.

The key downconverter selection criteria include weather resistance, cost, and signal reproduction quality (gain, frequency stability, and noise figure). An "ideal" downconverter would have high gain, low noise, stable frequency, be capable of operating in the -30 degrees F to +130 degrees F range, and cost under $50.00. An acceptable home downconverter would, in contrast have:

- gain of at least 15 dB;
- a noise factor of approximately 6.5 dB;
- frequency stability of +.005 percent;
- an operating range of -30 degrees F to +150 degrees F;
- a cost of $85.00 or less complete with power supply.

FREQUENCY AGILE DOWN CONVERTER





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Watching TV in the Line of Duty

By Don Houle, Chief Engineer
C-SPAN

The concept of the Congress being on television in the American livingroom, everyday, is very exciting to me personally as well as professionally. The part I would play in enabling the American citizen to watch his or her elected representative at work was the biggest motivating force for my joining the C-SPAN organization last February.

When I came to C-SPAN I also became a part of an industry that is growing at an astonishing rate. Cable television is here, and there is no limit to where it can go. I firmly believe that C-SPAN will play a major role in future developments within the industry because of its acceptance by the American people who watch its gavel-to-gavel coverage.

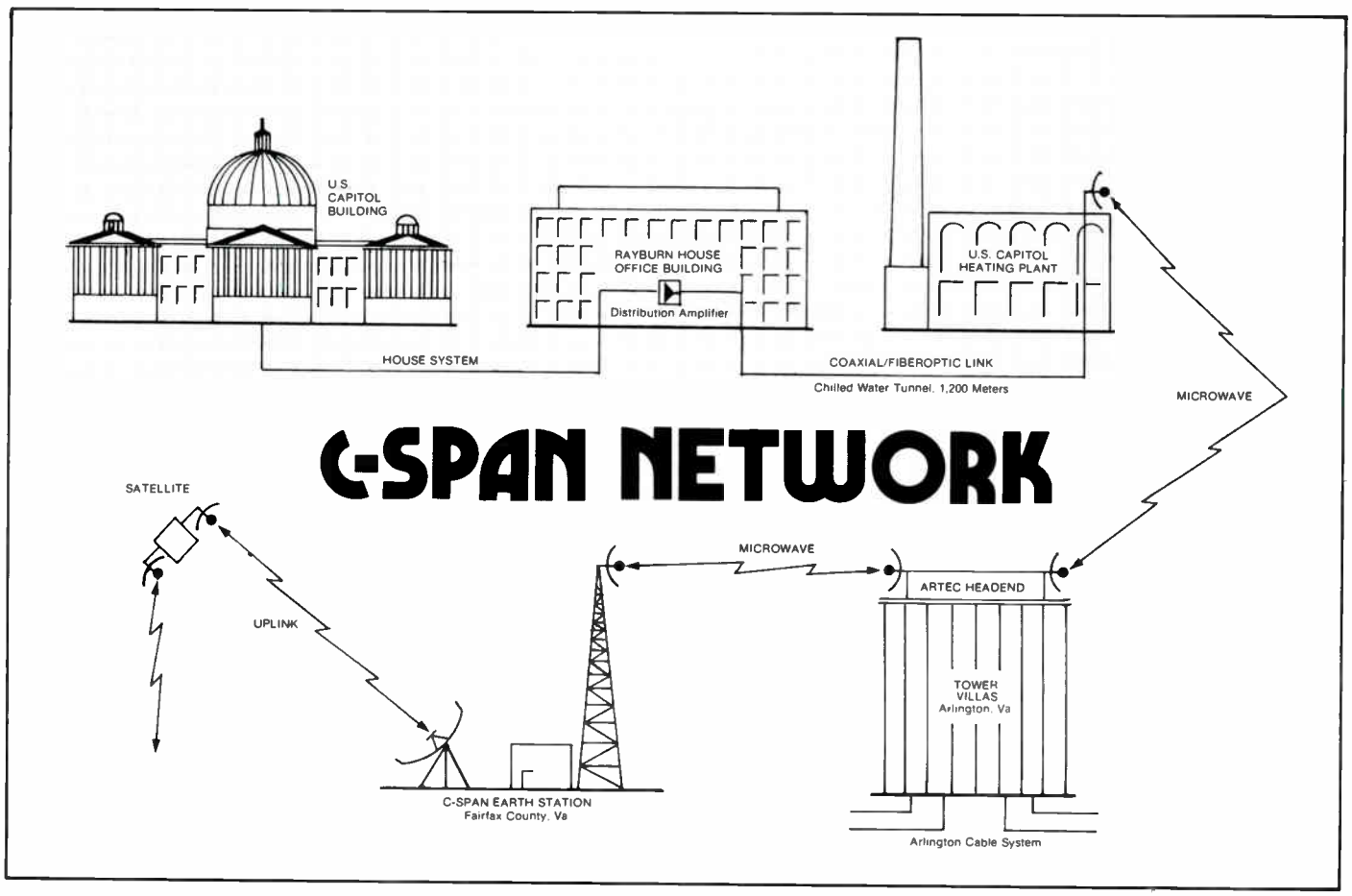
The acceptance by the public is evident by the mail and telephone calls we receive. However, I would like to discuss the acceptance of the C-SPAN broadcasts by the engineering community within the industry. I would also like to give my thoughts on cable television as a newcomer to the industry. I receive many calls from across the country by systems engineers requesting information on the broadcasts. These conversations usually lead to comments regarding the Congress in action. I would like to share a few of these comments and answer two of the most frequently asked questions:

- What is the C-SPAN broadcast schedule?
- What type of tone cues do I use and what are the cueing digits?

The broadcast schedule varies with the Congressional schedule. When Congress is in session C-SPAN goes on the air thirty minutes before the session begins. Each day during that time we deliver the Congressional schedule for the upcoming week. At the end of the sessions we televise the same schedule for a period of five minutes before cueing the affiliate systems. All times are given for the eastern time zone.

The tone cue is a Monroe Electronics 3000R37 Dual Tone sender. The digits for C-SPAN are 195* for turn on and 195# for turn off. I ensure that tones are transmitted properly by decoding them directly out of my 414 receiver from Satcom I.

The comments from different engineers about the



Congressional sessions have all been positive. One engineer from a system in California summed it up by saying "It is nice to see what our representatives are doing but all of the rhetoric that comes out of Washington had better be followed up by positive action. The American people are really getting involved thanks to C-SPAN." Another engineer from a Florida system called me one day and said that he had been admonished by a customer who was looking forward to the C-SPAN broadcast and Congress was not in session that day. He also stated that he looked forward to the Congressional debates as much as his customers. I must say that I also find myself getting involved watching Congress.

My position as chief engineer at C-SPAN has opened up a whole new world for me. I find that not only do I need to know what it takes to properly operate my earth station, I also need to know basically how cable systems are configured in order to properly interface with engineers who call. Several of these people have taken the time to call and ask me about the earth station, and in return, have given me valuable information about their cable systems.

I knew that these engineers who call and give me a little of their time are busy people, yet they always take the time to help me understand their systems. As a newcomer I'm left with a first impression of the cable television industry that can be summed up as follows: With people of this caliber in such a dynamic industry, the sky is the limit.

I find that this industry is highly organized and dedicated not only to the cable and satellite technology but also to the development of its people. The Society of Cable Television Engineers (SCTE) is a good example. When I first joined I was not sure of its function, but the more information I receive, the more anxious I become to make a contribution. In ten years with a common carrier in many technical capacities, I have never seen an organization that is so dedicated to the technical development of its people. I look forward to getting involved in SCTE activities and interesting associations with other members.

Don Houle Has Already Watched 600 Hours Of Live Television.

Donald R. Houle has a most unique and unusual job. Since March 19 of this year, the 32-year-old Lewiston, Maine native has watched over 600 hours of "live" television; all in the line of duty. For the last six months Houle has served as the chief engineer for the Cable Satellite Public Affairs Network (C-SPAN) which is headquartered in the nation's capital. The television he's been watching originates from the floor of the U.S. House of Representatives and is subsequently transmitted via satellite to cable systems in over 500 communities throughout the United States. Houle's number one responsibility is to keep the C-SPAN Washington satellite up-link in top working order.

Cable Programming for October

Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders
C-SPAN (times approx.)		12 pm-6 pm (Mon. & Tues.) 10 am-6 pm (Wed.-Fri.)	195°/#	F1, #9
Calliope		6:30 pm-7:30 pm (Mon., Tues., & Thurs.)	168°/#	F1, #9
CBN		24 hrs.	No	F1, #8
ESPN		7 pm-6 am (Fri.-Mon.) 6 pm-4 am (Mon.-Fri.)		F1, #7
Front Row		2:30 pm-2:30 am	481°/#	E,C F1, #12 P,M F1, #10
HBO	1	6:00 pm-1:46 am	Program	F1, #24
	2	6:30 pm-2:24 am	729°/#	F1, #22
	3	5:30 pm-1:01 am	Scramble	F1, #23
	4	5:00 pm-1:39 am	835°/#	F1, #20
	5	5:00 pm-1:32 am	Duplication	
	6	3:30 pm-1:30 am	940°/#	
	7	3:30 pm-1:00 am	Take-2 E.	
	8	6:00 pm-2:05 am	592°/#	
	9	5:00 pm-1:45 am	Take 2 W.	
	10	6:00 pm-2:15 am	681°/#	
	11	5:30 pm-1:30 am		
	12	5:00 pm-2:15 am		
	13	2:00 pm-1:15 am		
	14	2:30 pm-1:25 am		
	15	6:00 pm-1:28 am		
	16	6:00 pm-1:33 am		
	17	6:00 pm-1:15 am		
	18	5:00 pm-1:30 am		
	19	5:00 pm-2:28 am		
	20	3:00 pm-1:46 am		
	21	2:00 pm-1:45 am		
	22	5:00 pm-1:15 am		
	23	6:00 pm-1:13 am		
	24	6:00 pm-1:55 am		
	25	6:00 pm-2:01 am		
	26	5:00 pm-1:25 am		
	27	2:30 pm-2:35 am		
	28	2:30 pm-1:40 am		
	29	6:00 pm-2:10 am		
	30	6:00 pm-1:05 am		
	31	5:00 pm-1:28 am		
HTN		8 pm-10 (11) pm	207°/#	F1, #21
KPIX (time permitting)		2-4 hrs. per day	No	F1, #1
KTVU		7 am-1 am (weekdays) 7 am-4 am (weekends)	No	F1, #1
MSG Sports	2	7:30 pm-9:30 pm	438°/#†	F1, #9
	6	11:30 pm-2:30 am		
	13	11:30 pm-2:30 am		
	14	7:30 pm-9:30 pm		
	18	8:00 pm-1:00 am		
	20	11:30 pm-2:30 am		
	21	7:30 pm-9:30 pm		
	22	8:30 pm-10:30 pm		
	24	7:30 pm-9:30 pm		
	25	10:00 pm-12:00 am		
	26	8:30 pm-10:30 pm		
	27	11:30 pm-2:30 am		
	28	7:30 pm-9:30 pm		
	30	7:30 pm-10:30 pm		
Modern Talking Pictures		12 pm-5 pm (weekdays) 7 am-12 pm (weekends)	048°/#	F1, #22

Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders
Newstime		24 hrs.	276°/#	F1, #6
Nickelodeon		10 am-11 pm (weekdays) 9 am-11 pm (weekends)	749°/#	F1, #11
PTL		24 hrs.	No	F1, #2
Reuters		Not in use yet.	No	will use F1, #18
SPN		10 pm-8 pm (Mon.-Sat.) 24 hrs. (Sun.)	429°/#	F1, #21
Showtime	1	5:30 pm-1:30 am	576°/#††	E, C, F1, #12; P, M, F1,
	2	6:00 pm-1:15 am		
	3	6:30 pm-12:30 am		
	4	6:00 pm-1:00 am		
	5	6:30 pm-1:15 am		
	6	3:30 pm-12:30 am		
	7	3:00 pm-2:00 am		
	8	6:30 pm-1:30 am		
	9	6:30 pm-1:00 am		
	10	6:00 pm-12:45 am		
	11	6:00 pm-1:00 am		
	12	6:30 pm-1:40 am		
	13	3:30 pm-3:00 am		
	14	3:30 pm-12:30 am		
	15	5:30 pm-1:00 am		
	16	6:00 pm-12:40 am		
	17	5:30 pm-2:00 am		
	18	5:30 pm-12:30 am		
	19	6:30 pm-1:30 am		
	20	3:30 pm-2:00 am		
	21	3:30 pm-1:30 am		
	22	6:30 pm-12:35 am		
	23	6:00 pm-1:30 am		
	24	5:30 pm-1:30 am		
	25	5:30 pm-1:45 am		
	26	6:30 pm-1:40 am		
	27	3:00 pm-1:35 am		
	28	3:00 pm-1:40 am		
	29	5:30 pm-1:15 am		
	30	5:30 pm-1:00 am		
	31	5:30 pm-2:00 am		
SIN		2:30 pm-1 am (weekdays) 4 pm-12 am (Sat.) 11 am-11:15 pm (Sun.)	No	Westar II, #7
Star Channel		9:30 am-2:20 am	311°/#E. 519°/#W.	F1, #5
Trinity (KTBN)		24 hrs.	No	F1, #14
WGN		5:42 am-3 (3:30) am (Mon.-Thurs.) 24 hrs. Sat. & Sun. Ends 3 am on Sun.	No	F1, #3
WOR		6:30 am-1:30 am		F1, #17
WTCG		24 hrs.	No	F1, #6

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

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

† Commercial substitution 601°/#; Thurs. baseball 706°/#.
†† On-line 679°/#; off-line 753°/#; access 843°/#.

Get Your "Hands On" High Technology

Fiberoptics. Microwave transmission. Earth stations. Addressable taps. Broadband communications technology is ever-changing and increasingly complex. In fact, sometimes it's hard for a busy technical person to get a handle on just what's happening.

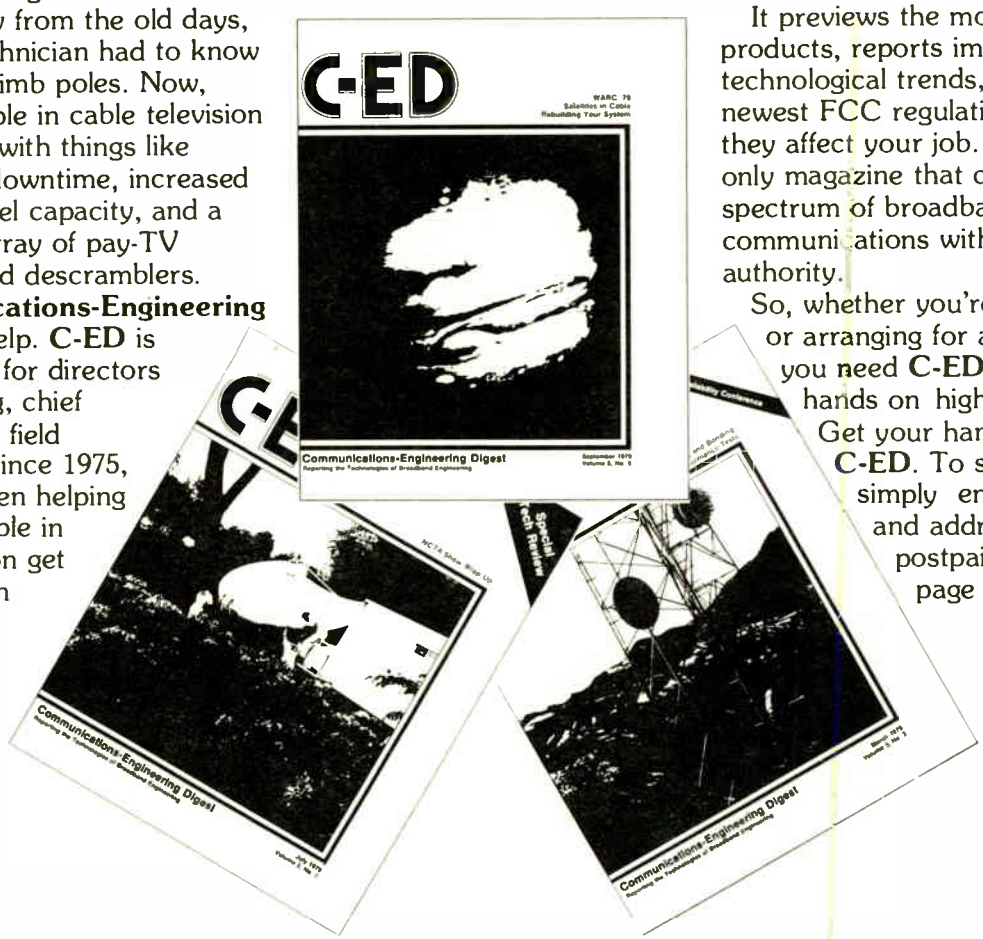
It's a far cry from the old days, when all a technician had to know was how to climb poles. Now, technical people in cable television have to cope with things like transponder downtime, increased system channel capacity, and a bewildering array of pay-TV converters and descramblers.

Communications-Engineering Digest can help. **C-ED** is *the* magazine for directors of engineering, chief engineers and field technicians. Since 1975, **C-ED** has been helping technical people in cable television get their hands on high technology. In fact, **C-ED** is the official publication of the Society of Cable Television Engineers. **C-ED** covers it all: from blue sky to-technology to down-to-earth daily maintenance.

C-ED explains hardware usage in your own technical language.

It previews the most promising products, reports important technological trends, and covers the newest FCC regulations and how they affect your job. **C-ED** is the only magazine that covers the whole spectrum of broadband communi ations with originality and authority.

So, whether you're installing taps or arranging for a satellite uplink, you need **C-ED**. Get your hands on high technology. Get your hands on **C-ED**. To subscribe, simply enter your name and address on the postpaid card on page 16.



Get Your Hands On C-ED

Comprehensive Directory of Satellite Industry Published

Phillips Publishing, Inc., publisher of the biweekly newsletter *Satellite News*, announced publication of the first annual comprehensive directory of the satellite industry.

The 1979 Satellite Directory contains a listing of satellite hardware manufacturers; a listing of earth stations; a "who's who" and "what's what" at major carriers including the major satellites, who operates them, who owns them, who leases transponders on them; governmental bodies dealing with the satellite industry; and programming suppliers and sources.

The Directory can be purchased for $45.00 from Phillips Publishing, Inc., 8401 Connecticut Ave., Chevy Chase, Maryland 20015. For purchases of four to ten copies to the same address, the price descends to $35.00 each, and for 11 or more copies, $30.00 each.

Bulletin on GTE Sylvania's Programmable Converter

A four-page bulletin describing Sylvania's 40-channel programmable converter for CATV applications has been issued and is now available.

Designated the model 4041, the programmable converter uses a microcomputer to store and recall up to ten television channels. Consisting of a hand-held control unit and compact electronic unit, connected by a replaceable 25-foot cord, the model 4041 accepts up to 40 channels from a 75-ohm CATV house drop and converts the channels to either channel 3 or 4.

For a copy of the model 4041 programmable converter brochure, write CATV Operation, GTE Sylvania Incorporated, 10841 Pellicano Drive, El Paso, Texas 79935.

New brochure on GTE Sylvania's programmable converter.

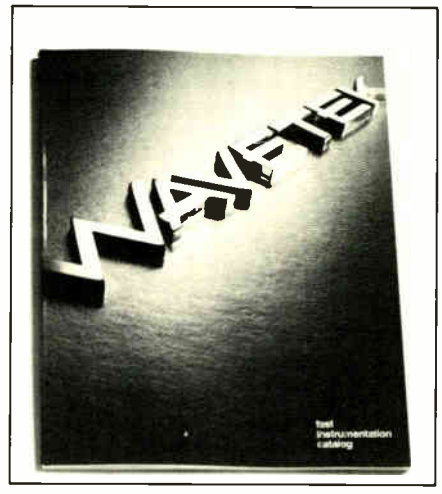
New Test Instrumentation Catalog from Wavetek

Wavetek has recently released a new Test Instrumentation catalog. This new 112-page catalog contains photographs and comprehensive technical specifications of over 100 different Wavetek models.

Included in the catalog are specifications for the new models which have been added to the Wavetek line of test instrumentation equipment—which now includes signal generators (to 2500 MHz), display oscilloscopes, RF components (detectors, filters, attenuators, crystal oscillators), programmable synchronizers, TV and CATV test equipment, function generators, programmable function generators, pulse generators, phase meters, and telecommunications test equipment.

Two complete indexes (a subject index and a model number index) plus five selection guides (one each for: function generators; programmable function generators; pulse generators; sweep generators; and signal generators) help make this new catalog simple to use.

For additional information, contact Wavetek Indiana, Inc., P.O. Box 190, Beech Grove, Indiana 46107, (317) 783-3221.



Wavetek's new Test Instrumentation catalog.

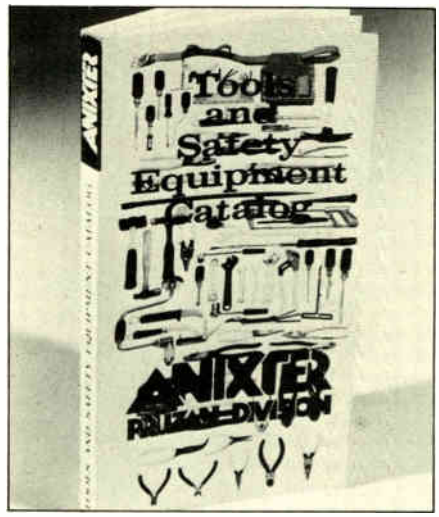
Anixter's Pruzan Division's New Tools and Safety Equipment Catalog

This handy, 150-page pocket sized catalog contains illustrations and descriptions of over 6,000 tool and safety equipment items in stock at Anixter's Pruzan Division facilities.

Manufactured by the top equipment manufacturers, these items are specifically designed to serve the needs of people in the industries who build and maintain telephone, CATV and power lines.

In addition to the items contained, the catalog also provides information on pricing, return merchandise, how to order and four prepaid return order blanks.

For a copy of this new pocket size catalog, write or call the nearest Anixter Pruzan Division office. East: 800/631-9603, West: 800/426-4948, in Washington; 206/251-6760, in New Jersey; 201/328-0980, and in Alaska: 907/274-8525.



Tools and safety equipment catalog from Anixter.

CableFile/80

See Our Card On Page 14.

Which would you choose?

You can weigh the difference yourself.

Special Pre-Publication Price $39.95 before October 15, 1979

After Oct. 15, 1979-$44.95

MAKE YOUR CHOICE TODAY.

CableFile is published annually by the Communications Division of Titsch Publishing, Inc., 1139 Delaware Plaza, Denver, CO 80204 (303) 573-1433.

Converters

Jerrold Introduces New Converter Line

General Instrument Corporation's subsidiary, Jerrold Electronics, introduced a new line of 36-channel converters, including both set top and remote control models.

According to the company, the new J-Series provides high reliability and reduced cost. This compact and advanced product line, with consumer conscious styling, is ideal for either operator sale or lease to the subscriber. Modular construction has been employed, leading to ease in repair, and a detachable cord on the remote models is utilized, making field replacement practical.

The new models also feature factory installed options, to combine pay-TV operation with Jerrold's indoor and outdoor Starpack descramblers. Other options include: a TV set on/off option, and offset frequency requirements for both harmonically related systems and Canadian frequency requirements.

Additional information may be obtained by calling or writing Jerrold Electronics Corporation, P.O. Box 487, Hatboro, Pennsylvania 19040, (215) 674-4800.

Test Equipment/ Power Supplies

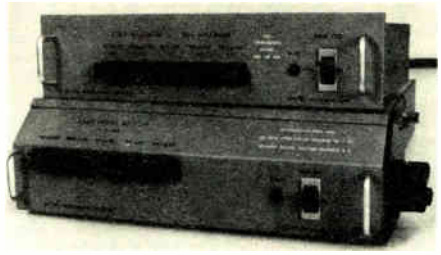
New Plug-In Modules From KeyTek

KeyTek Instrument Corporation has announced a major extension of the ramp generating capability of its System 1000 Surge Test System.

Two new plug-in modules now provide linear ramp pulses up to 3kV, at rates ranging from 100V per microsecond to 10kV per microsecond.

One module, model PN246, extends the ramp to a 1200V peak, while its companion unit, model PN286, produces a high, usable peak of over 3kV. The latter capability is particularly useful in surge testing and qualifying a three-terminal gas-gap and higher-voltage varistor types.

For more input, contact KeyTek Instrument Corporation, 220 Grove Street, Box 109, Waltham, Massachusetts 02154, (617) 899-6200.

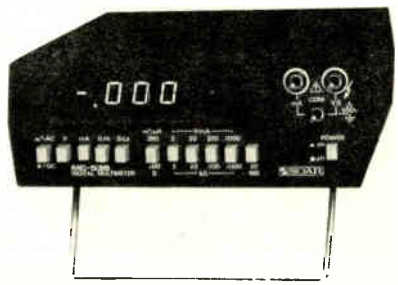


Soar Features High-Accuracy Multimeter

The model MC-535 is a 3-½ digit LED bench-type multimeter that features five function modes (DCV, ACV, DCmA, and Ohms) and provides automatic zero adjustment and polarity indication. All modes appear on the LED display. The completely battery operated unit can also be supplied with an AC to DC adapter.

This instrument features a DC measurement range of 200 mV to 1,000 volts, an AC measurement range of 200 mV to 750 volts, a current measurement range of 200 uA to 1,000 mA (DC and AC), and a resistance measurement range of 200 ohms to 20 megohms. Maximum indication is 1999 to -1999.

For additional input, contact Soar Electronics Corporation, 200 13th Avenue, Ronkonkoma, New York 11779, (516) 981-6444.



Two-Way Power Divider From Engelmann

A two-way cable TV power divider with high isolation is now available from Engelmann Microwave.

Designated as the model D3742-2, this power divider allows one or two downconverters to be connected, with a typical isolation of 28 dB or more. Specifications for this high quality power divider include: a maximum insertion loss of 0.2 dB, amplitude slope of ± 0.01 dB/MHz, and ripple of ± 0.1 dB maximum peak to peak. The maximum input VSWR is 1.20.

The model D3742-2 features type N connectors that are tarnish free bright nickel in one-piece construction.

For additional information, contact Carl Schraufnagl, Engelmann Microwave Company, Skyline Drive, Montville, New Jersey 07045, (201) 334-5700.

Miscellaneous

Monolithic 4-Bit A/D Converter From TRW

A low-cost, video-speed, monolithic, 4-bit analog-to-digital converter has been introduced by TRW LSI Products.

TRW says the device, designated the TDC-1021J, is the industry's only monolithic 4-bit A/D converter available off the shelf.

The new converter can digitize an analog signal at rates from DC to 30 megasamples per second without an external sample and hold circuit. The single chip is fully parallel, TTL compatible, and utilizes 1,000 closely matched bipolar components.

The TDC-1021J is suited for a wide range of applications where high speed, small size, and low cost are important but high resolution is not. Among these applications are video data conversion, radar data conversion, high-speed multiplexed data acquistion, X-ray and ultrasound imaging, image processing, and facsimile systems.

For further information, contact Jag Chopra at TRW LSI Products, P.O. Box 1125, Redondo Beach, California 90278, (213) 535-1831.

CCTA Technical Committee Activities

By Kenneth Hancock
CCTA Director of Engineering

From the pioneer days when the first community antenna was set up to pull in distant television signals, through the refinement of coaxial cable technology, fiberoptics and cable distribution using satellite, the development of the cable industry in Canada has been closely interwoven with advancements in technology.

Added to the necessity of keeping up-to-date with new technology, is the very real problem of working with government regulatory agencies such as the Canadian Radio, Television and Telecommunications Commission (CRTC) and the Department of Communications (DOC) to ensure that the needs of the cable industry are known and taken into account when standards and regulations are formulated.

It is not surprising, then, that the CCTA maintains a very active Technical Committee. The degree of the association's commitment to the technical side of the industry can be seen in the wide-ranging areas of involvement of the committee and the number of people working with it.

The extent of the committee's work has required a slightly different set-up than other association committees. The committee works through a technical executive structure to a Technical Committee, which consists of 15 subcommittees each with its own chairman, terms and conditions and objectives.

Current subcommittees are active in areas such as fiberoptics, safety, regulations for cable television receivers and joint-use support structures.

We found that on the technical side, we have a considerable number of continuing requirements in specific areas. We negotiate with the DOC on a more or less continuous basis on subjects such as Broadcast Procedures (BP-23) which set out the technical guidelines for the cable industry.

Recently, the Technical Committee has been involved with the DOC in a cooperative review and rewrite of BP-23.

Tied in with BP-23 is the proof of performance cable operators must complete to show their compliance with the regulations. We suggested that for smaller systems (referred to as C & D systems) that it was unnecessarily complex. DOC agreed and now we have a very simplified form for these smaller systems.

The Technical Committee has also been able to bring about changes in the method of applying for DOC technical operating and construction certificates. Previously, all applicants, both large and small, had to fill detailed engineering briefs. We've managed to persuade the department that only the successful applicants need to fill such a brief. We've cut down a lot of costs there.

The technical executive also, from time to time, sets up subcommittees to deal with special matters on an ad hoc basis.

Indiana Cablevision Offers a Wealth of Information

By Toni Barnett, Managing Editor

Nine channels of microprocessor-based automated information are currently serving subscribers to Indiana's Ft. Wayne Cablevision, a subsidiary of Cox Cable Communications, Inc. The equipment used is from System Concepts, Inc.

Ft. Wayne Cablevision's televised information programming originates in three distinct groups: automated channels, remote public access channels, and programming from the downtown studio.

The automated channels originate at the headend from two systems. A Q-III Billboard™ single channel and a Q-III dual channel system displays a complete weather station readout, and Reuters News-Views, two channels of general, sports and financial news with NYSE Ticker Service.

These channels are constantly displaying a one-row crawl with a shared 85-row internal memory. Each crawl is capable of crawling half of the memory, or 1,360 crawl characters per channel with local and remote keyboard access. The three channels are microwaved from the headend to the receiving dish at the downtown studio or hub.

The second group of information display are the remote public access channels. These channels originate with remote keyboards located in Ft. Wayne City: the City and County Building, the Public School Administration Building, the campus of Indiana/Purdue University (a shared network), and the City Library.

The edit or composing monitors at the public access sites are accessible by tapping the trunk line at each site for program video and on-line editing.

All four of the remote keyboards are individually connected to send and receive modems (see Figure 1), and are frequency shift keyed (FSK). The keyboards are connected through the send and receive modems located in the downtown studio. Three of the Q-III single channel systems each have 85-row internal memories. The systems also have a dedicated title area with the appropriate type of title access from the respective keyboard.

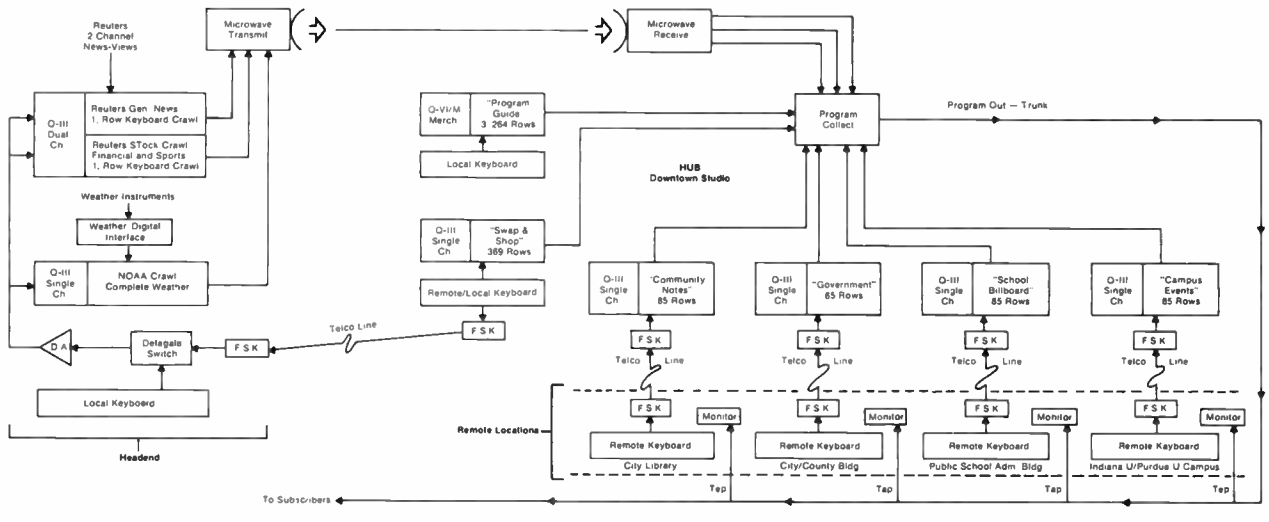
The system located at Indiana/Purdue University provides "Campus Events" programming. The system in the Public School Administration Building presents a "School Billboard" program, and a third Q-III single channel system in the City and County Building provides a "Government" channel.

The fourth system, located at the City Library, has a slightly different format than the previous three systems mentioned. This "Community Notes" program has a dedicated title area with title access. It features a one-row crawl that conforms with the type of title access.

The third group originates in the downtown studio. The studio utilizes one channel using a Q-III Billboard single channel system with local keyboard access only.

The second channel that's located at the hub is provided by the Q-VI Merchandiser™. This is an automated mass memory information display system that utilizes an external digital cassette memory to provide 3,264 rows of display.

All nine information systems are collected at the downtown hub from the headend via microwave, and from the public access sites by telco lines, where they join the cable system trunk. The information is then transmitted to subscribers.



Legend: F.S.K.—Transmit/Receive Modem (Frequency Shift Keyed)
D.A. — Distribution Amplifier

MOD-KITS®

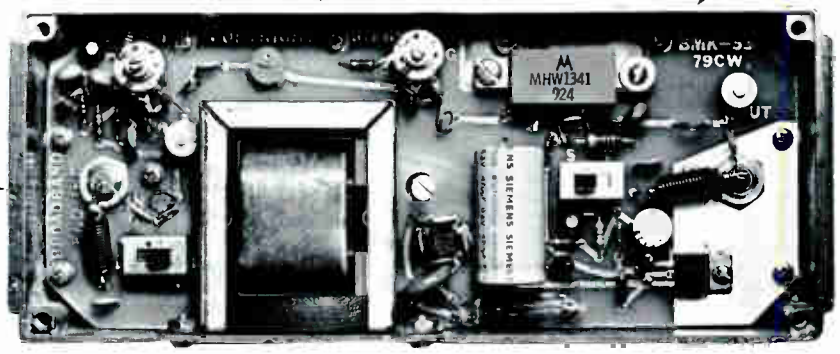
The Economic Alternative

JERROLD SLE-1, 20 & 2P PUSH-PULL I.C. LINE EXTENDER

12 to 20 dB Cable EQ. at 300 MHz

Double Sided G-10 Glass Board

Fast Acting Transzorb Protects I.C. Chip.



35 Ch. +45/40 dBmV

300 MHz Bandwidth

Xmod: – 65 dB
S.O.: – 74 dB
T.B.: – 87 dB

High/Low Voltage Selector Switch

Two Stage Power Supply Protection
(Ckt. Breaker & M.O.V.)

Full Thermal & Overvoltage Protection on I.C. Regulator Chip.

- ★ 35 Channel capability.
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- ★ New cover plate furnished with every kit.
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Push-Pull Hybrid Kits are available for all Jerrold Starline One and Starline Twenty Modules

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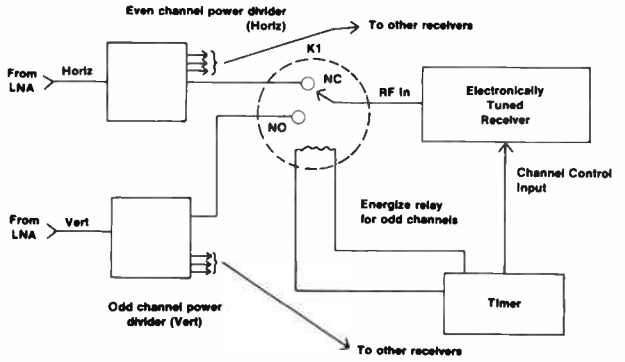
Editor's Note: *Occasionally we receive alternatives to problems submitted to* C-ED. *We have received such a suggestion from I. Switzer, of Switzer Engineering Services, concerning a solution to providing switching for a TVRO receiver* (C-ED, *June 1979, page 94.) The following is a reprint of the original question and graphic and an alternate method by Switzer.*

Q I have a dual polarized system installed with an electronically tuned receiver and a couple of manually tuned receivers. My problem is that I want to command the electronically tuned receiver from my night-time movie channel which is on an even-numbered transponder to an odd-numbered channel during the day. How do I accomplish this?

A As shown in Figure 1, the timer (or que tone detector) etc. will command the receiver to the different transponders. The relay will switch the RF input line to the receiver between horizontal (even) and vertical (odd) feeds. The specifications for the relay are important since isolation between the two polarizations must be maintained.

Figure 1: Original Diagram.

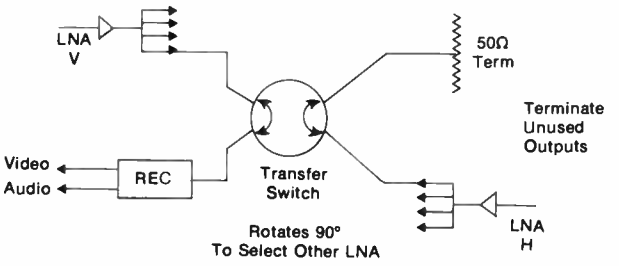


Specification for K1

Isolation: >40 dB
Insertion Loss: <1 dB
VSWR: <1.5:1

Frequency Range: 3.7 to 4.2 GHz
Operating Voltage: Either AC or DC
Connectors: Type N Female.

Switzer's Alternative.



The changeover is best made with a "transfer switch" which is a special form of DPDT switch. The transfer switch is shown with the receiver fed from an "H" splitter. Actuating the switch changes over to the "V" splitter. The unused splitter output is terminated in 50 ohms, and all unused splitter outputs should be terminated. The SPST relay leaves the unused splitter output unterminated. Additionally, switches, terminations, cable, etc., should all be characterized for operation at 4 GHz.

Q I have a college electronics professor living at the end of my system. He constantly complains that his pictures are snowy and says that the signal-to-noise is about 36 dB. Every time I measure it I get closer to 40 dB. Who is right?

A Probably both of you. The professor is measuring the video signal to RMS noise, and if you are using the standard CATV signal level meter method, you are measuring peak carrier to RMS noise. The video measurement measures the noise relative to the video information. Since the sync information and some "set-up level" are added to the video (40 IRE units of sync and usually 7-1/2 IRE units of set-up,) the reference for the video measurement is 20 log $\frac{(140-47)}{140}$ or 3.55 dB lower than the reference for the CATV measurement. This means your measurement should have been 3.55 dB.

But take heart, it could have been worse. There are many different "weighting" curves used by other transportation systems so almost any number is possible.

Both of the above methods use white or flat noise sources so translating from one to the other is easy. Things get even harder to explain to the professor if he had a pink (higher at lower frequency) noise reference or a blue (tilted up toward the high frequencies) as reference. The moral to this story is: don't argue about signal-to-noise ratio measurements until all the various factors are well-known.

★ **Times Wire & Cable**, CATV Division, has announced the appointment of **A. C. (Dyke) Deichmiller** to fill the post of director of Market Research. His responsibilites will include technical advisor for fiberoptic sales as well as overseeing the division's customer service efforts. Deichmiller's background spans 20 years of involvement with high technology electronic products. Before joining Times, he founded and operated OPTRON, Inc., a manufacturer of Electro Optical Tracking & Measurements Systems. Prior to that he served in various capacities as engineer, sales engineer, quality control manager, branch manager, and finally vice president of Marketing for MB Electronics, a division of Textron.

A. C. Deichmiller.

★ **Fred Burton Jr.** has been named vice president-operations for **TOCOM, Inc.** Burton will direct TOCOM's rapidly expanding engineering, manufacturing and field service activities, including the company's major assembly plant, which is manned by more than 200 employees in Matamoros, Mexico. A native of Kentucky, Burton holds a bachelor of science degree in electrical engineering from the University of Louisville and a masters of business administration from Harvard University. He has been vice president and general manager for Home Metals Products, Inc., of Plano, Texas, and president of Micropac Industries, Inc., of Garland, Texas. He also held various supervisory and managerial positions during 12 years of employment with Texas Instruments, Dallas.

★ **Troy Cable Communications, Inc.** has announced the appointment of **Mike DeWeese** as chief technician. DeWeese previously worked 12 years for WDTN Channel 2 in Dayton, Ohio, and five years for AT&T in Ohio. DeWeese graduated from DeVry Technical Institute in Chicago, Illinois. He holds a first class Federal Communications Commission Radio Telephone license.

Mike DeWeese.


IN
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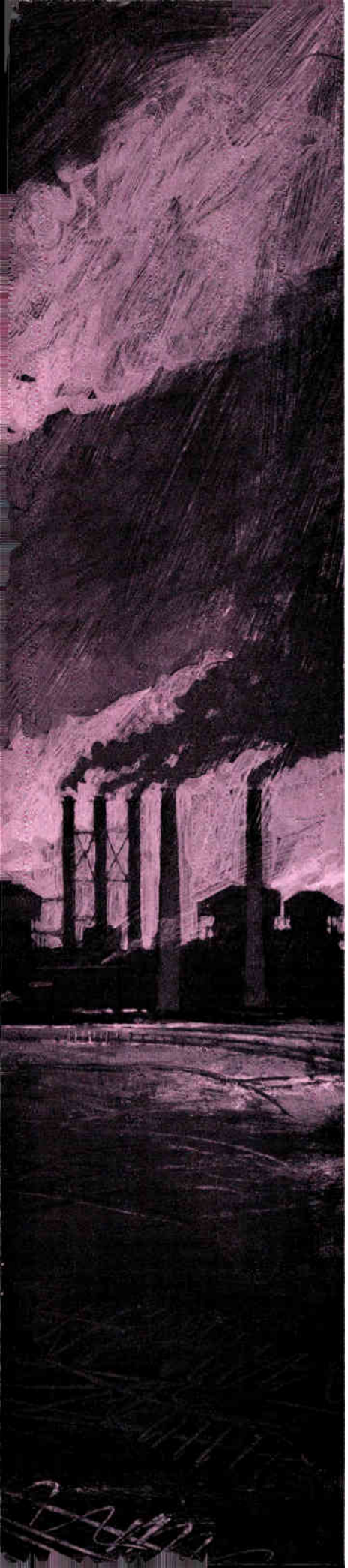
MAGNAVOX



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