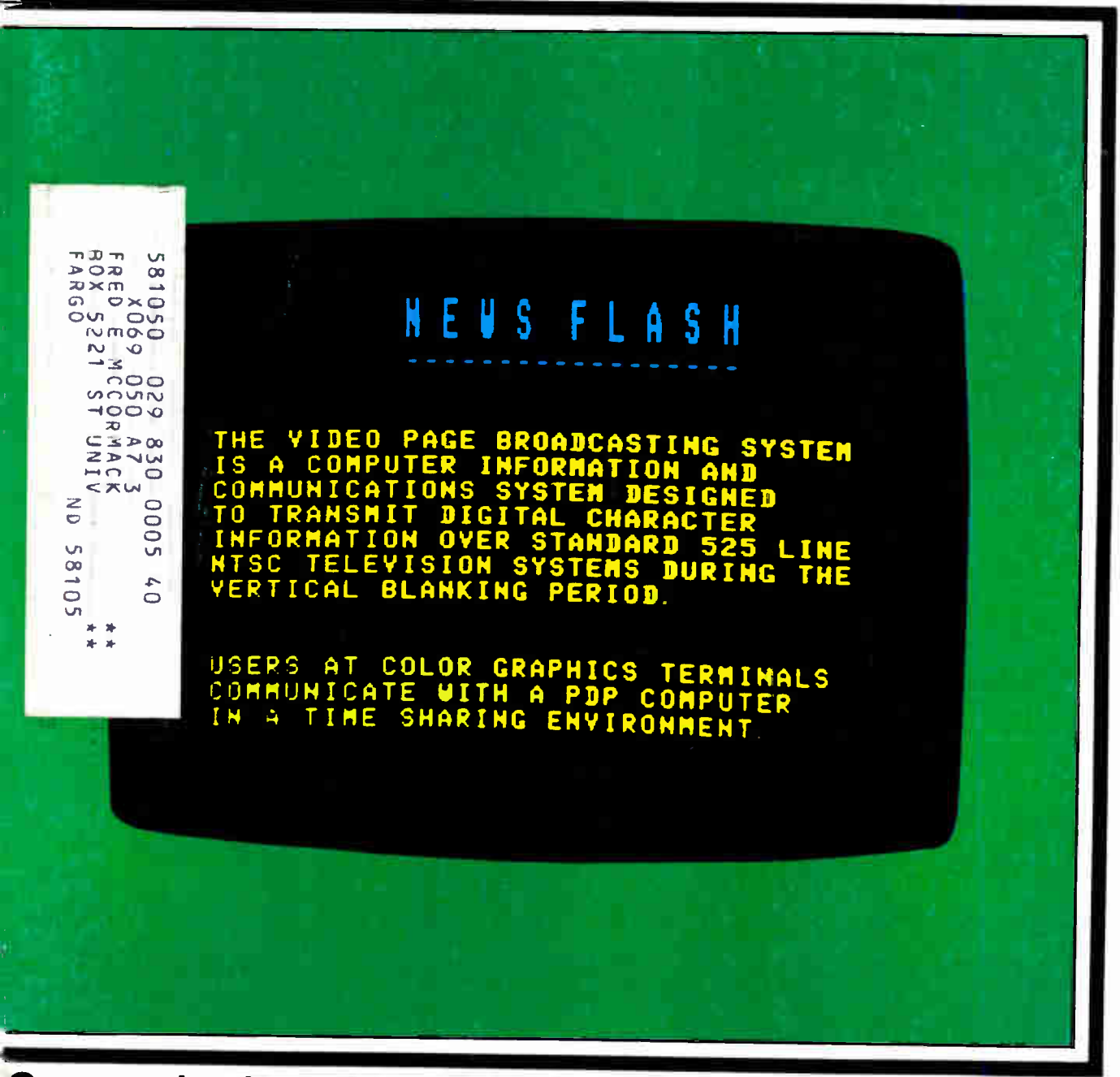
C-ED

N.C.T.A. Convention Issue

C-SPAN Photo Album
Non-Entertainment Services
CATV's Frequency Allocation Chart



Communications-Engineering Digest
Reporting the Technologies of Broadband Engineering

June 1979
Volume 5, No. 6

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.

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OAK Communications Inc. | CATV Division

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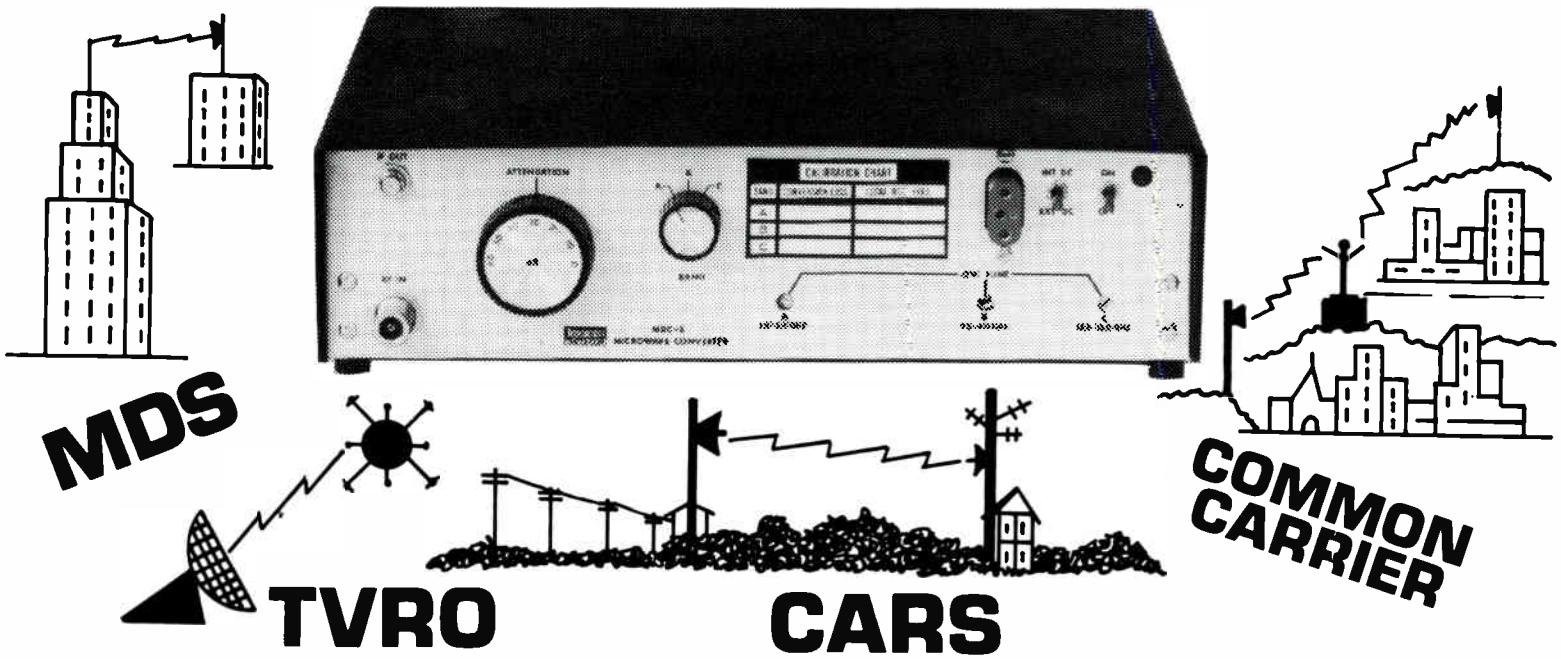

Texscan's microwave down converter permits measurement in the MDS (2.1 GHZ) TVRO (3.7 GHZ) and CARS (12.7 GHZ) band with existing VHF test equipment. Spectrum analysis, signal strength and even microwave sweeping are possible with the MDC-3.

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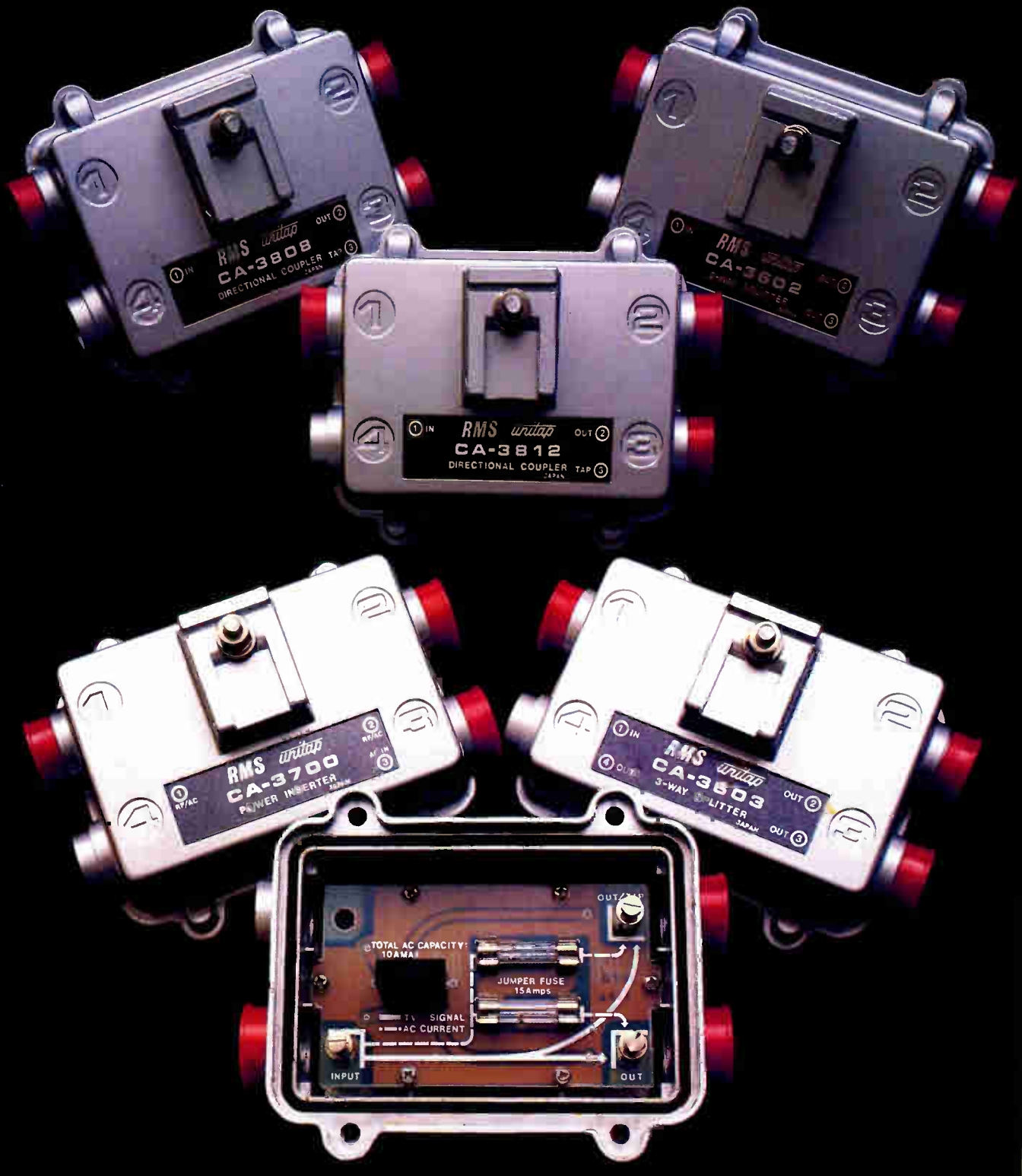

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C-ED News at a Glance

TULSA, OKLAHOMA—Reuters and Satellite Syndicated Systems, Inc. (SSS) have reached an agreement for use of the **new SSS-CableText System to deliver Reuters' News-View by satellite.** SSS said News-View would be delivered using this new system of message transmission, which will utilize the vertical blanking interval on RCA's Satcom I transponder six.

Michael Blair, manager of Cable Services for Reuters, said Reuters and SSS would display the news service, called "News-View By Satellite," at Booth 24 and 215 respectively, at the NCTA Convention in Las Vegas.

The service, aimed at the hundreds of smaller systems around the country, **involves one channel made up of financial, sports and general news, horoscopes, national weather and Hollywood gossip.**

According to Ed Taylor, president of SSS, "Implementation of the new technology, called SSS-CableText, now enables every cable system to offer data news services to its subscribers. **Any system** already **receiving channel 17 off of transponder six will be able to get "News-View By Satellite"** without installing an additional satellite receiver. SSS-CableText will lease a decoder to any system for $50 per month. The decoder, by Micro TV, will replace the character generator. (See *C-ED*'s non-entertainment programming section, specifically pages 29-31.)

WASHINGTON, D.C.—**Phil Verveer,** chief of the FCC's Cable Television Bureau since March, 1978, **was named Chief of the Broadcast Bureau** earlier this month and assumed his new responsibilities May 7. **Verveer's successor at the Cable Bureau is Randy Nichols,** who most recently was an attorney-advisor to Common Carrier Bureau Chief Larry Darby.

WASHINGTON, D.C.—Henry Geller's "point man" at the National Telecommunications and Information Administration, **Paul Bortz, has resigned effective June 30.** He will return to Denver, Colorado, where his family resides. He plans to pursue some consulting opportunities while at NTIA, the administration's communications agency under the umbrella of the Commerce Department, Bortz was known for "taking the lead" in posturing the executive branch's political and technical positions, but at the same time making clear when the opinions expressed were his own.

WASHINGTON, D.C.—**Hearings on S. 836, "a bill to provide for the financing of telecommunications facilities for broadband services in small towns** and rural areas, and for other purposes," introduced March 29 by Senator John Melcher (D-MT), **developed into a three-sided debate.** At issue is who should be eligible for Federal loans to facilitate development of communications in rural areas. Spokesmen for the Carter Administration pushed for acceptance of an administration initiative" which would only guarantee privately-placed commercial loans. Telephone interests expressed the opinion that they were best equipped to provide future services and, that because of their long standing experience working with REA, they should be allowed to continue as the primary recipient of low-cost funding.

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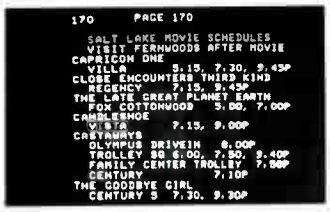
Inside C-ED



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FEATURES

DEPARTMENTS

OPINION

Cover: The photograph of teletext information on a television screen portrays the emphasis of *C-ED*'s non-entertainment services, beginning on page 25.

Editor's Letter

We have alluded to this subject matter previously, but this convention issue we devote a significant portion of June's *C-ED* to non-programming or non-entertainment services.

Last February, in Houston, NCTA President Bob Schmidt and Engineering Vice President Bob Luff exhorted the NCTA board to examine seriously future technologies and the impact they will have on the cable television industry. In particular, Luff emphasized several non-entertainment experiments such as teletext and the utilization of the vertical blanking interval. (See "Editor's Note" in the March 12 and 26 issues of *CableVision.)*

Because of the heightened interest in these services, we have selected four different non-entertainment experiments we believe will soon, if not already, find their way into cable television systems and subscriber homes. One, called PLATO, was first examined in some detail in the August 14, 1978 *CableVision.* The emphasis then was on the application of the computer software, in particular its educational relevance. Here, in this issue, we examine how the hardware and the software interface and we talk in considerable detail with two innovative designers of the PLATO software.

Managing Editor Toni Barnett and I sat at the Control Data computer and played a real time *Star Wars* game, for example, with contestants all over the country. To restate this capability, the game was not passive and not a contest against ourselves; it was battles against forces out in the Empire. We also were taught and responded to Latin, Geometry and English composition lessons.

All of this is by way of inticing our readers to page 25, the start of our cover story.

Paul A. FitzPatrick

THE WORLD'S FIRST FIBER OPTIC EARTH STATION LINK IS AVAILABLE FOR IMMEDIATE DELIVERY.

Times introduces, for satellite communications applications, a completely packaged fiber optic earth station link—100 meters of fiber optic cable, an optic transmitter, an optic receiver and all necessary connectors. **Available for immediate delivery. At under $8,500.**

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The Most Important Word You've Ever Heard

By Ralph Haimowitz
SCTE Director
Indian River Cablevision
Sebastian, Florida

The key to a successful cable television industry can easily be described in one word—reliability. Every single phase of cable television, from the corporate president right down to the telephone answering service that responds to after hour calls from the cable subscriber, is affected by reliability. The complexities of that one, simple word are enormous and far reaching.

Reliability begins with the cable equipment manufacturers and distributers. Obviously, if the equipment installed in a cable system does not meet minimum operational specifications or has an excessively high failure rate, the operational reliability of the cable system will be sub-standard. It is, therefore, an absolute necessity for the purchasing agent of any cable television company to insure that each and every item, from the headend antennas and processors down to the matching transformers and "F" connectors meets or exceeds minimum acceptable standards.

Fortunately, most manufacturers in the industry today are reliable and produce quality products, and it requires very little effort to determine the true reputation of any company and its' products. Cheaper is not better whenever the most insignificant item utilized lowers the quality or reliability of the signals to the subscribers. One other area of reliability that sometimes presents problems is timely delivery by manufacturers and distributors. Here, again, reliability is of prime importance and there is considerable room for improvement within the cable industry. Most purchasing agents know what the average delivery times are from date of order, but there appears to be a tremendous lack of communications when a supplier is out of stock or backlogged on the production schedule. Most of these problems can be easily resolved by a simple telephone call from the supplier to the purchaser with information about the delay and providing an honest, realistic date for expected delivery.

Proper office procedures which include accurate records, accurate and timely billing, complete and correct work orders - including timely scheduling of connections and system/customer maintenance calls, and a well informed office staff provides the reliability that insures an efficient operation. The cable office is the subscribers first and most frequent point of contact with the cable company and is usually where the lasting impressions, both good and bad, are established. Standard written procedures covering all aspects of office operation should be initiated and followed religiously, and new employees should be thoroughly trained in these procedures before they are assigned the responsibilitites of serving the subscribers. Needless to say, a courteous, and pleasant manner toward the public is a basic must even in the most difficult of situations.

Ralph A. Haimowitz

Systems personnel, from engineers to construction workers, must be proficient in the performance of their work. Again, good customer relations must be maintained throughout this secondary level of contact with the public. Every installer, technician, engineer, and construction worker comes in contact with the subscribers and general public at one time or another, and most of them on a day-to-

day basis. Customer appreciation and confidence in the cable company will occur only if these employees have the proper attitude in dealing with the public and if they are knowledgeable and efficient in their job performance. This industry continuously suffers from a lack of skilled personnel. Among the contributing factors to this problem are pay levels and a lack of company benefits, difficult working conditions, and an apparent lack of knowledge pertaining to career potential. The problems of pay and benefits will be resolved when cable employers realize that they must compete in the labor market to entice new employees and retain trained ones.

Difficult working conditions are a fact of life in this industry and must become accepted by the employees as inevitable. The career potential, however, can be handled at the local operators level through personnel information sessions and comprehensive training programs. An individual who is originally hired as an installer, for example, will have greater motivation if his employer has a training program that not only makes him completely knowledgeable and proficient in his job, but allows him to pursue additional avenues of education for advancement to systems technician, engineering, and even into marketing and management. A local training program in job proficiency, encompassing both classroom and hands-on style training, based upon written standards established by the company and cable television regulatory bodies, will provide the initial portion of the educational requirements and make the employee proficient in his job.

The second level of training for installers and construction workers, as well as systems technicians, can be accomplished by a combination of in-house training programs and utilization of technical training seminars such as those presented throughout the United States by the Society of Cable Television Engineers. One excellent method of effectively accomplishing this second level of training is to assign one or more systems technicians to attend the available training seminars and to further task these technicians to hold training sessions on the material they were exposed to at the technical seminars to the other company employees.

The third level of training should use the available technical seminars and other educational programs in electronics and cable television that are available through local community college programs, adult education programs, correspondence courses, and specific college courses.

SCTE Hands-On Sessions at NCTA Convention

LAS VEGAS, NEVADA—The Society of Cable Television Engineers will conduct hands-on technical sessions during the NCTA annual convention at the Las Vegas Convention Center May 20-23.

Many SCTE individual and Sustaining Members will be featured panelists during the three-day meeting.

Among those members participating are Robert Tenten on a satellite panel; Glenn Chamber, Mike McKeown and Tom Polis on the education and training panel; Bert Henscheid, Larry Searcy, Ernest Tunmann, Richard Roberts and Jim Waldo on small system problems.

Participating on the panel on advanced techniques are Ed Callahan, Robert Dickinson, William Evans and Cliff Schrock. The testing and maintenance panel will feature Don Dworkin, Syd Fluck, Ken Smith and Dan Pike. To learn about using computers and microprocessors, attend the session on computers with Ray Daly, Jim Grabenstein and Dick Amell.

Preventive Maintenance Seminar in Colorado Springs

COLORADO SPRINGS, COLORADO—On June 4-5, 1979 Region Two of the SCTE will sponsor a technical meeting and workshop at the Holiday Inn Central in Colorado Springs.

Speakers, workshops and demonstrations will be part of this workshop. SCTE Region Two Director Richard Covell of GTE Sylvania will moderate panels on construction, repair, test methods and other preventive maintenance systems. Included in the panels will be proper handling of cable, data collection and assessment, outage reduction methods and radiation limitation compliance. System sweeping, status monitoring and preventive maintenance programs for old and new systems are part of this two-day seminar.

The two-day seminar will be divided into four sessions. Panel one, the morning of June 4, will cover construction. The first speaker will be Jerry Cruzan of Comcast Corporation on "Preventive Maintenance Considerations." Next is Tim Homiller from Jerrold Electronics on "Headends are a Place to Start." Pete Collins from Gardiner Communications will speak on "Construction Techiques for Extended System Life"; Rex Porter from Times Wire and Cable on, "How to Keep Your Cable Up"; and Allen Kirby from Telenational Communications on "Sheath Currents Are Killers."

Panel two in the afternoon will be conducted by MSOs. This session will feature Al Kernes from ATC, "First Steps Towards the Preventive Maintenance Program"; Dan Pike from CPI, "Different Programs for Different Systems"; Frank Baxter from GE Cablevision, "Results of a Trunk Preventive Maintenance Program"; and Hugh Bramble from UA-Columbia, "A Two-Tier Approach to Preventive Maintenance."

Panel three on June 5 will feature "What Testing Can Tell You." Speakers will include Sidney Fluck from Wavetek, "How to Sweep Your System Clean"; Larry Dolan from Mid State, "Radiation Limits—Compliance Means a Better System"; and Cliff Schrock of C.B. Schrock and Associates, "Status Monitoring—The Ultimate in Preventive Maintenance?"

Panel four in the afternoon, "Repairs for Reliability" will feature George Fishman from UA-Columbia, "Equipment Repair Part One"; Fred Rogers of Broadband Engineering, "Equipment Repair Part Two"; and George Fenwick from KATEK, "Reducing Converter Repair Call Backs."

Registration starts at 8 a.m., Monday, June 4, and the sessions will begin at 8:30 a.m. Certificates of Completion will be awarded for attendance throughout this two-day meeting. The meeting will end at approximately 5 p.m. on Tuesday, June 5.

For additional information, contact Mila Albertson, SCTE, 1100 17th Street, NW, Washington, D.C. 20036, (202) 659-2131.

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Frequency Interference In Las Vegas No Problem

LAS VEGAS, NEVADA—Due to rumors that Las Vegas will not be a particularly good city to operate exhibitor's earth stations due to interfering microwave operations from the surrounding mountain tops, Compucon has conducted a frequency coordination plan. Results are that there will be some minor degradation of some of the transponders, but not degrading to the point where the signals would be unsatisfactory.

The NCTA asked Dan Yost of Compucon to do a frequency interference analysis for the operation of TVRO's adjacent to the Las Vegas Convention Center.

According to the study, the proposed earth station sites in the south parking lot adjoining the East Exhibit Hall have clear visibility to the satellite arc and are shielded by the Convention Center to the north and northwest.

The major sources of potential interference involve Bell Telephone of Nevada's 4 GHz microwave transmitters at Angel Peak, Potosi Mountain and Las Vegas. Without building shielding, all of these interference sources would be line-of-sight and present some interference problems.

The interference analysis summary shows:

- The interfering path from BTNV's Angel Peak to the earth station sites obstructed by the East Exhibit Hall "A". The initial interfering signal level of -111.9 dBw/1 MHz should be attenuated to allow at least a 15 dB C/1 ratio for the earth stations. This interference should not be detected in the video pictures. The transponders affected on Satcom I would be 1, 2, 5, 6, 9 and 10.
- The short 2.1-mile path to BTNV's Las Vegas transmitter may be partially obstructed with local buildings. The interfering signals from this Las Vegas transmitter should be better than -129.59 dBw/1 MHz. The impact of this interference should not be visible in a moving picture. The satellite transponders affected are 11, 12, 19, 20, 23 and 24.
- The final interference conflict involves BTNV's Potosi Mountain transmitter facing Las Vegas. This 4 GHz microwave station is on an interfering azimuth of 229.4 degrees while the earth station azimuth to the Satcom 1 satellite is 211.5 degrees. Since the interference from Potosi Mountain may be partially obstructed by some local buildings, some background interference would be expected. Thus, some detectable noise and white specks may be observed on satellite transponders 1, 4, 5, 8, 9, 12, 13, 16, 17, 20 and 21.

Based upon the above summary, proceeding with the current site location is not objectionable, according to Yost. The only improvement in site location would be a move to the east site of the Exhibit Hall which would have to be carefully arranged to avoid blocking anyone's view to the satellite.

Satellite Will Link Hospitals To Deliver Health Education

SAN DIEGO, CALIFORNIA—A new service was initiated this month for patients in hospitals—a nationwide television network which will bring health education for patients into hospital rooms.

The project, sponsored by the Public Service Satellite Consortium (PSSC) and headed by PSSC vice president Robert Mott, will test market the service free-of-charge during May and June, from 2 pm - 3 pm Eastern Daylight Time. The two-month test period will determine interest and marketing by cable operators and patients for the service.

The service will be officially on-line July 1, from 1 pm - 3 pm eastern time, and transmitted by the National Satellite Network, PSSC's distribution service, via RCA's Satcom I, transponder 21. The programs will be uplinked to the satellite from Douglasville, Georgia, by Satellite Syndicated Systems.

Presently, more than 1,300 cable systems can pick-up signals from Satcom I and approximately 500 hospitals are connected to those cable systems.

There will be no charge to cable systems for this service. Hospitals will pay one cent per hour per patient a day for the health education programming.

In addition, education programs for physicians, nurses and other hospital personnel will be transmitted to hospitals on the National Satellite Network. That service will be paid for by the group requesting transmission.

Hospitals subscribing to the health education service on or after July 1 will receive program guides for each patient and other printed materials for patients and physicians.

Further information on the National Satellite Network and the health education programming for patients is available from the Public Service Satellite Consortium, 4040 Sorrento Valley Blvd., San Diego, California 92121, (714) 452-1140.

Electronic Mail Under Study at Battelle-Columbus

COLUMBUS, OHIO—Future business opportunities associated with electronic mail will be examined in a group sponsored research program recently begun at Battelle's Columbus Laboratories.

According to Battelle's Richard J. Bengston, principal research scientist who heads the study, the program is designed to be a user-based view of the potential need and resulting market for electronic mail systems. The program, scheduled for completion in October 1979, is being sponsored by a number of companies in the communications, business machine and related fields.

"Because of the indicated cost savings—as well as greater speed, quality, and flexibility associated with electronic mail—this method of communications is on the threshold of full commercialization," Bengston said. "Electronic mail is in a similar position today as the photocopier industry was when the electrostatic copier was introduced."

The Battelle program will look at electronic mail as the generation, transmission, storage, disposition, and display of business correspondence and documentation by purely electronic means.

Research is directed at benefiting companies engaged in both electronic communications conventional "hard copy" communications. Researchers will analyze and estimate the opportunities and potential threats associated with electronic mail.

According to Bengston, "What we expect to do is to provide companies

with guidance as to what users really need in the way of electronic mail, equipment and services. Not in the sense of designing such equipment," he emphasized, "but what kind of performance the users expect to have."

Bengston stressed, "Most people have told us that the services and equipment they need are available with two exceptions: one is the lack of compatibility among equipment, and the other is that something has to be done about input. For effective or efficient use of an electronic mail system," he noted, "the managers are going to have to interface directly with the system. Since most of the input today is by keyboard, and since most managers don't like keyboards, something's going to have to be done.

Bengston further added, "One of the driving forces for electronic mail is lousy postal service, as far as we can determine."

The Battelle research study group will provide what type of performance and economics are needed, not the engineering details.

Two-Day Marketing Conference on Fiberoptics

BROOKLINE, MASSACHUSETTS—The second in a series of two-day marketing conferences for fiberoptics has been announced by Information Gatekeepers, Inc., sponsors of the two-day marketing conferences entitled "Furture Trends in Fiberoptics, Markets and Technology."

Featuring experts in their field, the conference will place heavy emphasis on marketing opportunities and future applications. It will highlight the applications of telephony, CATV, data, process control, industrial aerospace, satellite networks, underseas cable, government and military markets, both domestic and international, as well as the potential markets and future technological trends of fibers, cables, splicing equipment, connectors, couplers, sources, detectors and test equipment.

This two-day Fiberoptic Marketing Conference is planned for June 4 and 5, 1979 at Dunfey's Hyannis (Cape Cod) Massachusetts. Audience targets are marketing managers and chief excutive officers of both manufacturing firms and potential users of fiberoptics.

This conference is designed to keep industry personnel aware of new

Technology and the Rewrite

By Pat Gushman
Washington Bureau Chief

On more than one occasion we have written about the significance of actually getting the Communications Act of 1934 rewritten. The very fact that the rewrite has, for the most part, the appearances of a bipartisan effort has perhaps shaved as many as four years off the time it will take to get legislation passed, says an aide.

Minority members on the House Subcommittee say they see "a commitment to continue" with the effort sustained by former Congressman Lou Frey (R-FL) before he retired to run for the governor's office in his home state. And on the Senate Subcommittee, the very presence of Senator Barry Goldwater (R-AZ) as ranking minority member, adds to the stature and priority of Chairman Ernest Hollings' (D-SC) rewrite effort, even though the two leaders have introduced separate legislation.

But, there is another factor perhaps as important as having familiar names involved in the rewrite, Republican and Democrat alike. You have in Goldwater and also Senator Harrison "Jack" Schmitt (R-NM), two men who have a profound interest in and appreciation for the value of the engineering disciplines and the benefits of technology.

In addition to communications, both Senators are fixtures on the space committee. In fact, some jockeying in committee assignments was necessary to accommodate the interests and experience of both. Schmitt, who is said to be the most active of the Republicans on the rewrite, is one of the two U.S. Senators who are former astronauts; John Glenn is the other. Goldwater, a pilot himself, is fond of telling he has dabbled in amateur radio and makes good use of his mobile phone.

Goldwater also bemoans the fact that it took him 25 years to get on the Communications Subcommittee. "But now," he says, "I am participating in hearings on the most far-reaching communications legislation since the passage of the Communications Act of 1934.

"I have had an avid interest in electronic communications throughout my life. And I must admit to being as fascinated now by electronic technologies and their potential for providing new services as I was with my first crystal radio set." noted Goldwater.

Says Schmitt, "We want you to look at our bill as kind of a technological optical fiber," perhaps because of its adaptability.

"Changes in telecommunications are inevitable," he says. "The FCC and the courts are making changes without guidance from Congress. In addition, technology, like time, marches forward. We can avoid our responsibility no longer. We must provide the necessary guidance to the FCC and the courts and clear the way for the orderly assimilation of new technologies."

For these reasons, Goldwater and Schmitt have been particularly patient in the rewrite hearings thus far. In contrast to some other members of the subcommittee, for example, they were not annoyed by an elaborate "show and tell" performance by the glib Dr. Lee Davenport, chief scientist for General Telephone & Electronics, who passed around optical fiber and microprocessors. Goldwater, for one, has also visited Bell Labs and continually refers to the "marvels" he saw there. But he also is very pleased that Bell isn't the only company in the "forefront of technology."

"I want you fellows to keep making your technological improvements without having to fear government, or a bigger company stamping you out," Goldwater told Davenport.

Telephone manufacturers, large and small, are telling the Senators that the cable television industry isn't up to it, that it can't cut it. "If the broadcast character of cable TV were changed to provide private, two-way service, the cost would be very high," the GTE executive said.

If anyone really knows the real capabilities of the industries, it is the industries themselves. Cable certainly has its own story to tell, and it is telling it.

opportunities and developments in the fiberoptics field. The technological developments are rapidly moving the industry into the next generation. Longer wavelengths have already resulted in the development of fiber links without repeaters for distances greater than 50 Km. Hybrid integration of fibers with integrated circuits is about to begin, and intergrated optics and its potential applications are just on the horizon.

For complete details, contact Barbara Coffin, Information Gatekeepers, Inc., 167 Corey Road, Brookline, Massachusetts 02146, (617) 739-2022. Cost for this two-day marketing conference is $495.

Limited Translator-Originated Programming?

DENVER, COLORADO—In a speech before the National Translator Association convention, NTIA Director Paul I. Bortz has called for limited translator-originated local programming. Bortz said this should be done without imposition of "burdensome regulation, such as ascertainment and logging procedures."

In addition, Bortz called on the FCC to move immediately on the issue of FM microwave for signal importation. Moreover, the commission should amend its rules, and allow translator origination of fund solicitations and emergency warnings. Bortz also urged that the rural aspects of FCC Docket 78-253 be acted upon before the issues related to urban low power television broadcast stations are resolved.

Bortz endorsed a proposal that calls for a "full range" of services to local households by translators. These would include: the basic service of approximately three networks, plus one or two independents and an education station. These stations would be combined with originating low-power stations for pay-TV and special-interest programming. In addition, Bortz cited scrambled premium programming, with decoders at the subscriber's home, as an idea which "would provide a revenue base" for the participating translators.

The Commerce Department official went on to say that he has been impressed with the service the industry provides "against difficult odds and at very low cost . . . " And, he said, the industry has "labored under regulation that has been amazingly unreasonable"; and has provided service despite the fact that the value of translators' service "cannot easily be recovered from the households receiving . . . programming." Television translators, Bortz asserted, "are almost always the best way to provide basic television service to our rural areas," because:

- they are the least costly way to provide services; and
- they serve all households in an area—not just those clustered in towns.

The technical and economic capability exists, Bortz said, to provide service to rural areas. However, effective service is precluded by regulation. In the past few years, proposals viewed as favorable to translators have been "delayed and confused by commission inaction." However, Bortz said, we must concede that "things are going better." Many people in Washington, he added, are now committed to "lifting some of the regulatory burden from the translator industry."

NTIA Director Paul I. Bortz

Bortz feels that rural television service will be promoted by provisions in Senator Ernest Hollings' recently introduced Senate Bill 611. For example, a provision in the bill requires that the FCC identify within 60 days of passage of the legislation, all rules that have an effect on rural telecommunications service. Then, the commission must eliminate or modify any rules which restrict provision of adequate service. The National Telecommunications and Information Administration, Bortz said, would be required to aid in such an effort.

FCC Shoots Down Retransmission Consent

WASHINGTON, D.C.—The Federal Communications Commission, after reviewing and adopting the extensive staff reports on the economic and syndicated exclusivity inquiries, has voted to issue notices of proposed rulemaking on deregulating both the commission's signal carriage and syndicated exclusivity rules.

The commission also voted to deny the petition of the National Telecommunications and Information Administration, which has asked the FCC to initiate retransmission consent requirements, as well as a petition by broadcasters asking the FCC to discontinue authorizing satellite carriers to distribute television station signals to cable systems.

Lengthy debate developed over the issue of retransmission consent and super stations. It was not until the commissioners agreed that these issues would be open for comment and discussion during the ensuing review of the rulemaking proposals that the long-awaited vote on the inquiries and proposals could be taken.

Flanked by chiefs of other bureaus, the commission's general counsel, and the consulting economists who worked on the inquiries, Cable Bureau Chief Phil Verveer reported that the inquiries had revealed that the commission's syndicated exclusivity rules, which have been applied to the top 50 markets, in his words, "have the potential of inhibiting consumer benefit."

Verveer said that those rules had been promulgated without the benefit of any economic input. Therefore, in recommending that the deregulatory rulemaking proposals be adopted, Verveer said that the staff was relying heavily on the data which had been obtained in the economic inquiry.

According to the economic inquiry report, a worst-case loss of audience to broadcasters as a result of eliminating signal carriage rules would be less than one percent in the short term, over the next few years, even if every home were passed by cable and penetration were projected at 48 percent.

Over the long term, by the year 2,000, it was said the effect of deregulating signal carriage would be less than nine percent. The consensus of the staff and the economists was that the impact on the programming industry would also be negligible.

"Although very little evidence has been submitted enabling us to assess the industry structure, nor do we know what specific form the flow of remuneration will take in the marketplace, our view," said Verveer, "is that no evidence has been submitted suggesting that the quantity and quality of programming available to the consumer will diminish. In fact, the feeling is that it will increase."

The commission's decisions were hailed by representatives of the cable industry. "Broadcasters have always played Chicken Little when the spectre of the free marketplace competition from cable TV is raised," said NCTA President Robert Schmidt. "But, their cry that the sky will fall in on broadcasting if cable television is allowed to fulfill its consumer service potential won't wash against the two years of research compiled in the inquiry."

Broadcasting and programming interests, aware of the thrust of the findings for some time, did not appear to be too disgruntled by the outcome. In fact, one representative said his group would be buoyed by the time and attention paid by some of the commissioners to the copyright and super station issues.

The petitions to adopt retransmission consent and to halt satellite distribution of TV station signals were submitted within weeks of the culmination of the inquiries.

But, it was obvious from the debate which developed as the cable bureau was only a few minutes into its presentation that some of the commissioners, particularly Washburn, Lee and Quello, in varying degrees, at least, were willing to "Take the suggestions of the petitions more seriously than the inquiries," according to one legal assistant.

Finally, after it was suggested that copyright-related issues and the question of whether or not the commission has the authority to deal with them, at least be mentioned in the documents—which will be several inches thick when they are released—the commission was able to take a vote and approve the measures.

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Changing of the Guard

By Pat Gushman
Washington Bureau Chief

For the first time in more than eight years, the Federal Communications Commission (FCC) has a new person in charge of its engineering activities. He is Dr. Stephen J. Lukasik, formerly chief scientist for the Rand Corporation. Lukasik replaced Ray Spence who retired from the commission last month after 11 years of service.

What's more, the commission has taken the opportunity presented by the transition to redesignate the Office of Chief Engineer as the Office of Science and Technology and renamed the title of Chief Engineer to "Chief Scientist" this past month. The commission announced that this change reflects the recognition that present and future developments in communications require "extensive study of applied and basic technology" and will help to promote "mutually supportive efforts" in the fields of physical science, as well as engineering and electronics.

Currently staffed by 140 employees, the Office of Science and Technology has the responsibilities of the Office of Chief Engineer in planning and conducting the FCC's technical, engineering, technological and scientific studies and programs aimed at improving telecommunications.

The office will also be responsible for developing and coordinating the engineering, technological and scientific aspects of communications regulation; for developing technical standards for electronic equipment and directing the commission's type approval, type acceptance and certification programs; formulating and recommending FCC policies on frequency management in coordination with the Executive Branch; conducting interagency coordination in the use of specific frequencies; participating in the technical aspects of international telecommunications activities; and licensing experimental stations to provide new uses for the radio spectrum.

If that sounds familiar, it is, says one official. "All they have really done is change the name," *C-ED* was told. "They are into buzzwords around here these days."

But Spence, who was chief of the Federal Aviation Administrations Voice Communications Systems Branch, before he joined the commission in 1968, says that what is on the books isn't really that important. "What happens," he said, "depends on what the commission really wants to do with the operation and on what Dr. Lukasik wants to do."

Lukasik's credentials are indeed

Ray Spence

Dr. Stephen J. Lukasik

formidable. The Staten Island, New York native holds a B.S. in Physics from Rennselaer Polytechnic Institute and a MS and Ph.D. both in Physics, from the Massachusetts Institute of Technology. Staffers are wondering how long they will have to keep calling him "Doctor."

From 1971 through 1974, he was director of the Department of Defense Advanced Research Projects Agency (ARPA). He served with that agency from 1966 to December 1974, and was responsible for the direction and control of advanced research projects concerning materials, information processing techniques and human resources.

At ARPA, Lukasik also headed the exploratory development areas of strategic technology, tactical technology, nuclear monitoring distributed information systems, advanced command, control and communications technology, training, forecasting and decision technology and technology assessment.

Lukasik joined the Rand Corporation in May 1977 as senior vice president for National Security Programs, and was named chief scientist of Rand in June 1978. As the chief scientist he was responsible to the president of Rand on matters related to advanced technology, its applications and its implications for current and future national security and domestic programs.

He has also held positions with the Massachusetts Institute of Technology, Westinghouse Electric Corporation, Stevens Institute of Technology, and the Xerox Corporation where he was vice president of the technical staff and later vice president and general manager, systems development division. And, he was president of S. J. Lukasik, Limited, private consultants to government and industry organizations in the area of national security, from 1976 to 1977.

Because of his background, Lukasik is expected to spend a large part of his time on matters relating to the upcoming World Administrative Radio Conference (WARC). Some members of Congress who have been openly critical of the U.S. preparations for WARC have said their expectations have been bolstered by the commission's ability to attract someone of Lukasik's caliber to fill the post.

Spence, who plans to stay in Washington in some branch of communications, possibly mobile radio, says that the commission is probably better prepared for this one than it was for earlier WARCs. He doesn't believe it will go as badly as some critics that don't know anything about it are suggesting.

Closer to home, Spence is cautious of all this talk about technology from some government sectors. "The emphasis in Washington goes around in circles," he says, "but the real technical side of things gets missed."

"Everyone is calling for more new technology, but we have been drowning in space age technology for the last ten years. The technology is way ahead of our ability to use it," Spence added.

As for what to expect, say 15 years from now, cable is probably one of those which will lose out to satellite technology, Spence thinks. "But, that it won't lose out to some new technology is my point," Spence told *C-ED*. "All the new services will be provided through more adaptable carriers which will, in reality, be combinations of the technologies which are now available today." **C-ED**

See our card on page 39.

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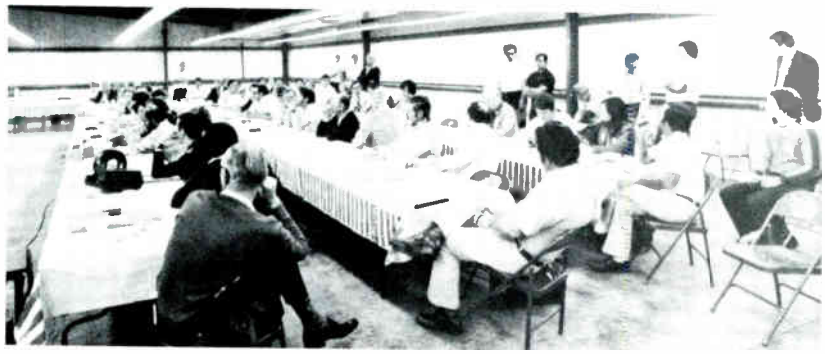

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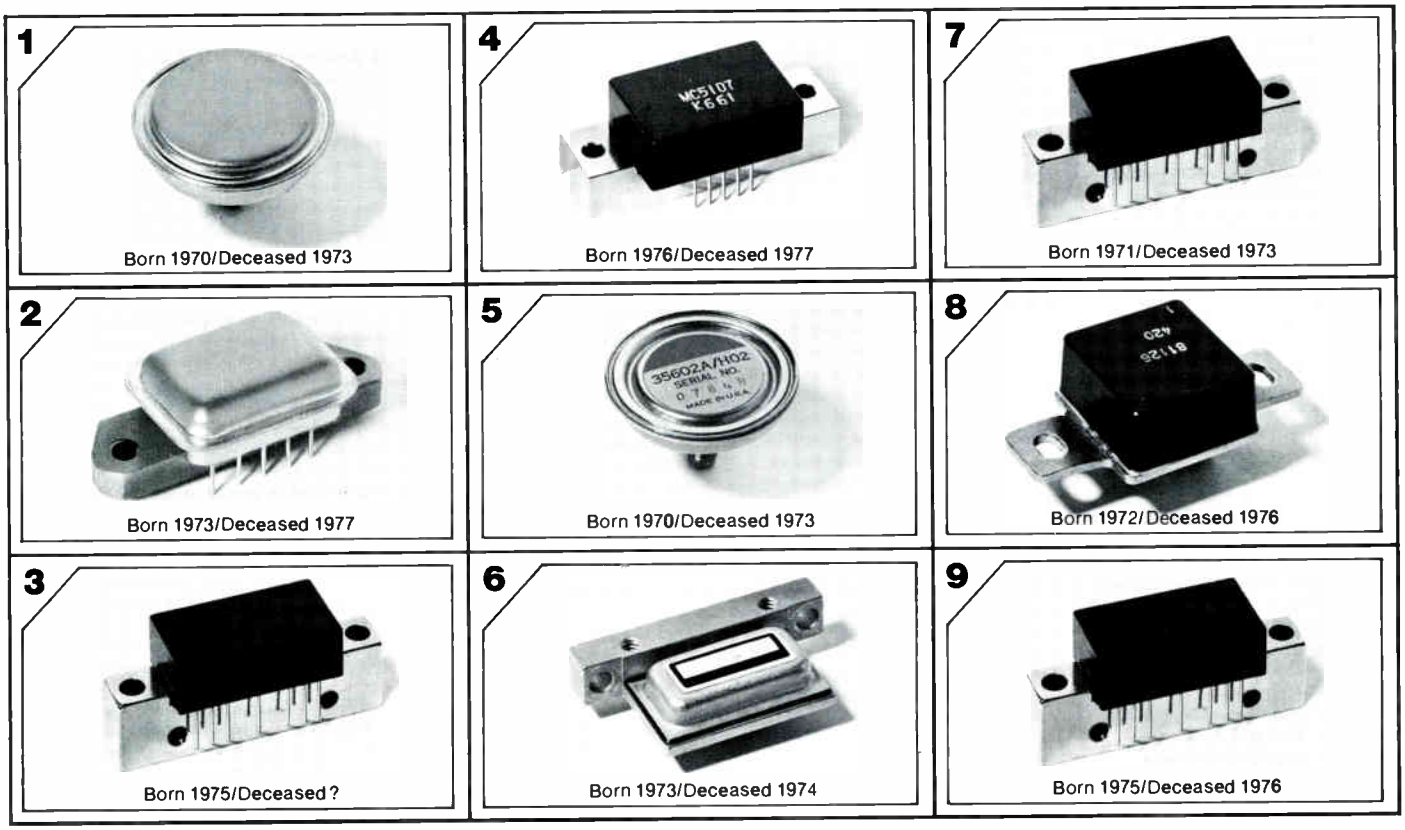
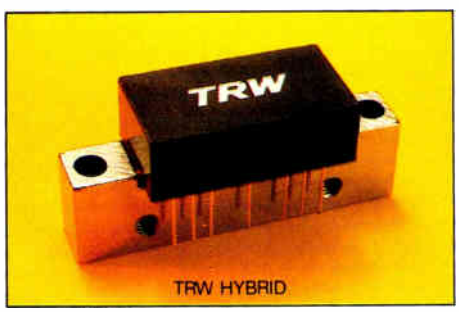


1, 2 and **3.** This manufacturer has already phased out two hybrids. How long will the third one last? **4.** This one looked like the real thing. But it didn't work like the real thing. If you got stuck, we're sorry. **5** and **6.** The manufacturer changed these from doorknobs to oblongs, but it didn't change the fact that they didn't work very well. So they weren't around very long. **7.** Another look-alike that didn't work alike. **8** and **9.** This manufacturer started with a square, then switched to a quickie-copy, and then walked out. Leaving you with amplified problems.



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Non-Entertainment Services

The main thrust of C-ED's convention issue is the use of non-entertainment services via broadband communications. The following four articles highlight the applications of teletext systems and load management services.

Non rtainment vices

The PLATO System

"The direction in which education starts a man will determine his future life . . . Let early education be a sort of amusement; you will then be able to find out the natural bent." —Plato

By Toni Barnett, Managing Editor

PLATO is a state-of-the-art computer hardware and software system several times more complex and expensive than any of the field-tested systems currently in operation. The system was developed over the past 18 years by Control Data Corporation based on research conducted at the University of Illinois.

PLATO is a user controlled, time shared interactive system on which several hundred users can access as many different courses simultaneously. The system is essentially an educational and information access tool designed primarily for university and industrial applications.

The System

PLATO terminals can be connected to the central computer via conventional or dedicated telephone lines, bi-directional cable, MDS, VHF or UHF (with phone return) and satellite (with phone return). Presently most applications are non-cable.

One of the major capabilities of the PLATO system is computer-managed instruction (CMI). CMI incorporates testing, learning resource selection and record keeping—all on-line.

The system also offers computer-assisted instruction (CAI), a direct instructional interaction with computer-provided lessons.

PLATO CMI was initially developed in response to growing concerns of educators and trainers for more individualized instruction. Tests are mastery oriented and criterion referenced to diagnose areas where learning is needed and to determine which learning experiences would be most appropriate. Students who demonstrate competency in a given area can pass over the related instructional materials. For those students who work at a slower rate, appropriate individualized study assignments are made. Frequent and repeatable tests allow the student to move on when ready.

PLATO CMI offers several advanced testing features

Community Cablevision Experiments with PLATO

Community Cablevision in Irvine, California, has installed two PLATO terminals in its cabled area. Community now passes 28,000 homes, with 80 percent of its system rebuilt to 36-channel capacity. The cable system is utilizing the PLATO terminals in conjunction with Control Data Corporation and a newly-established project implementation group called the Irvine Intergrated Information System (IIIS) Advisory Board. Presently, the data from the PLATO terminals is sent to Control Data's Cyber 174 main computer in Minneapolis, Minnesota, from Community's district office via telephone. As of now, the PLATO signals are not transmitted from the headend of the system.

In addition to the PLATO terminals, the Irvine Unified School District (IUSD), utilizes 21 locations in Irvine for a two-way video system. These locations are equipped with cameras, microphones and monitors, allowing the system to provide one-to-one or school-to-school, live televised learning activities. The system is also used by the community to provide community information programming.

Community Cablevision President Wayne Hauser told *C-ED*, "As of yet, subscribers in Irvine do not have any type of PLATO terminals in their homes. However," he added, "future plans anticipate Control Data Corporation developing a lower cost PLATO terminal that can be placed in the home."

According to Hauser, "The object of putting two terminals in the cabled area is to determine subscriber interest in using the PLATO system." Currently, the PLATO terminal leases for $1,000 a month.

Hauser and his associates have innovated in community services and in engineering excellence. Community Cablevision technically designed and installed the two-way switched network linking local schools, UCI, the county library and city hall. Stated Hauser, "Cablevision is exploring extended business uses of our existing two-way video capability. We are fascinated with PLATO, and we don't yet know exactly how it fits into the scheme of things . . ." (For more on what's happened in Irvine, see the August 14th issue of *CableVision.*)

including tailored testing, confidence testing and simulation testing. These tests can be written with varied response formats—matching questions, true/false, multiple choice, and graphic touch. Test results are available immediately for prompt evaluation of performance against objectives.

The CAI system provides self-paced instruction to maximize learning potential, minimize training costs and meet varied student time availability.

The Equipment

A PLATO terminal is designed to interface with a large central computer (the Cyber 70 or 170 series). The system is set up so that hundreds of users can activate the system simultaneously with each of them working at their own pace. The data from the terminal tells how many people are using the machine simultaneously, how many people have used the lesson, and the number of hours the lesson was viewed since its introduction.

The main components of the system utilize a computer terminal, keyboard and telephone line which connects to Control Data's central computer in Minneapolis, Minnesota.

Basically, it's an audio system as opposed to a hard-wire system. The system is an audio couple or binary asynchronous. All words and graphics that appear on the screen are comprised of dots. There are 512 dots in the horizontal direction and 512 dots in the vertical direction. The terminal display screen presents information in the form of words (in any language), numbers, graphs, charts and animated graphics. Users communicate via a keyboard that resembles a standard typewriter, or by touching the face of the display screen. The computer recognizes the screen area touched and responds accordingly.

The user can pick a certain figure on the screen, enlarge or reduce it, turn it in any direction and rotate it by using the appropriate keys on the keyboard. The computer can also provide information on how to build the characters.

Passwords

In order to activate the computer terminal, the user must type his personalized password. When typing the password all the screen reveals is a line of X's. This is a protective measure to insure privacy and, thus, non-user access to the computer.

Another unique application of the PLATO system is a form of electronic mail. Each user has his own note file on the computer. Users can send notes to other PLATO users throughout the country. If an operator has a specific problem, he can ask others on the system for assistance. Messages can be transmitted back and forth immediately, or can be left in the terminal to be picked up when that particular operator accesses his terminal.

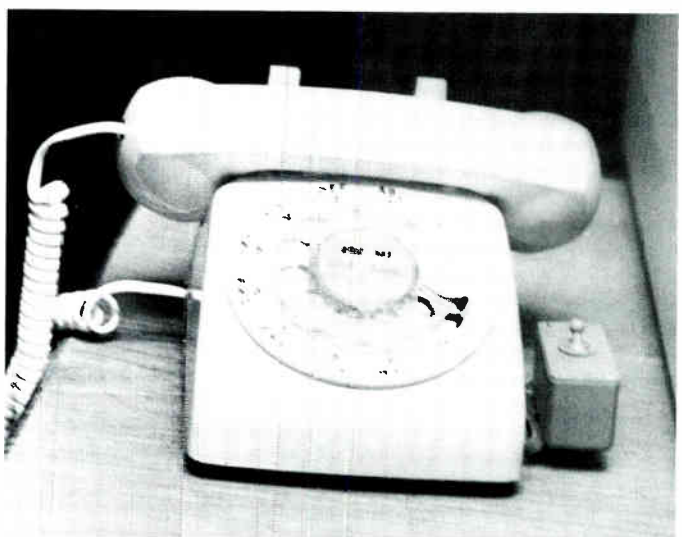
Visiting the System

C-ED had the opportunity to visit a PLATO system at Active Learning Systems, Inc., in Denver, Colorado. We spoke with Paul Ogle, vice president and John Stamper, president of Active Learning Systems. Stamper and Ogle both have high-technology computer backgrounds. Prior to the formation of ALS, each had an active interest in education applications for computers. They saw vast potential in the interface between computer software and education.

"We did some research on computer-based education," explained Ogle, "and finally determined that we were at a

From left-to-right: John Stamper and Paul Ogle of Active Learning Systems, Inc.

The keyboard on the computer terminal activates the screen.



The telephone, adjacent to the computer terminal, transmits the signals to Control Data's central computer in Minneapolis, Minnesota.

Table of Plato Capabilities

	Education	Community Services	Business	Home Communications	Urban Affairs
Notes and Information	Augment Present Two-way TV Network Student Communication	Inter- and Intra-agency Communication	Electronic Mail	Electronic Mail Public Forum	Public Forum Debate Issues City Announcements City Interagency
CAI Computer Aided Instruction	Classroom Teaching Teacher Training	Employee and Volunteer Training	N/A	Adult Training Basic Skills Development Stay-at-Home Training	N/A
CMI Computer Managed Instruction	Monitor Student Performance	Monitor Training and Simulations	N/A	N/A	N/A
Information Service	Library Reference Info. Weather News Service Sports News	Reference Library Civic Agency Records Storage and Retrieval	Stock Market and General Business Information Special Purposes Info.	Stock Market Weather News Shopping News Entertainment Bulletin Board	Demographic Records Municipal Data General Civic Info.
Data Service	N/A	Fiscal Data Operations Record Keeping Analysis of Service	Business Data Mgmt. • Fiscal • Sales • Storage • Presentation	Income Tax Family Finance	Fiscal Data Operations Recordkeeping Analysis of Service
Simulation Games	Simulation for Teaching Games for Communication and Fun	Simulation Training for Job and Skill Development Games for Off-duty Personnel	Simulations for Jobs and Skill Training	Interpersonal Competitive Games Games and Game Instruction	Citizen Participation in City Planning Simulation

point in time where the technology was inexpensive enough to be practical for commercial use."

Initially, Active Learning aggressively pursued selling PLATO technology to secondary educational schools. However, Ogle and Stamper ran into a lot of political problems. "The primary problem," stated Ogle, "was that schools are not as receptive to change as business and industry. All of these conditions result in very long lead times. On the other hand," noted Ogle, "business and industry are very receptive to change if you can show a positive cost benefit."

Both Ogle and Stamper, however, feel that students using the PLATO system could improve their education dramatically. Stated Stamper, "Sometimes kids feel the class is too far ahead or behind. As a result, if you're ahead of the class, you're just really bored. Conversely, a student in a classroom environment may be reluctant to ask a question he thinks everybody else knows because he doesn't want to be the 'dumbest kid in the class.' On the computer system," he continued, "if a student doesn't give the right answer, he doesn't move ahead. The student has to build a foundation in order to progress."

By using the PLATO system, a student can learn at his own speed and the computer will try different methods. The computer will remember what a child does or doesn't do well and respond accordingly.

The PLATO system used at Active Learning comprises a computer terminal, keyboard and conventional telephone line. The telephone has a switch to turn off the line because the line can also be accessed from other telephones in the office. In this manner, other telephones cannot interrupt when the computer is in operation. From the office, the telephone line interfaces with a rotary system in Denver that multiplexes the signal to Control Data's Cyber 174 main computer in Minneapolis.

Ogle told *C-ED*, "We will hopefully have a new system from Control Data which uses video discs. We'll be able to show movies and slides on the screen in addition to the available words and graphics. With this system," he continued, "we'll be able to show a picture of a bolt, for example, instead of drawing it graphically."

Control Data Corporation has exhibited massive dedication to education via computer. The corporation has committed to go into ethnic minority areas with PLATO where people have low levels of education and to make educational systems available at a considerably lower cost.

PLATO is now being used on-line for education in hundreds of schools throughout the country and well as in various commercial applications. United Airlines in Denver uses a PLATO system for its pilots, engineers and officers to enable them to learn recent advancements in its airplanes and control systems. PLATO is also being used by Community Cablevision in Irvine, California.

Presently, extensive interfacing of the PLATO system and cable television is too expensive to implement. However, computer costs are dropping while almost every other commodity is rising. It probably won't be too far in the future until cable systems will be able to offer its subscribers the unique advantages of PLATO.

Non-Entertainment Services

Electronic News On The Air

Bill Gross, president of Micro TV Inc., Philadelphia, Pennsylvania, recently announced that that company's teletext service—Info-Text—will be on-line this month. Micro TV Inc., the licensee of the British Broadcasting Company (BBC), has formed a joint venture with Southern Satellite Systems (SSS), to put Info-Text on Satcom I, transponder six.

An electronic newspaper is the most dramatic use of Micro TV's data transmission system. This project will be an electronic newspaper service broadcast via satellite, to cable systems throughout the country.

Ed Taylor of SSS, when asked by *C-ED* about the joint venture, said, "Bill provides the computer technology and we provide the transmission time. Our initial customers, Reuters and United Press International," Taylor stated, "are naturals. Associated Press has called and wants to play catch-up."

Features

Micro TV has modified the British Ceefax teletext system to meet U.S. standards, and Gross has added a few modifications of his own. A unique feature of this system is the creation of a "second transmission channel" over an existing TV station without interruption or interference to programs broadcast simultaneously over the main channel.

By using the "second transmission channel", cable operators can transmit special programs of stationary individual pages of graphic or alpha-numeric information. This data can be either a full color electronic TV newspaper or magazine.

Other features of the system include:

- no additional frequency
- adapted to NTSC standards
- a video page containing 20 lines, 40 characters per line
- full compatibility with VHF/UHF/MDS and cable TV systems.

How It Works

Information is typed by the customer or account on a smart color terminal (a CRT screen with a keyboard) in his office or home. He can type up several messages and whatever graphics he desires to send with a bar chart in color. The account would then dial a specified toll-free number to transmit the information pre-prepared on his screen. He would have his own assigned number that the computer would recognize. The account would tell the computer, via the 800-line, "I'm Jim Smith and my number is 12345." The computer then would verify the code number and the information would be transferred to the Info-Text computer terminal for storage and later transmission.

The sender would then disconnect and the computer would take that data and put it on the account's page. (Each account is assigned a particular page.)

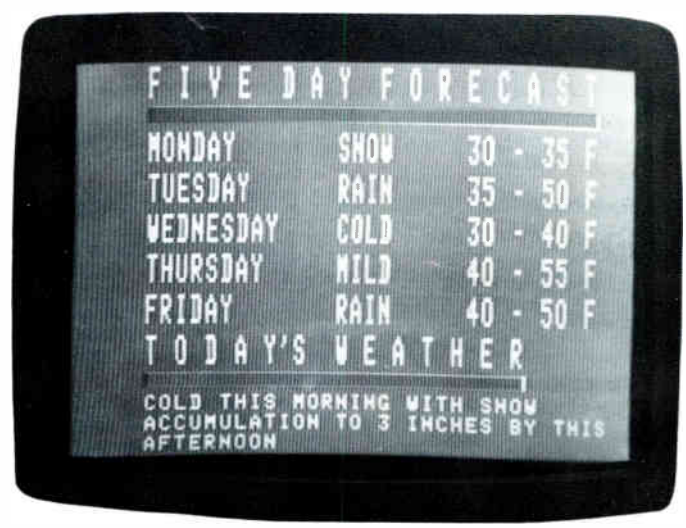
Basically, the account uses the telephone to connect to the Info-Text computer. Then, the phone is put into the account's smart terminal (with acoustic hookup). The smart terminal transfers the information into the computer and, in turn, the computer knows which page to put the information on. The information then goes to the uplink transmitter and is broadcast via satellite.

In this particular situation, the Info-Text model IF-2000 computer is located at SSS's uplink facility. A cable is fed through the modulator to the transmitter that's going up simultaneously on top of the channel 17 signal in the vertical blanking interval (VBI). This system typically uses lines 14-17 in the VBI.

An alternate method of transferring information is used in the case of Reuters and UPI. These newswire services are constantly updating their respective pages. Their telephone wire is hooked up directly to a modem in the computer. It's constantly sending information down the line and constantly updating the information being sent to the computer.

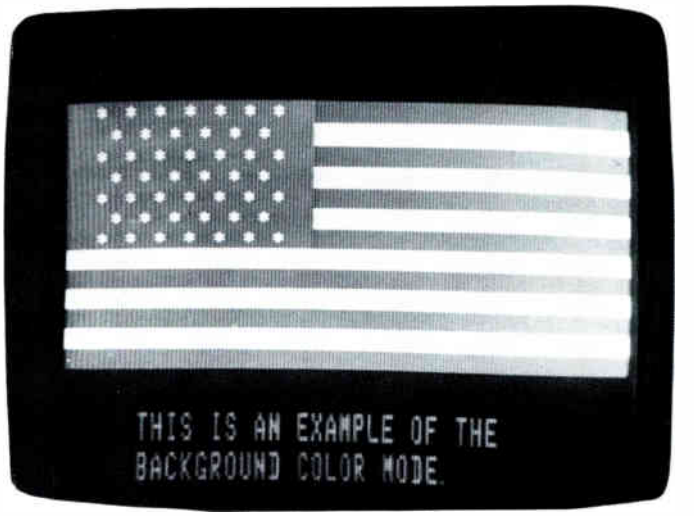
Displaying the Information

The information can be put on the TV screen by three



Typical Info-Text "electronic newspaper page" is weather report, which is selected and displayed by homeowner by pressing button on special decoder attached to his TV receiver's antenna terminal.

Info-Text encoder is used by operator to set up all types of graphic material for the new "electronic newspaper" system, in color.



Flag in full color is only one of unlimited graphic materials which can be transmitted by the new Info-Text system.

methods. The data can replace the entire screen with the information. A second approach would be an overlay on top of the picture being viewed—a double image. The third approach of displaying the data is to cut out a section of the picture at the bottom of the screen or at the upper right hand corner. This method would entail cutting a hole in the picture. Then, characters would be superimposed in the section cut out.

Safeguards

Each account would have his own code number. The only entities with access to the code number is the account and Micro TV. All codes are confidential.

If the account himself types in incorrect information, it's already in the computer and can't be recalled. It only takes one-quarter of a second from the time the account calls the computer until the computer receives the information. However, the account can retype the correct input and call the machine back a second later to insert the correct information.

Applications

The full color TV display enhances the energy and excitement of the printed word. Info-Text, in this application, becomes the culmination of the immediacy of the electronic media.

UPI now offers a full line of news, weather, sports, financial and consumer information for Info-Text users. As in the printed newspaper, advertisers in the electronic newspaper can position their advertising alongside relevant news stories. Financial ads can appear on the stock pages, supermarket ads on the food pages, etc.

Additional Info-Text applications are possible in the fields of finance, business, advertising and entertainment.

- Banks can transmit credit information, balances, interest and international exchange rates.
- Supermarkets can inform managers about the latest specials, featured items and store bulletins.
- With large-screen display, promoters can add excitement to point-of-purchase advertising campaigns.
- Farm information can be transmitted—such as weather, commodity prices, feed and grain information, etc.
- Bus, train and plane schedules can be displayed on TV receivers at all passenger pick-up locations.
- Educators can transmit question and answer pages simultaneously with the broadcast of the main program material.
- TV networks can transmit special bulletins to affiliated stations simultaneously with the broadcast of the main program material.
- CATV systems can transmit closed circuit bulletin boards.

Decoding

A special decoder, also developed by Micro TV, installed at the receiving location extracts the "second channel" information for display on a standard television receiver. The unit would connect to the TV's antenna terminal, much the same way as a video game hookup. The decoder not only has a page selector but also incorporates a 24-hour clock. This allows the viewer to pre-set the time to pickup a certain page or have access to the news alert feature.

If a cable operator is aware of a "hot story" coming over, the operator will send a preamble in front of that story, a sort of digital code. That preamble will trigger all of the decoder boxes with the buttons pressed for news alert. What a viewer is watching will be taken automatically off the screen and will be replaced by the news flash. This is an optional service for the home viewer.

Advantages of the 24-hour clock allows a page to be captured and stored for future viewing. Closing stock market prices, for example, could be captured and stored by a busy executive who might not be at the decoder at the time of transmission.

Micro TV makes only one type of decoder—the IF-2000 decoder. Stated Gross, "The home decoder is in a prototype state. We don't have a production line model to immediately sell to a homeowner. Our prototype," he continued, "is about $850, too expensive for the average homeowner. They need something in the $150-200 range."

According to Gross, Micro TV is approximately 12 months away from delivering a home decoder. Gross told *C-ED*, "We're in negotiations now. Oak Industries manufactures the boxes. We intend to set up a joint venture with Oak for an entire manufacturing facility in Taiwan."

Non-Entertainment Services

Testing . . . Testing . . . Teletext

KSL-TV in Salt Lake City has been transmitting teletext signals since June 15, 1978, on unused scan lines in the vertical blanking interval. Special permission was granted by the Federal Communications Commission, and with written permission from the British Broadcasting Corporation (BBC), the originator of the teletext concept, to use its patents during this test.

In 1976, Arch L. Madsen, president of Bonneville International Corporation, the parent company of KSL, visited the British Ceefax system in London. On his return, he directed Bonneville corporate engineers to design and build a teletext system modified to United States' transmission standards. Bonneville engineers contacted Texas Instruments (TI), because TI already had a receiver decoder unit for teletext systems in use in England. TI engineers formed a joint venture with Bonneville to modify TI's receiver to U.S. standards.

It was up to the Bonneville engineers to design and manufacture a computer-based encoder to generate the teletext signals.

In 1977, the prototype encoder and decoder systems were completed and activated. Permission was then sought by Madsen to broadcast the teletext signals over KSL-TV in Salt Lake City. Permission to test the new system was granted by the FCC on April 4, 1978.

Bill Loveless, director of engineering for KSL-TV, told *C-ED:* "We find that even engineers who have designed the teletext system really don't understand it properly. It's probably the most difficult concept to get across to people," he explained. "The only way to really understand it is to experiment and use it."

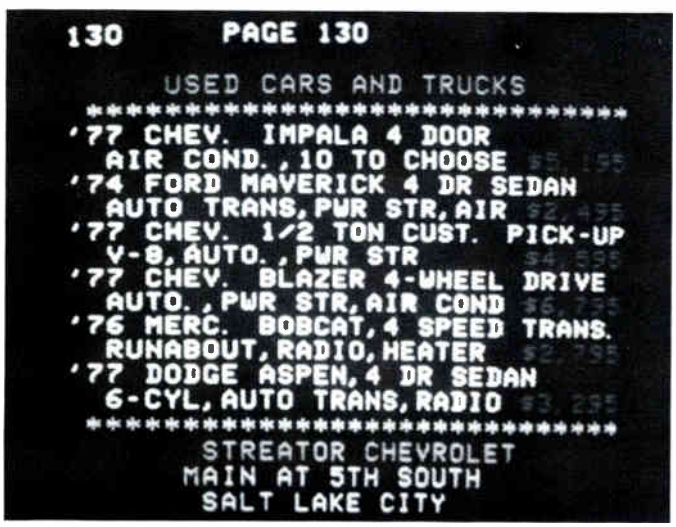
The equipment used at KSL is basically a mini-computer system with a capacity of 800 pages, six colors and black-and-white. The encoder sends a serial bit-stream (800 pages) of text and graphics at high speed to a Tektronix model 149 insertion unit. The digital bit stream is put on lines 15 and 16 in the vertical blanking interval (VBI).

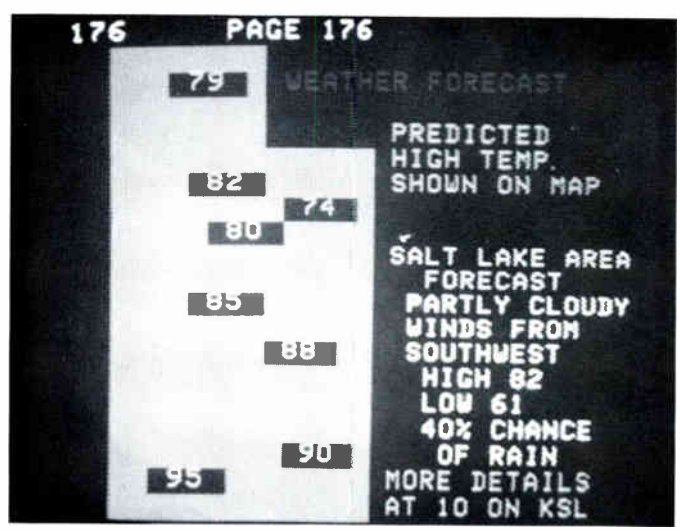
The Vertical Blanking Interval

The vertical blanking interval are unused scan lines in the TV picture. These lines were put in because older TV sets could not get the beam from the bottom of the picture up to the top of the picture in time. Hence, there are extra scan lines starting at line ten going through line 21. Lines 17 to 21 are already committed and have test signals on them. The networks are using line 20 for their SID signal and line 21 is certified for captioning for the deaf. Remote control transmitters utilize lines 17 and 18 for their test signals.

"We use lines 15 and 16 for the teletext signal," stated Loveless. "These lines are above the picture. If you crank the picture down via the vertical control, you can see the signals."

The pages of data are encoded via the American Standard Code for Information Exchange (ASCIE)—a common computer code. The code is sent on scan lines 15 and 16 which are invisible to the viewer.





A teletext display information message.

A home viewer switches to the teletext information mode.

In order to receive this information, the television set requires a special decoder which resembles a wallet-size computer board. The decoder receives the video and horizontal drive signals as inputs, and outputs directly to the red, blue and green gun drivers of the TV set picture tube. A small keyboard, that functions as a remote control device for the decoder, is attached and located on the outside of the TV.

To utilize the teletext information, the viewer uses the keyboard to select one of three modes of operation: normal TV reception; teletext information; or both methods simultaneously. The third method is accomplished via an overlay of the normal TV picture.

When using the teletext mode, the page number is requested by the decoder keyboard and is visible in the upper left-hand corner of the screen. A special line shows the pages being transmitted over the air next to the requested page that remains stationary. When the desired page is received, that particular page is overlayed across the entire screen until the viewer changes pages or modes.

"The standards that we're using are not necessarily the standards which will be finally adopted," remarked Loveless. KSL cannot use lines earlier than 15 and 16, which would provide them with a higher performance teletext system because of problems in older TV sets.

The dots in the VBI of the older sets do not get to the top of the picture fast enough. All new TV sets turn the beam off completely so that it's invisible during this time. The older sets don't have that circuitry, so that the beam is left on and scrambled lines can be seen.

"This is a free over-the-air service from KSL to subscribers in Salt Lake City," Loveless explained. "It's eventually going to be advertiser-supported and anyone who wants to pay the additional $50 for a TV set with built-in decoder can receive the service. However," he added, "it's more economical to buy the decoder when you buy the TV set. Otherwise, it's about $1,000 extra if you just buy the box that attaches to the TV set."

It seems that KSL-TV is not the only broadcasting station in the United States to utilize the teletext system. CBS has just started testing teletext systems in St. Louis, Missouri at its KMOX-TV station. It's using the British Ceefax system as well as the French version, ANTIOPE. However, they have encountered some problems.

KMOX was going to put one of the systems on lines 13 and 14, and the other system on lines 15 and 16. After the first week, they found that lines 13 and 14 were visible, so now they're alternating the two teletext systems on lines 15 and 16. Tests by CBS are supposed to be concluded late this month.

Presently, the United States is behind many countries in the development of teletext services. However, it seems that industrys nationwide are working up to the possibilities of teletext systems being a viable and useful medium of information.

Non-Entertainment Services

Load Management via Cable—One Year Later

Many electric utilities today find an increasing need to consider load management programs that can help them meet present and future customer demand fairly, make the most efficient possible use of scarce resources, and provide additional control over the rising costs of construction and operation of generating facilities.

In August, 1978, the city of Monroe, Georgia recognized the urgency of peak load management and implemented a system using equipment manufactured by Scientific-Atlanta.

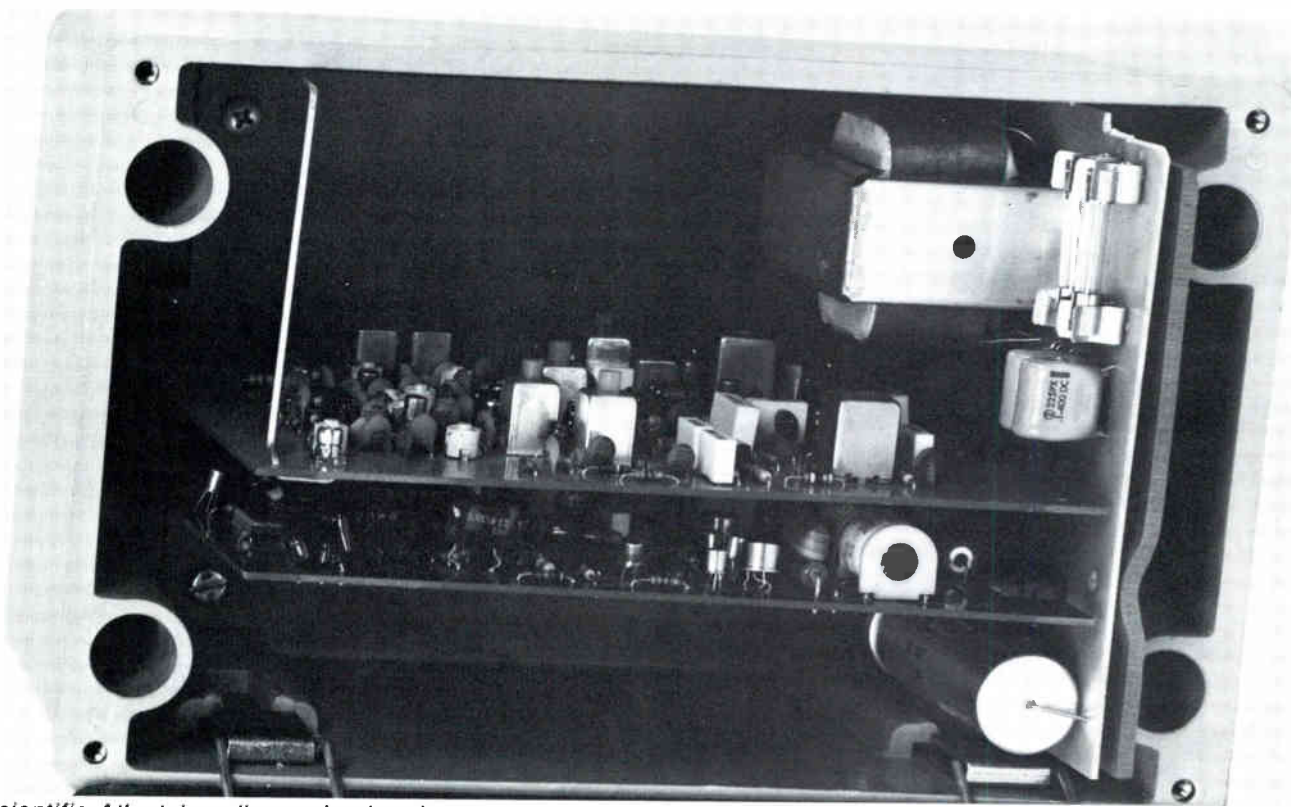
Scientific-Atlanta, the electronic firm that pioneered the development of earth receive terminals for the cable television industry, unveiled a novel system for managing electrical utility loads using cable television plant.

This unique load management system was installed in the municipally-owned cable television system serving Monroe, Georgia. The city of Monroe, which is served by the Georgia Power Company, purchased more than 1,000 appliance controllers to help shave peak electrical demand during hot summer days. The control devices were installed on municipal electrical loads, such as water pumps, to defer that load to non-peak periods.

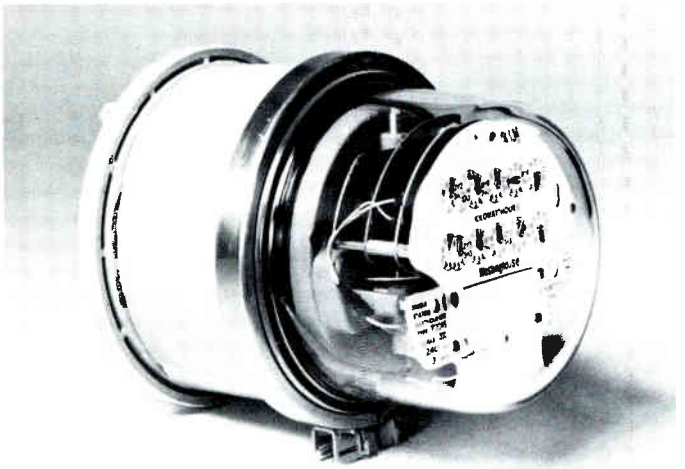
Because the system was installed towards the end of summer, there has been no evaluative information on how effective the system has been. John Briscoe, manager of the city of Monroe's Water, Light and Gas Commission, told *C-ED*, "How much load they shed and how much money they saved would be difficult to predict now." He did add, however, that he expects the system to be more than successful.

Dick Preston, regional sales manager for Scientific-Atlanta, stated that there haven't been "any new developments since the system was installed. However," he added, "interest has risen rather dramatically in the cable industry and among utilities with regard to using the cable network as a communications point for load management."

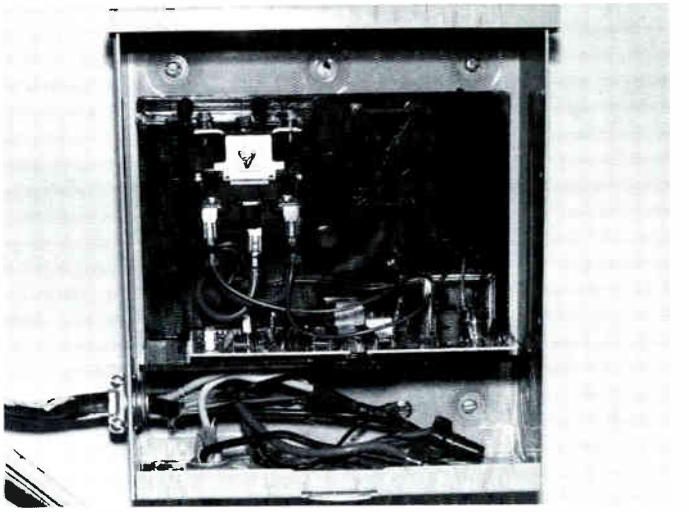
Last August, Briscoe made a successful appeal to the citizens of Monroe to have controllers installed on central air



Scientific-Atlanta's radio receiver/carrier current transmitter receives the message from the message generator unit via a standard cable drop.



Scientific-Atlanta's meter register control allows implementation of time-of-day tariffs, using central remote control and features a fail-safe timer.



The high current controller is designed for water heater load control or other applications that require interruption of 30 amp, 240 V AC circuits.

conditioning units and electrical hot water heaters. By disconnecting the air conditioner compressors for a period of seven-and-a-half minutes out of every half hour, and interrupting water heater loads for a period of two to four hours, the demand for electricity can be significantly reduced with little inconvenience to the public.

Interrupting one home's air conditioner compressor results in a four-kilowatt reduction in electrical load; and cutting back on a single hot water heater sheds an additional kilowatt from the load.

Why Use a Cable System?

C-ED asked Frank Hyde of Scientific-Atlanta, why the city of Monroe was using load management via a cable system. "The main advantage that a utility has in using cable," Hyde explained, "is if the utility is in an area that has RF communications problems. The situation could be a "Quiet Zone" area, an area saturated with other load management systems, or if there's a problem in getting licensing. The direct advantage to the utility," he continued, "is that they are not required to go to the FCC for licensing. As far as money savings, the utility is not required to buy an FM transmitter, antenna, tower or have a communications link to a transmitter."

Monroe, Georgia is comprised of gently rolling hills that don't present RF communications problems. However, the city is located in an area that has communication problems due to the large number of other load management systems.

The Equipment

Scientific-Atlanta load management products utilize a unique combination of radio frequency and carrier current communications media. The load management system in Monroe utilizes a combination of cable and power line carriers. The message generator unit generates the load control message. The message consists of an address and a command. This message, which is a series of audio tones, is modulated onto a narrow band carrier and inserted on a midband channel for distribution via the cable distribution system.

Each message consists of an address field and a command field. The address field comprises five bits of data which provide the selection of one out of 32 possible addresses. The command field is made up of eight independent command functions. Each message requires approximately 350 milliseconds of transmission time.

Cable receivers located on utility poles equipped with distribution transformers receive the message. These units receive the message via a standard cable drop and compare the transmitted address to the address programmed into the unit. If the address matches, the carrier current generator is activated. This carrier current command is transmitted via the electrical power lines to the subscriber.

Each time a command is transmitted the carrier current transmitter is activated for approximately one second. This carrier current signal is an FM carrier at approximately 200 kHz. The control modules detect the presence of the command signal on the power lines. If the module is programmed to respond to this code, a normally closed relay is opened and a 7.5 minute fail-safe timer is started. If at the end of 7.5 minutes ± 20 percent, the command is not repeated, the load will be automatically restored. This fail-safe feature prevents the load from being disconnected for long periods because of system failures or faulty reception.

The ± 20 percent variation of the 7.5 minutes prevents synchronous load restoration. If the load is to be disconnected for more than 7.5 minutes, the command signal must be repeated on a scheduled basis.

Disconnecting power to specific appliances in the home gives utilities direct control over electrical loads. However, such disconnects are only one form of load management. Utilities can also influence or control electrical loads by indirect means, such as offering a customer an incentive for shifting his electrical load to off-peak periods. The incentive? A cheaper rate for electricity used during non-peak periods. Scientific-Atlanta has designed a meter register control and customer alert device to communicate tariff status to consumers. The tariff status is identified by three color-coded lights. An audible tone sounds for five seconds each time the lights change status.

Load management—in one form or another—is expected to be commonplace in the 1980s. Cable television, it is predicted, will play a unique and vital role by providing utilities with the transmission paths to influence and control peak electrical loads—and conserve capital while meeting overall demand. **C-ED**

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CCTV Improves Safety and Service

By Toni Barnett
Managing Editor

Management of BART (Bay Area Rapid Transit)—the highly-automated, computer-controlled transit system serving 150,000 people in the San Francisco Bay area each working day—is proving that stations staffed on a remote basis, instead of by agents on the premises, can improve safety and service to patrons. Already, eight of the 34 BART stations are operated from a remote control center using closed circuit TV (CCTV), and more stations are scheduled for conversion.

The key to the new 84-camera CCTV observation system which makes remote staffing possible is an advanced FM cable communications system which provides pictures of startling clarity and detail at distances of more than 12 miles. This is probably the largest and most sophisticated CCTV system ever developed for a transit application.

"The picture quality ensures that the central control operators can see exactly what is going on at a station, even when the screen is split into four small images," stated project manager Jack Bradley. "Recently, he continued, "an operator noticed an elderly gentleman wandering on the track near the electrified rail and was able to warn him off using the PA system. A resident agent would not even have seen the incident take place."

The TV signals are transmitted on coaxial cable using wide band frequency modulation (FM) instead of the more traditional VSB amplitude modulation (AM). Pioneered and developed by Catel of Mountain View, California—a division of United Scientific Corporation—cable FM systems suffer virtually no signal degradation over long distances, unlike AM systems where high noise and distance rapidly degrade signal quality.

A single coaxial cable along each of the four rail lines in the BART system is sufficient to carry all the video signals to the central control at the Lake Merritt station in Oakland. Each coaxial cable can carry up to 17 video FM channels. With ten channels per given line, one channel can be assigned to each station with plenty of capacity remaining for system development.

Other functions of staffing, such as activating elevators, opening gates for the disabled, controlling fare collection equipment and bringing back alarm status to central control are handled by a supervisory control system. This system, which is under the control of the monitor center operators, also utilizes Catel's FM equipment to transmit data to and from the remotely staffed stations on the 42-mile coaxial cable network.

"At present, the PA and white courtesy phones used by patrons are on existing twisted pair cables," noted Bradley, "but eventually, all signals could be carried on the coax link, giving us a single pervasive communications network."

Remote Operation

"Remote staffing was introduced following a successful experiment in 1977 at two BART stations—Ashby and Rockridge," explained Bradley. "We used the Catel FM CCTV system to monitor station activity and operated the stations remotely for 45 days. During this time, the incident rate fell or at least remained at the previous low level."

"Many of the facilities—such as the PA system—were already installed at the stations and operated from the agent's booth," Bradley added. "To staff a station remotely, all we had to do was hook them up to the central console via spare telephone cables already laid along the permanent way."

An agent keeps watch on four stations at the central monitoring console.

Magnavox line amplifiers, complete with automatic gain control (AGC), are positioned at 2,000 feet intervals on each of the four coaxial trunks. If an amplifier fails, it can be bypassed and the AGC, the wide-input dynamic range of the FM demodulator and the 10 dB extra signal-noise margin combine to make the loss virtually unnoticeable. With an AM system, bypassing just one faulty amplifier would affect picture quality to such an extent that the surveillance system would be virtually ineffective.

At the Lake Merritt central monitoring point the FM signals are demodulated by Catel units (one for each station, tuned to the dedicated band) and fed to the band of eight station monitoring screens—one for each station—as well as to a test point and a supervisory console.

"Under the present set-up two monitor center operators remotely man four stations each," Bradley stated. "The CCTV signals are allowed to sequence automatically until an operator observes a problem. The sequence can then be manually halted, and if the incident appears serious, the operator can videotape it on one of three recorders."

The operators work directly alongside BART police control, so if an incident is serious, officers can be dispatched far more quickly than by an agent working in the station booth. The same procedure applies to a serious maintenance problem such as a faregate failure. The operator simply reports the problem to adjacent maintenance control, who sends in the nearest roving maintenance crew.

BART is currently working on plans to extend remote operation to more stations. Studies have shown that as many as 24 stations could be staffed remotely. The remaining ten are large downtown stations in San Francisco and Oakland which would be difficult to observe adequately using CCTV.

In terms of transmitting the FM signals, little additional work will be required. The coaxial trunks will need

(Cont'd on page 46)

(Cont'd from page 36)
to be extended to the end of each line; at present they terminate at the last remotely-staffed station, and more VFMS system-hardware will have to be installed at Lake Merritt and the additional stations.

"Most of the development work will be at central control," Bradley stressed. "The consoles will have to be redesigned to accommodate additional operators and TV screens. At the same time," Bradley added, "we plan to put the whole system under microprocessor control to give it more flexibility. It will allow us to switch stations from console to console so that operators can help each other out at busy periods."

In addition to making BART safer, the CCTV system has also played a part in allowing the system to run on weekends. "Extending service to include weekends would have required us to hire and train about 40 new agents to cover the extra two days," stated Bradley. "Remote staffing allowed us to reduce our new hire requirements by more than 20 agents."

The main problem in this system was sending quality video signals in the high noise environment through which the coaxial cable would pass. On the above-ground sections of track—which make up most of the BART system—the cable is less than three feet away from the electrified third rail.

"Signal quality was especially important because of the screen splitting which condenses a whole camera picture into a small section of the monitor screen," emphasized project engineer John Allen. "The high level of electrical noise," he continued, "would have caused a traditional AM signal to degrade to the point where the composite picture would have lacked the clarity which we needed for detailed observation."

According to Allen, Catel's cable FM was the only practical solution: "We could have used microwave transmission or dedicated video links for each camera," said Allen, "but either operation would have been prohibitively expensive without offering any technical advantages. In fact, Catel's system is priced on a par with the top-line AM systems, yet has the superior performance we needed."

Known as the VFMS 2000, the Catel system operates on exactly the same physical principle which makes FM radio superior to AM. Carrier waves are modulated by varying the frequency (FM) rather than the amplitude (AM). Because electrical noise has an amplitude modulating effect, signals transmitted by AM are adversely affected by noise, while FM signals are virtually untouched.

FM modulation of video signals is a technique which is well proven, with numerous terrestrial and satellite microwave communications systems using it. Catel's contribution to the art has been to develop a system which, for the first time, makes FM compatible with cable TV technology.

The VFMS 2000 system, which can transmit video and audio signals, employs a versatile modular design approach. Basic units can be combined in a standard-rack cabinet in a variety of ways to suit a given application, and all modules employ a low maintenance solid state design.

The basic building blocks for the system are video and audio modulators and demodulators, power supplies and band pass filters. A system can be assembled to operate anywhere within the 19 MHz to 293 MHz range, with a standard channel bandwidth of 14 MHz. C-ED

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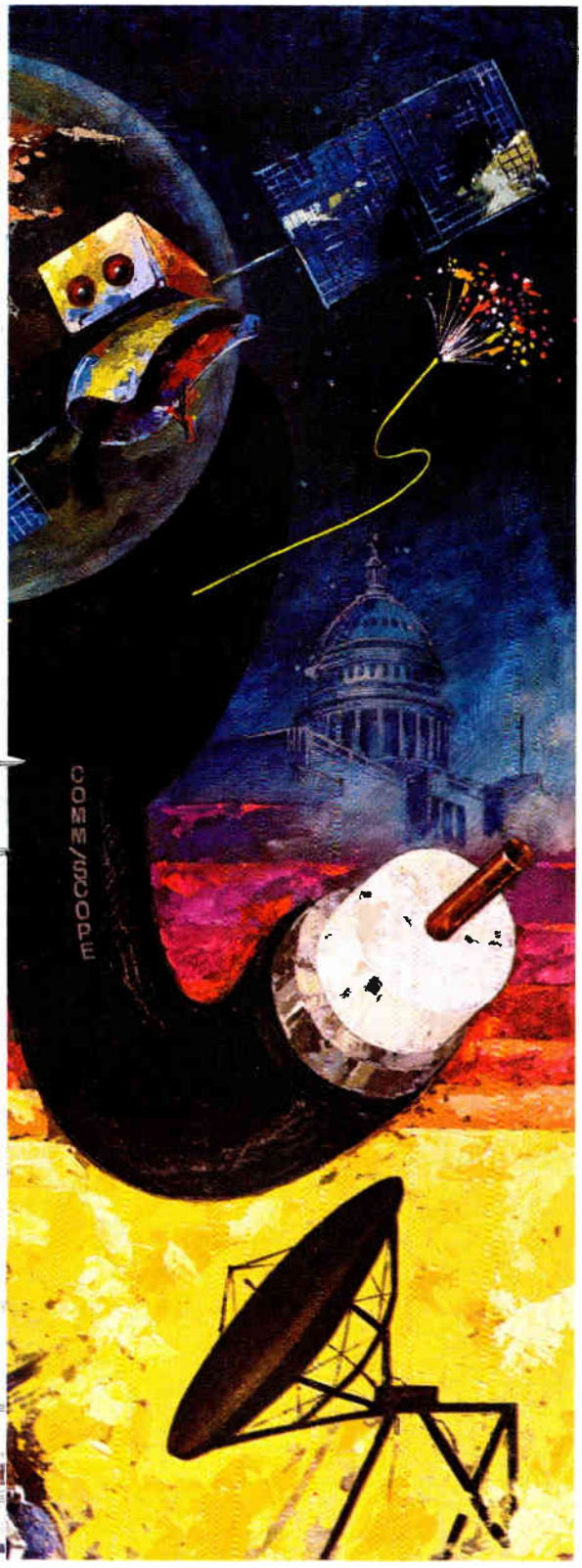

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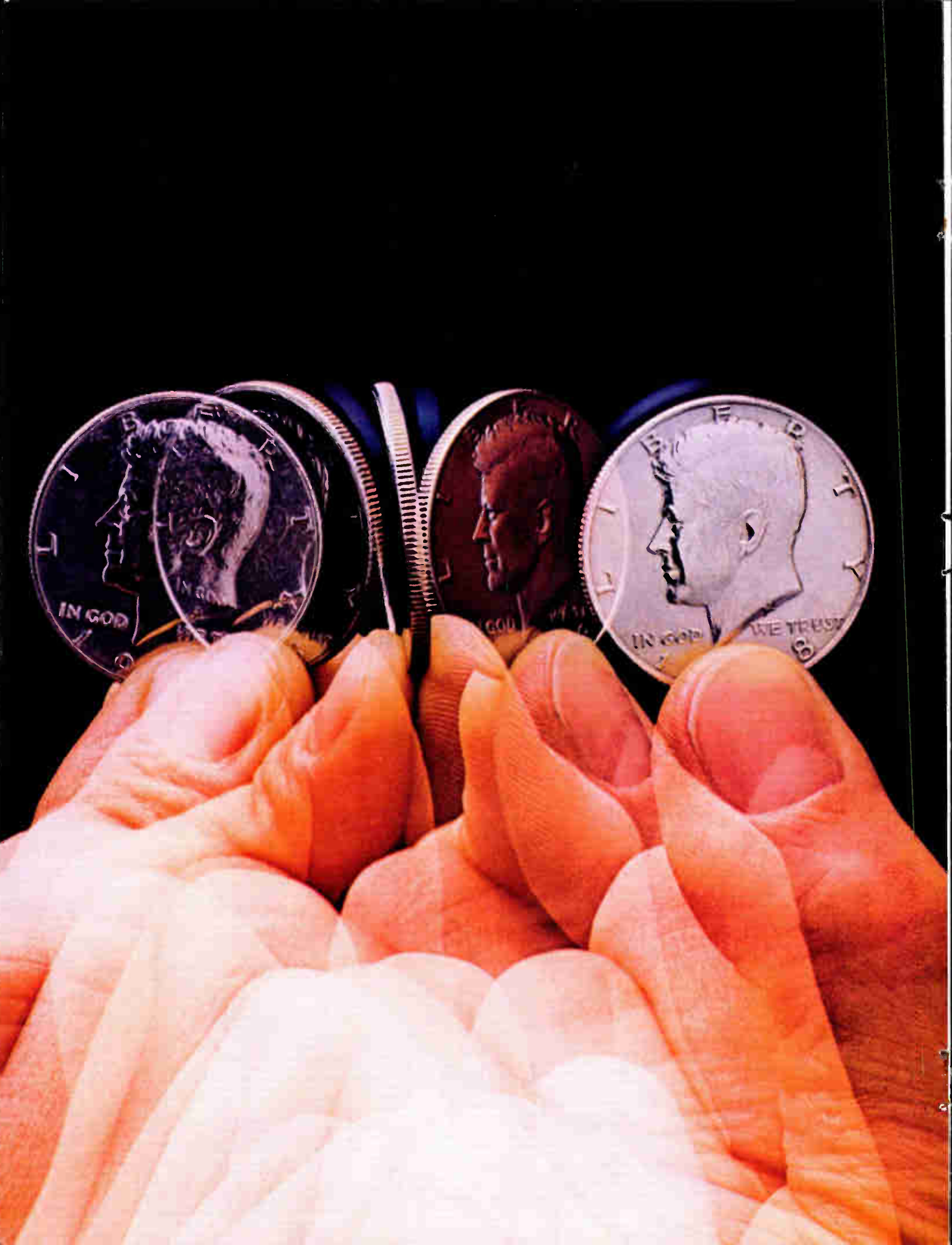
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Where Performance is Fact.

Grow Your Own Technicians For 1980

By Joseph Van Loan
Vice President — Engineering
Viacom Cablevision

The cable television industry is currently experiencing a period of unprecedented growth—growth which has created new jobs for qualified personnel at all levels of system design, construction and operation. Those new personnel are going to come from three sources: (1) by promotion from within a company, (2) by hiring from other CATV companies, and (3) from related non-CATV industries. These sources can be tapped for awhile, but without replenishment the pool soon runs dry.

Clearly, the first choice is preferred if qualified personnel are available. Promotion allows qualified personnel the opportunity to advance without leaving the company. This helps build a loyal, stable employee base. If we have new jobs, then a new supply of people is needed to fill those jobs. By hiring from other systems, the new job is filled, but another is vacant. It's like robbing Peter to pay Paul.

Why Have Employee Training?

System operators have always had difficulty attracting qualified technicians from other fields. When compared with the glamour of working on a magnificent computing machine in its hygienic, air-conditioned surroundings, there is little or no glamour in hanging from a pole on an unsightly CATV amplifier in a rainstorm on Saturday night. Since top-notch technicians are not clamoring to enter this industry, we must learn to use the "bootstrap" approach to obtain needed technical expertise.

There are several ways "bootstrapping" can be introduced: tuition reimbursement adds an incentive for employees to pursue formal education on their own; employers can underwrite employees' attendance at industry seminars; and an employer can provide in-house training for technical personnel. Whichever method is chosen, an effective training program requires substantial commitments by both the employer and employee.

What Are The Benefits?

The success of any training program is subtle and defies measurement by "cause and effect" observations, but some rewards become apparent and should be mentioned.

Training is one way a company can show interest in employee welfare; this generally improves the relationship between the company and its employees. It has been shown that when a company demonstrates such interest, productivity increases. In an industry where turnover rates for technical employees is inordinately high, a training program is one factor in reducing employee turnover. By maintaining a stable employee base, the overall efficiency of the organization is improved.

Training creates a source and a method for evaluating qualified personnel to fill advanced positions when they become vacant. This process of filling positions with qualified people from within reduces turnover rates by creating an atmosphere where individuals feel they can earn promotions throughout their employment term.

What Should Be Taught?

Viacom began using the "bootstrap" approach when an informal training program began in the early 1970's. This consisted of periodically having technicians with expertise in a particular area give presentations to a group of technicians and installers; these presentations usually took place outside normal working hours. The commitment was formalized early in 1975 when a full-time man was assigned to training during working hours. His function is to provide four hours of training per month to approximately 100 technicians. This is no small task since the 100 technicians are distributed among many cable systems; and with widely varying levels of proficiency in each system, the task of providing training is somewhat analogous to teaching grades one through twelve in a one-room school house. The largest group consists of entry level technicians who need training in fundamentals of CATV, including drop installation and trouble shooting, the use of field strength meters and volt-ohm meters, and a basic understand-

ing of decibels. At the same time, upper level technicians are interested in some of the more ethereal aspects of the craft including system design, processor alignment, antenna phasing, microwave path design, and the use of the vertical interval test signals in system diagnosis. It has not been a simple task to respond to the needs of this divergent group in the time available.

Entry level technicians need to learn fundamentals as soon as possible in order to become effective. This dilemma has been partly solved by having technicians in each system give classes to the entry level group. This training has worked well because it is not just taught by the chief technicians, but by several different technicians who find it is a learning experience for the teacher as well.

How Should It Be Taught?

When training was conducted on a voluntary basis, outside of normal business hours, initial enthusiasm was high but each succeeding session had diminished attendance. As a result of experience with after-hour sessions, training is now conducted during working hours, usually first thing in the morning. For convenience in scheduling the instructor, each system has one four-hour training session a month; however, almost without exception, one four-hour session is not as effective as two two-hour sessions. Participants find it difficult to maintain a high level of interest for four hours and it tends to cause scheduling problems for field work. Therefore, we have concluded one- or two-hour sessions are best if they can be arranged.

Thus far, we have not been giving homework assignments, but the general concensus seems to be that such assignments are desirable. By giving an individual some homework problems relating to a subject covered in class, the learning experience would be reinforced. Tests given at six months to one year intervals are used to evaluate an individual's long term comprehension of material covered, but consideration is being given to supplementing these tests with more frequent tests on the classroom material as it is covered. They could include questions on homework material, thereby adding an incentive to complete the assignments. Such a scheme would give the training greater depth, resulting in a more effective program.

As mentioned earlier, Viacom has a full-time instructor whose teaching is supplemented by technicians in the systems. This approach works fine for MSO's and large systems, but is hardly practical for smaller systems. However, the same success is possible by sharing the job among technicians in the system. By having technicians share the responsibility, each technician has an opportunity to polish his skills in the subject matter covered, both as a result of researching the material in preparation and by explaining it to others.

What Is The Price For Training?

Costs for training are substantial, but the rewards are well worth the investment. With classes taking place during business hours, the greatest costs can be traced to salaries paid during training. Training costs also include the salary and overhead for the instructor and the clerical support required.

It presently costs about $500 per year per man for technician training. About 65 percent of that is salaries for the students, and 35 percent is the cost for providing an instructor. The costs for training construction and installation personnel can be lower since they receive more on-the-job training than classroom training.

Other benefits become obvious. Prior to Viacom beginning its training program, each system depended on one or two good people for extraordinary occurrences such as headend outages. As a result of training on a variety of subjects, more technicians are cross-trained to perform system sweeping, microwave repair or headend maintenance. More technicians are available for stand-by duty, thus reducing pressure on the chief technician. For example, we make extensive use of AML microwave equipment for signal distribution. One or two people from each system attended the factory school and became responsible for being available in the event of a failure, which really meant they needed to be available 24-hours a day, seven days a week. By initiating a series of classes in each system, often taught by those who attended the factory school, each system now has several technicians who can handle microwave failures.

Training seems to improve the technician's confidence in himself and his abilities. One technician made this remark: "For years we knew how to fix the problem, but we didn't know how or why the problem existed. Now we know what we're talking about!" As a result of classes on the nature of the TV signal, its transmission and propagation, and the inner workings of the TV set, CATV technicians are better prepared to interface with their counterparts in the broadcasting and TV service industries. This is especially valuable in those situations where a customer is told its the "other guy's" problem. In the past, the CATV technician was often at the mercy of the well-informed TV serviceman. We encourage customers to call us in the event of reception problems; by doing so, they are often spared a costly TV repair bill when the problem was in the cable system all along. Technicians who are knowledgeable in both CATV systems and TV receivers can intelligently advise customers when their set is actually in need of repair.

In-house training often stimulates a technician's curiosity so that he seeks further education on his own by correspondence or night school. Both in-house and outside education help technicians cope with new problems. They seem to develop a "thinking" approach to problem solving, rather than being complacent with timeworn, and often ineffective, approaches to problems encountered. Partly as a result of the training program, a number of people have advanced from being installers to becoming top grade technicians in just a year or two.

The choice to conduct training during business hours requires management to realize problems must be attacked at the source. There is a tendency to adopt the tact we've all heard, "I don't have time to work on the headend; I have too many customer service calls complaining of snow on channel 4 that I have to do first." Too many managers believe they are too busy keeping the system operating to find time for training. It's another case of working hard, but not smart!

The rewards of a training program are well worth the cost and effort it takes to provide regular personnel training, and the key word is regular. Whether the training is done using a full-time instructor, having individuals prepare presentations for their peers, or having the chief technicians work with one or more individuals, the result should be identical. By any standard of measurement, the rewards make the effort worthwhile. C-ED

The System

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Required Signal to Noise Ratio For Satellite Feed to Cable Television Systems

By Norman P. Weinhouse
Hughes Aircraft Company

The required signal to noise ratio of a satellite feed to CATV systems remains the subject of confusion, even though satellite derived programming is now very common in the CATV industry. The confusion stems mainly from a situation where cable operators measure noise performance at VHF (carrier to noise ratio) at the subscriber drop, and the satellite feed is measured at baseband (signal to noise ratio). This situation is compounded by a variety of definitions, virtually all of which have weighting factors in the measurement, some of which have changed over the years and are now obsolete.

A further confusion factor arises from the fact that present day satellite signals are the result of frequency modulation of a microwave carrier, and cable systems utilize vestigial sideband modulation of a VHF carrier.

This paper makes an analysis of the situation and presents recommendations based on present-day standards, available test equipment and practical measurement methods.

The situation under consideration here is shown in Figure 1. In this case, the CATV system or cable plant is fed from a satellite program source, much the same way as any local origination program source.

The cable operator is required by its charter (and good business practice) to maintain a certain value of carrier to noise ratio (C/N) at the subscriber drop. This paper will address the problem as to how the satellite derived program affects the C/N at the subscriber drop. Only thermal noise is considered, and no attempt is made to allocate a noise budget for the cable plant.

The analysis used to derive the relationship between the S/N at the modulator input and the C/N of the modulator output follows the method used by T. M. Straus (1) in a 1974 paper.

Satellite Derived Signal

The satellite signal arrives by way of a two hop microwave link. The hops are rather long and, due to the nature of satellite transmission, some new jargon has found its way into common usage. Although the purpose of this paper is to relate the satellite derived S/N to the cable system C/N, it is

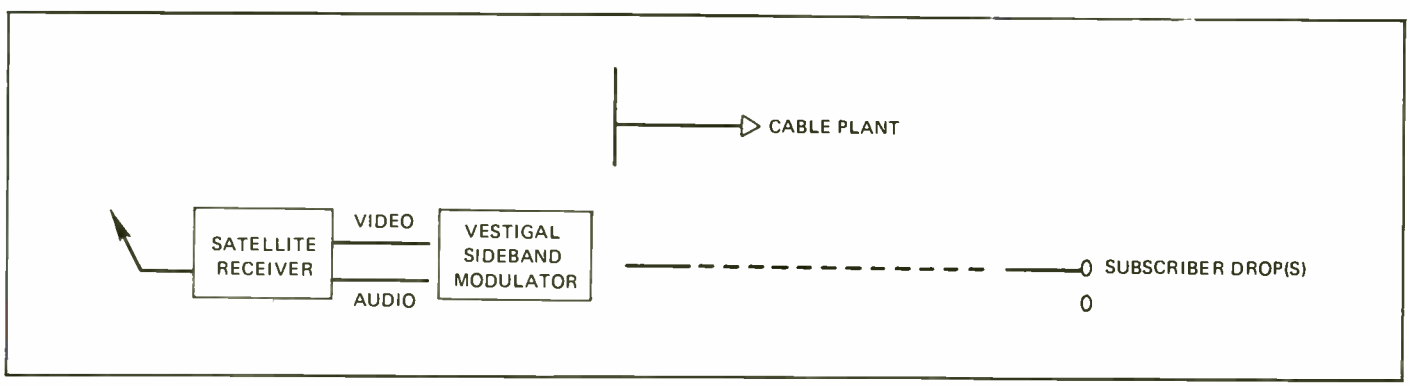

Figure 1: Satellite feed to CATV system.

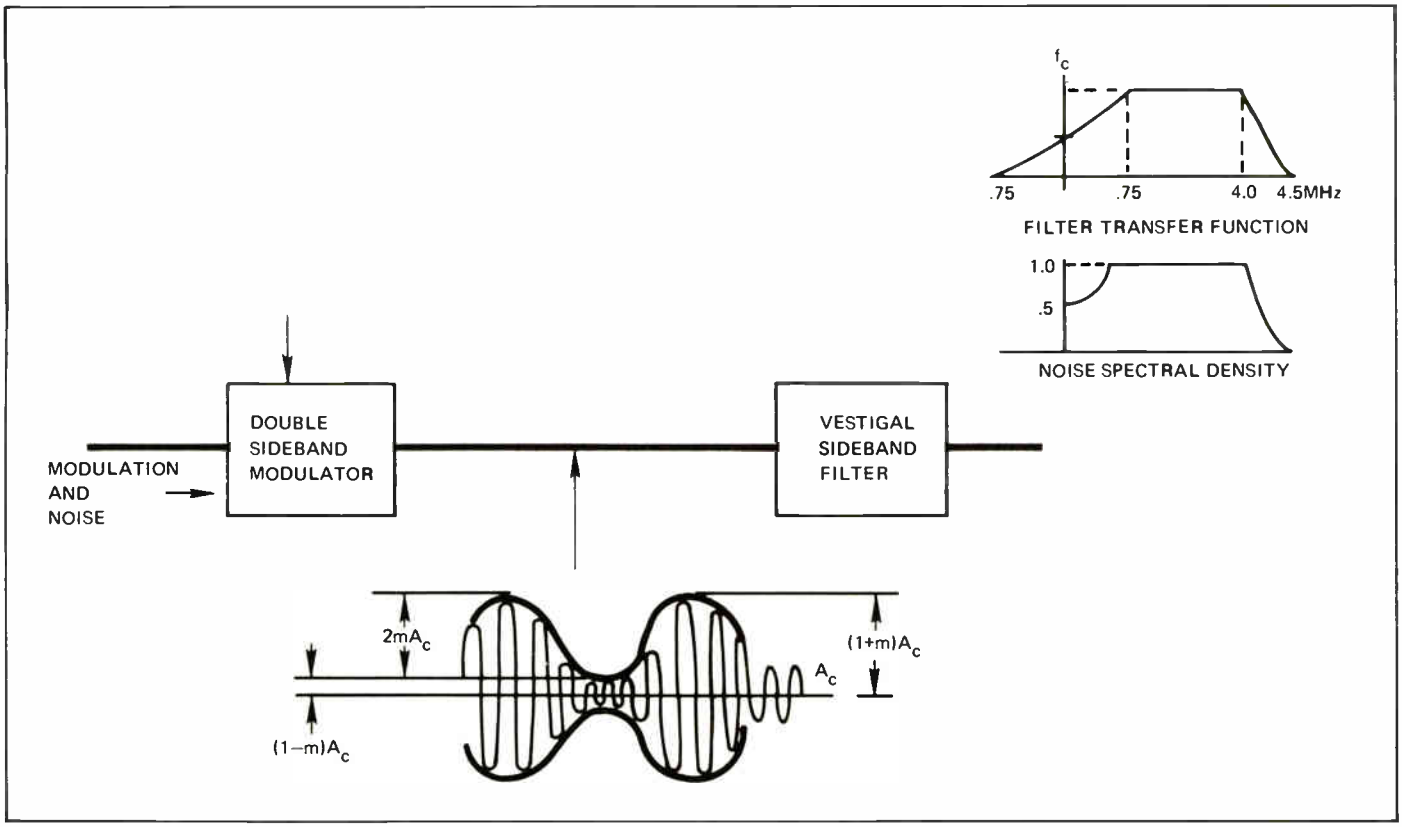

Figure 2: Vestigal sideband modulator.

considered proper that the factors which contribute to the S/N be established.

Over the years many standards for television transmission have been documented, unfortunately with different definitions. At this time, the definition has been standardized, although there is still some variation internationally in the weighting characteristic to be used in the measurement. Baseband S/N (random noise) is defined universally as the ratio of the amplitude of the luminance signal (blanking to white or 100 IRE units) to the weighted and band limited RMS noise level. A good standard for use in the U.S. and Canada is NTC Report number 7 (2). This report is totally compatible with CCIR current standards for U.S. and Canada, and it also describes a measurement technique whereby a non-interrupting measurement of noise can be made.

Assuming the signal from the satellite, and the earth station parameters as such that the satellite receiver is operating above its threshold, the video signal to noise ratio $(S/N)_V$ as defined in NTC 7 is:

$$(S/N)_V = 6 \cdot \left(\frac{\Delta F}{fm}\right) \cdot \frac{B_{PD}}{fm} \cdot (C/N)_{PD} \cdot pw$$

Equation 1

where

- ΔF is the peak deviation of the satellite carrier by the video
- fm is the highest modulation frequency
- B_{PD} is the predetection bandwidth
- pw is the combined deemphasis and weighting improvement
- $(C/N)_{PD}$ is predetection carrier to noise ratio

Substituting the ANIK TV transmission parameters, and assuming B = 36 MHz,

$$(S/N)_V = 38.3 + (C/N)_{PD} \text{ dB}$$

Equation 2

The $(C/N)_{PD}$ can be expressed as a power summation:

$$(C/N)_{PD} = (C/N)_u \boxplus C/I \boxplus (C/N)_D \text{ dB}$$

Equation 3

where

- $(C/N)_u$ is the uplink C/N
- C/I is the carrier to interference ratio from all sources
- $(C/N)_D$ is the downlink C/N

The uplink C/N is generally greater than 30 dB, and if the earth station is properly coordinated the total interference from space segment and terrestrial sources will give C/I>20 dB. In applications using small aperture (4.5- to 6-meter diameter) antennas, the downlink C/N will be in the range of 12-16 dB. The summation of these assumed values yields $(C/N)_{PD}$ in the range 11.3 to 14.5 dB. The range of $(S/N)_V$ is therefore 49.6 to 52.8 dB.

Vestigal Sideband Modulation

Reference to Figure 2 will assist in an understanding of the derivation and analysis which follows. The vestigal sideband signal is a result of double sideband modulation and passing this signal through an ideal vestigal sideband

filter whose transfer characteristics are as shown.

Modulation enters the amplitude modulator and the resulting output waveform is given by the familiar expression:

$$g(t) = A_C [1 + mf(t)] \cos w_c t$$

Equation 4

where

m	is the modulation index
w_c	is the carrier frequency
A_c	is the carrier amplitude
f(t)	is the modulation function

This waveform is shown in Figure 2 using sine wave modulation for simplicity. It should be noted that the carrier envelope varies between (1 + m) and (1 − m) because f(t) is forced to be equal to or less than unity. It should also be noted that the peak-to-peak carrier envelope (signal) voltage is 2 m A_c.

This signal is accompanied by noise assumed to have a uniform spectral power density n over 2B (two sidebands) where B is the baseband bandwidth. The baseband noise is not precisely flat, but very nearly so, because the FM "triangular" noise is modified by a deemphasis network in the receiver. The ratio of the detected peak-to-peak signal power to the RMS power is then:

$$(S/N)_{AM} = \frac{(2m\ A_c)2}{2Bn}$$

Equation 5

The RMS carrier power during the peak of the modulating cycle is

$$C_P = (1 + m)^2 \cdot \frac{A_c^2}{2}$$

Equation 6

Substituting, into Equation 5 and rearranging terms gives:

$$(S/N)_{AM} = \left(\frac{2m}{1+m}\right)^2 \cdot \left(\frac{2\ C_p}{2\ Bn}\right)$$

Equation 7

At this point in the development, a close look at the term (2m/1 + m) shows that it represents the envelope variation relative to the peak of the envelope. Therefore, any definition of peak signal of the baseband signal is taken into account by this factor. For example, in the CCIR and NTC 7, definition for baseband signal synchronizing pulses are not included. Equation 7 should therefore be modified

$$(S/N)_{CCIR\text{-}AM} = \left(\frac{100}{140}\right)^2 \cdot \left(\frac{2m}{1+m}\right)^2 \cdot \left(\frac{2\ Cp}{2\ Bn}\right)$$
$$= \frac{1}{2} \cdot \left(\frac{2m}{1+m}\right) \cdot \left(\frac{2\ Cp}{2\ Bn}\right)$$

Equation 8

Consider next the effect of the filter on this function. The filter effectively eliminates half the sideband voltage, but the carrier voltage is also reduced by one half. The envelope

variation as a fraction of peak carrier remains the same. Therefore, the factor $(2m/1 + m)^2$ is valid for vestigal sideband as well as double sideband. The carrier power (Cp) is reduced by 1/4, the bandwidth (2B) is replaced by the effective noise bandwidth of the filter B_N, and the uniform noise spectral density (n) is replaced by the noise spectral density of the filter (w). The noise power on the output of the filter is then, (B_{Nw}). Rewriting Equation 8 to reflect the S/N on the output of the filter gives:

$$(S/N)_{CCIR\text{-}VSB} = \frac{1}{4} \cdot \left(\frac{2m}{1+m}\right)^2 \cdot \frac{Cp}{B_{Nw}}$$

Equation 9

In order to put Equation 9 in a more convenient form, multiply both sides by $(Bn)_{RF}$ which is a "flat noise power" in the bandwidth (4 MHz) which is defined as the noise power in the NCTA measurement of carrier to noise ratio. Performing this operation on Equation 9 and rearranging terms gives:

$$(S/N)_{CCIR\text{-}VSB} = \frac{1}{4} \cdot \left(\frac{2m}{1+m}\right)^2 \cdot \left(\frac{Cp}{Bn}\right)_{RF} \cdot \frac{(B)_{RF}}{B_N} \cdot \frac{n}{w}$$

Equation 10

where the ratio (n/w) represents the ratio of a "flat" noise spectral density to the noise spectral density on the output of the vestigal sideband filter, when properly weighted by the CCIR weighting filter.

Straus (1) has evaluated B_N and (n/w) with the result as 3.8 MHz and 6.7 dB respectively.

Rewriting Equation 10 in logarithmic form, and substituting numerical values gives:

$$(S/N)_{CCIR} = 10 \log\left[1/4 + (0.875)^2 + \left(\frac{Cp}{B_n}\right)_{RF} + \frac{4}{3.8}\right] + 6.7 \text{ dB}$$
$$= [(C/N)_{NCTA} - 6 - 1.2 + 0.2 + 6.7] \text{ dB}$$
$$= (C/N)_{NCTA} - 0.3 \text{ dB},$$

The use of 0.875 for (2m/1 + m) is due to the fact that the ratio of peak-to-peak envelope to carrier peak in television broadcast standards is 0.875.

This result shows that there is only a 0.3 dB difference between the baseband S/N defined and measured by CCIR 421 or NTC7 standards and the C/N defined and measured in accordance with the NCTA standards *for an equal subjective effect.*

Measurement and Experimental Verification

Experimental verification of the above theoretical treatment is devilishly difficult to obtain. It is thought that the reasons are twofold. First, the measurements of the baseband and RF S/N, and C/N are themselves subject to error. Second, and probably most important, the filters used in CATV modulators are not "ideal".

In practical application and to aid in system design, it is suggested that the NCTA measurement standards and CCIR 421 or NTC 7 measurement standards be used, ignore the 0.3 dB theoretical difference, and calculate the overall system performance by the power addition of the resultant values.

$$(C/N)_{TOTAL} = 10 \log\left[\frac{1}{\left(\frac{N}{C}\right)_{NCTA} + \left(\frac{N}{S}\right)_{CCIR}}\right]$$

As an example, if a cable plant exists where the worst case C/N at a subscriber drop is 40 dB, the effect of a 50 dB S/N from a satellite feed is:

$$(C/N)_{TOTAL} = 10 \log\left[\frac{1}{0.0001 + 0.00001}\right]$$
$$= 10 \log\left(\frac{1}{0.00011}\right) = 39.6 \text{ dB}$$

The degradation due to the satellite feed is only 0.4 dB.

The result of the analysis shows that the baseband S/N (measured in accordance with CCIR standards) when derived from a satellite signal is very nearly equal to the subjective equivalent to the C/N measured on a cable system in accordance with NCTA standards. The baseband S/N, and the rf C/N can be added on a power basis to determine the overall C/N, and therefore determine the degradation to the C/N due to the satellite feed.

References

(1) T. M. Straus, "The Relationship between the NCTA, EIA, and CCIR Definitions of Signal-to-Noise Ratio", *IEE Transactions on Broadcasting,* Vol. BC-20, No. 3, Sept. 1974, pp 36-41.

(2) NTC Report No. 7, "Video Facility Testing, Technical Performance Objectives", prepared by the Network Transmission Committee of the Video Transmission Engineering Advisory Committee, June 1975, Revised Jan. 1976, pp 50-52.

Because of the early deadline schedule for the National Cable Television Association Convention, we were unable to obtain the satellite programming schedule for June.

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Cable Locating and Fault Finding Equipment In Decatur

By Ralph Duff
Chief Engineer
General Electric Cablevision
Decatur, Illinois

Dealing with increasing mileage of underground cable was causing several different problems for the engineers of General Electric Cablevision's Decatur cable TV (CATV) network. The engineers were faced with a growing number of cable locating requests from contractors. They also had to contend with fault finding below ground and the problem of charting abandoned ducting.

Our original cable locating equipment was not accurate enough for our growing network, and we often had to confirm a cable finding by digging—a time-consuming and expensive operation. In addition, we had very unreliable underground fault-finding instruments—we clearly needed more advanced equipment, and soon.

Help came in the form of an instrument, originally developed for the telephone industry, which combined a locating function with a fault tracing capability and could also be used to chart underground ducting. It was already field proven by utilities and other CATV companies.

Since we began using this instrument we have significantly improved the reliability of our cable locating and made substantial time and cost savings. We never need to dig now to confirm a location, and in addition, we can easily pinpoint faults, allowing service to be restored far more quickly than before.

The new instrument has also proved extremely beneficial in the current work on wiring the downtown area by locating many old, abandoned ducts that the company has been able to utilize and avoid the expenses of digging trenches and installing new conduit.

The Decatur System

The Decatur CATV network serves 21,000 homes, using 320 miles of coaxial cable. Around 52 miles are underground, but this figure is growing by ten miles per year due to new additions to the systems being underground.

We often have to perform six or seven "locates" a day for contractors who need to know the location of our cables before they start work. The new instrument now makes these "locates" a routine task.

The most common fault that occurs is a cable being accidentally cut, a

An engineer uses the A-shaped earth contact frame with the Dynatel 573 to find underground cable sheath faults. By simply checking the meter built into the hand-held receiver, the G.E. Cablevision engineer can tell if the fault lies ahead or to the rear on the cable run.

A G.E. Cablevision engineer uses the Dyna-Coupler™ to induce a tracing tone on an underground cable. This simple, clamp-like device combines the simplicity and speed of the traditional induction method with the accuracy of a direct electrical connection.

problem which arises on an average of about once every two months. Even a cut made by a vibrating plow, normally very difficult to find, is easily located using the new equipment.

The instrument which has solved these problems is manufactured by Dynatel Corporation of Sunnyvale, California. GE Cablevision utilizes two instruments in Decatur: a model 500 for locating and depth finding, and a model 573 which has these same capabilities plus a fault finding feature.

The New Instrument

Designed to withstand the rough treatment handed out in the field, the complete instrument comes in a rugged container the size of a small suitcase and weighs only 20 pounds. It consists of two basic units: a transmitter which is built into the case, and a hand-held receiver.

The transmitter is used to "put" a 300 KHz radio frequency tone on the cable, while the receiver is used to follow the line of the cable by picking up the tone. The RF frequency is such that it does not interfere with the CATV signal or any nearby telephone lines.

The way in which the tone is put on the cable, and the means by which it is monitored by the receiver, are the key reasons for the instrument's cost-savng accuracy.

The apparatus used to put the tone on a cable is known as a Dyna-Coupler™. This is a unique, clamp-like device attached to the transmitter which can put the tone on any cable up to three inches in diameter just by clamping it around at any accessible point, such as a manhole or pedestal.

It is a simple but advanced concept, which means that the tone is only placed on the line itself, so the danger of putting signal on adjacent cables and causing the receiver to pickup a ghost reading is eliminated.

In the few instances when it is not possible to Dyna-Couple and no other cables are nearby, the tone can be put on using the traditional induction method. A third, highly accurate alternative is to put tone on the cable by direct connection.

To make the line of the cable easy to follow, the receiver is equipped with both an audible tone and a meter. There are two operation operating modes, Null and Peak.

Null is the easiest operating mode to use, with the audible tone and the meter reading dropping to zero when the receiver is directly above the cable.

However, the Null mode can give misleading readings in a multi-cable environment, so this is the time to switch to Peak mode.

We usually work with the Peak mode. Here, the signal and meter reading are both greatest when the receiver is parallel with and directly above the cable. No matter how many cables are nearby, this will always be the case.

Trenching Costs Saved

This method of accurate locating was put to good use when the company was wiring a bank building in downtown Decatur.

We placed our main distribution cable in the duct running under the road, and right near the building in question we found an abandoned Western Union lateral, not shown on the charts, that ran in the right direction.

To ascertain where the lateral went, engineers pushed rods through until they could go no further, and then put a tone on the rods by connecting up to the Dynatel transmitter.

The receiver quickly showed that the rods ended directly below the bank parking lot. We marked the spot and then, with the bank's permission, dug down to find out what happened to the duct.

The digging showed that the lateral was not blocked, but actually dead-ended at that point. To wire the building it was only necessary to dig a trench across part of the parking lot to extend the lateral all the way to the building.

This reduced the cost of wiring up the building considerably. And, there are other instances where we have been able to save trenching costs by using the instrument to trace uncharted ducts.

Accurate Fault Finding

The instrument's RF tone plays a key role in fault finding because it allows the model 573 to indicate the direction in which the fault lies.

An earth contact frame is plugged into the model 573 receiver and orientated so that the green end points away from the transmitter. On the receiver reference meter, the needle also points to the green section, indicating that the fault is ahead.

The operator simply follows the CATV cable by listening to the audible tone and pushes the contact frame into the earth at intervals. As long as the needle remains in the green section, the fault is ahead. As soon as the needle swings into the red zone, the fault is behind. The operator then backs-up until the exact point at which the directional change occurs and he is immediately over the fault.

The 573's fault indicator meter is very sensitive, and a small movement over the fault will produce a large swing on the needle. If the fault lies under an area of asphalt, it is a simple procedure to work around the area with the contact frame and take two or more directional bearings. The point at which they intersect marks the fault location.

Other Uses

One unusual use which even Dynatel had not considered is the way we find pre-wired wall outlets which have been plastered over. We simply put a Dyna-Coupler on to our cable where it enters the building and then go over the walls in the Peak mode until we pick up the signal.

The instrument is also used by the construction department to monitor both the progress and the depth of boring rods, a facility that was not previously available to them.

Depth locating is very straightforward, and does not rely on the error-prone triangulation method which involves trying to guess a 45 degree angle. The following steps are used in depth locating:

- The single switch is moved to the Set position and the receiver is placed on the ground directly above the CATV cable. Then the control knob is adjusted until the meter needle is centralized in the yellow zone marked Set.
- Switching to the Peak setting, the audible signal and meter reading both go to maximum. Then, the handset is lifted vertically until the meter needle drops back to the yellow Set zone. The distance between the receiver and the ground is exactly equal to the depth of the cable below ground.

Since the Decatur CATV network pioneered the use of Dynatel cable locating technology, other GE Cablevision systems have been quick to follow suit. There are now five units used by GE CATV networks and if performance continues to match present standards, there may be more cable systems turning to this equipment in the future. C-ED

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Saturday, May 19

10:00 am **Registration**
5:00 pm Foyer, Convention Center

9:00 am Golf Tournament
5:00 pm Sahara Nevada Country Club

10:00 am Tennis Tournament
5:00 pm Cambridge Tennis & Racquet Club

Sunday, May 20

2:30 pm **Exhibits Open**
5:30 pm East Exhibit Halls B & C

10:00 am **Registration**
6:00 pm Foyer, Convention Center

12:00 pm **Champagne Opening**
1:00 pm Foyer, Convention Center

1:00 pm **Opening Session**—Mtg. Rms. A1-6
2:30 pm **Opening Remarks**—Burt Harris
Welcome—Sen. Howard Cannon (D-NV)
Remarks—Bob Hughes
Speech—Former President Gerald Ford
Closing Comments—Burt Harris

4:30 pm **Exhibitors' Cocktail Reception**
5:30 pm Exhibit Halls B & C

Monday, May 21

10:30 am **Exhibits Open**
5:30 pm

7:30 am **Registration**
6:00 pm Foyer, Convention Center

9:00 am **Lead-Off Session**
10:30 am (Speaker to be announced)

2:30 pm **Satellites**
4:00 pm

"Small Earth Stations' Protection of Service," R.H. Allen, Rockwell International, Dallas, Texas

"Low-Cost FM Video Receiver Design Considerations," Jim Hart, Scientific-Atlanta, Inc., Atlanta, Georgia

"Satellite Cross Polarization," Robert C. Tenten, Manhattan Cable TV, New York, New York

"EIRP of the Satcom Cable Television Spacecraft," J. Christopher and W. Braun, RCA, Piscataway, New Jersey

2:30 pm **Education and Training**
4:00 pm

"When All Else Fails, Do It Yourself," Glenn Chambers, American Television & Communications Corporation, Englewood, Colorado

"Development of a CATV Technical Practices Manual," Michael McKeown, Cox Cable Communications, Atlanta, Georgia

"Education—The Means to an End," Thomas J. Polis, Magnavox CATV Systems, Inc., Manlius, New York

Tuesday, May 22

10:30 am **Exhibits Open**
5:30 pm

7:30 am **Registration**
6:00 pm Foyer, Convention Center

9:00 am **Small System Problems**
10:30 am

"Calculation and Balance Techniques for a Smaller, Dedicated Return Line," Bert Henscheid, Theta-Com CATV, Phoenix, Arizona

"Preventive Maintenance of Small Systems," Richard F. Roberts, Cobb-Cherokee Cable TV, Acworth, Georgia

"Small System Problems," Larry Searcy, Enterprise Cable Television, Inc., Enterprise, Alabama

"Program Management in CATV Implementation," Ernest Tunmann, P.E., Tele-Engineering Corporation, Framingham, Massachusetts

"Power Supply Requirements and Voltage Calculations for Cable Powered CATV Systems," James Waldo, Teleprompter Cable TV, El Paso, Texas

9:00 am
11:30 am **Advanced Techniques**

"A Wide Band Data Transmission Link Utilizing Existing CATV and Microwave Facilities," Ed Callahan, American Television & Communications Corporation, Englewood, Colorado and William J. Deerhake, IBM, Triangle Park, North Carolina

"A Versatile, Low-Cost System for Implementing CATV Auxiliary Services," Robert V.C. Dickinson, E-Com Corporation, Stirling, New Jersey

"A Bi-Directional Coaxial Cable Inter-City Transmission Network for Multi-Purpose Uses," William E. Evans and Jeffrey C. Rohny, Manitoba Telephone System, Winnipeg, Manitoba

"Pay-Per-View, Security and Energy Controls via Cable: The Rippling Rivers Project," Clifford B. Schrock, C.B. Schrock and Associates, Inc., Aloha, Oregon

"Narrow-Band Video: The UPI 'Newstime' Technology," Glen Southworth, Colorado Video, Inc., Boulder, Colorado

12:10 pm **Luncheon**
2:00 pm Las Vegas Hilton
Presentation of Awards

2:30 pm
4:00 pm **Fiberoptics**

"Installation and Field Operation of an Eight Km Fiberoptic CATV Supertrunk System," Donald G. Monteith, Cablesystems Engineering, London, Ontario

"Installation and Performance of a Fiberoptic Video System at Viacom," Paul J. Dobson and Tad Witkowicz, Valtec Corporation, West Boylston, Massachusetts and Jerry Marnell, Suffolk County Cablevision, Long Island, New York

"A 12-Channel, Eight Km Fiberoptic Supertrunk," Sol Yager, Times Fiber Communications, Inc., Wallingford, Connecticut

2:30 pm **Testing and Maintenance**
4:00 pm

"Reliability—A Total Approach," Don Dworkin, Ellery Litz, Peter Parikh and Harry Suri, Warner Cable Corporation, New York, New York

"Microprocessor Control for CATV Test Instruments," Sid Fluck and Marv Millholland, Wavetek Indiana, Inc., Beech Grove, Indiana

"Spectrum Analyzer as a Computerized 'Proof-of-Performance' Machine," I. Switzer, Switzer Engineering Services Ltd., Mississauga, Ontario

"Analysis and Measurement of CATV Drop Cable RF Leakage," Kenneth L. Smith, Times Wire & Cable Company, Wallingford, Connecticut

"The Measure and Perceptibility of Composite Triple Beat," Dan Pike, Communications Properties, Inc., Austin, Texas

7:00 pm **Reception**
8:00 pm **Annual Banquet**
Grand Ballroom, Las Vagas Hilton
Entertainment: The Young Americans

Wednesday, May 23

7:30 am **Registration**
12:00 pm

9:00 am **Exhibits Open**
1:00 pm Foyer, Convention Center

9:00 am **Computers**
12:00 pm

"Potential Use of Microprocessors by Technical Personnel," Ray Daly, Computer Cablevision, Inc., Washington, D.C.

"System Design and Operation with 'Basic'," James B. Grabenstein, Potomac Valley Television, Cumberland, Maryland

"Computer-Aided CATV System Design," Richard Amell, Cox Cable Communications, Inc., Atlanta, Georgia

Hands-On Demonstrations

By Pat Gushman, Washington Bureau Chief

The political ramifications of the Cable Satellite Public Affairs Network, both for the industry and the entire country as well, have been covered extensively by the media. Pound for pound, C-SPAN, because of its uniqueness as an industry cooperative project and also because of the uniqueness of its first program offering—live coverage of the U.S. House of Representatives, has received more publicity than anything to come down the line in a long time.

All of the industry publications have tracked it. Dozens of the nation's leading news and business papers have examined it. And, in hundreds of local communities, small dailies and even weekly 'shoppers,' as some papers are called, have reported on viewers being able to see their elected representatives at work in Washington.

one of the most significant things the cable industry has done. All of the suppliers and everyone else involved, the operators who put up the money, should all give themselves credit for pulling together something which is so much in the interest of the public."

The comments are representative of almost everyone involved including the other suppliers: Microwave Associates, Video Data Systems, Monroe Electronics, U.S. Tower of Rockville and Professional Products of Bethesda, Maryland.

But, if there is a story of anyone who typifies the spirit in which this historic step for the industry was taken, it would have to be the story of one of the contractors. He wasn't even in the industry, but he is now. He had done a few installations for Scientific-Atlanta, but until recently his main business was constructing apartments and office buildings in and around the state of Georgia.

THE C-SPAN STORY

But, as Ed McMahon of the *Tonight Show* might say, "You probably think you have read and heard everything you could possibly ever, ever want to know about C-SPAN."

"Wrong, C-SPAN breath," Johnny Carson would reply.

It seems there is yet another angle to the story which plays off of the "cooperative" nature of the undertaking—it represents the efforts of 23 board member companies, nearly a dozen equipment suppliers and already more than 400 cable systems around the country. It is that unique blend of people and the technology which has made C-SPAN so worthwhile.

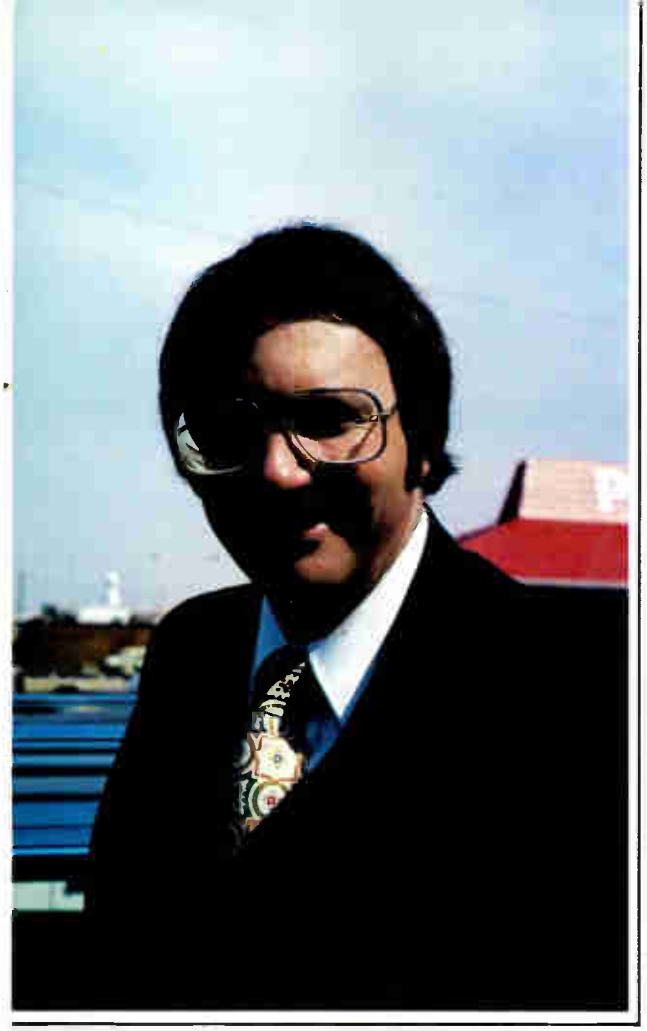
"When I saw the way all of those top cable executives on the board were able to work together," stated Jay Levergood of Scientific-Atlanta, which provided the uplink, "I just liked the industry all over again."

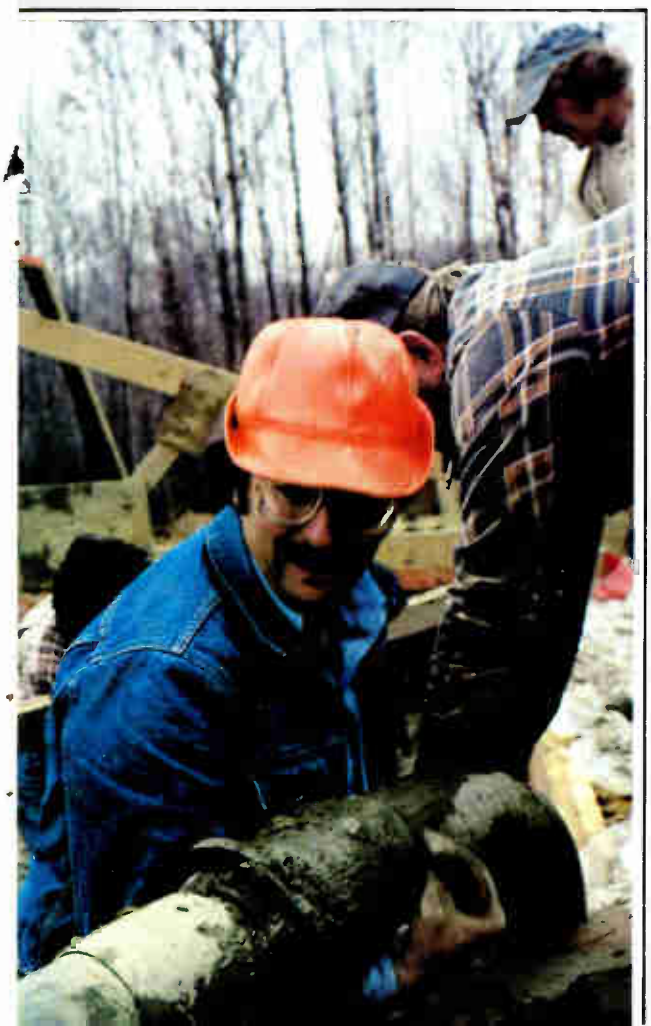
"We're very proud to be a part of the whole operation," Frank Drendel of Comm/Scope exclaimed. "I think this is

His name is Howard M. Hargis, Jr. He entered the picture at a time when it was beginning to look doubtful that C-SPAN, beset with seemingly endless construction delays due to the worst winter working conditions the Washington area has seen in decades, could be ready when the House of Representatives was ready to turn over its feed to the public.

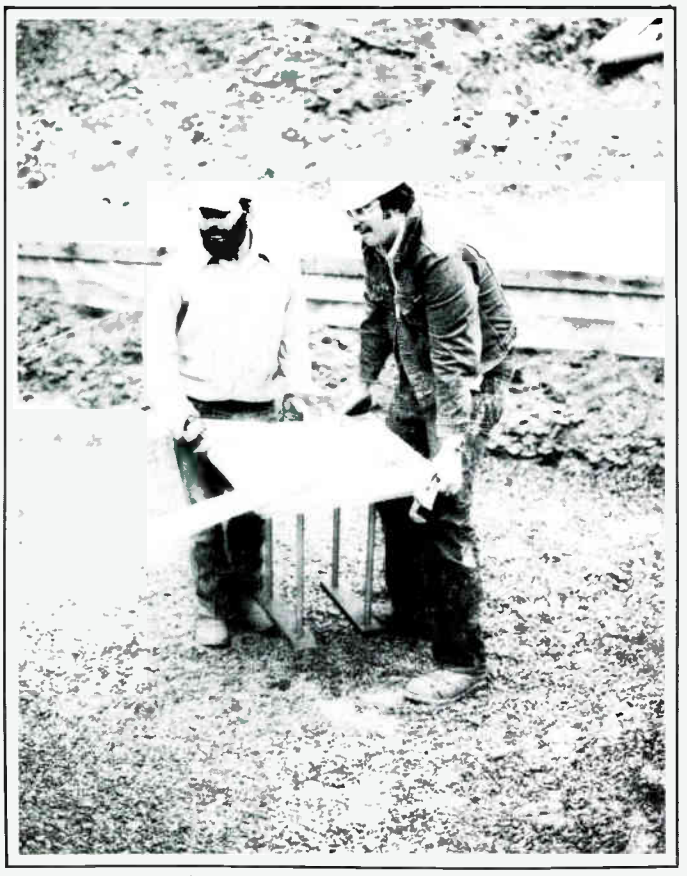
"It gives me a lot of satisfaction to accept a challenge like this one was," Hargis recalls, with all the sincerity and humility a true southern drawl such as his can convey. "I got off the plane on a Tuesday and was told it was sitting for almost a month now, and nobody was able to do anything. So, I said by next Tuesday, no matter what the weather is, I'll have it in. And we made it."

Hargis' responsibility was to just get the pad in, but as he explains, there was really more to it than that. "We have the technology to get a satellite out there in space and beam





Top left: Howard Hargis—the gentleman contractor from Augusta who came to get the job done. Lower left: Once the concrete problem was solved, the rest was routine. Above right: Hargis and his three-man crew didn't stop working for six days.



Easy does it with a template.

signals back and forth, but you have still got to start with just some good 'ole back-breaking labor."

"You still have to take a shovel and dig a hole and pour some concrete in it in order to get it started."

It sounds so simple now, but a series of freezes and thaws, unprecedented snow fall, and the more typical ice storms, had made "digging the hole and pouring some concrete" almost impossible. Hargis had been doing some foundation work for Scientific-Atlanta, particularly for aerospace installations, but his specialty is doing the "undoable."

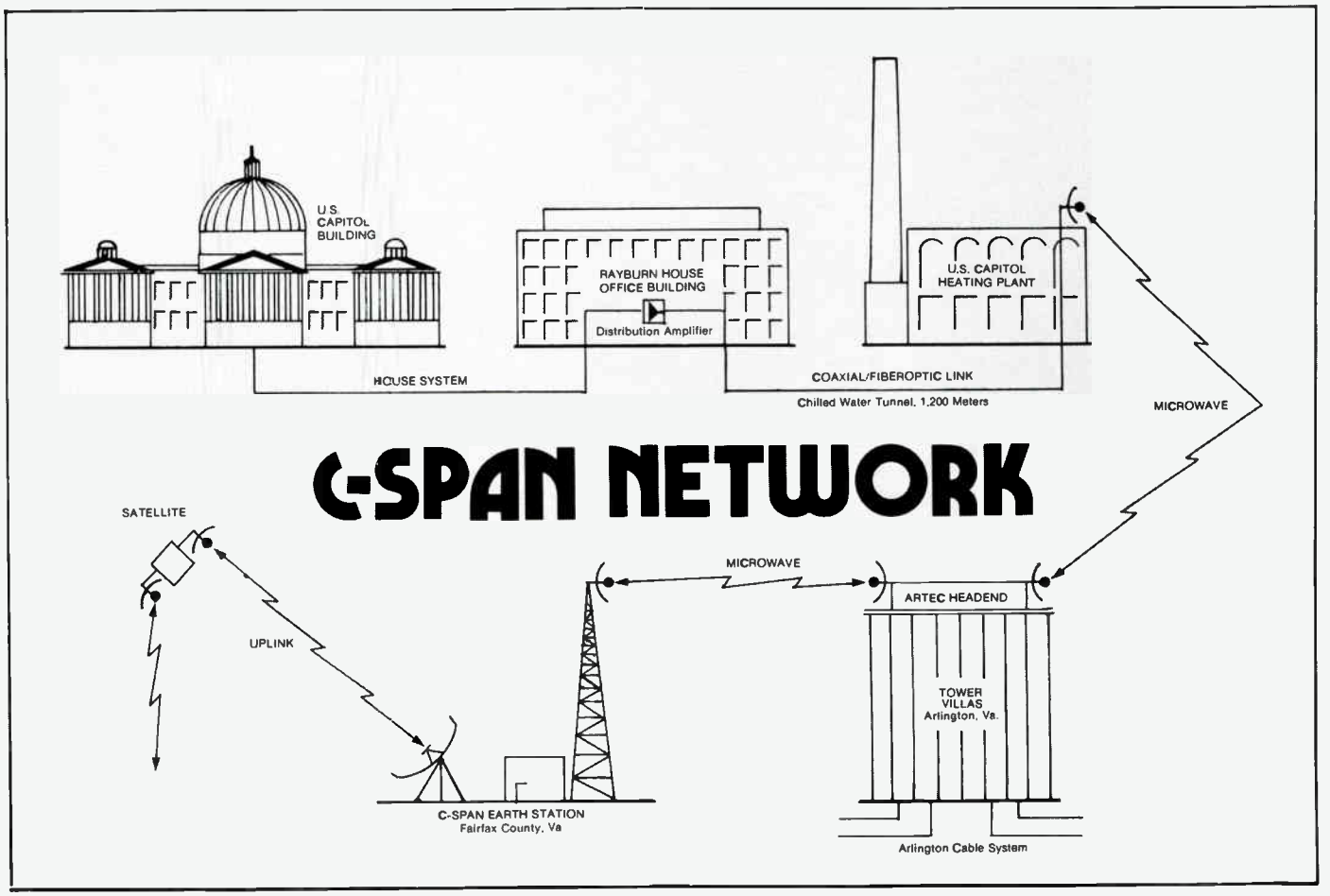
"He's a very creative and enthusiastic guy," says Scientific-Atlanta's Tom Williams, who knew if they didn't get the foundation in, he would never be able to power up the HPA and do his performance tests, let alone get the thing actually "on the air."

"I was working on a job at the Goddard Space Center, when they called me and asked if I could get one in under some very adverse weather conditions and under severe time constraints," Hargis recalls. "I said if it's got to be in, I can put it in under any kinds of conditions—even if I have to put a wood frame house over the entire site like they did in the old days when they built the railroads in the West."

"I guess it was in the 1860s, it got so bad out there in the wintertime that they built wooden sheds as they went across the mountains and the plains.

"Well, I could do that if I had to. It really wasn't any worse than I thought it would be when I finally got to the site and had a look," he stated. "I knew if it would have been a nice job they wouldn't have called me."

"There is almost always a challenge to doing one of these things. You might find one, once in awhile, out in some



THE C-SPAN PHOTO ALBUM

1

1. Congressman Charlie Rose meets with C-SPAN board on Capitol Hill, September 21, 1978.

2. Transmitter construction awaited January 9 special hearing by Fairfax Zoning Appeals Board.

2

3

3. C-SPAN Board Chairman Bob Rosencrans and staffer Jana Dabrowski break ground.

4. Construction crews move in.

4

5

5. Worst snow in 54 years slows things way down.

6. Below freezing weather and hot concrete mix brings steam in late January.

6

7

7. Temperature rises, the thaw begins, the rain comes and so does the mud.

8. The water and the mud just wouldn't go away.

8

9. In early March the water and mud forced changes in construction plans; C-SPAN's Brian Lamb, Scientific-Atlanta's Richard Campbell and HMH's Howard Hargis confer on site.

10. Howard Hargis brings "special touch" from Augusta, Georgia.

11. Pumper truck needed to get 152 cubic yards of concrete into foundations.

12. A microwave tower foundation worth its weight in concrete.

13. Hargis team member J.B. Goode with cement vibrator.

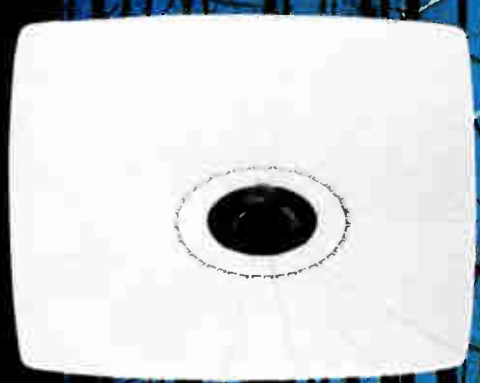
14. S-A crew begins putting steel on completed foundation pad.

15. An earth station antenna soon to be uncrated.

15A. C-SPAN ten-meter dish joins PBS antenna farm.

16. It all starts to look normal.

17. Looking for the feedhorn.



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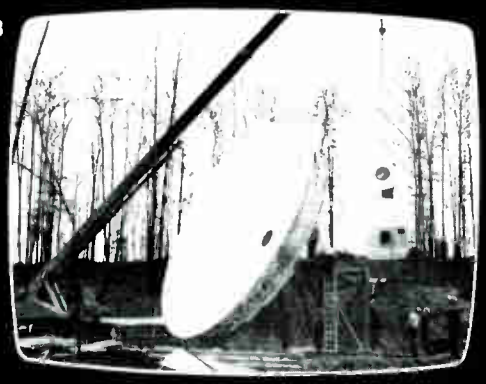

19

18. Ready for transmit.

19. After two months of open holes, water and mud, U.S. Tower's Norm and Dave begin to see daylight.

20

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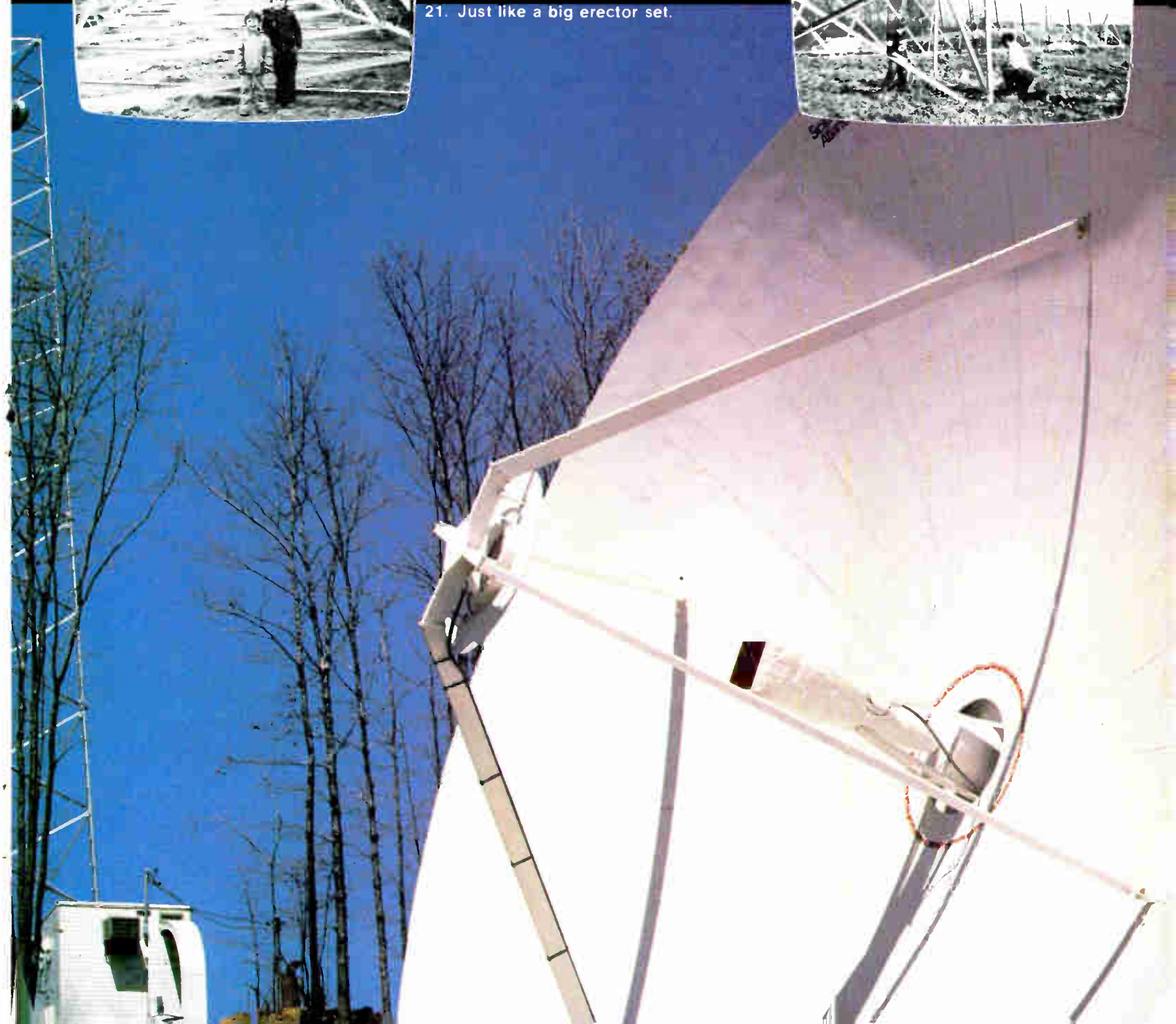
20. 120 feet of steel and two special helpers, Chris and Kurt.

21. Just like a big erector set.



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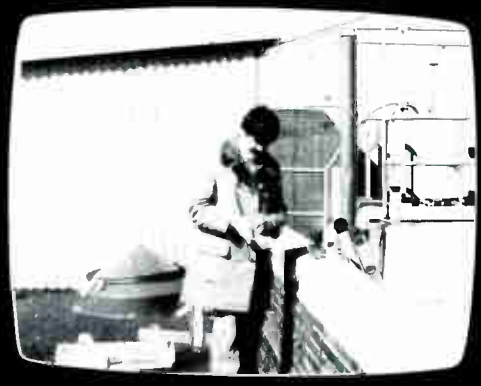
22. Sometimes it even looked like a work of art.

23. ARTEC's Roger Pence made it all come together on Capitol Hill—March 15.



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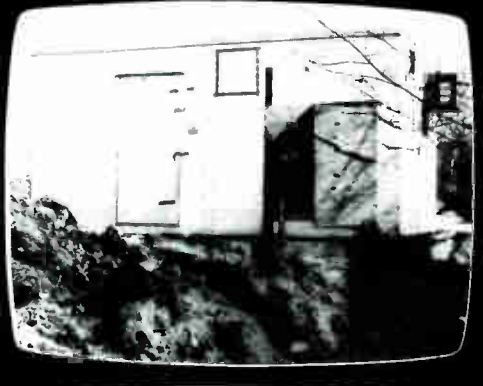
24. Dick Shannon of Microwave Associates gets the Washington panaramic view from the ARTEC headend.

25. Jim Scofield and crew take microwave aim on the earth station site seven miles away.

25

26



26. C-SPAN Chief Engineer Don Houle's home away from home.

27. Time for a laugh and some relief—It all works and there's 36 hours to go before the March 19 turn-on. Left to right: Don Houle, chief engineer, C-SPAN; Emerson Porter, Tom Williams (project manager) and Bob Porter, all of Scientific-Atlanta.

27

28

28. House operated control room in basement of the Capitol.

28A. At long last, the uplink is up.

28A

29

29. C-SPAN's Production Manager Brian Lockman at his Rayburn House office building control, gets ready for opening day.

30. C-SPAN is here!

30

farmer's cornfield, but most of the time they are in some inaccessible place—on the side of some hill which probably isn't usable for anything else. But, they are all a little bit different due to the climate or due to the soil conditions. That's what makes it interesting."

Hargis, who went to Georgia Tech to become an architectural engineer and left after two years to start making a living, says one of the difficult things about putting in earth stations for Scientific-Atlanta is the exactness required.

"It's pre-built; everything is pre-cut. So, their anchor bolts have to be perfect. The plans call for them to be within 1/64th of an inch and I don't even have anything that will measure 1/64th of an inch.

"We take a carpenter's pencil to make a mark and it makes a mark of an eighth of an inch!

"But we do use the template. After you pour your concrete and the template comes off, then their plates are supposed to go back on. If the template doesn't come off, you've bought the farm."

Hargis, who appears equally comfortable in jeans or a three-piece suit, is 39 years old. He says that ever since he was in high school, and then up until 1973, the city of Atlanta was just in a fantastic boom.

"The only way you couldn't make it was to have had your head buried in a hole. There was just so much construction going on.

"But, then we got into the recession. In the real estate business it was a depression."

Ever since, Hargis says he has known you have to be diversified a little bit. That's why doing some of this work for Scientific-Atlanta appeals to him and he wants to get involved in more than just the foundation aspects of it in the future.

One of the keys to his success is the way he treats the people he works with. One of the guys he brought up from Georgia for the C-SPAN job has been with him for years. Richard, June and J.B. Goode, who brought his own frontend loader along for the job, all demonstrate the same "get down to it" attitude that Hargis displays. As bad as it sounds, all of the cliches which relate to getting a job done do apply.

"When you have done a job yourself, then you know what to expect of another man doing the job. I have never pushed a man any harder than I would push myself. I always try to make my guys party to what we are doing. By getting this C-SPAN site in, we did something I don't think anybody else was willing to do. We did it. And I try to get the guys to feel the same sense of satisfaction that I get out of it. Money motivates me, but it doesn't motivate every working man the same way. Pride and security are important, too."

One thing is for sure, though, Hargis has found that money can talk. It has on more than one occasion when he has tried to get a job completed.

"I had to get a star-shot over at Goddard one time and I couldn't find anybody who could do it," begins one of Hargis' typical stories. "I finally went into one place. I was dressed in my jeans and boots. I had my Levi jacket on. And I walked in and told them what I wanted. They told me they could do it, but the guy was looking a little skeptical at me. Then he said there would be a $600 fee and he wanted to know just how I was going to pay for it.

"Well, I had about three thousand dollars in cash just in my shirt pocket. I reached in, pulled out my roll and pealed him off six one-hundred dollar bills. His eyes started popping out. He didn't even know how to write a receipt. No one had ever paid cash!

"I really don't like to carry that kind of money, but sometimes you have to have it when you want to get some things done," Hargis stressed. "Cash-money does have that psychological effect on people."

The cable television industry with all of its exciting channel capacity and satellite technology has had an effect on Hargis, too. He is becoming increasingly enamored of it. Actually, he says, "it is rubbing off on me." He has taken great pride in the fact that he played a part in "bringing the House of Representatives into the home."

When Hargis was a kid, his father worked for the railroad. Young Howard would ride the train up to Washington and see the monuments and the Capitol. "Very few people have even had the opportunity to do that," he reflects. "Now, all they have to do is turn on the TV set and watch Congress because of all that your industry has done.

"The thing that amazes me, and I figured it out one night, based on your budget, is that it's only costing about $400 an hour to do it. To me that is very exciting."

Setting anchor bolts.

C-SPAN made the target date. And, after its two week trial run, a reception was held on Capitol Hill. Hargis was there because he "wanted to be." He mixed with the usual pot pourri found at a Washington reception. After all, he was wearing a suit.

But, up on the large screen where images, like the ones on the preceeding pages, depict the evolution of C-SPAN there was Howard Hargis, with his bright orange hat and standing knee deep in the mud, repeating to himself: "If it were a nice job, they wouldn't have asked me to do it." C-ED

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RCA's Product Guide on Imaging Devices

A 48-page product guide providing tabulated data and outline configurations for RCA's standard line of imaging devices, designed for use in communications, industrial, consumer, and military applications, has been released by RCA Electro-Optics and Devices.

The product guide, IMD-100, features sulfide vidicons, Vistacons, Saticon vidicons, Ultricon camera tubes, Isocons, charge-coupled devices, low light level SIT and ISIT types, and image intensifiers. It includes a comprehensive treatment of imaging device characteristics, a selection guide, and a vidicon interchangeability guide that lists RCA replacements for more than 350 types of imaging tubes supplied by a wide range of manufacturers.

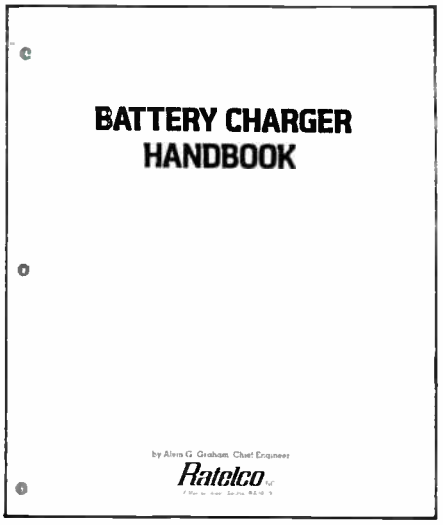
Copies of the IMD-100 product guide may be obtained by writing to RCA, Box 3200, Somerville, New Jersey 08876, or by calling (717) 397-7661, ext. 2712.

RCA's product guide on imaging devices.

Battery Charger Handbook from Ratelco

Battery chargers are described and illustrated in a new, comprehensive 12-page handbook on the subject from Ratelco, Inc. Featured along with a brief history and discussion of battery chargers is an evaluation of current technologies based on 40 years' experience by the manufacturer. Major topics include regulation, current limiting, fast charging, efficiency and power factor, reliability, ripple, noise and other impacts. Also highlighted are battery charger accessories such as high and low voltage alarms, etc.

For a free copy, write Ratelco, Inc., 1260 Mercer Street, Seattle, Washington 98109.



Battery charger handbook from Ratelco.

"Engineering Considerations For Microwave Communications Systems"

GTE Lenkurt Inc. has announced the availability of a third printing (1975 edition) of the authoritative publication, "Engineering Considerations for Microwave Communication Systems", by Robert F. White.

Tutorial in nature, the book assembles in one volume, in a readily usable and practical form, a compedium of the best available information on the planning and engineering of line-of-sight microwave radio paths. Written for engineers engaged in microwave planning, the book is sufficiently general to be used by executives and engineers in other fields for a technical overview of microwave communications systems. However, the emphasis is on technique and practice, with considerable theoretical discussion included to aid in the understanding of important microwave transmission phenomena.

For a copy of this publication, 1975 edition, write GTE Lenkurt Incorporated, Dept. C720, 1105 County Road, San Carlos, California 94070.

How To Understand Frequency Counter Specifications

With the increasing sophistication of frequency counter applications, such as time domain stability measurements, engineers need better defined counter specifications, as well as new specifications.

In a new 34-page application note from Hewlett-Packard, engineers and technicians are able to review basic counter specifications as well as become acquainted with new specs. This new AN 200-4 entitled "Understanding Frequency Counter Specifications" starts with a general introduction. Following is a section detailing input characteristics of counters including range, sensitivity, signal operating range, dynamic range and trigger level considerations.

The booklet, liberally illustrated, also includes many examples. It is available from Hewlett-Packard free of charge. Ask for AN 200-4, "Understanding Frequency Counter Specifications", Publication No. 02-5952-7522. Write to Hewlett-Packard Company, 1507 Page Mill Road, Palo Alto, California 94304.

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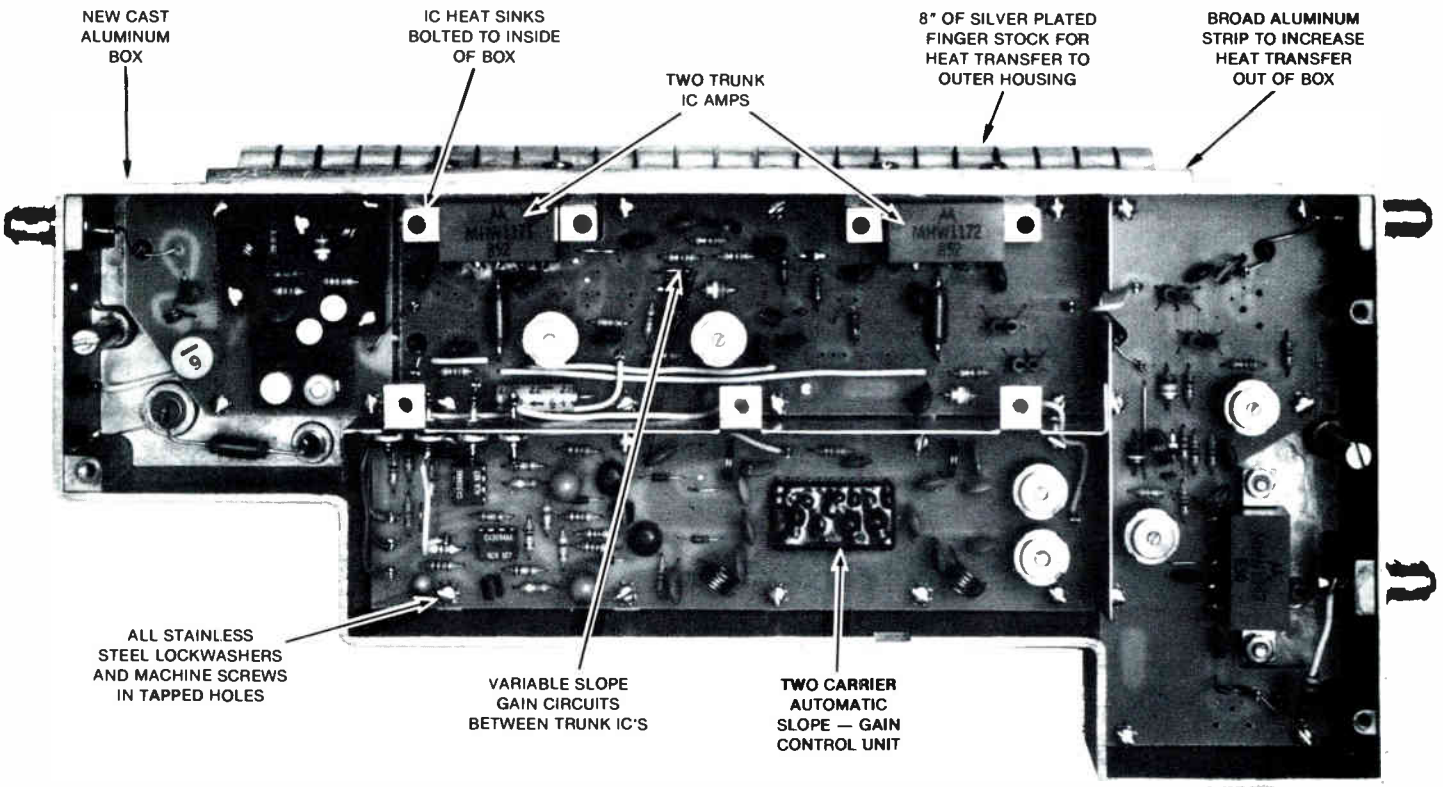

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UPDATE modules are constructed entirely of new materials and components from the cast aluminum boxes to the connectors, and are completely assembled and tested in the factory. They are ready for immediate installation when you receive them and are fully warranted against defects and workmanship for 120 days. **UPDATE** amplifiers are not kits on printed circuit boards to be tacked into used Starline 1 castings after you receive them.

UPDATE modules are of latest electronic design and are equal in performance to the best models of any other manufacturer of all new equipment. They have been packaged to plug into Starline 1 housings to enable you to get the best system performance available at readily affordable cost with very little effort and system down time.

New strand mounted weatherproof housings are available so if you wish to extend your system you won't have to change to a different type of equipment merely because no more Starline 1 housings are available.

High efficiency switching mode power supplies are built onto the **UPDATE** modules, so even with IC amplifiers, power consumption of each module is approximately the same as its Starline 1 counterpart. No replacement or relocation of system power stations is required.

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See our card on page 37.

Converter/Decoders

Oak/CATV Division to Unveil "Total Control" System at NCTA Show

A cable system operator will be able to control who is watching what program, where and when with the new Oak "Total Control" system of addressable technology, stated Dean Bach, vice president, marketing, for the CATV Division of Oak Communications Inc.

"The Oak 'Total Control' system will enable operators—for the first time—to remotely control programming at all times and at all locations," Bach added.

Capitalizing on the two-year "successful operations" of its NST over-the-air system in the greater Los Angeles area, which now utilizes over 150,000 addressable STV decoders, Oak expanded the application of its addressable technology into CATV, Bach noted.

"Oak proved that individual, remote control of decoders from the headend works, and works well," he commented.

He added that now, the Oak "Total Control" system provides CATV operators with the same opportunity to increase revenues, enhance security of equipment and service, and control access to additional pay programming.

" 'Total Control' can be tailored to fit the specific needs of the largest MSO requiring control over multi-tiered programming to the smallest independent operator requiring control," Bach emphasized.

For example, an operator can authorize a converter/decoder to receive all sports programs in addition to regular programming, sports programs exclusively, or a special one-time sports event.

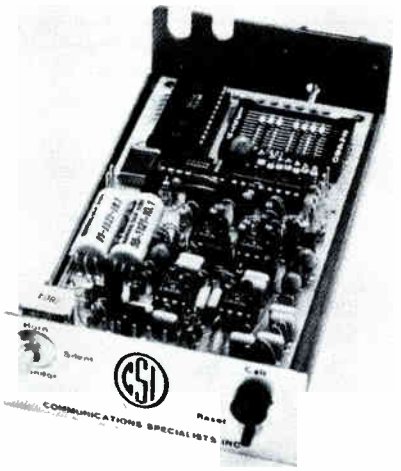
"Control of the system at the headend ensures that only those subscribers authorized to receive a specific program or program level will receive it. A subscriber can't outwit the addressable signal; if he attempts to interfere, the decoder will not operate," Bach said.

In addition to addressable home terminals, the Oak "Total Control" system incorporates a wide range of services, including computer installation, software programming, on-going service, system personnel training, and billing operation assistance.

Oak engineers will demonstrate the "Total Control" system at the NCTA Show. Stop at the Oak/CATV booth No. 80 to see the system in operation. For more data, contact Oak Communications Inc., CATV Division, Main Street, Crystal Lake, Illinois 60014.

DTMF Decoder from Communications Signalling

Communications Signalling, Inc., has introduced its new model SR7 DTMF decoder. The decoder uses AT&T touch tone format. Design features such as 16-digit decoding, wrong number reset, non-dedicated group and all call provisions allow the device to fit into almost all existing selective signalling designs.



Well protected circuitry and matrix switch code settings are provided for ease of installation. Relay outputs give isolation and eliminate extra parts required for installation.

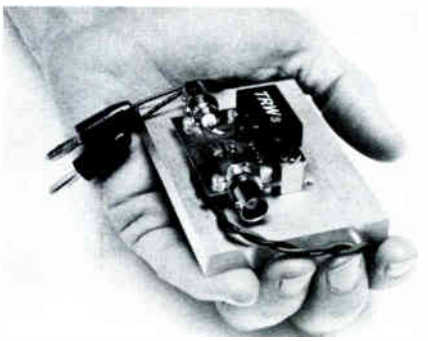
Crystal controlled detector circuit by Mostek and sharp 6th order band pass filters with AGC provides stability while rejecting noise and other tones.

For additional information, contact Communications Signalling, Inc., 11409 Chandler Blvd., N. Hollywood, California 91601, (213) 980-5414.

Test Equipment

Low-Cost Test Package from TRW

A low-cost test package consisting of a complete evaluation test fixture and a wide-bandwidth, high-output-power hybrid amplifier has been introduced by TRW RF Semiconductors.



The package—designated "The Demonstrator"—sells for $39, although its two components separately would cost $135. It is intended for pre-testing of specific TRW amplifiers in a variety of digital and analog applications in communications and instrumentation.

The 2-½ inch x 3-½ inch test fixture provides rapid measurement of all the RF specifications shown in a data sheet. It includes a base plate for the heat sink; PCB with BNC connectors; banana jacks for connection to a power supply; and, gold-plated pin sockets for connection to the amplifier's pins.

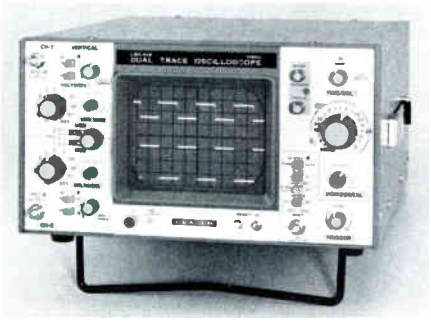
The test fixture is offered with a choice of two TRW amplifiers—model CA2820 or 2812—both of which operate over the 1-520 MHz range with a typical flatness of ± 1 dB. The CA2820 delivers up to 0.5 W and operates from supply voltages ranging from 16 to 28 V. The CA2812 delivers up to 0.3 W and operates from supplies of 8-15 V. Both devices have a gain of 30 dB and are internally matched for 50 ohms.

For further information, contact Don Feeney at TRW RF Semiconductors, an Electronic Components Division of TRW, 14520 Aviation Blvd., Lawndale, California 90260, (213) 679-4561.

New 10 MHz Oscilloscope From Leader Instruments

Two 10 MHz oscilloscopes recently introduced by Leader Instruments Corporation, feature up to 1 mV sensitivity, a capability until now unavailable in low cost instruments.

The combination of high performance and low cost was made possible by a much simplified design using integrated circuits for many functions.



The LBO-513 single trace and LBO-514 dual trace oscilloscopes are both equipped with 8x10 cm displays, Z-axis modulation, x5 magnifier and complete trigger controls. The LBO-508 dual trace unit also provides front panel x-y operation, CH-1/CH-2 trigger selection and alternate or chopped display modes.

For further information, contact Leader Instruments Corporation, 151 Dupont Street, Plainview, New York 11803, (516) 822-9300.

Multiple-Use Tester From General Scientific

A new, light weight, rugged, all-in-one tester that checks for OSHA compliance of polarity, grounding and line leakage in 120 volt power tools, cord sets and receptacles is now available from General Scientific Equipment Company, Inc. The unit, called Multi-Check, provides simple visual indicators for "Go" or "No-Go" operation, permitting a check of equipment in seconds. There are no scales to read, no readings to interpret. No training is necessary since clear, easy to understand instructions are printed on the face of the unit.

Multi-Check tests for correct wiring, reversed polarity, open hot wire, open ground, open neutral, hot and ground reversed, hot on neutral terminal, hot terminal unwired and neutral and ground reversed.

For further information, write to General Scientific Equipment Company, Inc., Limekiln Pike and Williams Avenue, Philadelphia, Pennsylvania 19150.

Video

RCA Introduces New Saticon Camera Tubes

New Saticon camera tubes, designed for TV color broadcast cameras, were recently announced by RCA Electro-Optics and Devices.

The BC4390 series are 18-mm diameter types for use in three-tube compact TV color broadcast cameras. They feature a seven-pin base which provides interchangeability for cameras with lead-oxide vidicons, precision construction for easier and more accurate registration and a faceplate button to keep dust out of the focal plane.

The BC4395 is a 25-mm diameter type for use in high performance studio color cameras. This new Saticon tube features a low-capacitance low-lag photoconductor, a low-lag low-resistance electron gun and a faceplate button for proper optical path.

Data sheets and other information may be obtained by contacting the Marketing Manager for Imaging Devices, RCA Electro-Optics and Devices, Lancaster, Pennsylvania 17604, (717) 397-7661, ext. 2295, or by writing to RCA, Box 3200, Somerville, New Jersey 08876.

Fiberoptics

Fiberoptics Designer's Kit

AMP Incorporated has packaged an assortment of emitter and detector bushings, splice bushings, polishing bushings, several sizes of connector ferrules, a polishing plate, a hand tool for terminating fiberoptic cable, sample lengths of optical cable, etc., in this new "Fiberoptics Designer's Kit".

Designed to accommodate most common sizes and types of fiberoptic cables, emitters, and detectors, the Kit is intended to allow the engineer to experiment with, and build prototypes of, fiberoptic interconnection systems. An instruction booklet included provides cross-referenced data concerning semiconductor emitters and detectors as well as fiberoptic cables.

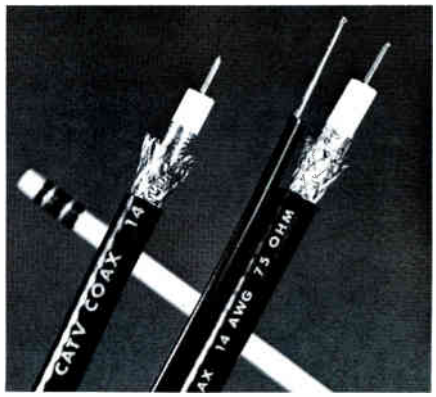
The Kit contains enough components to house 25 emitters or detectors, make five free-hanging and five bulkhead mounted splices and terminate 20 fiberoptic cables.

Further information concerning the new AMP Fiberoptics Designer's Kit is available from AMP Special Industries, Valley Forge, Pennsylvania 19482.

Cable

11/U-Type MATV Coaxial Cables Introduced by Belden

Two new 11/U-type 75-ohm coaxial cables for MATV applications have been introduced by Belden Corporation, Electronic Div., in conventional and messengered constructions.



Both designs (Nos. 9011 and 9012) utilize a 14 ga. solid bare copper-covered steel wire conductor, cellular polythylene dielectric, Duofoil® foil-film-foil shield augmented by 40 percent aluminum braid and black PVC jacket. Messenger style No. 9012 utilizes a 0.470-inch diameter PVC construction surrounding a 0.051-inch galvanized steel strength member. Nominal velocity of propagation is 78 percent; nominal capacitance, 17.3 pF/ft.; and attenuation at frequencies from 50 to 900 MHz ranges from 1.0 to 5.2 dB per 100 feet.

For more information and samples of Belden's 11/U-type MATV cable, write Manager, Marketing Communications, Belden Corporation, 2000 S. Batavia Avenue, Geneva, Illinois 60134.

Split Cable Feeder by GMP

A new split cable feeder designed specifically for use in pre-con or conects pre-connected cable installa-

tions has been developed by General Machine Products Co., Inc.

The new installation methods—which employ pre-connected cable lengths to reduce splicing time from as much as six hours down to 1-½ hours—require the use of a cable feeder which can be opened and closed as needed for placement of the cable and removal of the feeder.

The new GMP split cable feeder features heavy duty metal construction. The main section of this new feeder comprises a split, flexible metal hose, four inches in diameter by 90 inches long. Extension sections, each 36 inches long, are also available. Both the main and extension sections feature a series of hinges, latches and locks which enable the feeder to be easily opened for placement of the cable, closed and locked during the pulling operation, and re-opened for removal of the feeder at the end of the pull.

This new split cable feeder also features a special rubberized coating on the exposed metal portions to eliminate any sharp edges which might damage the cable.

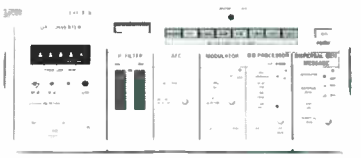
Details on the new GMP Split Cable Feeder are available upon request from General Machine Products Co., Inc., 3111 Old Lincoln Highway, Trevose, Pennsylvania 19047, (215) 357-5500.

Earth Station Equipment

Satellite Earth Station Message and Video Exciters

LNR's product line of earth station ground communication equipment has been expanded to include message and video exciters. The modular equipment meets all Intelsat ICSC/CCIR criteria. Model UEM6-D3 for message traffic and UEV6-D3 for video traffic both include a synthesized (250 KHz steps) dual conversion up converter with internal crystal-controlled local oscillator, providing direct-reading thumbwheel tunability over the 5.925-6.425 GHz uplink frequency band.

Each exciter, available in single thread or redundant (with automatic switchover) configurations, occupies only seven inches of vertical rack space and features fully modular construction, permitting rapid plug-in conversion to other FDM channel capacities or video 625/525 line (optional) reception. Channel-capacity-determining plug-in includes roofing filter and emphasis network.



For further information, contact David Linker, Marketing Manager for Ground Communications Equipment at (516) 273-7111.

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Fiberoptics Moving From The MGM Grand Hotel

By Toni Barnett, Managing Editor

Valtec Corporation engineers turned the science of fiberoptics into a practical art when they designed, manufactured and installed a fiberoptic voice/television phone system in the MGM Grand Hotel in Las Vegas, Nevada.

The 4.2 kilometer system was turned on in December 1977 during the U.S. Independent Telephone Association Convention, and the system connected the MGM Grand Hotel to the Central Telephone's main switching office.

The process used in Las Vegas comprises optical fibers—wispy strands of ultra-pure glass through which signals are sent via rapidly-pulsing lights. This system employs Valtec's fibers, laser diodes and detectors with ruggedized cable developed and manufactured by Comm/Scope, a subsidiary of Valtec.

It was Valtec's intention to demonstrate a fiberoptics system compatible with a working telephone installation. The system displayed an upgradeable link capable of carrying many thousands of telephone calls or several studio quality videotape transmission simultaneously.

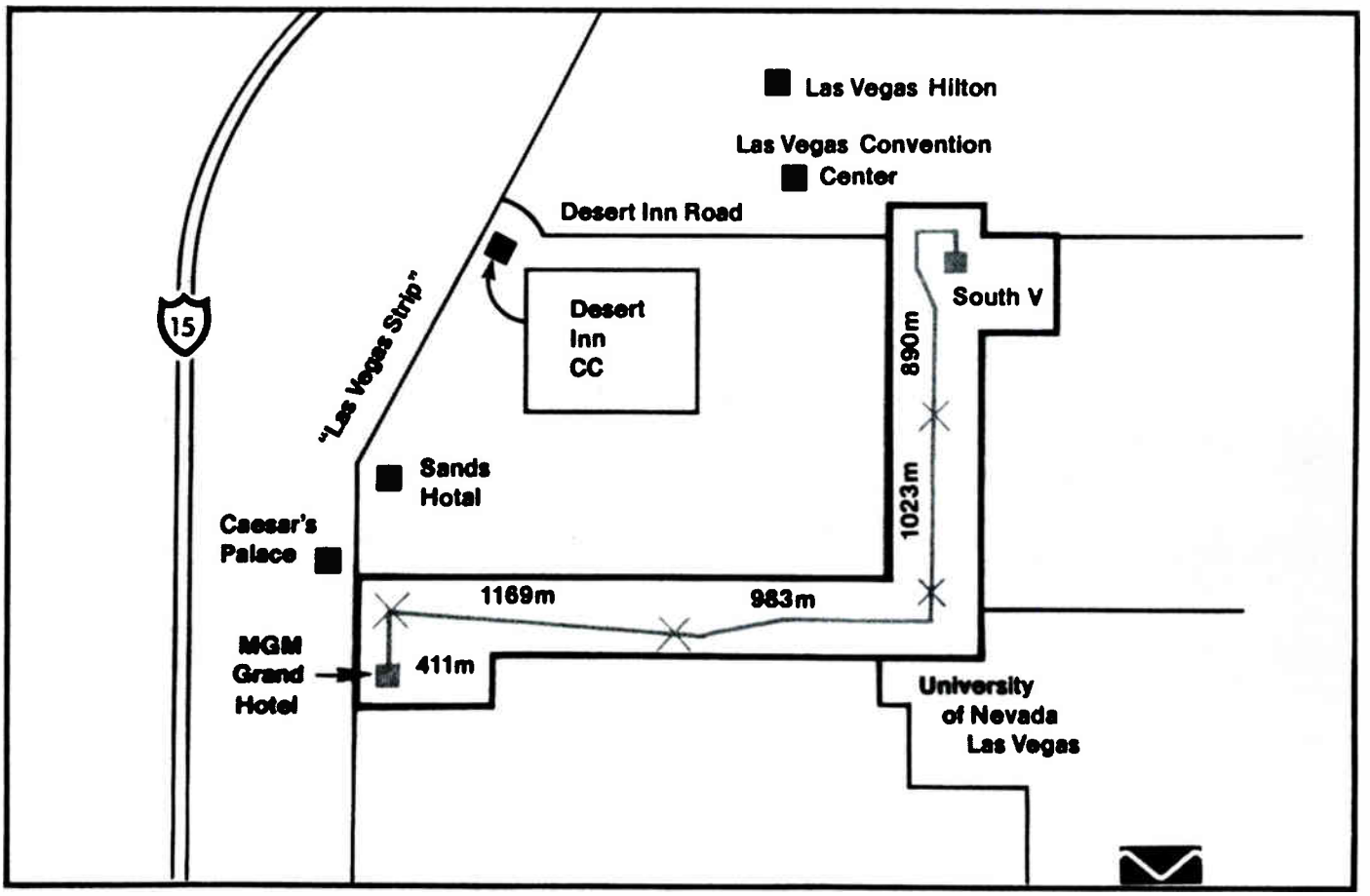
Existing ducts were used for the Las Vegas system. The fiberoptic cables were finished in red polyethylene to stand out from other types of cable so workers would recognize them. The center of each fiberoptic cable is insulated with a 3/32-inch stranded steel strength member which was used to pull the cable through the duct. Fitted with a polyethylene jacket for smoothness, the steel was tested for 1,200 pounds pull over a 370-foot length without fiber breakage.

Surrounding the steel member are the six low-loss graded index fibers. Each, in turn, is covered by a polypropylene tubing and then by a flame-retardant Kevlar strength member.

Color-coded 22-gauge copper wires surround the six fiberoptic subcables. These are primarily to provide an electrical supply if repeaters are required for higher bandwidth or video systems which may not be able to transmit over the full distance without boosting.

The stranded wires are covered by a thin layer of mylar tape for a thermal barrier and to bind the cable together before applying corrugated aluminum sheeting. The sheeting serves as a moisture barrier and a strength member. This is covered by a polyethylene shield for total moisture resistance.

The system employs the conventional splice box which phone companies now use for electrical cable. Standard low-loss fiber lengths are slightly over a kilometer. Lengths of 4,000 to 5,000 feet are routinely available now for ease of installation and cables can be supplied with any number of fibers.

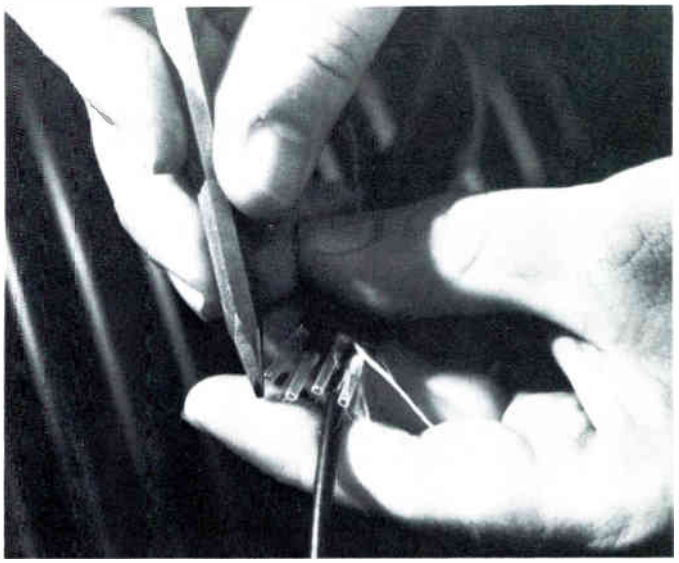


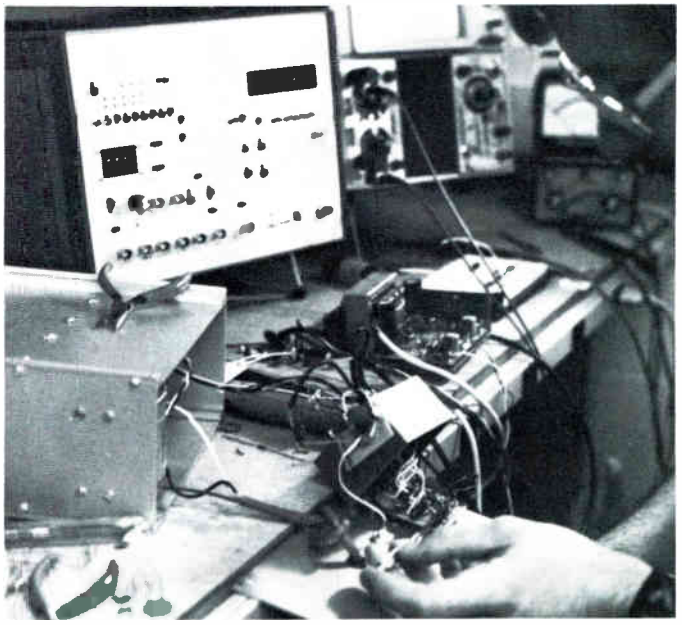
Path of fiberoptic traffic from the MGM Grand Hotel to the South V telephone office.

No Hitches in Performance

Dr. Marshall Hudson, New Technology Manager/Fiber-optic Communications for Valtec, told *C-ED:* "In November, 1978, Valtec engineers went out and remeasured the system. We measured the attenuation of all of the fibers. We also measured all of the communications channels between the South V central office and the MGM Grand Hotel—a difference of about 4½ kilometers. There had been no change in the attenuation," Hudson emphasized, "over the one-year period the system had been in operation."

The system used in Las Vegas employs lasers in the transmit portions of the transmitters. Valtec engineers also measured the terminal response of this system. "Engineers have long worried about the degradation of laser devices,"





Making sure. It was check and double-check in Valtec's stringent preparations before shipping the fiberoptics/cable communications system materials to Las Vegas. At top left, cable is color-coded so that each fiber can be identified to allow installers to choose the proper sets. At top right, fibers at cable end are prepared so each will be flat and flush to allow maximum light flow through splices, thus taking full advantage of the low loss characteristics. At bottom left, Dr. Marshall C. Hudson, New Technology Manager/Fiberoptic Communications, measures to insure that full information capacity will travel the entire distance. At bottom right, a Valtec technician assembles the receiver section which reconverts the light back into the original voice or video signal.

Hudson commented. "However, one year later, the devices still measured the same as when they were installed.

Improvements to the system were added during the re-evaluation in 1978. Valtec engineers updated the system by adding connectors to the terminal equipment. When the system was installed, it was essentially by "hard splice." The fibers were brought into the terminal equipment and spliced in place. There was no way to disconnect the fibers immediately if an engineer wanted to remove the equipment. Breaking the fiber was the only way to do it.

Valtec has remedied this situation by installing fiberoptic connectors at the terminal device. These connectors are manufactured by the Deutsch Connector Company.

Noted Hudson, "There is a tool used, also made by Deutsch, by which one simply inserts the fiber through the connector, puts it into the tool, and the special tool cuts the fiber. Cleaves it if you will so it's very perpendicular."

Problems?

There have been a few problems with the system but nothing having to do with the optical components. "In January, 1978, we had a power supply failure," Hudson stated. "All we had to do was replace the power supply. We also had, in the summer of last year, an air conditioning problem in the metro office."

The air conditioning problem was a situation of cause-and-effect in which the lasers shut down. Because the temperature of the room rose dramatically, the lasers were automatically shut-down due to a protective mechanism. If the temperature gets too high, the lasers will turn themselves off automatically to keep from being damaged. "That problem," Hudson added, "was just a matter of bringing the temperature in the room back down.

What Next?

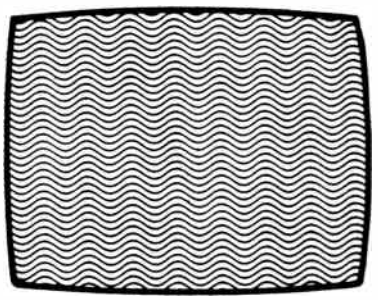
The next step in this unique fiberoptics system is going to be a very expensive one from the viewpoint of the Central Telephone Company—a method of using very high multiplexing equipment. The present T1 system is only 24 channels and operates at 1.5 megabits per second. It's a relatively low density system.

The T3 system Central Telephone is talking about implementing can carry 672 voice channels over fiber. Since there doesn't seem to be a need for putting that kind of traffic in the MGM Grand Hotel, *C-ED* asked John Paulbick, technical support engineer for the telephone company, about the change.

"Next year in Las Vegas, we'll be putting in new digital offices and transferring the equipment from the MGM to those digital offices," Paulbick remarked. Presently, Central Telephone is using a T1 carrier system—a 24-channel two-way system. "What we end up doing now is taking 28 of the 24-channel systems and multiplexing them together. We run this into the fiber—approximately 44 megabits of information per second," he continued. "With the new type of digital office, it will come out in a trunking format, available in either an analog or digital mode. We'll take groups of these 24 trunks and run them into a multiplexing unit capable of 672 trunks per two fibers. The savings on copper cable," he added, "would be a tremendous amount."

The reason Central Telephone initially used the MGM Grand Hotel was for a feasibility test more than anything else. Now, they are ready to expand and upgrade the "proven" system for high traffic telephone use.

Q I want to augment my programming by adding a satellite receive only terminal to my cable system, where do I begin?



A Start with a frequency coordination. This process analyzes terrestrial microwave interference levels at your selected location and will dictate whether a horn or a parabolic dish antenna can be used. In the event the interferring levels are too high, then further study may find an alternate location for your earth station.

Q What is the difference between manually tuned and electronically tuned receivers?

A A manually tuned receiver requires an operator to change transponder channels. This is accomplished by changing crystals, turning a pot or flipping a switch. This type of receiver is normally used for receiving programming from the satellite that is on 24-hours a day; so therefore, you don't have to change channels. However, in the event of a transponder or program change, you would still be able to change channels.

The electronically tuned receiver's channels can be changed by remote control, allowing for unattended earth station program changes by use of time clocks, que tone decoders, touch tone phone interfaces, etc.

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.

Q How do I peak my antenna on the satellite as part of a maintenance cycle?

A One method is to connect an RF millivoltmeter to the IF output (typically 70 MHz) of the receiver. Place the receiver in the manual gain mode and adjust the manual gain control for a reference level. Make sure this level does not exceed the maximum level detailed in the instruction manual since it is possible to saturate this output port, consequently causing erroneous readings, then peak the azimuth and elevation of the antenna. (Most times, polarization adjustment will not be required.)

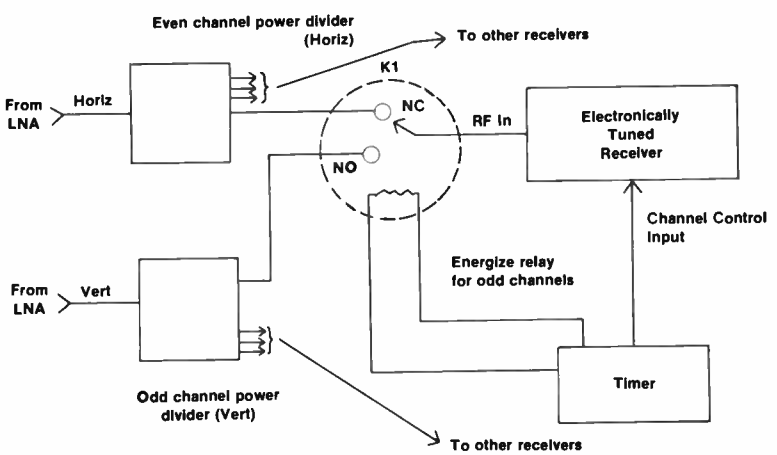
Note: This should be done when the satellite is in the center of its figure 8 pattern. This information is available from the satellite carrier.

Q What inputs do I need on my headend modulator to interface with the satellite receiver?

A Most satellite receivers have a baseband video output which is 1V peak-to-peak with an impedance of 75 ohms unbalanced. The audio output level is about 0 dBm plus or minus 10 dB into 600 ohms balanced.

Q What should be used to power the DC low noise amplifiers?

A Definitely not the receiver. In the event of a lightning hit, there is no point in damaging the receiver due to induced voltage on the LNA power line. A separate power supply is recommended.



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.

Figure 1.

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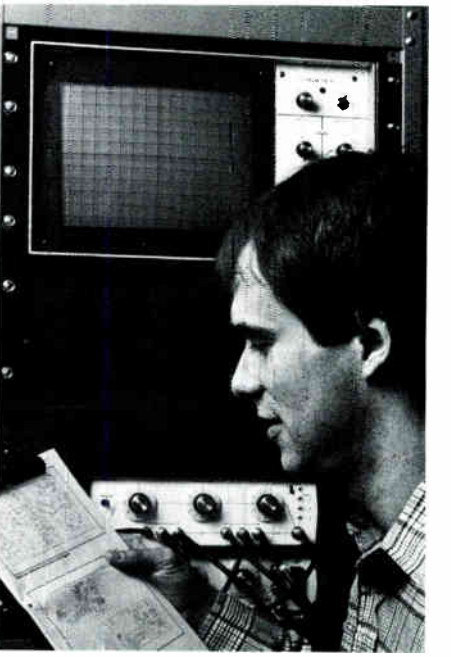

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Canadian Freedoms Threatened

By Toni Barnett, Managing Editor

Michael Hind-Smith, president of the Canadian Cable Television Association, has said in a recent debate on the Clyne Committee report, released April 11th, that two of its proposals strike directly at the freedoms of cable subscribers. If adopted, they would be an "enormous and immediate political embarrassment to the government." They are:

- the proposal to black out what would amount to 80 percent of the prime time American programs are seen on cable—that is, those programs licensed to Canadian stations for a single Canadian showing; and
- the proposal to limit carriage by cable systems of only four U.S. channels, regardless of how many channels may be seen in the community by non-cable subscribers. Hind-Smith described this proposal as "discriminatory."

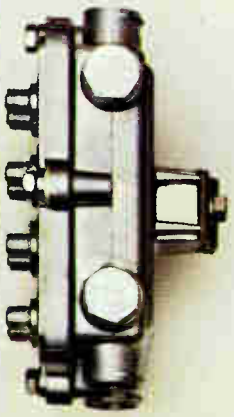
He continued by saying that the cable industry shares the objectives of "cultural and technical sovereignty" around which the Clyne Committee was formed. However, the industry will oppose the "restriction of viewing alternatives as the means to this objective."

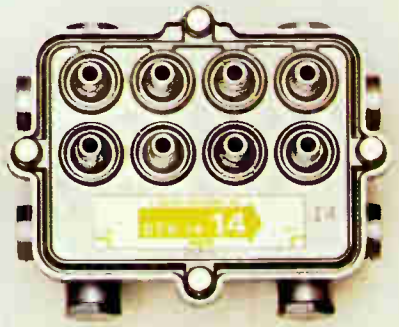
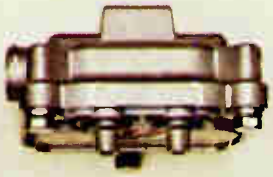
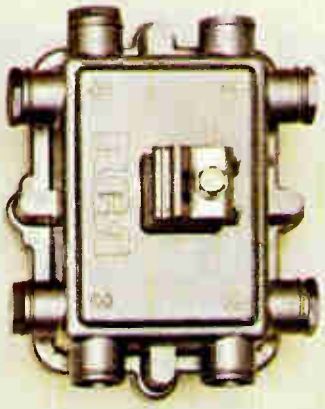
The committee, in addition, Hind-Smith said, proposes a $1.00/month levy on all subscribers for remaining channels. This $42 million per year levy on subscribers represents almost "the entire pretax earnings of the cable television industry, or twice the profit it earned after tax." Neither subscribers nor the cable industry, Hind-Smith emphasized, are prepared to be a tax agency in a government agency in which they have no say.

Hind-Smith, on the subject of pay-TV, said the committee's "cursory" two-page reference to the subject is "unrealistic and misleading." While the committee has said there is not a substantial demand for pay, other research has shown that almost one-third of Canadian adults had an interest in subscribing to a first run movie service on TV. The adverse effects of the committee's proposed three-year delay on pay-television, Hind-Smith feels, would be:

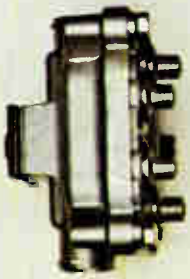
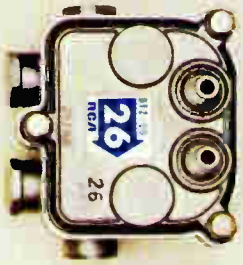
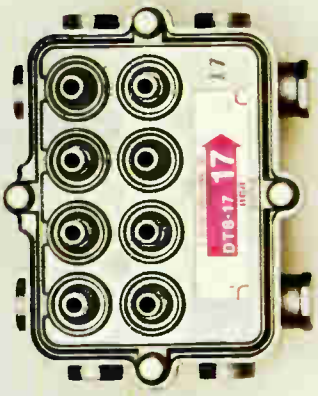
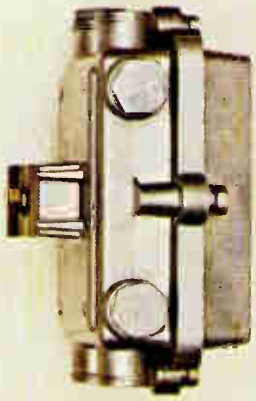
- diversion of funds from programming into hardware and billing systems; and
- further delay of a badly needed flow of funds to performing and production industries.

Finally, Hind-Smith addressed the committee's reasoning in supporting the application of rate of return principles to cable services. Cable rate applications to the CRTC have been infrequent, unlike those of regulated telecommunications common carriers. Few subscribers have intervened at CRTC public hearings for rate applications. These factors are "positive evidence" that customers are satisfied with their rates, and feel investors are entitled to a fair profit. Significant benefits to the consumer would not necessarily accrue from the use of such an unnecessarily rigid formula, Hind-Smith concluded.

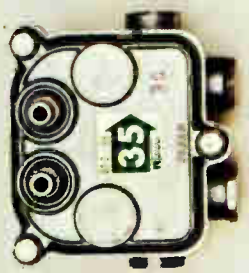
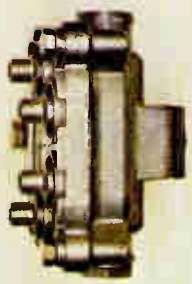


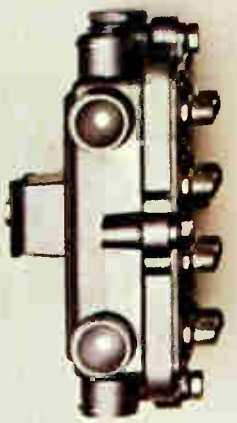
RCA Passive Components for Quality and Performance

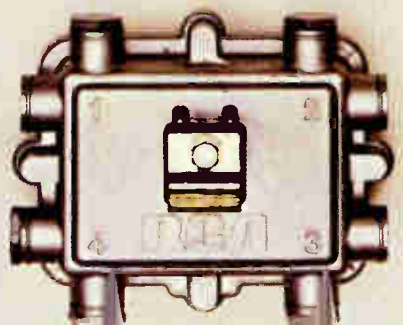





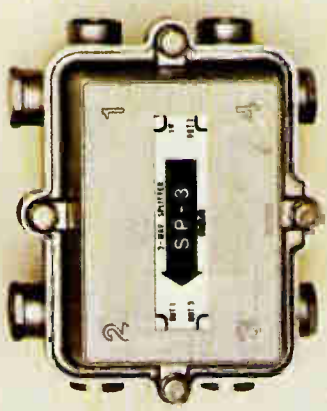
The RCA line of passive components includes a wide range of subscriber taps and trunk passives for cable system applications. RCA Subscriber Taps are available in 2-way, 4-way and 8-way units and are used in the feeder line to distribute the signal to the subscriber. RCA Trunk Passives include directional couplers in 4, 8, 12, and 16 dB values, 2-way and 3-way splitters and a power inserter. The directional couplers and the splitters are utilized for splitting the main trunk lines in a cable system into sub-trunk lines. The power inserter combines the AC Power with the RF signal onto the coaxial cable. For more information contact RCA/Cablevision Systems, 7355 Fulton Avenue, North Hollywood, California, 91605. Toll free number: (800) 423-2404. In California: (213) 764-2411.

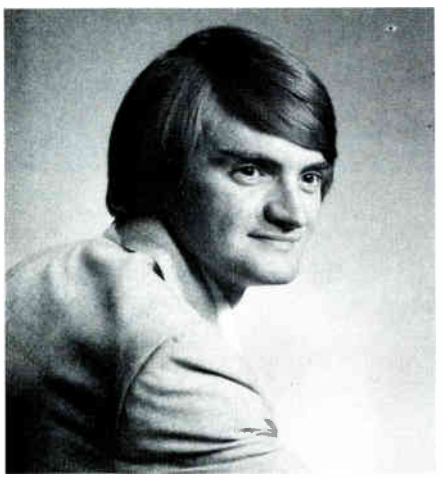
RCA







★ **Ralph Potts** has been appointed chief technician of **Continental Cablevision**'s Galion, Crestline and Willard systems. Potts will be responsible for the technical duties of the three systems serving approximately 7,371 subscribers. Most recently, Potts was a chief technician in Continental's Bellevue Clyde system since November 1977. Prior to that, he was employed as a technician in Continental's Springfield systems.



Ralph Potts.

★ **Donald E. Truitt** has been named the first general manager of **Teleprompter of Chicago, Inc.,** the recently established subsidiary of the nation's largest cable television firm, Teleprompter Corp. In the new position, Truitt will direct all Chicago operations, including marketing the firm's pay-TV service to apartment and condo buildings.

Donald E. Truitt.

★ **Danny E. Cornett** has been appointed general manager of **Scientific-Atlanta (Canada), Ltd.** The Canadian company, headquartered in Toronto, is a subsidiary of Scientific-Atlanta, Inc. Scientific-Atlanta (Canada) provides sales and service for the Canadian industrial, communications and government markets. The company has recently completed arrangements with Canadian firms to manufacture and assemble in Canada certain products in the Scientific-Atlanta line. Cornett is a graduate of the Georgia Institute of Technology and has gained in-depth technical experience in defense satellite communications with the U.S. Army Communications Command and ARINC Research Corporation. His experience includes intensive involvement in program management of large-scale, integrated global communications network developments. For the past three years, Cornett has been employed by Scientific-Atlanta in various positions involving marketing of cable communication products to the U.S. cable television industry.

Danny E. Cornett.

★ **Leonard Mitchell,** former manager of engineering for Page Communications, has been hired as director of engineering operations for **United States Tower Company.** Mitchell will be responsible for all designing, testing, research and development of the company's satellite related products. Beginning in the late 1950's, while employed with the Bell System, Mitchell was involved in the development and application of terrestrial microwave, television operating centers, satellite earth stations and high capacity digital multiplex systems engineering for local and long distance telecommunications. At his former position with Page, he was responsible for system design of earth stations, television and AM-FM broadcast design projects.

Leonard Mitchell.

★ **Southern Satellite Systems** has announced the appointment of **Shaun Johnson** as earth station manager at their Douglasville, Georgia uplink where WTCG (Channel 17), Satellite Program Network (SPN), UPI Newstime, and Home Theater Network are relayed to the RCA Satcom I satellite. Prior to joining SSS, Johnson was employed by United Video, Inc. as their field operations manager in Tulsa. He also participated in the implementation of the Public Broadcast earth station program. Johnson will now share responsibilities with the SSS engineering staff in coordination of growth of the Douglasville earth station technical facilities, as well as managing program operations for the expanding Satellite Program Network.

★ **John W. Dozier** has been appointed manager of engineering for **Hughes Aircraft Company**'s microwave communications products. Dozier, who holds an M.S. degree in electrical engineering from Johns Hopkins University, has been a member of the technical staff at Hughes for five years. Prior to joining Hughes, he was a member of the R&D staff at Control Data Corp., Minneapolis.

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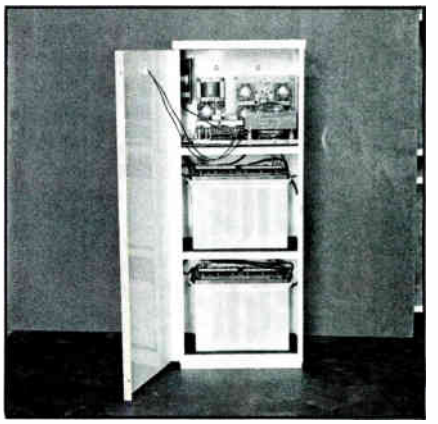
CATV Standby Supply

SV-L-4-60-BC

SV-S-4-60-BC



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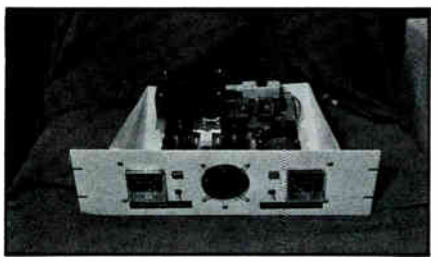
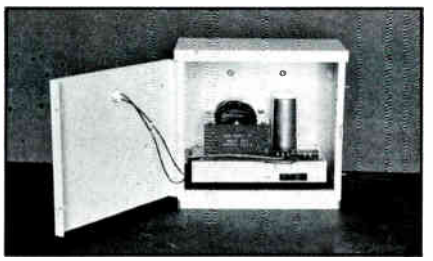
- Constant voltage battery charger
- Power supply status indicators
- Metered battery voltage and output current
- Surge protection to power transistors, 115V AC input and 30/60V AC output
- Temp. range-40° to +140° F
- Output Power -720 watts, 30 or 60 volts
- Low voltage shutdown -18 volts
- Utilizes any make of ferroresonant transformer



SH-0-3-11-0



FR-F-1-60-BC

FEATURES SH-0-3-11-0

- Designed for maximum reliability at minimum cost
- Surge protection provided for power transistors as well as 115V AC input and output
- Plug in PC cards for easy maintenance
- Front panel power supply status indicators
- Metered battery voltage and output current
- Fan cooled for maximum reliability
- Automatic overload and short circuit protection
- Low voltage battery protection
- Constant voltage battery charger
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- Rack mounts in 5½" rack space

SPECIFICATIONS FR-F-1-60-BC

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Output ..... 14A @ 30 or 60VAC
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Efficiency .....90% full load
Overload Protection
Fold-back limited above..... 16AMP
Dimensions..... 13W-8D-11H
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