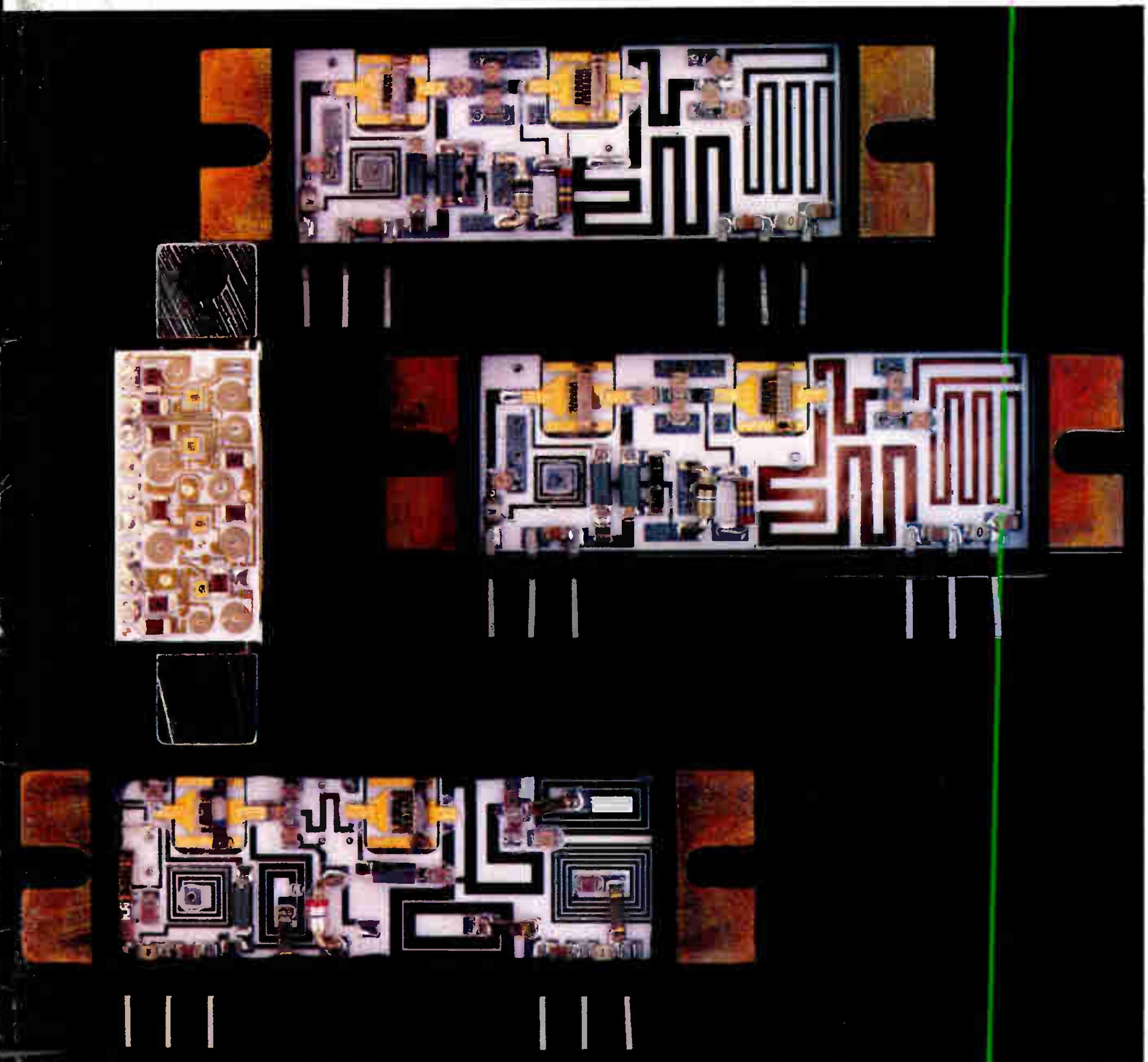
C-ED

Exclusive Videotext Feature
Computer Applications in CATV



Communications-Engineering Digest

Reporting the Technologies of Broadband Engineering

August 1979
Volume 5, No. 8

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

Six steps to becoming a converter expert.

New Econo-Line Thirty shown

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

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

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

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

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

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

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SWEEP GENERATOR

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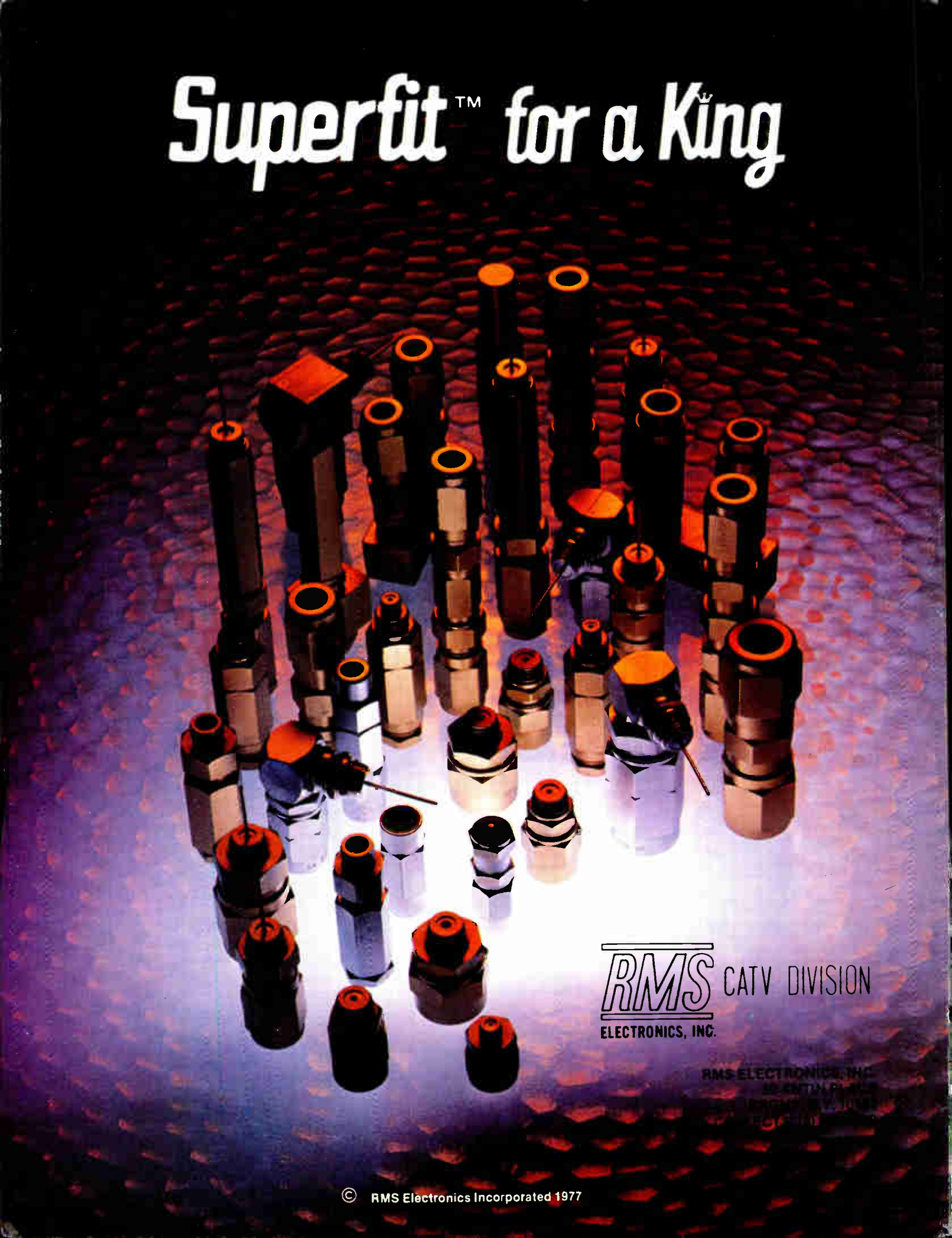

RMS CATV DIVISION
ELECTRONICS, INC.

C-ED News at a Glance

WASHINGTON, D.C.—House Communications Subcommittee Chairman Lionel **Van Deerlin** (D-CA) **has scrapped** his **Communications Act rewrite bill, H.R. 3333**, after failing to get the necessary support of the subcommittee. Van Deerlin now plans to move only with Title III of the bill, common carrier regulation, as he attempts to effect a restructuring of AT&T. Under Van Deerlin's new plan, AT&T would be required to set up subsidiaries which would operate with a separate accounting system in instances where the phone company entered into competitive markets other than basic switched telephone service. The same holds true for AT&T's relationship with its own Western Electric and Bell labs. The provisions which detail AT&T's ability to offer cable television type services will reportedly be based on a recent agreement in principle between telephone concerns and NCTA and CATA. Telcos would not compete in existing services by offering video entertainment programming and, in new markets, would be required to stand and bid for franchises as do cable operators. Meanwhile, the controversial retransmission consent provision, which was a part of Title IV of the bill, is dead. It could be revived, however, in the form of an amendment to the '34 Act.

FONTANA, WISCONSIN—The **Community Antenna Television Association**, holding its annual meeting for the first time away from its home base of Oklahoma, appeared to be **gearing** itself **up for** some big lobbying battles, specifically **telephone issues and copyright.** Although showing a willingness to go along with the agreements being made between representatives of the cable industry and the telcos, CATA members expressed grave concern over the potential of smaller cable systems being bought up by rural telcos and co-ops.

COLUMBUS, OHIO—One of the most dramatic demonstrations of the innovative use of new technology occurred recently, when NBC's "Prime Time Sunday" program, hosted by Tom Snyder, **switched to Warner Communications' two-way interactive Qube-system** for a report on immediate feedback from **President Carter's address** to the Nation on energy. Host Snyder and correspondent Jack Perkins queried Qube subscribers about their reaction to the President's message. Within seconds, computer tabulated responses flashed on the screen as subscribers recorded their answers on their own Qube home consoles. Warner officials expressed a high level of excitement over the ability of the broadcast and cable interests to cooperate in maximizing use of the technology's potential.

WASHINGTON, D.C.—The FCC has authorized **Western Union to launch** its **Westar III domestic satellite into a temporary orbital position at 91 degrees west longitude this month.** The commission also decided not to renew the moratorium prohibiting AT&T from providing private line services over the domestic satellite system it owns with GTE. In 1972, the FCC barred AT&T/GSAT from offering private services with their Comsat system to allow time for competition to develop among satellite carriers. Western Union, meanwhile, says it will send Westar III up this month. In order to keep up with the increasing demand for satellite transponders and also to be prepared for backing up Westar I and II as their lifespans decrease.

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Cover: "Computer Technology on the Move," the emphasis of this month's *C-ED*, is illustrated by hybrid integrated circuit modules. Photo courtesy of TRW DDS & Photo Lab 1.

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OFFICES

Titsch Publishing, Inc.
1139 Delaware Plaza
-or- P.O. Box 4305
Denver, Coloredo 80204
(303) 573-1433

Washington Bureau
3800 N. Fairfax Dr.
Arlington, Virginia 22203
(703) 522-3888

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Editor's Letter

"Computer technology on the Move" is the main thrust of *C-ED*'s August issue. Because computers are now finding multiple uses in broadband communications, we think you'll find these articles timely, useful and informative.

Beginning on page 18 is an exclusive *C-ED* feature, "Oak's Videotext® Brings Teletext Under Addressable Control." This article looks at the development and implementation of the Videotext system, developed by Dr. Howard Prosser. Our next feature is a hands-on piece entitled, "A Computer-Assisted Video Switching System." This paper, by Steve Hester of Woodlands CATV, covers the implementation of a computer controlled video/audio switching system that's time oriented. And this article starts on page 29.

Last, but far from least, is an engineering/management article on a computerized subscriber accounting system. Frank Spexarth of FASCOM assists our readers by detailing proper subscriber accounting systems for use in a variety of systems. And that article begins on page 33. We think you'll find that all of the features, coupled with *C-ED*'s usual departments, will provide for some very interesting reading.

Because of the interrelationship among communications technologies, we have made a few changes at TPI. As some of our readers know, this publishing house also owns publications in the mobile radio business. Because of the just-referenced increasing cross-over, we have merged our cable and mobile radio divisions and have created a Communications Division under which all of TPI's communications publications will fall. Paul Levine will serve as Vice President of Sales/Publisher; serving with equal rank is Michael McCready, currently Managing Editor of our three mobile radio publications. McCready will serve as Editorial Director of the Communications Division's publications.

Paul A. FitzPatrick

More System Technicians Needed at SCTE Seminars

By Richard Covell
SCTE Western Vice President
Sylvania CATV Transmission System
El Paso, Texas

The Society of Cable Television Engineers' two-day seminars are doing a terrific job in educating the engineering talents of the cable television industry with not only the latest in technology, but with how-to instruction on basic techniques as well. There is at least one meeting scheduled somewhere in the United States each month, with knowledgeable panelists supplied by the manufacturers, multiple system operators (MSOs), and just plain cable people who support the SCTE with their talent, so that others might learn.

The question-and-answer periods result in the sharing of information from many systems, and the discussions generated do not necessarily stop when the last speaker of the day steps down.

Who attends these seminars? Typically, the attendees are the chief engineers/technicians and directors of engineering, the "upperclassmen," if you will. And that's fine, because even the brightest engineer can come away with some new information. But, the percentage of technicians who work the benches or set system levels, the percentage of people who can benefit the most from these seminars, is much too small. Although management has begun to appreciate the need for well-engineered equipment, and recognizes performance trade-offs of good versus bad system design, all are not convinced that the cost to send a technician to one of the many seminars can be justified.

Richard Covell, SCTE's Western Vice President.

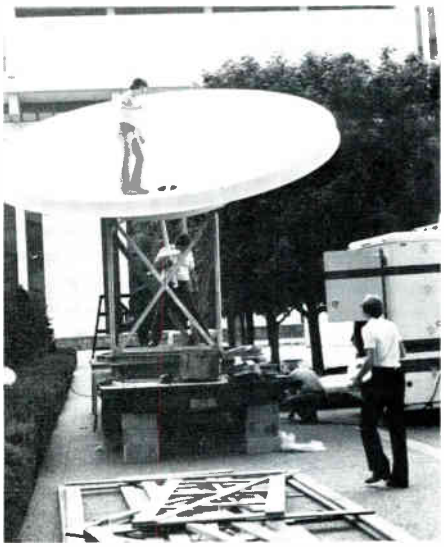
It is my firm belief, however, that a typical $75.00 plus expenses, will give a system manager a heck of a good return on his investment. The more knowledgeable a technician is, the faster he will fix a system outage, and more importantly, the better he can prevent one. You can sell good quality pictures and that's the name of the game.

I encourage those of us who may have influence at the management level to promote the education of technicians within their systems. And, when an SCTE seminar is being held in their regions, to support that seminar with as many attendees as is appropriate. Just as the standards of living of a nation are directly proportional to the educational level of its people, so also is the performance of a system directly related to the knowledge of the people who maintain it.

Fifth Annual Northeast CATV Technical Seminar

NEW YORK, NEW YORK—The Fifth Annual Northeast Cable Television Technical Seminar, held June 7-8, 1979, in Albany, New York, was the most successful gathering so far, according to Bob Levy, seminar chairman.

The event is regularly sponsored jointly by the New York State Commission on Cable Television, the State University of New York, the Upstate Chapter of the Society of Cable Television Engineers and the New York State Cable Television Association.



Henry Schwab assembling the Comtech earth station as Harry Perlow looks on.

More than 240 technicians represented most cable television companies in New York and adjacent states. There were thirty exhibitors, including mobile TV production vans, a working earth station, microwave equipment and a fiberoptic link.

The sessions emphasized "Thirty Years of CATV." Warren Fribley and Tony Cerrache, New York State cable pioneers, talked about the early years of cable and the sessions concluded with "A Brief Review of Optical Waveguides" by Corning Glass.

Sessions were also held on construction and maintenance of TV towers, satellite tone switching, CATV antenna arrays, preventive maintenance, low cost microwave, and Satcom.

The Northeast seminar is the only one offering Continuing Education Credits through the State University system. This year 124 technicians availed themselves of the CEU credit.

Harry Perlow, upstate Chapter president, also voiced enthusiasm over the seminar's success and noted that the chapter increased its membership by ten percent.

The sessions were held in the Convention Center of the newly opened Empire State Plaza, built on 90 acres in downtown Albany by former Governor Nelson Rockefeller at a cost of over one billion dollars.

Northeast Technical Meeting and Workshop Slated for Boston

BOSTON, MASSACHUSETTS—Earth stations, satellite networking and cable television are the emphasis of SCTE's Northeast Technical Meeting and Workshop scheduled in Boston, August 20-21, at the Logan Airport Hilton Inn. The latest developments in satellite programming from the major suppliers will be a prime part of this two-day meeting.

Featured topics will include practical construction aspects of a TVRO, cross-polarization, cue-tone switching, future satellite networking, maximizing satellite capacity, importance of satellites for TV entertainment distribution, problems in delivering multiple premium services, satellite applications and future trends in design. Guest speakers include Ken Gunter, Gerry Marnell, Bob Tenten, Al Davis, Jim Vaughn, George Bell, Isaac Blonder, Terry Spearen, John Morissey and Shaun Johnson. Luncheon audiences will be addressed by Danny Cornett and Edward A. Eagan.

There will be table-top exhibits from at least 30 of SCTE's Sustaining Members on view during the two-day meeting. Certificates of attendance will be awarded to all those who complete the 16-hour course.

Registration for the two-day conference is $75.00 (which covers all workshops, exhibits, sessions and two luncheons). Registration forms are already in the mail. For further details, call Mila Albertson at the SCTE office at (202) 659-2131.

CCOS '79 Highlights New Technologies

FONTANA, WISCONSIN—Three-meter dishes and fiberoptics were among the highlights of CCOS '79 as members of the Community Antenna Television Association met to explore ways of integrating the new technologies and marketing the expanded programming offerings these technologies are making available.

The CATA members also heard from President Carter who sent a message from the White House commending the operators for the strides they have made in serving their local communities and thus the entire country.

"I commend your industry and the small cable operators for the strides you have made and urge you to take advantage of the new opportunities in programming services and new technologies to make television live up to its early promise as a medium of information and cultural enlightenments as well as entertainment," the message stated.

Carter said that in return, his administration would do everything it could to eliminate inappropriate restrictions that hamper the free flow of ideas.

"Resolution of the complex issues facing this nation require an informed electorata," Carter's message stated. "Cable television, with its wide selection of channels and services, can make an important contribution to the debate needed to thoroughly examine these issues."

In anticipation of removal of some of the restrictions the President's statement alluded to, CATA operators demonstrated a keen interest in the capabilities of the small aperture TVRO's. Expecting the FCC to further deregulate the satellite receivers, operators reported they were giving dishes as small as three meters definite consideration.

Tom Humphries of Scientific Communications, who was one of the earth station receiver vendors with dishes on display in the parking lot outside the exhibit hall, was quick to point out that there are a lot of places where a three-meter or ten-foot dish won't work, but, he explained, depending on the footprint of the signals being received, the smaller terminals offered a very economical means of receiving satellite services.

"Give your subscribers something they have never had before," Humphries said, explaining that one channel could be put in for six or seven thousand dollars.

Several operators reported they were considering putting in three-meter dishes after FCC deregulation, not only as their primary receiver, but as a second dish to point at one of the other birds. The strength of the Westar footprint, for example, appeared to encourage many of the rural operators who have limited channel capacity, to consider picking up one of the two new program offerings from other than the fully loaded Satcom.

The operators also reported they were impressed with the package assembled by Times Wire, Avantek, Microdyne and Gardinar Communications which ran the fiberoptic link into the exhibit floor.

Voyage II's Jupiter Fly-By Via Satellite

NEW YORK, NEW YORK—The solar system was made a little smaller on July 9th when close-up color photographs of Jupiter were beamed live into the homes of cable television viewers over RCA Americom's Satcom 1, transponder 10, one of the transponders leased by Showtime 12 hours a day to transmit programming to its affiliates.

This photo of the plant Jupiter was taken by Voyager II while still more than 25 million miles away. Ganymede, Jupiter's largest satellite, can be seen to the lower left of the planet.

The rare television event, which was made available free of charge to the entire cable industry, was made possible by NASA and its spacecraft Voyager II and RCA Americom. As Voyager II entered the phase of its orbit closest to Jupiter, the communications system onboard sent electrical impulses back to NASA headquarters—the Jet Propulsion Laboratory in Pasadena, California. On the ground, the impulses were fed into a computer which translated them into video signals that were beamed to the RCA Satcom 1 satellite on transponder ten, which is also leased by Showtime to transmit programming to its affiliates in the Mountain and Pacific time zones.

A more detailed description of the transmission process is as follows: basically, it is the workings of the concept of digital pictures. Voyager II had on board a camera and a computer. The computer changed the camera's pictures into a checkerboard pattern of tiny squares, each with an assigned degree of brightness. That checkerboard pattern can be likened to the dots that make up a common black and white photograph. Each tiny square was known to NASA scientists as a "pixel" or picture element. One whole picture of Jupiter was comprised of 640,000 pixels or 800 lines of 800 pixels per line. The computer processed 800 lines—one at a time—in 48 seconds.

With that information, the computer on the ground in Pasadena received each whole picture and functioned like a darkroom in photography, adjusting contrast and balancing the color of each picture. The ground computer then fed the pictures as regular video signals up to RCA Americom's Satcom 1 satellite on transponder ten, for primary distribution to NASA.

Cable School in August

PHOENIX, ARIZONA—Beginning on August 6th, a school for cable television installers and technicians will open, announced the Arizona Cable Television Association. The school will be run by the Maricopa County Skill Center, an occupational skill training institute engaged in training underemployed, unemployed, and disadvantaged persons.

The cost of training enrollees will be paid principally with Comprehensive Employment and Training Act (CETA) funds allocated to the state of Arizona, and will be dispensed by CETA prime sponsors. Others interested in the program may pay their own costs. A course outline and additional program information will be sent to members of ACTA shortly.

One benefit of the program will be the Targeted Job and WIN tax credit from the 1978 Internal Revenue Act, P.L. 96-600. This act allows employers hiring members out of the CETA program to take a 50 percent tax credit on the first year's salary, up to $6,000.

Second International Fiberoptics Exposition

CHICAGO, ILLINOIS—The second International Fiberoptics and Communications Exposition to be presented in the United States will be held September 5-7, 1979, at the Hyatt Regency-O'Hare in Chicago, Illinois. This is the second such exposition sponsored by Information Gatekeepers, Inc., of Brookline, Massachusetts.

Topics of the technical program include:

- Basic Fiberoptics Systems
- Tutorial Sessions
- Future of Fiberoptics
- Common Carrier Applications
- CATV Broadband Applications
- Rural Communications
- Recent Developments in Sources, Detectors, Connectors, Splicing, Couplers and Fiber Cables
- Advanced Technology in Longer Wavelengths and Integrated Optics
- Test and Measurement Techniques
- Review of Fiberoptics in Various Countries
- Plus many more topics.

Three short courses will be offered during the exposition. Course 1 is an advance, two-day session that will review new developments in the field from a technical standpoint. Course 2 is a two-day session on systems design, and Course 3 is a one-day session on the fiberoptics market.

For additional input on the Second International Fiberoptics and Communications Exposition, contact Michael O'Bryant, Expositions Director, Information Gatekeepers, Inc., 167 Corey Road, Brookline, Massachusetts 02146, (617) 739-2022.

Fiberoptic Seminar Series

BROOKLINE, MASSACHUSETTS—The Communications and Information Institute (a division of Information Gatekeepers, Inc.) has recently announced a 13-city seminar series entitled "Fiberoptics: Technology and Marketing." The series of two-day courses, scheduled to run from August through December, will be presented in Boston, Chicago, Minneapolis, Atlanta, Phoenix, Kansas City, Dallas, Seattle, New Orleans, Washington, D.C., Philadelphia, San Francisco and San Diego. The seminar instructor will be Dr. Glenn Elion, president of International Communications and Energy, Inc. He will focus on the latest in technical developments and system design requirements on the first day, covering: optical fibers and cables; couplers, splices and connectors; and light sources, detectors and modulators. The second day will be devoted to marketing, including components markets, systems markets, and applications and sales.

Dr. Elion has authored several publications in the fiberoptics field. Among them are a new four-volume Fiberoptics Market Study Series (1979),

Elions' "Electro-Optics Handbook" (1979), and "Fiberoptics in Communications Systems" (1978).

Registration for the technical seminar is $195.00; marketing seminar, $245.00; and both days, $395.00.

For further information, contact Donna S. Ahrend, Director, Communications and Information Institute, Information Gatekeepers, Inc., 167 Corey Road, Brookline, Massachusetts 02146, (617) 739-2022.

Reducing Radio-TV Interference

WASHINGTON, D.C.—The National Association of Broadcasters (NAB) has said that while it prefers that private industry solve the problem, it may be necessary for the Federal government to regulate the design and manufacture of radio and television receivers in order to reduce interference.

In a filing with the FCC, NAB said the FCC first "should focus upon the potential of cooperative efforts within the consumer electronics industry, the use of standards committees, and any other feasible nongovernmental techniques."

NAB said the dramatic increase in interference, especially due to the growth of legal and illegal citizens band transmitting equipment, cannot be overstated. It also noted that the commission's own statistics show that radio frequency interference is caused by transmissions in services other than citizens band.

The association said many radio and television stations have been injured by loss of effective coverage due to interference and that broadcasters are unable to resolve the vast majority of complaints. Consumers, NAB pointed out, often blame the broadcasters rather than the actual source of the interference problem.

Declared NAB, "it is unlikely that the average consumer, even in the wake of a massive educational campaign, may be competent or even willing to consider interference factors when making a consumer electronics purchase. Hence, a nonconsumer solution appears to be required.

"Regardless of whether the interference solution comes from government edict or industry initiative," volunteered NAB, "the practical alternatives concern either initial design or subsequent retrofit."

THANKS A MILLION

We want to thank all of you who stopped by our booth in Las Vegas. In fact, thanks a million for helping us to add over a million dollars in Earth Station package orders. Proof again, that Gardiner's breakthrough of a lower cost, high quality Earth Station Package is what you, the operators have been asking for.

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FCC Fills Sky With Transponders

By Pat Gushman
Washington Bureau Chief

The Federal Communications Commission is continuing to fill the heavens with nearly 75 new transponders to be available soon, many of which could be used for video services. In separate but somewhat related actions, the FCC has authorized Western Union to launch Westar III into temporary orbit and has also declined to extend the moratorium prohibiting AT&T from providing non-government services via domestic satellite.

The expiration of the moratorium will result in AT&T and GTE Satellite Corporation, which jointly own and operate the Comstar system, to be able to integrate totally their existing long haul domestic communications facilities network by removing the requirement that non-government private line traffic be transmitted via terrestrial facilities only. This means as many as 50, possibly 60, transponders could become available on Comstar alone.

Western Union, meanwhile, has been given a temporary orbital position which is subject to change by the FCC with 30 days notice. The launch is planned for early this month, and Westar III will initially be parked at 91 degrees west longitude. When Western Union prepares to move Westar III to a permanent home, it must inform the FCC and any other operators whose in-orbit satellites might be affected by the orbital transfer.

In 1973, the FCC authorized construction of three Westar satellites, two of which were placed in orbit the next year with the third held in reserve until now. Western Union says the third is needed now because of demands on the capacity of Westar I and II, an anticipated increase in demand for service and the need for backup and restored satellite capacity. Western Union says that use of its system for occasional video use has grown from about 300 hours in 1975 to over 10,000 hours in 1978. Out of the 22 transponders expected to be available in the Westar I and II satellites at the beginning of next year, six could be filled with message-type traffic, seven would be leased full-time to public broadcasting and the American Satellite Corporation, with the remaining nine protected transponders being used increasingly for occasional video services.

In addition to growth requirements, one of Western Union's main reasons for launching Westar III is to avoid service disruptions as transponders in the other two satellites reach the end of their usefulness.

AT&T's story is a little different, obviously. To prevent its pervasive power in the domestic communications arena from keeping qualified applicants from entering the domestic satellite market, the FCC in 1972 barred AT&T from offering non-governmental private line services via domestic satellite. On reconsideration, the FCC decided that the limitation could expire automatically three years from the time the Comstar system became operational, unless an interested party sought an extension and provided a detailed, convincing argument that the public interest required that the moratorium be extended.

The American Satellite Corporation and Western Union asked that the moratorium be extended, and Satellite Business Systems sought clarification of the procedural requirements which must be complied with prior to AT&T and GSAT offering satellite-only services.

The FCC has realized now that without satellite carriers, it is doubtful that there would be the proliferation of programming now available on cable television. The FCC said that consumer demand has been sufficient in other services as well to encourage satellite carriers to increase their communications capacity.

In announcing the decision, the FCC said the high percentage of utilization of Westar and RCA's Satcom systems alone was compelling evidence that the satellite carriers have had a fair opportunity to establish themselves. Both the carriers are now seeking authorizations for additional capacity.

A Top Engineer... On Fused Disc Cable

Bob Bilodeau, Vice President, Engineering for Suburban Cablevision of East Orange, New Jersey had this to say in a recent letter to us:

"...our use of General Cable's Fused Disc is based on its electrical properties and its installation handling characteristics.

"Since June, 1975, I've used Fused Disc to construct nearly 1,000 miles of dual trunk cable system. Neither Suburban, nor our contractors have experienced any mechanical difficulties with underground or aerial placement.

"Additionally, we are able to take advantage of the lower attenuation characteristics and lower loop resistance properties in terms of amplifier spacing (electronics density) and the parameters of power supply per mile of plant.

"I plan to continue constructing with Fused Disc cable for the remaining 1,600 miles of our franchised northern New Jersey area."

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VIDEOTEXT® BRINGS TELETEXT UNDER ADDRESSABLE CONTROL

A Staff Report

Teletext—digital data broadcast during the vertical blanking interval as part of an otherwise normal television signal and displayed as pages of text or elementary pictorial material on suitably equipped TV receivers—is now a fully established, regular service in Great Britain. It's also growing rapidly in the U.S., with pilot systems now operating as part of several broadcast stations around the country.

But if teletext is an exciting advance in broadcast television, it is equally if not more exciting to the cable television industry. CATV operators see it as a promising way to expand the amount and variety of data services that can be marketed to the home. And Videotext, a set-top teletext adapter system now in final engineering development by the CATV Division of Oak Communications, Inc., is designed to make those expanded CATV services a reality.

Videotext, like other set-top teletext adapters, is a self-powered, stand-alone device connected between a source of teletext bearing television signals and the antenna terminals of a color television receiver. It extracts and decodes the high-speed teletext digital data stream contained on two to four lines of the vertical blanking interval (VBI), separate from and above the standard television picture. That data is then presented in a full screen display called a page. Pages, which vary from 20 to 24 rows and from 32 to 40 characters per row, are selected by the viewer via a keypad control. Hundreds of pages can be carried on a single teletext channel.

Videotext decodes and presents information from lines 16 and 17 of the VBI as pages of 20 rows of 32 characters. A subscriber may key in any one page in sequential order or rapidly scan all pages arranged in a cycle—initially up to 800 pages—in less than three minutes.

An almost limitless range of information can be offered:

- Captioning for the deaf
- Fast-breaking local or international news
- Horoscopes
- Traffic reports and road conditions
- Stock market quotations and money market rates
- Weather alerts and school closing announcements
- Airline schedules
- Telephone directories of major cities
- Used car and mail order advertisements
- Entertainment and sports schedules
- First aid information and emergency phone numbers

In addition to words, graphic displays using lines or groups of textual characters may be presented. Such displays can range from a linear chart to illustrate growth of a particular stock to a block picture of a diver to advertise community swimming lessons.

From its conception, Videotext has been designed to be fully compatible with Oak's "Total Control" CATV addressability system. The Oak system gives the operator centralized control of individual subscriber reception of specific programs, controlling both hardware and premium programming.

To control premium programming, up to 35 channels are scrambled and "tagged" with up to eight levels of program information. When addressed from the headend, the subscriber's decoder is specifically pre-authorized to respond to any one or combination of eight program levels and to descramble the coded signal. The decoder simply compares the tag signal of a subscriber-selected channel with stored pre-authorized program levels.

By extending the control offered by addressability to teletext programming, Videotext and similar systems will open the door to make what is now strictly a service into a profitable commercial medium.

Oak's "TotalControl" converter/decoder is a unique 35-channel device, designed for one or more pay-TV channels, up to 35 channels. With this new addressable unit, an operator can remotely control premium programming for each subscriber at the control center, ensuring total system security. The unit features automatic frequency control and a single detented rotary selector to control both basic cable channel selection and automatic pay channel descrambling.

Beyond the outright advantages teletext offers television in general, it means even more to the cable operator, according to Dr. Howard Prosser, leader of Oak's Videotext development.

"Teletext can free up CATV channels now fully occupied with character generators, typically two to six channels on an average cable system," stated Prosser. "Those generators can display only a small fraction of the information available from one channel of teletext. By moving all textual information to teletext," Prosser emphasized, "operators will be able to provide a much greater variety of information and entertainment on channels once occupied by character generators, and increase their revenues at the same time."

Addressable Videotext, Prosser explained, makes for a broad range of subscriber programming choices, all of them selected, switched, and billed via a central computerized control system.

As for the equipment to bring it all about, Prosser foresees a demand both for teletext adapters and for sets with built-in teletext. However, he added, any large-scale production of teletext units must wait until U.S. teletext standards are issued by the FCC. That, he expects, "is probably about two years down the road."

"Once broadcast standards are adopted here," Prosser remarked, "the need for teletext set-top adapters will be an immediate reality. Long design cycles in the television manufacturing industry will mean several years before sets incorporating adapters will be widely available. Beyond that, the long operating life of present solid state receivers means they will be around in great numbers long after teletext has become popular." Oak, as a result, expects that set-top adapters will be in demand for the greater part of the 1980's.

Development of Videotext began less than a year ago under Prosser, senior scientist at Oak. A veteran of the television industry, Prosser has been involved with several technical advances in television receivers and peripherals while with Oak and other companies. He helped develop some of the more popular features, such as the surface acoustic wave IF filter.

When development work on Videotext began early last fall, Prosser used the established British Ceefax system as an engineering starting point. The BBC, which has granted limited engineering licensing agreements on its system to the American television industry, developed Ceefax in the early 1970's. Today, teletext is a routine service on all three British networks.

Oak identified seven design objectives for its adapter, based on an evaluation of the Ceefax system:

1. The adapter must maintain the quality and strength of the basic television program signal passing through it.
2. It must extract and decode teletext digital data, yielding a modulated text signal output on a low VHF channel.

"The winner in the teletext ratings game will be the system with the most bells and whistles on it," stated Howard Prosser, senior staff scientist for Oak Communications CATV Division.

3. It must provide a seven-color standard NTSC output signal (red, green, blue, yellow, cyan, magenta, and white).
4. Proper band-limiting of the chroma signals should be employed to minimize ragged edges on characters caused by cross luminance effects (chroma into luminance).
5. Luminance delay should match that introduced by the band-limiting chroma filters to allow proper registration of luminance and chrominance in small characters.
6. Excessive overshoots in the sharply defined luminance signals should be avoided or at least minimized.
7. Full operational compatibility with Oak's addressable converter/decoder system must be ensured.

Those objectives were met this January when an engineering breadboard model of Videotext was first successfully demonstrated. Since that time, the system has undergone engineering refinement and now awaits only the issuing of FCC standards before package and product engineering, and finally production, can begin. In the meantime, Videotext began FCC approved engineering tests in June on KBSC, the national subscription television station in Los Angeles. Prosser hopes a pilot installation for that station in which teletext is available to subscribing viewers will be on line by early 1980.

Videotext follows the functional block diagram shown in Figure 1. Since the input to the system is a fixed, low VHF channel, a bandpass filter and fixed-tuned RF amplifier can replace the UHF and VHF tuners and the IF amplifier with AFC that are required by broadcast adapters.

Bandlimiting provisions incorporated in today's television receivers, however, complicate the picture for set-top adapters, Prosser explained. "The problem," stated Prosser, "is that the data rate is so high it's attenuated in the bandpass of the front end of the receiver. If the frequency were lower, it would be well within the luminance bandpass that every TV receiver can handle." A data rate of about 4 megabits/second (MBPS), he feels, would be much more workable than the BBC-recommended 5.538 MBPS.

As a result, signal processing at this point becomes a primary technical chore in designing the adapter, Prosser exclaimed. Since the video signal contains both analog (program video) and digital (teletext) data at the relatively high 5.538 MBPS data rate, the best possible operating tradeoff between the two must be found. Tuning for best picture operation is generally at the expense of best text decoding.

Maintaining the smooth, finely modulated waveform of program video that provides best picture quality spells trouble for the threshold detector, or data slicer. It must discriminate each pulse in the signal train, coming in at high speed and in varying amplitudes, as a discrete logic level—either a data "0" or "1." Even with very fine tuning, however, a high bit error rate (BER) results and frequent errors appear in the teletext display (extra, missing, or wrong characters).

Signal processing to make higher amplitude, more discrete waveforms suitable for digital data, on the other hand, would enhance teletext performance by lowering the BER as the incoming data are read. However, program video quality would suffer, becoming ragged and coarse.

The Videotext approach to stay within British BBC teletext guidelines for IF group delay and amplitude response while still achieving satisfactory overall performance is to use a surface acoustic wave (SAW) bandpass filter before the fixed tuned RF amplifier. BBC's Ceefax system requires that baseband video response and group delay should both be flat up to one-half the bit rate. Use of a SAW filter meets those requirements, resulting in data pulses that are slightly distorted, but still acceptable for both teletext and program video.

Also necessary for optimum teletext performance is the use of synchronous detectors rather than video envelope detectors. BBC experience has shown envelope detectors are subject to non-linear (quadrature) distortion which can severely affect data slicer performance.

The resulting Videotext system thus retains high quality program video while enabling satisfactory teletext decoding at the same time. A BER of 10^{-4} results in an occasional wrong character. But because of the rapid (six pages per second) cycling of the teletext broadcast system, such errors exist for only a short time.

Videotext's video output drive circuitry, Prosser noted,

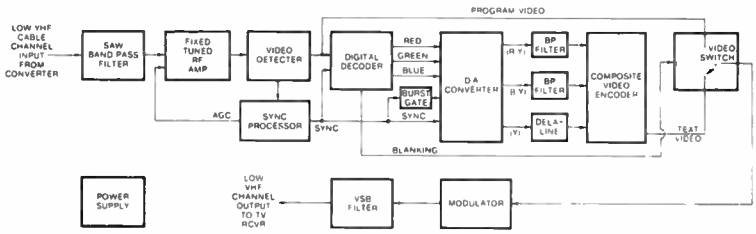

Figure 1

generally parallels that of current color television receivers. Sync processing circuitry, consisting of a sync stripper and horizontal AGC loop, is necessary for operation of keyed AGC in the adapter front end. AGC back to the RF amplifier is provided to ensure a constant data input level to the data slicer in the video detector.

The data bearing composite video input signal is split at this point. One part goes to the digital decoder to begin processing into teletext video. The other part bypasses the decoding and video encoding circuitry and proceeds directly to the video switch to be fed to the modulator as program video. The digital decoder processes the data bearing input signal, stores at least one page of text data in a RAM, and then produces the properly timed TTL level output signals corresponding to red, green, blue, and blanking. These outputs are then re-encoded into a composite video signal. A digital-to-analog converter accepts the red, green, blue, and blanking output signals from the digital decoder, as well as sync and burst gate signals via the sync processor. It performs NTSC color matrixing to obtain the luminance signal (Y) and the color difference signals (R-Y and B-Y).

Videotext incorporates several elements between D-A converter output and video encoder to enhance teletext video quality. To prevent the extremely fast transitions in the color difference signals (R-Y and B-Y) from causing ragged edges on the text characters, Prosser explained, identical band limiting filters are inserted in the color difference signal lines. These bandpass filters are chosen for minimum overshoots and symmetrical impulse response.

To compensate for the delay introduced by the chroma band limiting filters, an equal delay is introduced into the luminance signal path. This results in proper registration of the luminance and chroma components of the characters that are subsequently displayed on the television screen.

Operation of the Videotext adapter in either the text or program mode is accomplished with a single pole double throw video switch activated by the blanking signal output of the digital decoder. The output signal of the video switch, whether program or text, is then modulated as either channel 3 or 4 and filtered to comply with FCC regulations.

Viewer control can be provided in a variety of means, according to Prosser. Remote control using a small key pad and either hardware, infra-red, or ultrasonic transmission are all possibilities. Final configurations, Prosser noted, must await product engineering. That, in turn, can be completed only after FCC teletext guidelines have been established.

A BULLETIN FROM EASTERN MICROWAVE...

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Addressability adds yet another dimension to teletext. By giving the CATV operator channel-by-channel, program-by-program, subscriber-by-subscriber control of the system, the amount, variety, and flexibility of programming is tremendously increased.

Oak's "TotalControl" system provides level-by-level control of subscriber reception through the following series of events:

■ A computer generates a pre-authorization program level message which the headend transmits to the subscriber's converter/decoder.

■The converter/decoder stores pre-authorized program levels in memory prior to a premium program or teletext channel showing.

■The headend tags the transmitted channel with a program level identification signal.

■The decoder compares the tag signal of a subscriber-selected channel with stored pre-authorized program levels.

■A channel of premium programming or teletext is descrambled when the tag signal for the program matches the pre-authorized program level.

In the event a subscriber's equipment is stolen or non-payment of subscriptions occurs, the unit can be remotely disabled by addressing the converter/decoder to deny the service. If a nonsubscriber attempts to use the converter/decoder illegally, a disabling signal that contains the addresses of all unauthorized converter/decoders will turn off the unit.

System operation depends on two forms of data transmission:

1. Transmission of data to address the individual converter/decoder and pre-authorize it for specific program levels. (This data also pre-sets the converter/decoder to respond to the unit On/Off Refresh signal).
2. Transmission of a TAG signal on each controlled channel to identify the level of the program being carried at a given time.

The addressing data channel carries a unit On/Off authorization refresh signal that must constantly be received and recognized by the converter/decoder to enable the unit to function.

Equipment in the system consists of:

- The control center, which generates unit and program level control data for each subscriber.
- The headend control equipment, which comprises video scramblers, an addressing channel data modem, and program level tag signal generators.
- Subscriber terminals in the form of "TotalControl" converter/decoders.

The computerized control center can control the operation of up to two million converter/decoders simultaneously, far more than would ever be used in a single CATV system. This quantity, however, permits exchange of inventory between multiple systems that are owned by one MSO, without the risk of duplicating control addresses assigned to other individual decoders.

Videotext, being just downstream of the converter/decoder, would be assigned a separate "level." Subscribers desiring teletext data on a specific channel would then be authorized to receive that level.

"TotalControl" Videotext, a new addressable technology breakthrough offering CATV system operators total control of information transfer, was introduced by Oak Communications CATV Division at the recent NCTA show. A wide range of information, ranging from local comparative shopping to nationwide airline schedules to a recipe for elephant stew, is transmitted from a control center into the home, decoded by an Oak addressable decoder, and displayed in color on the television screen.

What's Ahead

Where will teletext, and Videotext, go from here? First on the list, stated Prosser, is the establishment of FCC standards. The production teletext systems that follow will then be modified to conform to those standards.

"But it's going to be nothing static," he added. Like other competitive markets and equipment, Prosser predicts a ratings game for both teletext programming and adapters. The winner, he declared, will have the equipment "with the most bells and whistles on it."

Although only the drifting, unpredictable factors of consumer demand and preferences will determine which features become popular and which don't, some improvements are already on the horizon. Capacity is one. Videotext, for example, can be further expanded by dedicating additional video scanning lines within one CATV channel to increase either system capacity or speed of operation by a factor of more than 100.

Certainly, with what's already available now, those and other future advances in televised information systems will be interesting to see.

Dr. Howard F. Prosser

Dr. Howard F. Prosser is a Senior Staff Scientist at Oak Communications, Inc., CATV Division. Development of the Videotext system began less than a year ago under the direction of Prosser. As an engineering starting point, he used the established British Ceefax system.

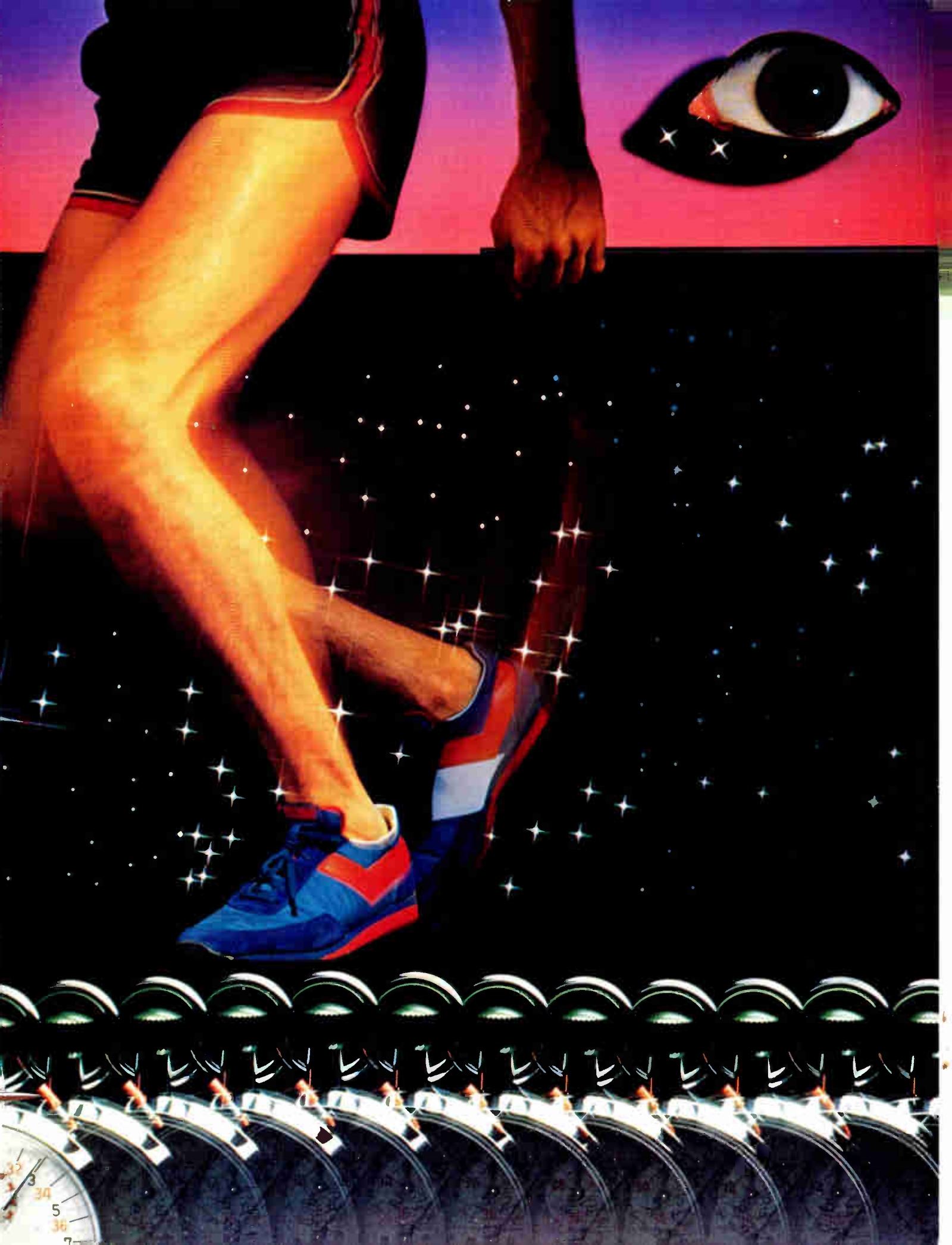
A veteran of the television industry, Prosser has been involved with several technical advances in television receivers and peripherals while with Oak and other companies. He helped develop some of the more popular technological features, such as the surface acoustic wave (SAW) IF filter.

Prior to joining Oak Communications, Inc., Prosser was in the circuits research department at Zenith Radio Corporation. He obtained his BSEE in 1959 and his MSEE in 1961 from the University of Notre Dame. In addition, he received his Ph.D. in 1968 from the Illinois Institute of Technology.

Prosser has taught electrical engineering at ITT and the University of Illinois, Chicago Circle.

Prosser has also published three articles in the field of consumer electronics: "Use of Fourier Transforms In Transient Analysis of Asymetric Sidebands Systems," *IEEE transactions on broadcasting*, Volume BC-18, Number two, June, 1972; "Two Proposed Quadraphonic FM Broadcasting Systems," *IEEE transactions on broadcast and television receivers*, Volume BTR-19, Number four, November, 1973; and "A Companding In Noise Reduction Techniques for FM Broadcasting and Reception Using a Transmitted Control Channel," *Proceedings—National Electronics Conference*, Volume 30, 1975.

Prosser is a member of the IEEE, a past chairman of the IEEE Chicago Fall Conference on Consumer Electronics and is presently secretary/treasurer of the IEEE Consumer Electronics Group.



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A COMPUTER-ASSISTED VIDEO SWITCHING SYSTEM

By Steve Hester
Digital Systems Engineer
Woodlands CATV

Building a smart video switching system can be easier than most people think. With the availability of single board computers and solid state switches, a simple but effective system can be implemented. The need for an intelligent video switching system is even more apparent when "non-duplication" rules and switching satellite video sources becomes necessary for cable operators.

This article will cover the implementation of a computer controlled video/audio switching system that is "time-oriented." Interface to tone-cued or Touch-Tone controlled switching will also be covered. It is important for those wishing to utilize a system of this type to carefully define their particular switching requirements before assembling the hardware.

The choice of controllers resulted in the use of the Dynabyte basic controller. This unit provides all the necessary inputs and outputs for external controls and a resident rom operating system. This unit also provides a cassette tape system, onboard eprom programmer and a video console output. A serial port is provided for external terminal applications and can be used as the console device for the controller. Main memory (ram) can be expanded to 16k bytes on the card, and two 2716 eproms can be plugged to provide permanent program storage with auto restart on power up.

The software operating system consists of a basic interpreter call ZIBL. It has been enhanced to provide the necessary basic commands for controlling all of the peripheral I/O and includes a time of day feature. This time of day (TOD) clock was the key feature in making this system complete without modifications to the hardware or software supplied.

The video/audio switch was the next step. There are two alternatives to this area, a miniature relay or solid state switch. There are several relay manufacturers that make low signal

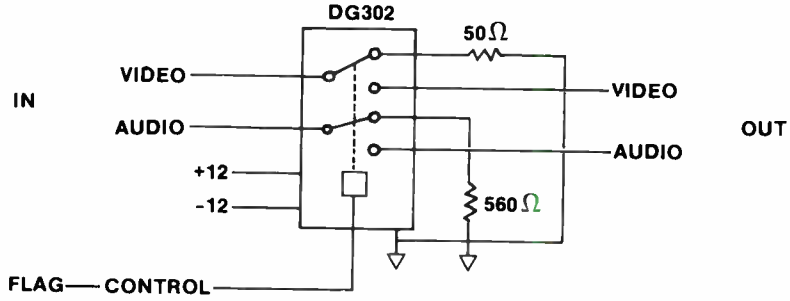

Figure 1: Switch Diagram

contacts available, but this can add extra cost to the design. A compromise choice was made with a MOS switch. The Signetics DG302 provided a DPDT CMOS compatible analog switch with an on resistance of less than 100 ohms. The attenuation caused by the switch can easily be compensated for in the modulator input adjustments. A one channel video/audio switch module was then assembled (see Fig. 1). Terminating resistors were used to insure that all input sources not being used would be terminated to reduce crosstalk. The control input is TTL logic compatible so that it interfaces with the basic controller to its Flag Outputs. Each switch output feeds to a common signal buss which terminates at the TV modulator (see Fig. 2). By turning on the appropriate Flag, any channel can be used as the program source for the modulator. By turning on several Flags, you can mix sources assuming they are synced together.

Figure 2 shows a block diagram of the system that was assembled for our switch application. Cable channel nine was used for an automated wire service. A Systems Concept Quantum-II, designed for New York Stock ticker, was to be the primary program feed to the modulator. However, when Madison Square Garden or *Calliope* programming was on, the controller would enable the satellite receiver to feed the modulator. The system would now provide control of two program sources. But, since *Calliope* only provides services on Monday, Tuesday, and Thursday, it was decided to add a JVC CR-6060 videocassette recorder to the system, and two more switch modules. One switch was needed to connect to the modulator and a second switch was needed to connect/

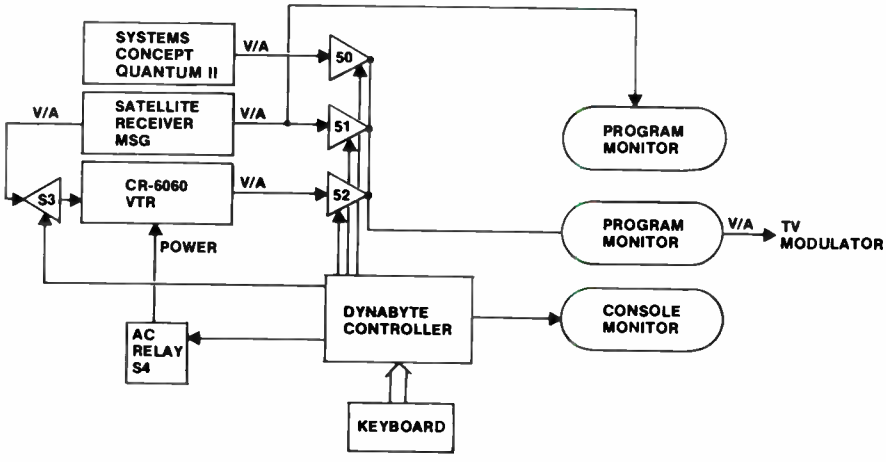

Figure 2: Block Diagram

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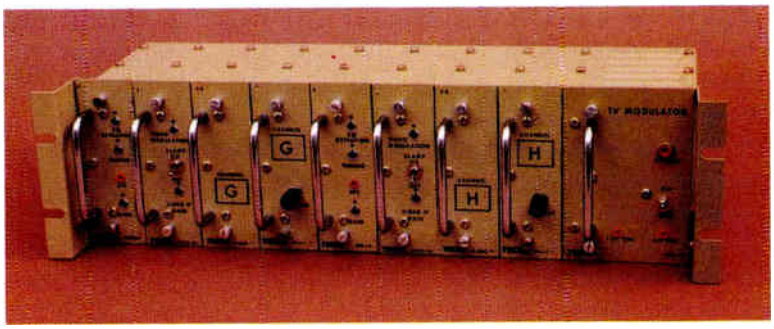

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disconnect the video in of the recorder to the satellite receiver. *Calliope* would be recorded Monday, Tuesday, and Thursday, for replay Wednesday, Friday, and Sunday respectively.

The basic controller has eight relays that can be controlled by software. These are designated Relay 0 to 7. Relays 0 to 3 are SPDT heavy duty type, and relays 4 to 7 are SPST reed type. The reed relays provided the control functions (stop, play, rewind and record) through the remote control input on the CR-6060. A GE 4N37 optoisolator was used to interface to the "stop" indicator on the remote control plug, and was connected to a Sense input on the Dynabyte controller. A Crydom ten amp solid state relay was then used to control power to the recorder by a Flag output.

The hardware assemblies were complete. Control of two video/audio sources and record/play for tape facilities could be implemented. A list of interface designations can be found in Figure 3.

Because of the ease of interfacing to the Dynabyte controller, the use of tone switching will only be covered in general terms. Much of the satellite programming is available with Touch-Tone commands to activate switching equipment to connect and disconnect those sources from modulator equipment. There are several companies which manufacture the decoding equipment needed to make use of these tones. A Sense input to the controller has been assigned to make use of a tone sequence decoder which provides a TTL or switch closure for on/off control. A logic high input would indicate no decoder or an "off" condition. A logic low input would indicate an "on" command had been sent.

The Dynabyte controller uses a language called ZIBL. ZIBL is a basic interpreter with enhanced statements to cover the control of Flag outputs and Sense inputs, along with the other I/O devices available on the unit. The time of day is maintained in a 24-hour format, and is available for testing or changing by a program. The manual that comes with this unit covers all ZIBL statements and includes some examples of applications.

The flow-chart of the program is shown in Figure 4. This routine inputs the "on" time and the "off" time for channel control. It also inputs the

Dynabyte Function	
Flag 0	V/A Switch control
Flag 1	V/A Switch control
Flag 2	V/A Switch control
Flag 3	V/A Switch control (VTR input)
Flag 4	AC power control (VTR)
Sense 0	VTR "Stop" status
Sense 1	Tone code status (optional)
Relay 4	VTR-Stop control
Relay 5	VTR-Play control
Relay 6	VTR-Rewind control
Relay 7	VTR-Record mode

Figure 3: I/O Interface Description.

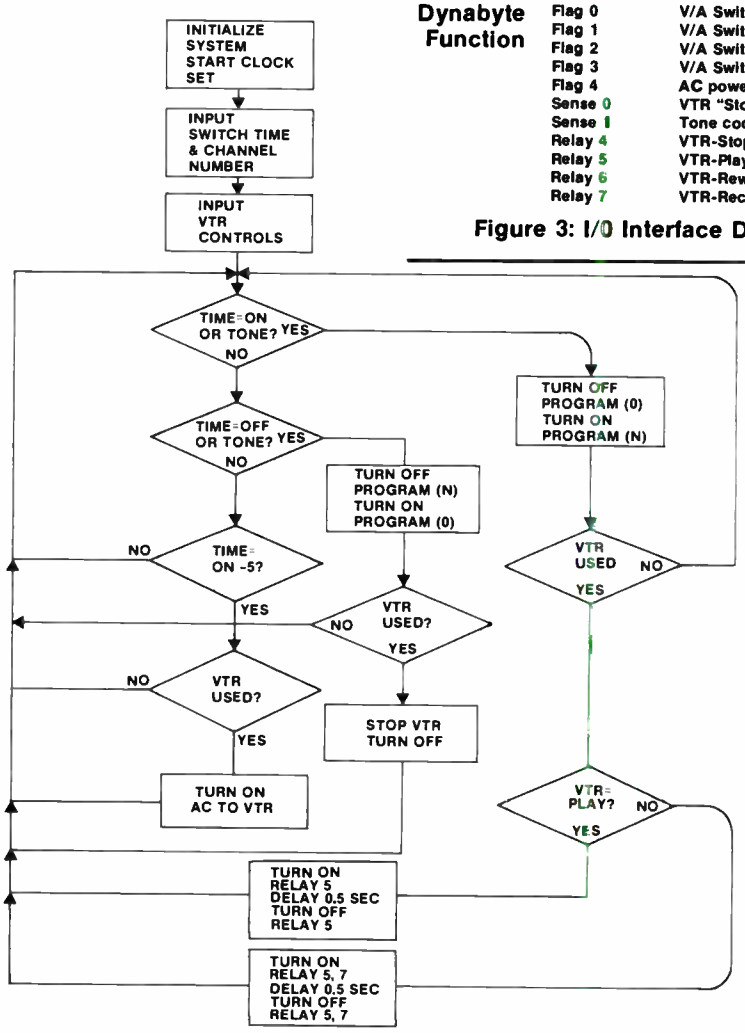

Figure 4: Program Flow Chart

channel to be switched and VTR control (play, record and no action). The program also uses variables internally to bypass those routines already executed. This eliminates reexecuting a section of code more than once, especially when VTR control is affected.

When the time matches a switch point the program transfers to the section that performs the desired function. The following test routine will demonstrate a simple application:

```
10 A=0: T=#133000:
                    S=#143000: B=1
20 IF Time=T Then Go To 50
30 IF Time =S Then Go To 70
40 Go To 20
50 Turn Off Flag (A): Turn On
   Flag (B)
60 Go To 30
70 Turn Off Flag (B): Turn On
   Flag (A)
80 Go To 20
```

This program initializes A, B, T and S to preset values. The next statement (20) checks to see if T and the current system Time are equal. If they are equal, the program transfers to statement 50 which turns off Flag 0(NYSE ticker) and turns on Flag 1(MSG sports). This is a break before make action. The program then transfers to statement 30 which checks for a match between Time and S. The result is that at 13:30:00 the programming changes from the stock market to Madison Square Garden and at 14:30:00 it changes back.

Because the software is easily modified, it is not a problem to add or delete functions or to expand the capabilities to control several channels and create a crosspoint switching system. The serial port can be used to log the switching for a permanent record. This approach gives maximum flexibility to the user without the need for time consuming software development. C-ED

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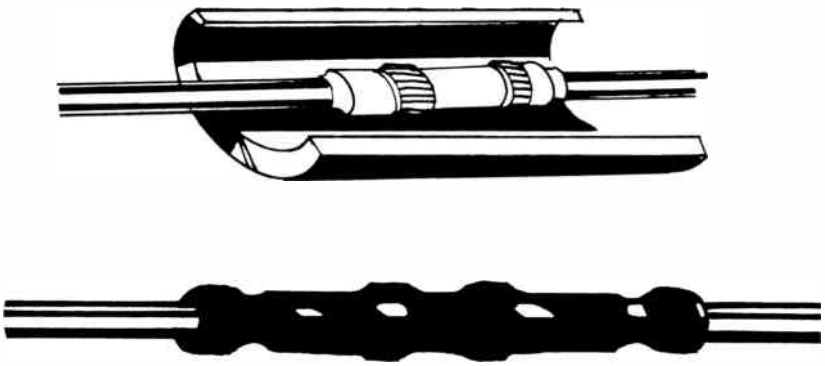

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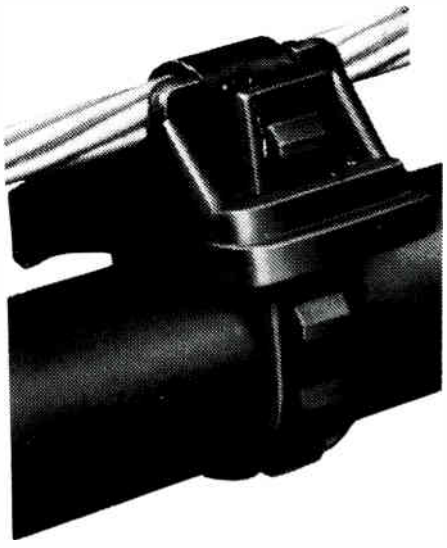

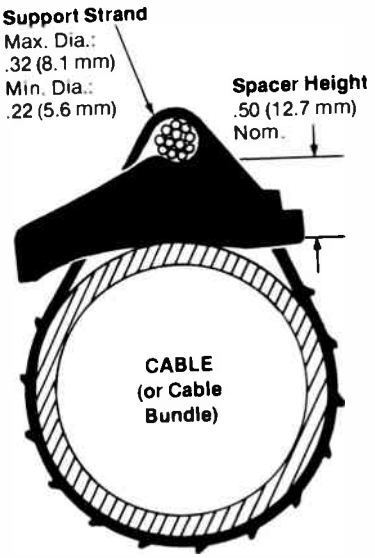

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A Computerized Subscriber Accounting System?

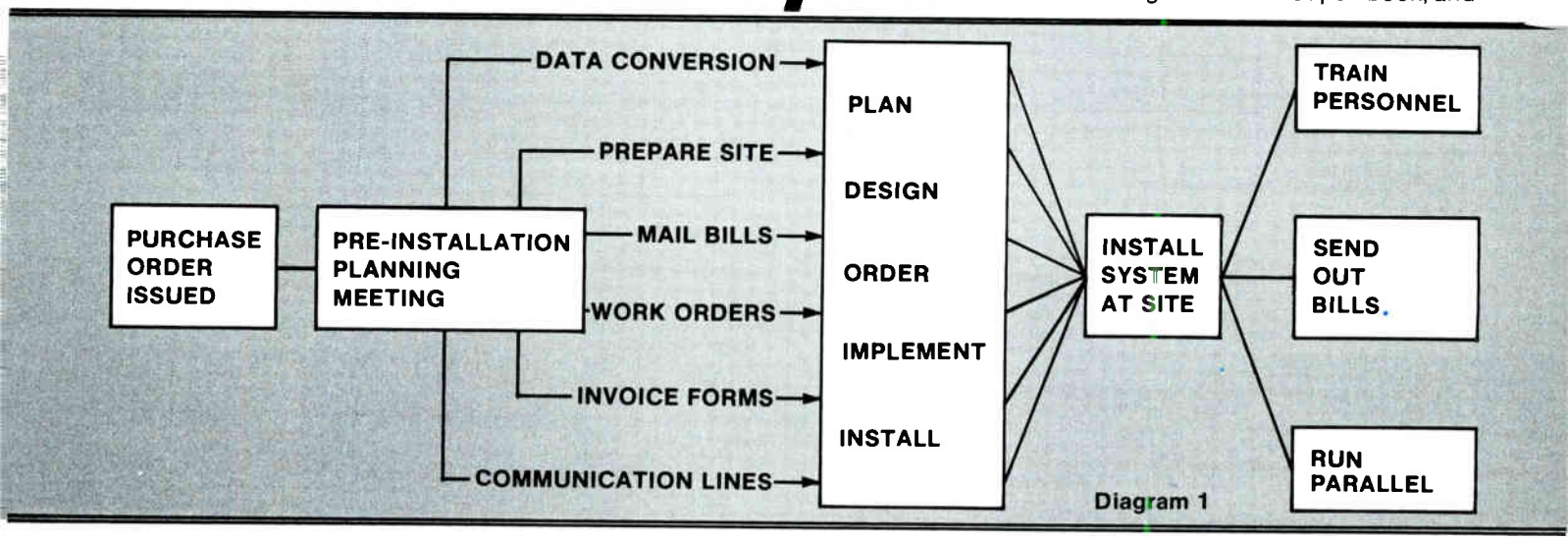

Diagram 1

By Frank Spexarth
President
FASCOM
Freehold, New Jersey

If you are ready to start up a new system, add to an existing system or add more revenue generating services, you have probably been studying the advantages and disadvantages to the many subscriber accounting system options available to you:

- Manual record keeping and billing
- Service bureau system
- Batch type
- Modified batch with a terminal to the bureau computer center
- National
- Regional
- Local
- In house—sharing time on your company's computer
- On-line and interactive with regional computer center
- On-site, interactive computer system.

What system is best for your business now and five years from now is an extremely important decision since changing later has adverse economic implications, as well as the time and effort needed to institute a change later. A good example is the time, effort and expense required to enter the manually kept records into a computer at some later date. Even more costly might be the conversion of data that needs a "machine language translater" when switching from one brand of computer to another or from a service bureau computer to your new system.

A system with 5,000 basic and 1,500 pay subscribers that has no major expansion plans, keeps postal costs low using an annual coupon book, and is controlling involuntary disconnects to 30 days, should not consider changing the system unless several additional tiers of service are planned and/or accounting and management reports are needed more frequently to "refine" control of the business.

You should investigate changing your current subscriber accounting system if one or more of the items below are planned or needed to improve your cable system's operation:

- Adding more basic subscribers by cable plant expansion and acquisitions.
- Introducing addition tiers of revenue generating services such as premium programming or alarm services.
- Improve cash flow by tighter control of non-paying subscribers.
- Improve manpower utilization.
- Control set top equipment inventory and repair.
- "Instant" on-line access to system records for improved day-to-day customer service and management decision making.

The list can be expanded depending on your priorities and management style. Improvements that reduce costs or increase revenues will probably cost slightly more than your existing system. You must make sure you include

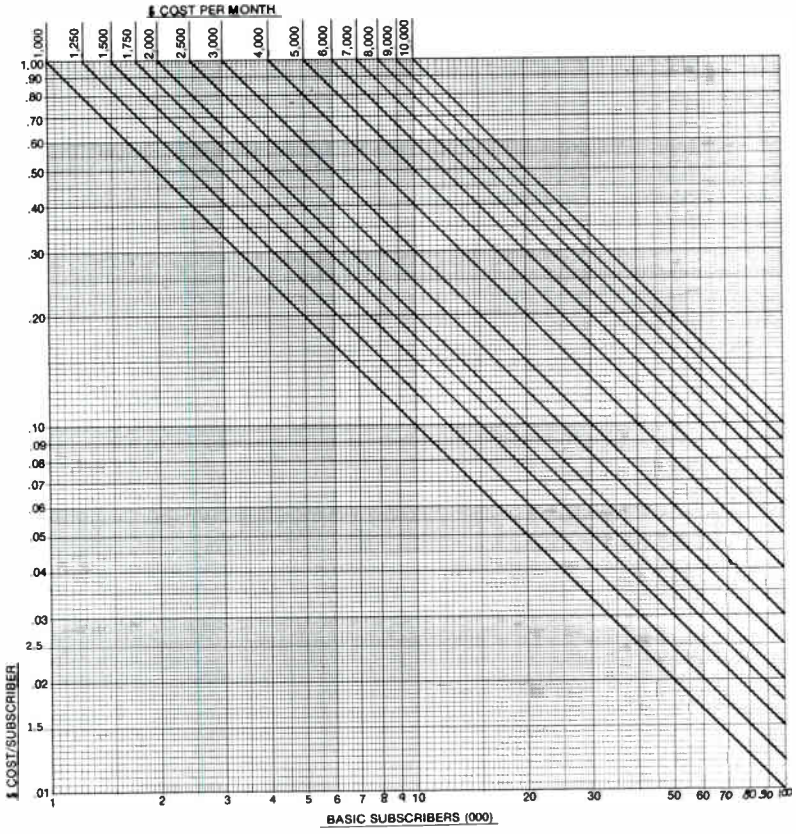

Figure 1

"all of the costs" when you make an economic analysis. The graph in Figure 1 can be used to directly translate "cost per subscriber" to "cost per month" data or vice versa.

Selecting a Computerized System!

One of the key considerations in implementing a computerized system is the supplier of the subscriber accounting system and how the software (programs) were developed and documented. Software requires maintenance and revisions as the programs are used and expanded. Programs have been known to "grind to a halt" when a programmer that developed the program leaves a company.

The availability of maintenance and service for the software, as well as for the equipment, is of vital consideration since you need to minimize downtime due to technical problems.

Understand what each available program can do for your needs and what additional programs are planned so that you will be able to satisfy your system needs now and in the future. Be careful of programs that are loaded with "Bells and Whistles" that will not be of real interest to you in accomplishing your goals.

Be sure to look at a computer system that has the flexibility to grow with your anticipated future needs. Measure the flexibility in terms of the ease that equipment can be added for a remote site, maximum number of subscribers anticipated, increased levels of service, additional programs, etc. Since the subscriber accounting system is extremely data intensive, the data storage media, stability and flexibility are very important considerations.

Other important considerations are:
— How will your current subscriber data be converted to your new system?
— Is a procedure established for the conversion of your data or will it have to be "developed" by you or the supplier?
— What safety procedure is available to prevent loss of data during conversion?
— What do current users of the system have to say about their experience with the system operation and supplier support?
— What financial options are available? (Equity lease, investment tax credit, rental, etc.)
— What methods will be used or recommended to prepare and mail your subscriber bills.
— What is the flexibility of the stored data? Can you modify output reports and can the data be used for programs like general ledger accounting, inventory control, etc.?
— What capability exists or is planned for interfacing with addressable taps or being able to achieve per program billing?
— Does the computer system require technically trained people for your system operation? Consider the cost as well as the problem retaining skilled technical personnel.

The Order was Placed—Now What?

Now that you have ordered the system that best suits your needs, your work begins in earnest. A "pre-installation" planning meeting should take place immediately after the order is placed. This meeting between the supplier's support representatives and your key people is extremely important since you will not only define the parameters needed for your subscriber accounting system but also plan what key actions must take place before your installed system will "work" for you. Diagram 1 outlines the sequence of key events you must control and implement. Normally, systems are being installed 90 days after the order is placed which doesn't allow any "slack" time.

Data conversion, obtaining invoice and other forms, and arranging for the mailing of your invoices are the longest lead time items. Activity planning should include assignment of timed events to specific personnel that will be able to accomplish the tasks while carrying out their normal duties. These tasks include data conversion, site preparation, invoice form design, work order design, a system to insert and mail invoices, obtain proper communication lines for remote sites, assure thorough operator training and a system to run in parallel during start up.

As you can see, choosing the proper subscriber accounting system requires studied analysis and effort similar to what you would devote to the selection and installation of cable TV plant and electronic equipment. The best engineered and designed cable TV system will be able to live up to its full profit potential only if the "internal" subscriber accounting system is efficient and co-ordinated into your operation. C-ED

Torus: The Next Step In Satellite Technology

By Toni Barnett, Managing Editor

Communications Satellite Laboratories (Comsat) in Clarksburg, Maryland, has developed a multiple beam Torus antenna (MBTA) that is capable of picking up seven or more satellite feeds simultaneously. The antenna is only limited by physical interference between the radio frequency feeds along the focal arc. Over a 20 degree arc, it is possible to couple the antenna feeds with more than seven satellites.

Dr. R. William Kreutel, responsible for Optical Communications at Comsat Laboratories, told *C-ED*, "We have one full-scale engineering prototype that was constructed at Comsat. It's a ten-meter aperture, and it's been in pseudo-operation for experimental purposes for almost five years.

"We're working with two satellites so far," Kreutel explained, "but that's because we've only built two feeds for it." Comsat has recently applied to the Federal Communications Commission for authority to construct three ten-meter antennas at its principal gateway stations—Etam, West Virginia; Andover, Maine; and Jamesburg, California. These antennas will be used by Comsat to connect international and domestic satellite systems.

What It Is

The MBTA is a fixed reflector, multiple-beam, offset-fed conical Torus antenna. The fixed reflector design provides improved reliability and lower cost by eliminating the reflector pedestal and using more efficient load paths. This results in a lighter but stronger reflector.

The multiple beams provide simultaneous RF connections with several satellites through reflector reuse by the overlapping illuminated areas. The offset-fed geometry results in an unblocked aperture, providing low wide-angle sidelobes as well as convenient access to feeds and the nearby RF equipment. Additionally, the circular symmetry of the conical Torus geometry allows identical beams to be generated by the feed system along the geostationary arc.

To form multiple beams with this configuration, feeds are distributed along the imaginary focal arc (electo-magnetic devices which essentially couple electro-magnetic energy to the reflecting surface). Each one of these feeds generates an independent beam in space. In connection with the satellite communications system, the reflector is oriented so that the beams which are formed are directed towards a section of the geostationary orbit. A feed is put at each point along the focal arc which forms a beam directed towards a satellite in orbit.

How It Works

The Torus antenna derives its name from the fact that the reflector is a portion of a toroidal shape. The device features a parabolic line, rotated about one axis, which is nominally perpendicular to the focal axis of the parabola. That generates a surface, referred to as a toroidal surface.

As the parbolic line is rotated, the focal point associated with that line also rotates. The result is an imaginary line.

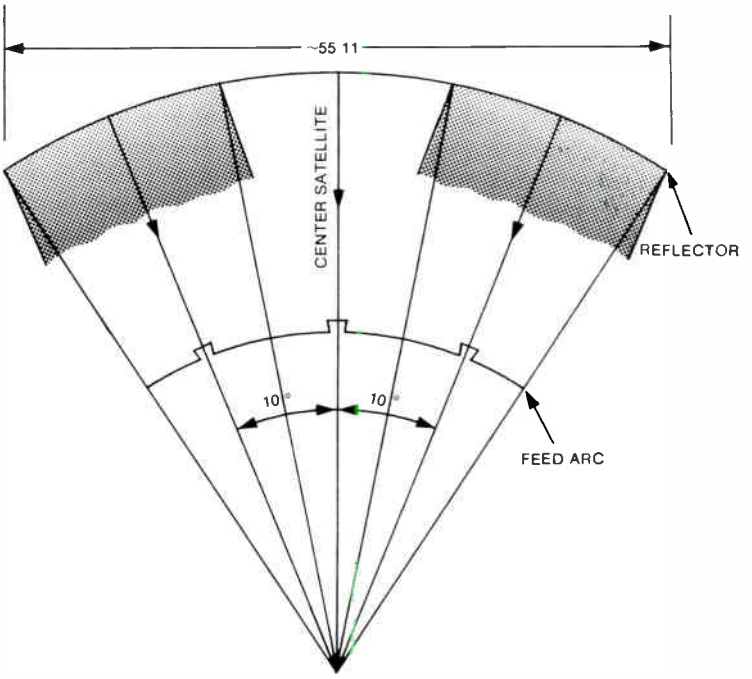

***Figure 1: Location of feeds along the feed arc.**

The universal reflector structure design was developed so that the antenna could be used anywhere in the United States. It consists of a triangular spine truss with nine vertical flat trusses, each identical to the others, to provide a modular structure. The spine truss is supported on four points by the reflector support structure. Although this structure is a universal design, it requires changes in the lengths of some members to fit the orientation for each specific site. The foundation center line dimensions and the tower location, with respect to the reflector, must also be varied for different locations. Only four different reflector panels are used in the reflector surface, eight units of each.

The tower of the antenna was designed to provide a stiff structure to prevent beam misalignment due to focal length changes with respect to the reflector. It provides space for batteries, power equipment, transmitters, feed horn, and receivers. The batteries and power equipment are located on the ground floor, and the RF equipment is located in the upper room. To minimize tower height and provide easier access, the ground has been filled approximately five feet so that the ground floor is level with the adjacent road.

The tower is a simple steel structure with diagonal bracing for stiffening. The upper floor is metal decking covered with fireproof plywood and vinyl tile. The roof and walls are corrugated steel, insulated with flat steel interior panels. The walls and roof, galvanized and prefinished in the shop, are fitted, cut and attached to the steel with stainless steel self-tapping nylon hex head screws.

The MBTA reflector structure and tower were designed and built using standard techniques of analysis, fabrication, and erection to produce an economical and useful antenna system which can demonstrate the feasibility of a multiple-beam system.

---

* *Reprinted from Comsat Technical Review, Volume 4, Number 2, Fall 1974, page 255.*

Question 1

Which type of Pay-TV security is the least expensive... Positive or Negative?

The following simple formula can be used in estimating the relative costs of positive vs. negative security:

$$(BPD+H) - B(1-P)T = S$$

Where:

- **B** = No. of basic subscribers
- **P** = Pay penetration of basic subscribers
- **D** = Unit cost of a descrambler or decoder
- **H** = Cost of head-end equipment
- **T** = Unit cost of Vitek's trap
- **S** = Savings

Typical example using approximate values:

Where:

- **B** = 1000 (1000 subscriber system)
- **P** = 35.4% (national average pay-penetration according to the latest Paul Kagan Associates census-Dec. 31, 1978)
- **D** = $9.75 (approx. cost of low-band decoder)
- **H** = $500 (approx. cost of head-end equipment for low-band decoder)
- **T** = $5.00 (approx. average cost for Vitek's single-channel trap.

Using these values applied to the formula as follows:

$$(1000 \times .354\% \times 9.75 + 500) - 1000 \times .646 \times 5 = S$$

$$3951.50 - 3230 = 721.50$$

The example shows that a savings of $721.50 would be realized in choosing Vitek's negative traps instead of the positive device. Note that more expensive decoders or descramblers would result in greater savings.

The "4" Most Important Questions You Should Ask Before Choosing Your Pay-TV Security.

Question 2

Which type of Pay-TV security is the most secure?

Pay-TV security that is outside the home and on the pole. Any picture brought into the home can be reconstituted. By using Vitek traps on the pole, this risk is eliminated. There is the added advantage, with Vitek's cable traps, of having a low-security profile.

Question 3

Which type of PAY-TV security allows for almost any number of premium channels and/or tiers of service.

Vitek's multi-channel traps gives every system operator the opportunity to market his product in almost any combination of channels and/or blocks of channels. Vitek's band-reject traps allows the system operator to trap out most of the mid-band (channels A thru G), the super-band (channels L thru W) or in a combination of both mid-band and super-band in one trap (channels A thru G plus L thru W).

Question 4

Which type of Pay-TV security has no affect on the signal-noise ratio?

Vitek's traps have absolutely no affect on the signal to noise ratio. The traps are passive and they are installed in-line only for those subscribers *not receiving* the premium channel.

Now, when you ask those 4 important questions . . . what's your answer going to be?

If you still have any unresolved questions, call or write:

Vitek Electronics, Inc.
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Edison, New Jersey 08817
(201) 287-3200
Telex: VITEK-EDIN

VITEK

Cable Programming for September

Signal	Day	Start/Stop	Alert Times	Satellite/ Transponders
C-SPAN (times approx.)		12 pm-6 pm (Mon. & Tues.) 10 am-6 pm (Wed.-Fri.)	No	F1, #9
Calliope		6:30 pm-7:30 pm (Mon., Tues., & Thurs.)	No	F1, #9
CBN		24 hrs.	No	F1, #8
Fanfare		Schedule unavailable at press time.	No	F1, #16
Front Row		2:30 pm-2:30 am		E,C F1, #12 P,M F1, #10
HBO (East) (West) (TAKE-2) (Back-up)	1 2 3 4 5 6 7 8 9 10 11 12 13 114 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	3 pm-2:08 am 3 pm-2:16 am 2:30 pm-1:22 am 5:30 pm-1 am 6:30 pm-1:15 am 5:30 pm-1:44 am 6:30 pm-2:45 am 3 pm-2:17 am 2:30 pm-1:45 am 6 pm-1:09 am 5:30 pm-1:37 am 6 pm-1:44 am 6:30 pm-2:23 am 6:30 pm-2:27 am 3 pm-1:22 am 3 pm-2:29 am 5 pm-2:02 am 5:30 pm-1:12 am 6 pm-1:46 am 6 pm-1:29 am 5 pm-2:11 am 3 pm-2:30 am 2:30 pm-1:45 am 6 pm- 1:57 am 6 pm-2:18 am 5:30 pm-1:45 am 5 pm-1:47 am 5 pm-2:33 am 3 pm-2:09 am 2:30 pm-1:32 am	Before & after programming & promos.	F1, #24 F1, #22 F1, #23 F1, #20
HTN		8 pm-10 (11) pm	No	F1, #21
KPIX (time permitting)		2-4 hrs. per day	No	F1, #1
KTVU		7 am-1 am (weekdays) 7 am-4 am (weekends)	No	F1, #1
MSG Sports		Schedule unavailable at press time.	No	F1, #9
Modern Cable Programs		12 pm-5 pm (weekdays) 7 am-12 pm (weekends)	No	F1, #22
Newstime		24 hrs.	No (tones only for local adv.)	F1, #6

Signal	Day	Start/Stop	Alert Times	Satellite/ Transponders
Nickelodeon		10 am-11 pm (weekdays) 9 am-11 pm (weekends)	No	F1, #11
PTL		24 hrs.	No	F1, #2
Reuters		Not in use yet.	No	will use F1, #18
SPN		10 pm-8 pm (Mon.-Sat.) 24 hrs. (Sun.)	Yes	F1, #21
Showtime	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	2 pm-1:30 am 2 pm-1:06 am 3 pm-1:04 am 5:30 pm-12:55 am 6 pm-1:54 am 5:30 pm-1:06 am 6 pm-1:30 am (approx.) 2:30 pm-2:20 am 3 pm-1:00 am 5:30 pm-12:55 am 6 pm-1:35 am 6 pm-1:04 am 5 pm-1:18 am 6 pm-1:47 am 3 pm-2:30 am (approx.) 3 pm-12:37 am 5:30 pm-1:30 am 5:30 pm-12:32 am 5:30 pm-1:45 am 6:30 pm-1:10 am 5:30 pm-1:54 am 3 pm-2:10 am 3 pm-1:18 am 6 pm-12:32 am 5:30 pm-1:39 am 5:45 pm-12:30 am (approx.) 5 pm-1:30 am (approx.) 6 pm-1:42 am 3 pm-1:57 am 3:30 pm-1:17 am	1 minute before and after programming.	E, C, F1, #12; P, M, F1,#10
SIN		2:30 pm-1 am (weekdays) 4 pm-12 am (Sat.) 11 am-11:15 pm (Sun.)	No	Westar II, #7
Star Channel		9:30 am-2:20 am		F1, #5
Trinity (KTBN)		24 hrs.	No	F1, #14
WGN		5:42 am-3 (3:30) am (Mon.-Thurs.) 24 hrs. Sat. & Sun. Ends 3 am on Sun.	No	F1, #3
WOR		6:30 am-1:30 am		F1, #17
WTCG		24 hrs.	No	F1, #6

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

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

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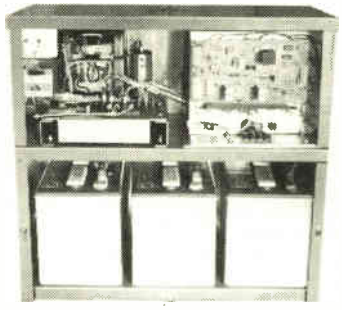

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All Secure in Oxnard

By Toni Barnett, Managing Editor

Oxnard Cablevision has found a way to alleviate its security problems in apartment houses in Oxnard, California. The solution is the utilization of Delta-Benco-Cascade (D-B-C) addressable equipment.

According to Al Varden, system manager for Oxnard, "The addressable taps have the highest benefit where there is a fairly high turnover rate because of a larger savings in labor costs. That's the primary advantage."

The D-B-C tap allows the operator to control the individual tap in a loop through system. Previously, it was impossible to provide individual service in an apartment complex utilizing that type of system.

Oxnard Cablevision was visiting one particular apartment complex virtually every third day. The cable company was doing disconnects for moving, disconnects for non-pay, or reconnects for new move-ins. Penetration was poor, so the cable system decided to take positive action.

In August, 1978, the cable system installed D-B-C addressable equipment. According to Neil Phillips, president of Signal Vision, Inc. (D-B-C's west coast distributor), "The purchase of the addressable equipment paid for itself in 90 days."

The test complex selected by Oxnard Cablevision consisted of 140 units and was loop through wired. That particular complex was selected because the turnover of apartments was extremely high, and hard-core security was needed to sell pay. Penetration before implementing the new taps was 28 percent. The added security of the D-B-C Intelligent tap system has now brought penetration up to 54 percent.

Normally, when a cable company wires an apartment building, a home run system is used, which means running an individual cable to each apartment from a central location. If an installer or technician goes to that central location, usually a locked box of some kind, he can disconnect or connect any apartment in the complex.

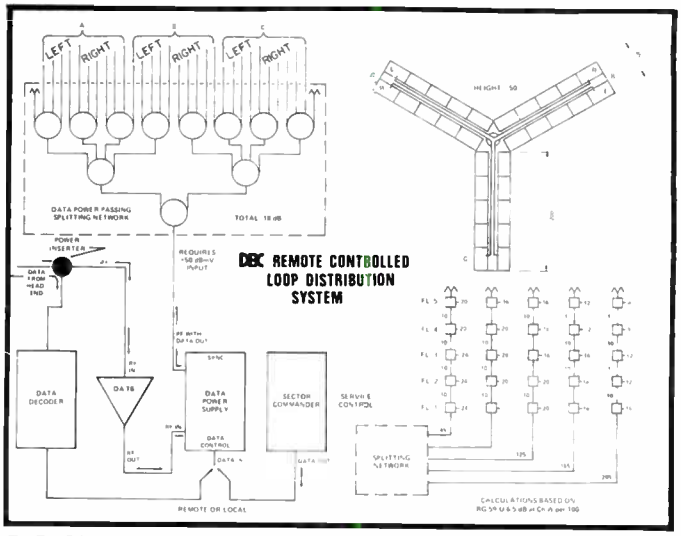
When a master antenna system (MATV) is installed in the complex, by someone other than the cable company, a loop through system is common. When that type of system is used, there has previously been no way to turn off an individual apartment externally. This was the situation Oxnard Cablevision faced before introducing the Intelligent tap system.

Paul Olivares, chief technician for Oxnard Cablevision, told *C-ED*, "We first brought all of the D-B-C taps into our office and addressed them before the taps were used in any apartment. We found no problems with them," Olivares added.

The taps were installed in the existing loop system of the 140-unit test complex. Oxnard removed all of the old wall plates and inserted the D-B-C system.

A D-B-C data encoder was installed in the chief technician's office of Oxnard Cablevision. This unit converts the subscriber's code number and switching instructions from a decimal form to a digital word. Each word is formatted and modulated onto a pilot carrier. The data is converted to an RF signal, operating at 220 MHz, that is routed to the apartment complex.

Remote control operation of the taps is accomplished via the RF carrier from the cable company's office. A data detector and decoder is used in place of a sector commander. The decoder receives and detects the modulated carrier from the office, and the detected data is then fed into the D-B-C power supply.



D-B-C's remote controlled loop distribution system.

The IT-1 controlled subscriber tapoffs are wall mounted in a standard electrical box. Each unit has a unique address, programmed prior to installation, enabling the service to be controlled from the cable company's office. Each IT-1 can be monitored to verify correct operation, allowing detection of units which have been tampered with or removed from the system.

Oxnard Cablevision uses D-B-C's addressable loop through wall plate taps. The taps contain proprietary integrated circuits (ICs) which incorporate an electronic switch. This IC is powered via the coaxial line which is used to distribute signals from a data power supply.

The Intelligent tap system is unique in that it utilizes power data which greatly simplifies the taps and enhances reliability.

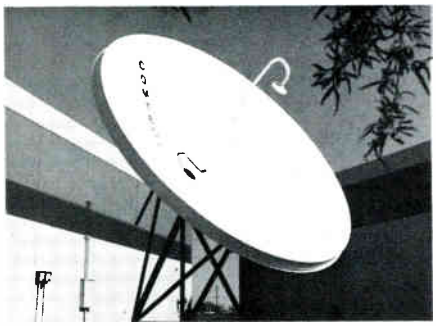
Oxnard Cablevision uses a further extension of the Intelligent tap system. Pay-TV control is added via positive and negative trapping. The cable company uses the Promo trap manufactured by Pico, Inc. Control is achieved by feeding the voltage through the "F" connector to turn the trap filter on or off.

It is now much easier for Oxnard to maintain control of the basic and pay programming it provides to subscribers. One day a week, the cable company connects or disconnects as required. In cases of non-pay, instead of warning subscribers for 30 days and then getting 60 days behind, service is simply cut off. Subscribers now have 15 days in which to pay—no payment, no service. This process now puts the cable company behind for only 45 days worth of service versus 65 or 90 days. According to the cable company, this new procedure has prompted payment considerably.

Earth Station Equipment

Comtech's Five-Meter TVRO System

The latest offering from Comtech Data Corporation is its five-meter TVRO system. The nucleus of the system is the 807-6-5M, a five-meter fiberglass satellite TVRO antenna. The 807-6-5M dual prime focus antenna



has been developed for reception of wideband FM video carriers via domestic and international C band satellites. The antenna also incorporates an elevation over azimuth mount. The system can utilize Comtech's RCV-450S automatic video switch, which provides automatic substitution of the agile receiver for any one of up to six on-line receivers. The redundant receiver is automatically switched to the channel and polarization of the failed receiver. Each on-line receiver is given a priority assignment.

For complete details, contact Comtech Data Corporation, 613 South Rockford Drive, Tempe, Arizona 85251, (602) 968-7756.

Cable

Valtec Announces Expanded Optical Fiber Lines

Valtec Corporation's Communication Fiberoptics Division has announced expanded lines of optical fibers at prices as low as ten cents a foot for immediate delivery.

The ten cents per foot figure is for Valtec's #810 low-loss graded index fiber with a maximum attenuation of 8 dB/km at a minimum bandwidth of 100 MHz-km.

For further input and a new catalog and price list, write to Valtec Communication Fiberoptics Division, West Boylston, Massachusetts 01583.

General Cable's Fused Disc III

General Cable Company's CATV Division has introduced its new line of coaxial cable, Fused Disc III. The cable is available in .412, .500, .750, and 1.00-inch sizes; with maximum dB spacing per 100 feet of 1.46, 1.20, .80 and .65 respectively.

Fused Disc III's attenuation is rated at 300 MHz, an improvement of approximately 12 to 13 percent over competitive products. As a result of the improved electrical performance, an operator can increase profitability by reducing the amount of electronics and required maintenance for the system.

For complete information on Fused Disc III cable, contact General Cable Company, CATV Division, P.O. Box 700, 1 Woodbridge Center, Woodbridge, New Jersey 07095, (201) 636-5500.

Converter/Decoders

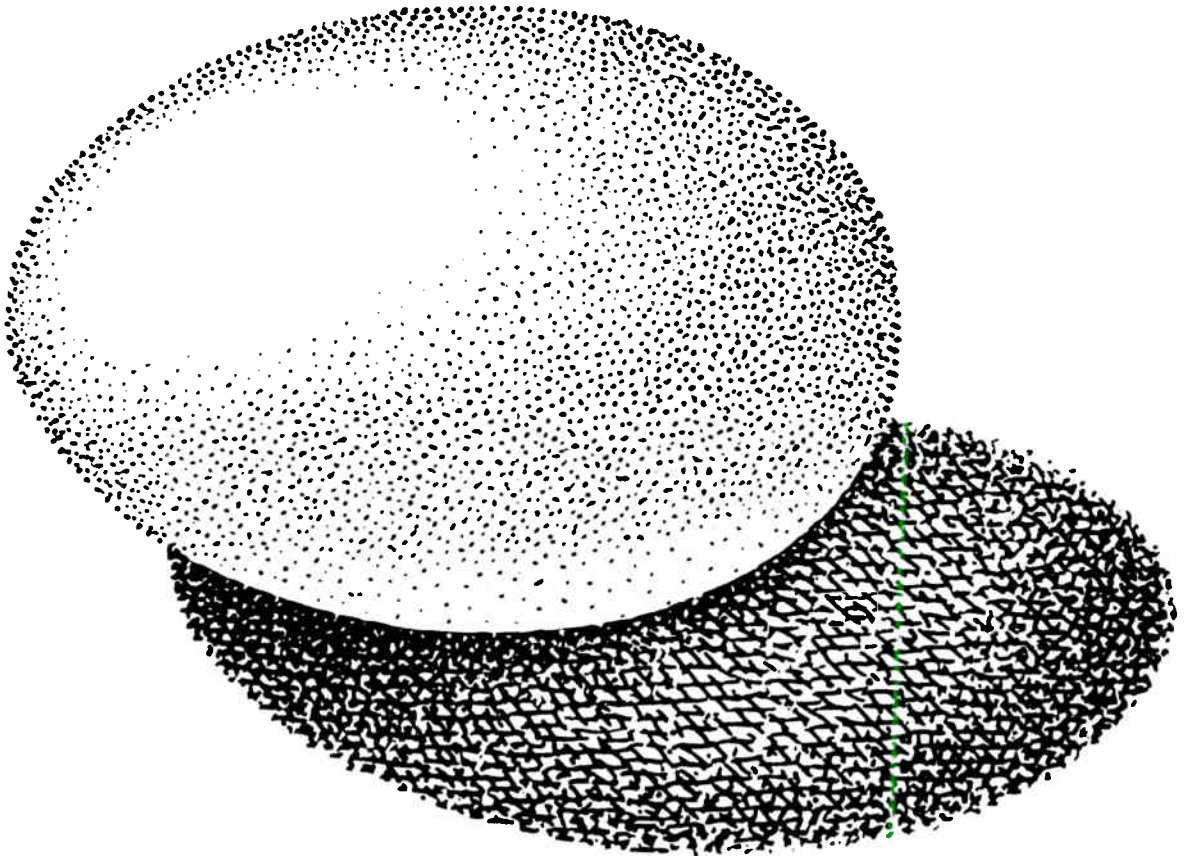
ATC Develops STV Converter-Descrambler

American Television and Communications Corporation has announced the development of a new addressable STV converter-descrambler.

The new converter-descrambler, called Sync Suppression and Active Video Inversion, SSAVI 1, has been approved by the FCC and is now undergoing field testing. Zenith Radio Corporation has agreed to manufacture the unit, with production quantities of the SSAVI 1 to be available next year.

For complete information, contact American Television and Communications Corporation, 20 Inverness Place East, Englewood, Colorado 80112, (303) 773-3411.

The Egg



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AD INDEX

An Act of Sovereignty?

By Toni Barnett, Managing Editor

The Clyne Committee (Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty) was set up by the Hon. Jeanne Sauvé on November 30, 1978 with Justice J.V. Clyne as chairman, to advise her on the implications of telecommunications for Canadian sovereignty. It received 22 delegations and its report was released in April.

In empowering the committee, the then Minister of Communications referred to a crisis facing the Canadian communications system which she said was "more profound than any that has affected it since the 1920's." The Clyne Committee itself echoed this sentiment but the Canadian Cable Television Association (CCTA), in a 24-page reply, describes itself as "skeptical" of the committee's findings.

The CCTA, representing 321 cable companies coast to coast, issued its response July 3rd to the findings of the Clyne Committee. The Association suggested that officials of the Department of Communications themselves created the "air of crisis" which the department required to set up the Clyne Committee. "The 'crisis' may have originated as a strategy," declared the CCTA, "designed to strengthen its control of the private sector under the guise of its oft-repeated quest for 'orderly, rationalized development' of our communications system."

In particular, the cable television industry questioned the secrecy in which Department of Communications submissions were made to the Clyne Committee, while others, including that of cable, were made public.

According to a CCTA brief, "The crisis, if indeed there is one, would not be so much one of sovereignty as it is of technological revolution. The Department evidently finds it necessary to simulate crisis, like apprehended insurrection, in order to justify its substantial investment of public funds in social engineering of the system."

The CCTA brief agreed with a number of points made by the Clyne Committee, including the need for a separate definition of cable television within a new Telecommunications Act, and the recommendation that cable companies incorporate separate companies to provide security services, Telidon information system, etc.

Attention was drawn by CCTA to the dissenting opinions of committee members Clyne and Fulford, who suggested that Canadian cable systems effectively black out 80 percent of foreign programs seen in prime time from U.S. stations. The Association agreed with the dissenters that such a move would be unacceptable to Canadians.

The basic focus of the mandate given to the Clyne Committee was recommendations for the strengthening of Canada's sovereignty over the software and hardware elements of its telecommunications system. The state of Canadian sovereignty, particularly with respect to the broadcasting system, is largely sovereign in itself. As a whole, the telecommunications system is almost entirely owned by Canadians. There are only a few cable companies where

foreign ownership exists at all. Conversely, the trend is now in the opposite direction, with Canadian companies acquiring cable licenses in the U.S.

The CCTA concurred with the Clyne Committee's opening paragraphs in chapter seven stating that Canadian culture cannot be protected by restriction but rather by the pursuit of superior quality "and the promotion of opportunity to view and appreciate the best we have."

The majority proposal—to black out U.S. signals which have been licensed for Canadian broadcasting—is discriminatory against cable subscribers versus those having home antennas who can watch the American stations at will, said CCTA.

Astonishingly, just over two pages of 76 were devoted to one of the four principal subject headings on which its recommendations were sought—pay-television. The Committee states that it has "heard no evidence that there is, at present, any substantial demand for the early introduction of pay-TV."

Research by the Complan Research Associates "Omnibus" study of Canadian issues, February 1979, (not available to the Committee at the time of the meeting), suggests an opposite conclusion to that of the Committee. According to the study, almost one third of all Canadians, whether cable subscribers or not, say they are "very interested or fairly interested."

Citing little evidence except its "careful consideration," the Committee concluded "that a pay-per-program system would be best suited to Canadian circumstances." Examples of programming were opera and ballet, and the Committee argues that pay-per-channel would "entail the continuing subjection of television audiences to lowest-common denominator programming."

Noted the CCTA, ". . . by failing to license pay television during the past four years, the CRTC has missed its best opportunity to stimulate competitive Canadian programming. The proposals," continued CCTA, "which have been made by the cable industry at the various pay-television hearings for assisting in the funding of Canadian programming production, would give great stimulus to the program production industry.

Presently, U.S. pay television entrepreneurs will be providing the service to Canada whether Canadian authorities like it or not. A system, licensed in Detroit, will begin shortly with over-the-air transmissions and a descrambling device will be made available to Canadian customers in Windsor. Additionally, other U.S. interests are seeking funding in Toronto for a Buffalo-based STV system.

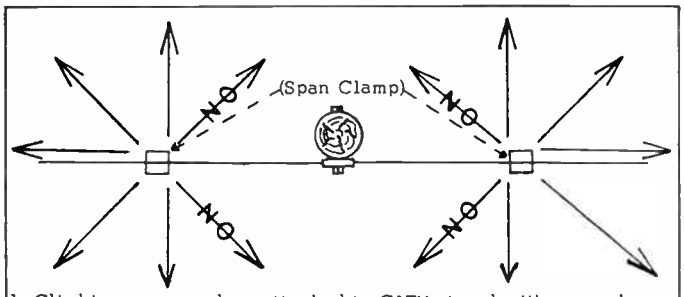
Once again, the Clyne Committee surprised the cable industry by devoting only a little more than four pages to chapter nine on satellite communications. This subject ranks in equal importance with the introduction of pay-TV as one of the four principal mandates of the Committee. In total, only seven pages out of 76 are devoted to two of its principal references.

The Canadian cable television industry will present a comprehensive plan on behalf of more than 100 cable operators via the Cable Satellite Network for a national satellite-delivered package of services.

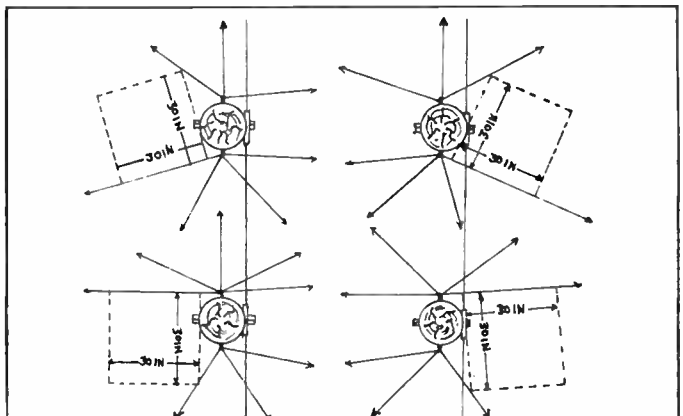
Q I recently entered the cable television field after working as an electronics technician at a television repair shop. I have been working in installations and have heard the term "climbing space" referred to several times. What does this mean?

A "Climbing space" refers to a corridor that must be maintained to allow a lineman to pass safely around and over the various cables attached to a pole. Climbing space is only one of many "clearance" requirements necessary to allow all parties safe access to their facilities on a pole. It is very important that all personnel working on utility poles understand these requirements and adhere to them.

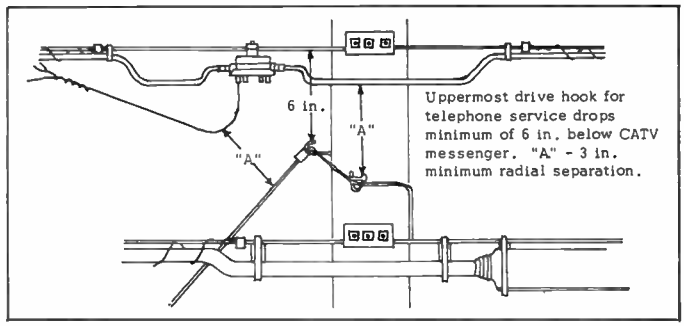
The following diagrams show the basic climbing space requirements as well as other important clearances that are required to be maintained.



1. Climbing space - drop attached to CATV strand with span clamp.



2. Climbing space - drop attached to drive hook (use only to obtain additional vertical clearance or on deadend pole).



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Vice President & General Manager
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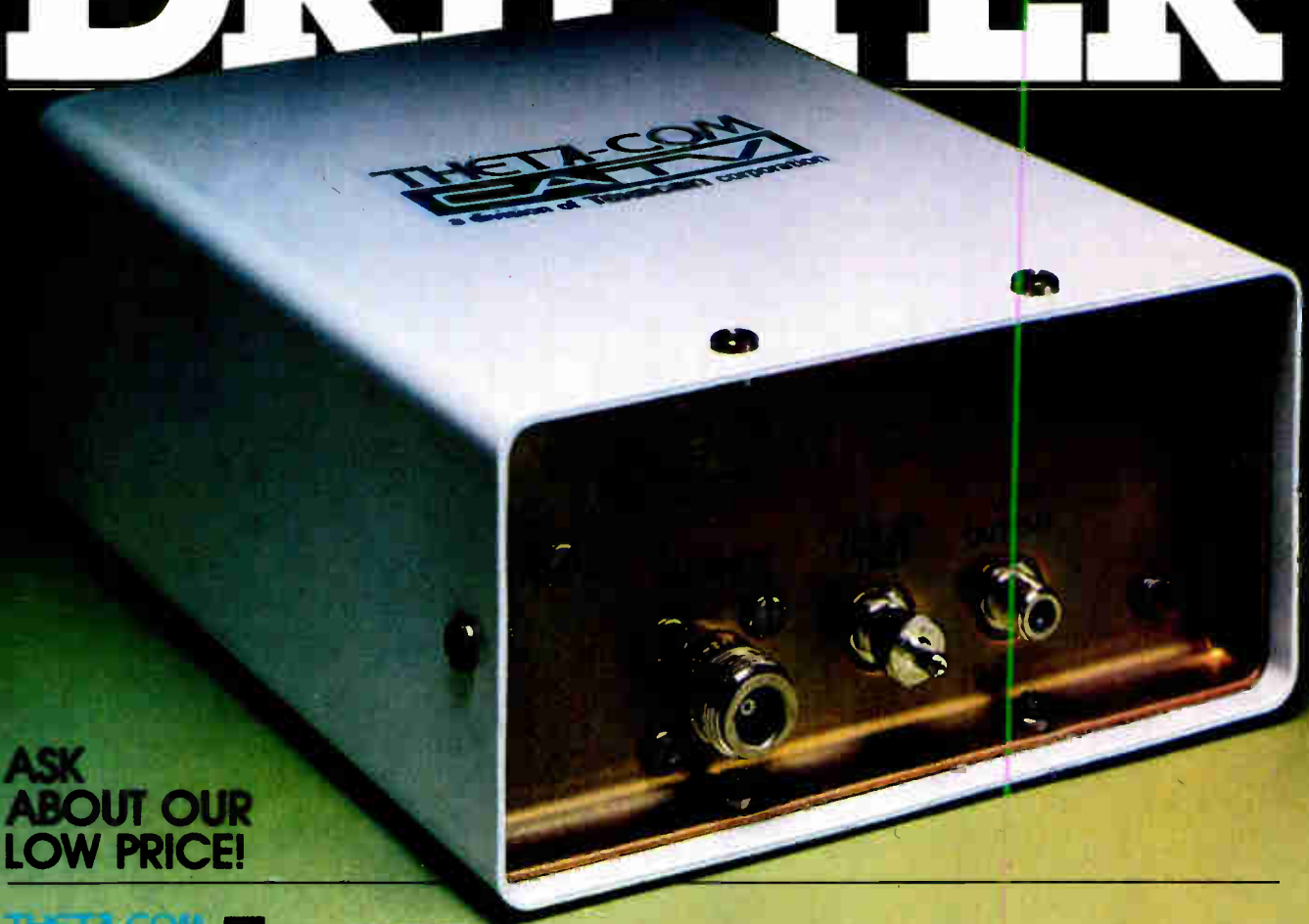

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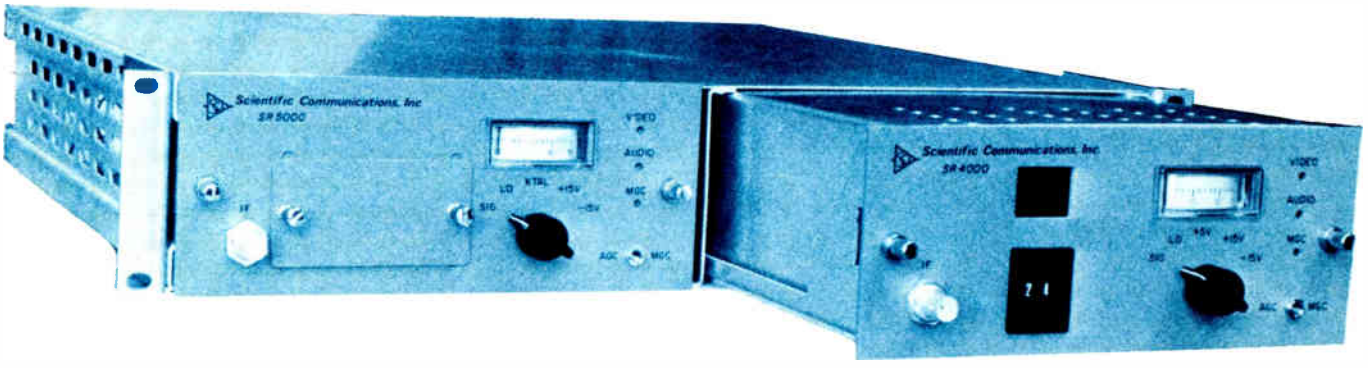

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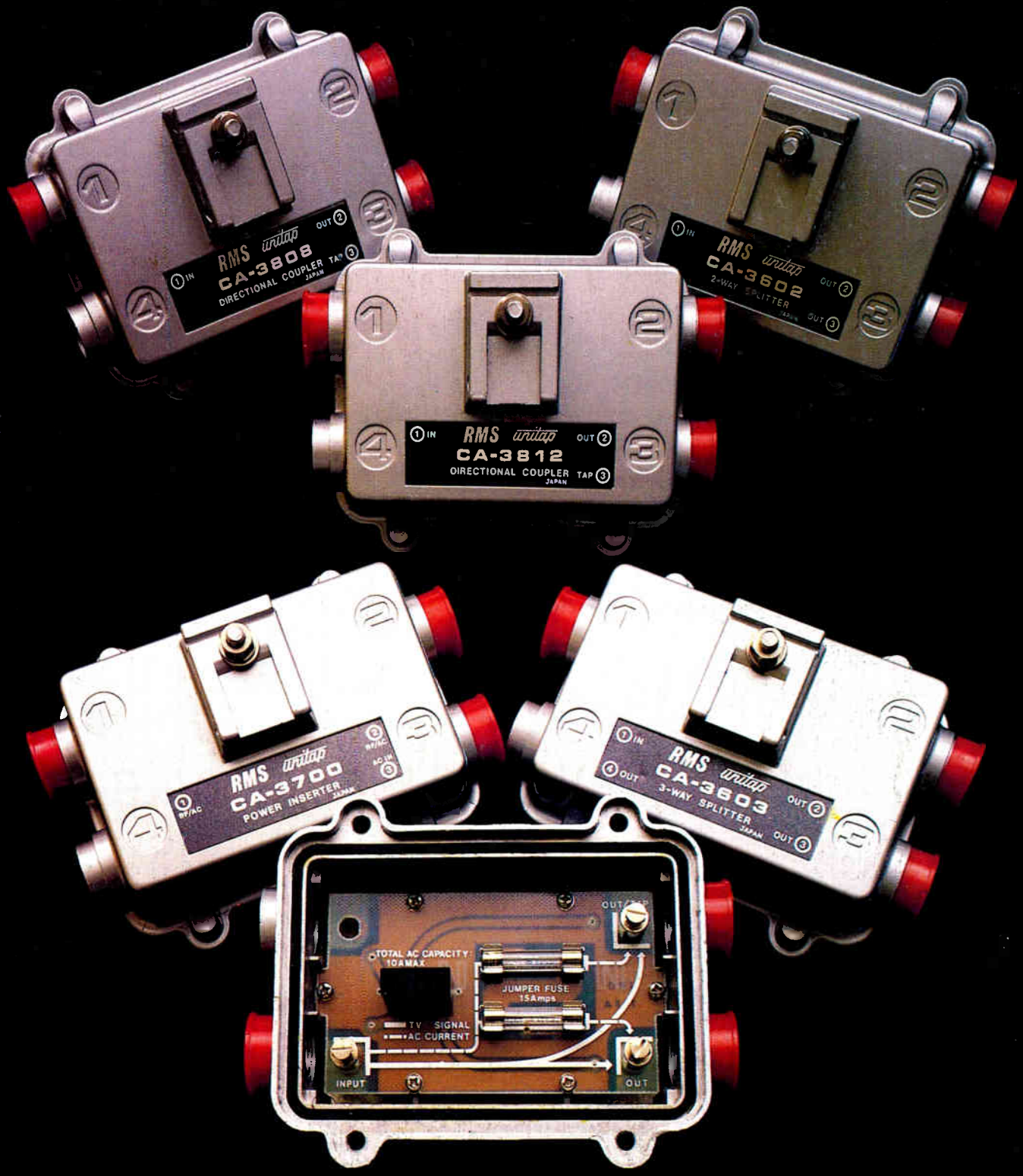

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