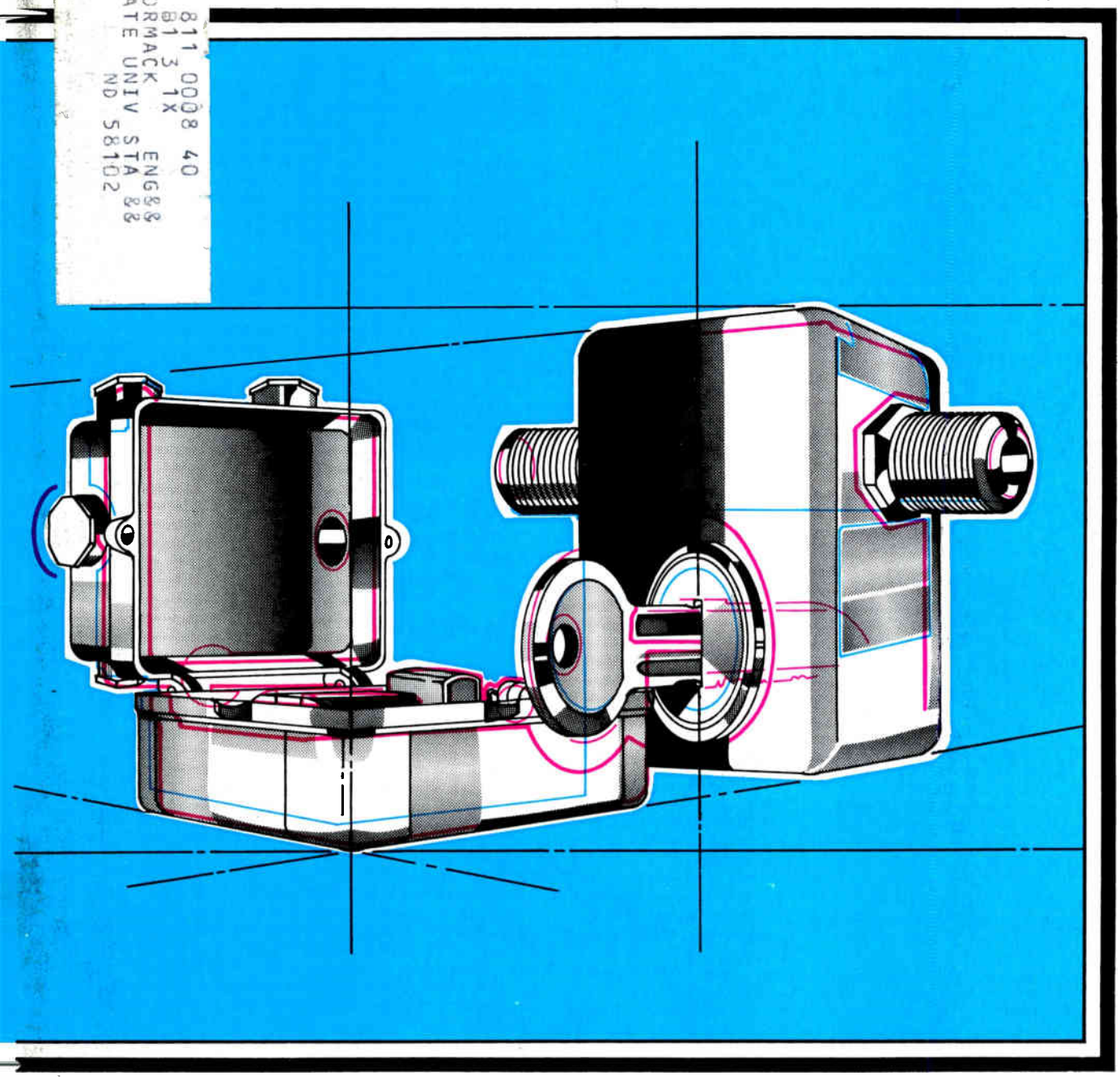
CED

581020 029 811 0008 40
$107 B1 3 1X
FRED E MC CORMACK ENG&&
BOX 5221 STATE UNIV STA &&
FARGO ND 58102

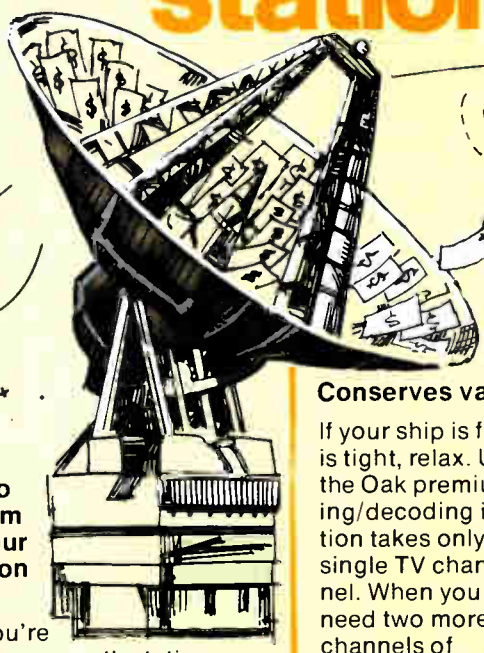
Taps and Traps
Simulcasting on the Birds
CARS Band Microwave System



Communications-Engineering Digest
Reporting the Technologies of Broadband Engineering

May 1979
Volume 5, No. 5

Oak protects your earth station investment!

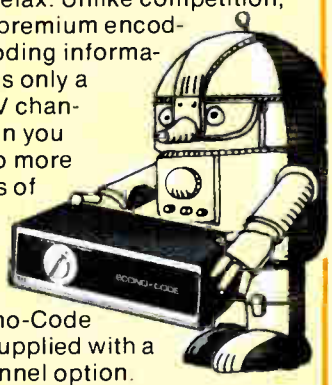


Keep video raiders from tapping your earth station profits.

Now that you're paying for a new earth station, make sure all your subscribers are paying you. If you use soft security, video raiders may be tapping expensive premium programming and costing you megabucks. Let exclusive Oak pay TV security, help you maximize your profits.

Conserves valuable space.

If your ship is filling up and space is tight, relax. Unlike competition, the Oak premium encoding/decoding information takes only a single TV channel. When you need two more channels of outer space without rebuild, the Econo-Code can be supplied with a two-channel option.



Space age scramblers... your secret weapons.

Reliable Oak scramblers offer the ultimate in security. In MDS applications, use the Mini-Scrambler at a remote site. For full systems, the Oak Mark II scrambler is used with your modulator at the head-end. Both employ the Oak sinewave sync suppression system for highest security.

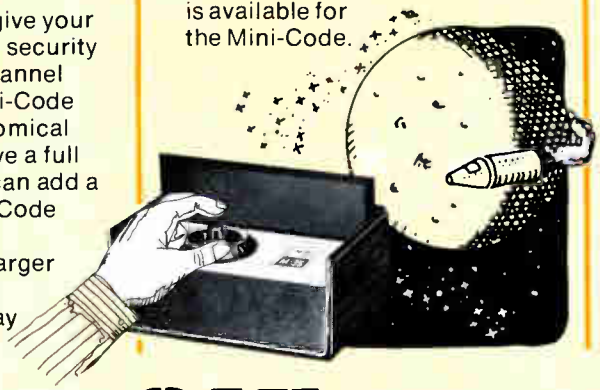
Oak also offers an optional dual-level security system with both internal and pole-mounted components, so a decoder won't work in an unauthorized location.

Three ways to land bigger pay cable profits.

Oak decoding products give your system the best pay cable security in the industry. For 12-channel or MDS systems, the Mini-Code is the effective and economical choice. If you already have a full 12-channel system, you can add a channel with the Econo-Code single channel midband converter/decoder. For larger systems, the 35-channel Multi-Code is the best way to land bigger profits.

Outer space at their fingertips.

Remote controls give your customers fingertip command. With the Jewel Case Multi-Code remote, you can pre-determine any combination of encoded channels up to thirty-five. A single detent rotary control simplifies channel selection. A remote switch with control cord is available for the Mini-Code.

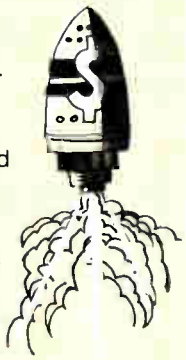


Built and backed by Oak.

All Oak products are built by Oak people, in company owned facilities. This is a commitment to our customers and a symbol of our faith in the industry. We deliver what we promise, when we promise it. We follow up with service after the sale, rapid repair turn-around, and a one-year warranty for all customers.

Bigger payloads!

You'll bring in bigger payloads because Oak decoders offer you performance and reliability, along with the security needed to beat the video raiders. Protect your profits and your system. Choose Oak.



OAK Industries Inc.
CATV DIVISION / CRYSTAL LAKE, ILLINOIS 60014
TELEPHONE: 815 • 459 • 5000 ■ TWX: 910 • 634 • 3353

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."

Suburban Cablevision is the largest CATV company in New Jersey and has recently connected its 50,000th subscriber. Our successes are mutual.

General Cable

A Division of GK Technologies Incorporated

Customer Service Center, 800-526-4241, 201-636-5500 (From NJ)
CATV Products Operation, General Cable Division, 1 Woodbridge Center, P.O. Box 700, Woodbridge, NJ 07095

See us at Booth 178 at the NCTA show in Las Vegas.

Superfit™ for a King

RMS ELECTRONICS, INC. CATV DIVISION

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

© RMS Electronics Incorporated 1977

C-ED News at a Glance

ATLANTA, GEORGIA—**Homesat, Inc.**, a new operating subsidiary of Scientific-Atlanta, **will sell and install private homeowner earth stations** at large rural farms and ranches in ten western states. The S-A announcement marks the first legal direct satellite-to-home distribution of television programming in the United States. (See page 14 for complete story.)

WASHINGTON, D.C.—A reliable NCTA industry spokesman told *C-ED* that the long-awaited **CARS expansion proceedings** slated for late April/early May, **will permit CARS expansion in the 13 GHz range.**

The delay on the rulemaking is a result of the FCC lumping together, not only the frequency allocations issue, but also the thrashing out of the rules. It's significant that the FCC has decided to do all this in one package.

LAS VEGAS, NEVADA—**Rumors** have abounded **that Las Vegas will not be a** particularly **good city to operate exhibitor's earth stations** due to interfering microwave operations from the surrounding mountain tops.

Because of the rumors, **NCTA asked Compucon to do a frequency coordination plan** and access the situation. **Results** of the frequency coordination plan (a four-page report), **are that there will be some minor degradation** on some of the transponders, but **not degrading to the point where the signals would be unsatisfactory.**

WASHINGTON, D.C.—The U.S. **Supreme Court has declined to review a ruling by the U.S. Court of Appeals** for the Second Circuit **which had upheld the FCC's authority to regulate pay cable rates.** The request for review had been filed by the National Association of Regulatory Utility Commissioners and the New York Commission on Cable Television. The appelate court ruling was in response to the New York State Commission's attempt to regulate subscriber rates charged for specialized pay cable services.

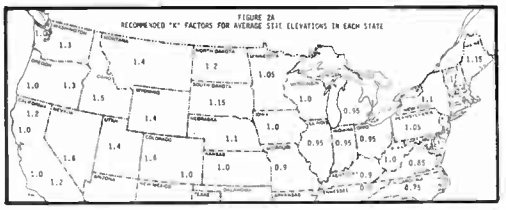
WASHINGTON, D.C.—The **FCC has denied a request by the three major television networks to terminate** immediately the rotational, **carrier-of-the-week system providing international television via satellite.** The commission said that the three companies had presented no compelling reasons for changing the time frame set for the end of the rotational system, adding that in less than two months, the American Telephone and Telegraph Company, Western Union International, Inc., and RCA Globcom would be required to apply for removing conditions authorizing and requiring rotational arrangements for TV service. Comments supporting the broadcasting companies had also been submitted by the Spanish International Network and Home Box Office.

WASHINGTON, D.C.—The **FCC has issued a special AM stereophonic test authorization to station KING in Seattle, Washington.** The authorization permits KING to conduct over-the-air testing of the AM stereophonic system proposed by Kahn/Hazeltine. Under terms of the authorization, KING may not use the test authority for promotional purposes though the tests may be announced. After completion of the test, scheduled to end July 22, 1979, the station is to submit results to the commission for inclusion in the record of Docket 21313, the AM stereo inquiry.

Communications-Engineering Digest (USPS 330-510) is published for the Society of Cable Television Engineers by Titsch Publishing, Inc., 1139 Delaware Plaza, P.O. Box 4305, Denver, CO 80204. © May 1979. Subscription price: 1 year, $15.00. Canada and Mexico add $5.00, and foreign subscriptions add $10.00 per year. Controlled circulation paid at Denver, Colorado.

Inside C-ED

Page 14



Page 34

Page 45

FEATURES

DEPARTMENTS

OPINION

Cover: The line drawings of a tap and trap, done by our own artist, Dale Waters, are the emphasis of this month's cover story beginning on page 31.

PRESIDENT
Robert Titsch

V.P. AND EDITOR-IN-CHIEF
Paul FitzPatrick

WASHINGTON BUREAU CHIEF
Pat Gushman

NEW YORK BUREAU CHIEF
Barbara Ruger

CONTROLLER
Michael Borer

C-ED

PUBLISHER
Paul R. Levine

MANAGING EDITOR
Toni Barnett

ASSOCIATE EDITOR
Charline Karell

ASSISTANT EDITOR
Wayne Lasley

TECHNICAL EDITOR
Ron Cotten

CONTRIBUTING EDITOR
Raleigh Stelle

ART DIRECTOR
Diane Adams

ARTISTS
Lisa Hahn
Dale Waters

TYPESETTERS
Lorraine Gomez
Michelle Mason

CIRCULATION DIRECTOR
Mic Gumb

ASSISTANTS
Yvonne Bauer Livingston
Linda Trondson

ADVERTISING MANAGER
Martin Laven

ADVERTISING PRODUCTION MANAGER
Joyce Hemmen

OFFICES

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

Washington Bureau
1745 Jefferson Davis Highway, Suite 308
Arlington, Virginia 22202
(202) 892-4200

New York Bureau
4 Duncan Road
Hohokus, New Jersey 07423
(201) 444-8929

Editor's Letter

Direct satellite-to-home broadcasts have been talked about for several years. In fact, in Japan, an ongoing experiment augurs well the day when such programming will find its way into millions of homes in technically advanced nations around the world. But, as our readers will learn on page 14, Scientific-Atlanta, the Georgia-based manufacturer, has unveiled a plan that will bring satellite-transmitted programming into "homes" in ten western states.

We employ the word, "homes," cautiously, for these are not your every day homesites. Rather, the S-A plan would provide for the sale and installation as well as other services to farms and ranches that exceed 2,000 acres. These "homes" currently do not receive adequate over-the-air broadcast signals; nor do they have access to cable television service. In fact, the latter, S-A learned, is too expensive a proposition. To wire one particular ranch spread—albeit large—would have cost the rancher some $300,000. The S-A plan, on the other hand, will cost the prospective buyer about $20,000 for the S-A 4.6-meter dish. Already, we have been told, two customers have signed on the dotted line.

Naturally, not every one of the potential "homesites" will opt for the space age service (there are some 44,000 such farms and ranches in the ten western states); but clearly the next step, it seems to us, is for the Federal Communications Commission to deregulate the earth-receive stations, so the next step in this landmark development will actually be—one day—the installation of the much heralded rooftop antenna.

Paul A. FitzPatrick

The cart on the left contains a Hughes AML receiver, all you need for a 12-channel microwave system. The other two carts hold the receivers and modulators needed at each receive site for a conventional 12-channel FM system. Hughes AML gives you better reliability and lower maintenance costs, plus lower initial cost. And you can expand the system up to 40 channels per receiver with no cost or work at the receive site.

More advantages: Phase lock operation to minimize TV co-channel interference is one. VHF input and VHF output is another. And the FM broadcast band is just one channel to a Hughes AML system.

Hughes patented AML system was designed and optimized specifically for CATV. It is now in its fourth-generation delivering more than 6000 video channels around the world.

Call or write: Hughes Microwave Communications Products, P.O. Box 2999, Torrance, CA 90509; (213) 534-2146. Before you fill your shopping carts.

Hughes AML Canadian distributor: Micro-Sat Communications, Ltd., 975 Brock Rd. South, Pickering, Ontario, Canada L1W3A4; (416) 839-5182.

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

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

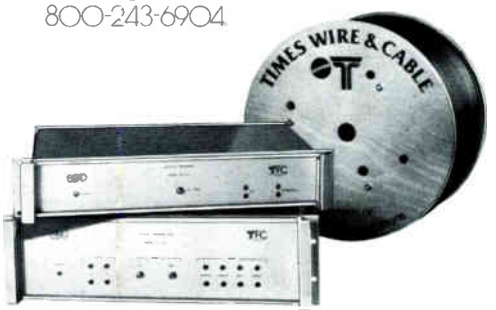
It's cost effective. It's easy to install. Just plug it in. In less than an hour. And of prime importance, it establishes new standards in the transmission of video, voice and data signals. The new link eliminates electro-magnetic interference and common mode problems. It also reduces signal degradation and fluctuations. All to attain the highest quality transmission yet.

As for reliability, the Times fiber optic cable is purer, tougher and more flexible than any other fiber optic cable. In fact, it's as reliable as any coax Times has ever built. The optical transmitter utilizes an advanced laser capable of continuous operation for 100,000 hours. And that adds up to more than 11 years of reliable service.

Further, it carries our standard warranty. It'll operate in virtually any temperature extreme. In any weather condition. And it's backed by the full resources of the industry's largest cable manufacturer.

The first fiber optic link for earth stations. In CATV you knew it was only a matter of Times.

For more information call your Man From Times. Or write Times Wire & Cable, 358 Hall Avenue, Wallingford, Ct., 06492. Or Call 800-243-6904.



Times Wire & Cable
The #1 Cable Company
DIVISION OF TIMES FIBER COMMUNICATIONS, INC.

See us at the NCTA, Booth #10.

SCTE

CHAIRMAN
Robert D. Bilodeau
Suburban Cablevision

PRESIDENT
Harold R. Null
Storer Cable TV

EASTERN VICE PRESIDENT
William H. Ellis
Evansville Cable TV

WESTERN VICE PRESIDENT
Frank J. Bias
Viacom Communications

SECRETARY
Kenneth S. Gunter
UA-Columbia Cablevision Inc.

TREASURER
Thomas A. Olson
Tomco Communications Inc.

EXECUTIVE DIRECTOR
Judith Baer
Washington Office
1100 17th Street N.W., Suite 506
Washington, D.C. 20036
(202) 659-2131

REGIONAL DIRECTORS

REGION 1
Kenneth D. Wall
Western Communications Inc.

REGION 2
Richard G. Covell
Sylvania CATV Division

REGION 3
Michael J. Gardner
Six Star Cablevision

REGION 4
Jerry O. Bybee
American TV & Communications Corp.

REGION 5
Ralph A. Haimowitz
Indian River Cablevision

REGION 6
James B. Grabenstein
Potomac Valley TV Cable

REGION 7
John A. Morovich
Satellite Business Systems

AT-LARGE DIRECTORS
Lawrence C. Dolan
Mid State Communications

Michael F. Jeffers
Jerrold Electronics Corp.

Martin J. Moran
Toner Cable Equipment Inc.

A.H. "Abe" Sonneschein
Hughes Microwave Communications Products

Cable Television's "Three-Mile Island"

By Thomas A. Olson
SCTE Treasurer
Tomco Communications, Inc.
Mountain View, California

Having been a part of this industry for almost ten years, I have been able to see significant changes in the nature of the business and, of course, in the way that we as an industry conduct ourselves. Some of the changes back in the early 1970's had an adverse affect on all of us and I must comment that, due to the tenacity of our industry, the industry not only recovered but is expanding today at a rate that a few years ago never seemed possible.

We are being featured today (and rightly so) as the entertainment medium of not only the present but the future as well in many of the major publications around the country. Ten years ago if I were to sit next to a stranger on an airline flight and tell him I worked in cable television he probably would have asked what it was. Today he asks when he can get the movies, the 300 ball games and all of the other entertainment items *he knows* we are offering.

We have done an excellent job of telling the public what we can now do and apparently are getting it done. Also, being realistic, we are doing it with entertainment. We are not yet a total communications medium and, in my opinion, that will be a long time coming. So what you say!

Where is our new entertainment coming from? More often than not, our entertainment comes from a little spot in the sky 22,300 miles away. No one has ascended that tower yet! I know it is a big "what if", but what if something catastropic happened to the F1 [Satcom I] satellite. We had better be prepared as an industry to do more than walk around in our SCTE hardhats waiting for the debris from F1 to hit.

The impact of such an occurrence must be addressed by all of us because, being the engineers in this industry, that is who the boss is going to be screaming at (among others). Maybe it never will occur, but it could be our own "three-mile island", if it does happen and we are not ready. The problems we faced in the early 70's are going to appear very small in comparison.

I guess my concern here is two-fold in nature:

- Where in the past our programming sources were from very divergent sources, (i.e., wherever you could get a signal from) our new sources of revenue are increasingly coming from one additional source [Satcom I].
- Can we, as an industry, that is selling product to more homes daily, afford to be relying upon a single distribution source for the entire industry? We owe more to our customers than that.

I propose that SCTE form a group to investigate what is being done in the event of such an occurance (I am sure there is much more than I know about). This group should formulate methods and procedures to minimize what could be a real disaster. Even the most common pieces of CATV hardware are taking three months to manufacture. I wonder what satellite delivery is these days? Hope to hear some comments from you.

P.S. I did get up on the right side of the bed this morning and the sun was shining.

Thomas A. Olson

Test Equipment —Who Needs It?

PORTLAND, OREGON—"Test Equipment—Who Needs It?" is the theme of SCTE's technical seminar to be conducted April 23-24 at the Portland Hilton Hotel in Portland, Oregon.

This two-day seminar will include a hands-on demonstration of test equipment from the leading manufacturers in that field. The session will enable participants to learn about the latest developments in test equipment.

Topics to be covered include radiation leakage measurements, field strength meters, calibration, "no loose ends" proof-of performance techniques, the hows and why of sweeping a system, and the use of spectrum analyzers with emphasis on testing for FCC measurements, ingress identification and composite triple beats.

Raleigh Stelle of Texscan Corporation lends his expertise to the Portland seminar.

Featured panelists are Warren Braun of ComSonics, Inc., Larry Dolan of Mid State Communications, Bill LeDoux of Avantek, Cliff Schrock of C.B. Schrock and Associates, Raleigh Stelle of Texscan Corporation, Don Thomsen of Cable Market Specialists and Bob Welsh of Wavetek Indiana Inc.

There will be table-top exhibits from at least 30 of SCTE's Sustaining Members on view during the two-day meeting. This will allow attendees to talk with the manufacturers on a one-to-one basis.

Registration fee for the two-day technical seminar is $50. The registration fee provides for two lunches, the sessions and workshops, and the exhibits.

SCTE Turn-Ons

WASHINGTON, D.C.—Joining the Society of Cable Television Engineers in April were Tektronix Inc. as a Sustaining Member. New members are Thomas H. DeSeyn, Wayne County Cablevision; William J. Salk, United Cablevision Services; Don Bridgman, Heritage Communications; Dave F. Neiman Jr., Coaxial Communications Cable TV Inc.; Gordon J. Wharton, United Cable TV Inc.; Forrest W. Kohrt, KAY-B-L Vision; Leslie F. Clendenin, Tanner Electronics; Robert W. Holly, ACT-V, Pawling, New York; Tom Johnson, Walden Video; Joseph J. Majczak, New Channels Corporation; Lawrence Flinn Jr., Communicable of Texas Inc.; Cal M. Taasevigen, Cablecom of Cobre Valley; Jack F. Winterhalt, Canandaigua Video; John C. Lanier, UA-Columbia Cablevision of Texas; Terry L. Adkins, CPI of Arkansas Inc.; Neil M. Serafin, Communications Systems Inc.; Eugene Bartlett, Cape Cable TV; Ronald J. Roberts, TEST Inc.; Anthony J. Suraci, Cable Contractors of Connecticut; John E. Hare, DeKalb Cablevision Corporation; Robert J. Tupper, Reed, Veach, Wurdeman & Associates; Gary H. Whitman, Hewlett Packard Company; Larry E. Krautbauer, Wadena AVTI; John R. Bateman, John Bateman Associates-Municipal Cable Consultants; James L. Smith, TOCOM Inc.; Jerry D. Schultz, Lectro Products; George E. Menefee, Garfield Skill Center; Grady "Greg" H. Daniels, Communications Properties Inc.; Roger A. Lapp, Freeport Cablevision; Donald May, Powervision; Thomas J. Bowles, King Videocable Company; Ben W. Forte, Hughes Microwave Communications Products; and Robert N. O'Hara; Westec Engineering.

Committees Named on UW-Platteville Training Program

PLATTEVILLE, WISCONSIN—Eighteen SCTE members are participating in the development of the University of Wisconsin-Platteville CATV training program. The effort is being shared by two SCTE committees: the Senior Advisory Committee (SAC) and the Technical Review/Study Committee (TR/SC).

The SAC group will provide overall guidance and direction while the TR/SC will actively assist with editorial work to ensure that programs presented are "true" to cable television/broadband communications' technologies.

Members of the SAC include Gerry Bahr, Bob Bilodeau, Hank Cicconi, Bill Ellis, Jim Grabenstein, Mike Jeffers, Bob Luff and Tom Polis.

The Technical Review/Study Committee members are Glenn Chambers, Dick Covell, Larry Dolan, Jim Emerson, Neil McLain, Don Meinders, Dan Pike, Earl Willits and Eric Winston.

Construction Guidelines Manual

WASHINGTON, D.C.—SCTE members Mac Quarashi and Bill Ellis are polling the CATV industry for information on construction techniques. Many larger companies have established and published practices that SCTE would like to learn from and use as a base to develop general industry guidelines.

Northeast CATV Technical Seminar

ALBANY, NEW YORK—The 5th annual Northeast CATV Technical Seminar will be held June 7-8 at the Empire State Plaza Convention Center in Albany, New York. The conference is sponsored by the New York State Commission on Cable Television, SCTE, the State University of New York and the New York State CATV Association.

This year's theme centers on honoring 30 years of CATV. For additional information, contact Bob Levy, assistant chief of telecommunications at the New York State Commission, at (516) 474-1324.

Future Meetings

WASHINGTON, D.C.—Dates and sites for future IEEE/SCTE CATV Reliability Conferences are February 5-6, 1980 at the Adams Hotel in Phoenix, Arizona; March 16-17, 1981 at the Opryland Hotel in Nashville, Tennessee; March 9-10, 1982 at the Copley Plaza Hotel in Boston, Massachusetts; and March 8-9, 1983 at the Radisson South Hotel in Minneapolis, Minnesota.

For further information, contact Mila Albertson, director of Membership Services, SCTE, 1100 17th Street NW, Washington, D.C. 20036, (202) 659-2131.

"OH NO, NOT AGAIN."

TONIGHT, WILL YOUR CUSTOMERS GET A RUN FOR THEIR MONEY OR A RE-RUN?

On Showtime your customers will see only first-run feature films. Unlike other pay television services, we won't show movies already aired on regular television.

And we won't ruin a good thing by running first-runs ragged. Our monthly schedule isn't padded with encores. Instead, Showtime gives you the freshest lineup possible. With quality movies and our own quality entertainment specials not seen on regular television. All scheduled at different times on different days, for everyone's viewing convenience.

So offer your customers Showtime, the premium pay television service. We're the one viewers find worth paying for. Month after month after month.

SHOWTIME®

Programing that makes pay television worth paying for.

1211 Avenue of the Americas, New York, NY 10036 (212) 880-6611. Call toll-free (800) 223-0646; 0647 Telex, 710 581 5520.
Regional Sales Offices: Northeastern (516) 822-8969, Art Gusow Southern (404) 923-9933, Bob Mason
Central (317) 474-0359, Randi Pattison South Central (501) 834-0282, J.L. Poff Western (415) 820-6110, Curt Bennett

Direct Bird-to-Home Broadcasts Now A Reality

ATLANTA, GEORGIA—Scientific-Atlanta has announced the formation of Homesat, Inc., an operating subsidiary of the Georgia-based manufacturer. Homesat, according to its newly named vice president and general manager, Dick Campbell, will sell and install earth stations at large rural farms and ranches in ten Western states. The S-A announcement marks the first legal direct satellite-to-home distribution of television programming in the United States.

According to Campbell, there are some 44,000 farms and ranches, each comprising more than 2,000 acres in the market areas, that either don't have access to cable television service or receive, at best, "marginal over-the-air television signals."

Campbell told this publication prohibitive costs to wire "large" homesites prompted the S-A decision to enter the direct satellite-to-home market. Campbell noted a plan by Grants, New Mexico cable operator, Eddie Pena (see *CableVision* cover story on Pena, January 2, 1978), to install cable service to a nearby New Mexico ranch would have cost $300,000. The Homesat plan will cost the "homeowner" $20,000 for the purchase of a 4.6-meter dish, installation and service.

"We're offering an alternative plan for much less money than a normal coaxial hook-up. Homesat will provide a satellite earth station, for private use, identical to what a cable operator would purchase. The equipment," Campbell noted, "is a 4.6-meter antenna, a low noise amplifier, one or more receivers depending on the channels selected, and a modulator that converts the signal to a television set."

The earth station dish would act as a receive-only TV antenna. Coaxial cable would be laid from the dish to the receiver and modulator. The modulator converts the signal to a spare channel on the TV set. The receiver and modulator would be located next to the TV or beside the set in a small cabinet.

The received satellite signal is not limited to one TV set, but like large cable operations, can be connected in a series to four, 16 or 32 TV sets.

"There's a problem in the home market in that sense," Campbell stressed, "and that is that everybody's got to watch the same program on that particular channel."

Channel sharing between neighbors is possible but probably too expensive to implement. Both subscribers would have to pay the programmer for receipt of the signal, and also absorb the cost of stringing cable, amplifiers, line extenders, etc. Most neighbors in rural areas are at least one mile away from the other. Hence, it would seem to be more practical for each subscriber to have his own individual earth station.

"An alternative to all of these individual earth stations," stated Campbell, "is a translator—low-powered transmitter—configuration. However, that method is not legal and I don't recommend it because of the problems network translators have had. We think the answer is more earth stations rather than translators."

According to Campbell, another reason for using private earth stations comes into play. "The network stations' reception is either marginal or non-existent. On some ranches, they receive no televison reception whatsoever. Now," he added, "there's a lot of pressure in Washington from various sources: the White House, FCC, Congress and from the Justice Department. They all recognize that, especially in today's age, these rural areas should at least have the opportunity to receive decent television reception."

Homesat will be using the normal construction permit, licensing and frequency coordination process with one exception—the financial requirement for the purchase of the earth station. Homesat would submit a cable-type filing with the FCC with the exception being that the financial details of the private owners are not relevant since the owner is not redistributing the signal. "If the private owners can afford to pay $20,000 for their earth station," Campbell emphasized, "that's *prima facia* evidence that they can handle the earth station costs... The homeowner, then, would be entered into the pubic record, have a license and construction permit, have frequency coordination rights, and be able to block AT&T and anyone else who might interfere with them receiving the signal."

Initially, Homesat would advise earth station homeowners of the various types of programming available from Satcom I. In turn, Homesat would then advise the programmers of the subscriber potential.

During the first year of operation, Homesat would pay the programmers for the premium channel subscribers would receive. After the first year, the subscribers and programmers would sign an agreement for the services provided. The subscribers would then be billed by the programmers or possibly by an intermediary group.

The homeowner can have as many pay channels as he wants. However, the receivers for each channel, and associated equipment, sells for $2,500-$3,000 per receiver.

The Homesat entrance into the direct satellite-to-home market raises questions about similar service to urban areas. Already, in Japan, Nippon Electric is experimenting with such service and is utilizing a 1.2-meter dish contrasted with 4.5-meter dishes, the minimum authorized FCC earth station. Homesat's Dick Campbell speculated the commission would deregulate earth stations by year's end, thus opening up the market for smaller roof top dishes. "I feel that private receive-only dishes will not only be deregulated, but there is a question as to why they are even regulated now," noted Campbell. He did not, however, expect dishes to go below three meters, given the restraints of current satellite broadcast capability.

Thus far, Homesat has two customers, both of whom are in New Mexico. Other states Homesat will direct its efforts to are: Texas, Montana, South Dakota, Colorado, Kansas, North Dakota, Nebraska, Wyoming and Oklahoma.

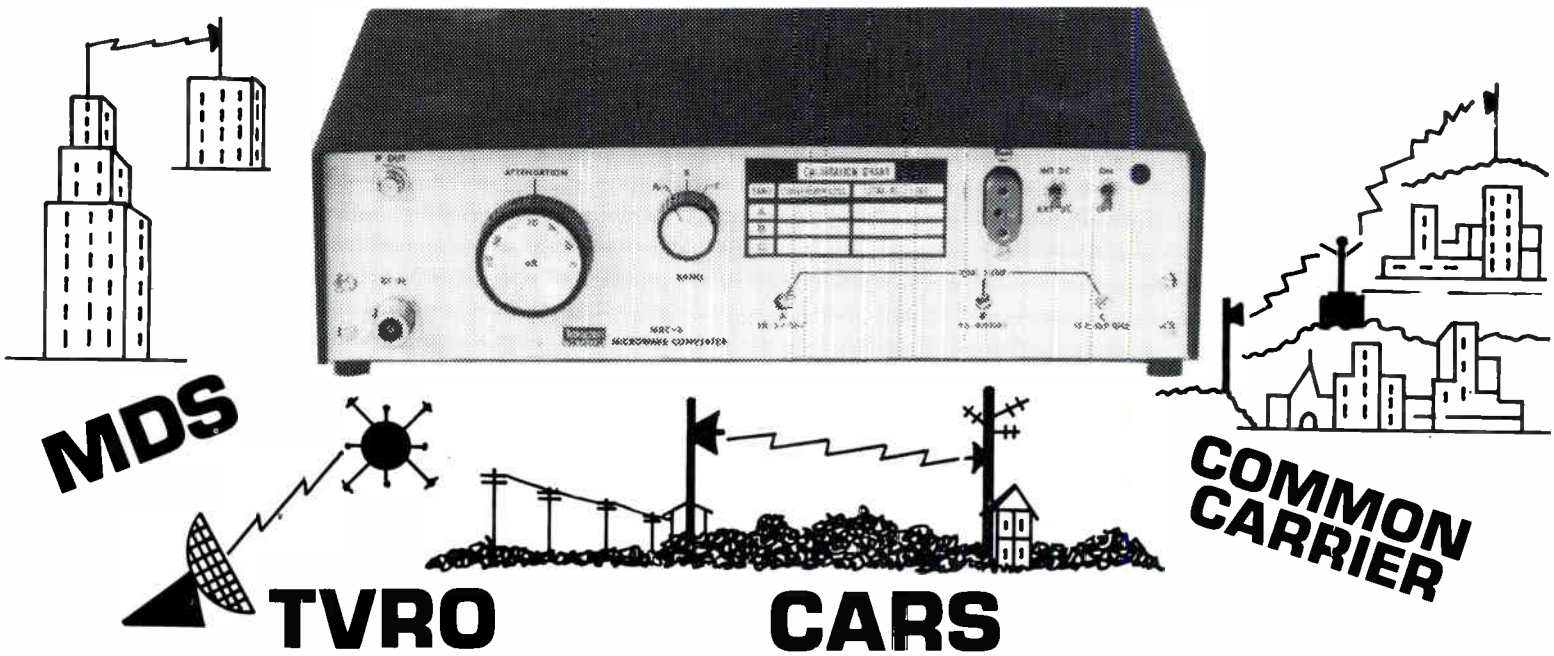
Congress Convenes In 50 States via C-SPAN

WASHINGTON, D.C.—Approximately 200 people nationwide attended the official April 3rd start-up of the Cable Satellite Public Affairs Network's daily coverage of the U.S. House of Representatives.

Representatives of the cable industry,

MICROWAVE

MEASUREMENTS MADE EASY!



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

Available as an option are three bandpass filters which speed and simplify the measurement process. The filter kit is required for sweep operation. The MDC-3 has a calibrated insertion loss and adjustable local oscillator for each band. Other frequencies are available.

Texscan

TEXSCAN CORP.: 2446 N. Shadeland, Indianapolis, Indiana 46219, (317) 357-8781, TWX 810-341-3184
THETA COM: 2960 Grand, Phoenix, Arizona 85017, P.O. Box 27548, 85061, (602) 252-5021, (800) 528-4066 TWX: 910-951-1399

Washington's political community, and the press heard Congressman Charlie Rose (D-NC), who is chairman of the Speaker's Advisory Committee on Broadcasting, describe the live gavel-to-gavel coverage of the Congress as an "historic undertaking." Rose was instrumental in securing his House colleagues' approval of the television project.

The group also heard brief remarks from Congressman Jack Brooks (D-TX) and Congressman Gillis Long (D-LA).

Following the reception in the Longworth House Office Building, John Evans, vice president and CEO of ARTEC, the Arlington, Virginia, cable system, hosted another reception. Virginia Congressman Joe Fisher was the guest speaker.

C-SPAN President Brian Lamb revealed that approximately 375 cable systems serving 3.5 million homes in all 50 states are already taking the historic service. Lamb expects the number of C-SPAN affiliates to increase over the next several weeks, although one short-term roadblock is the backlog in earth station installations around the country, which is due to the extraordinary demand on system construction.

Simplified TVRO Rules Suggested by the NAB

WASHINGTON, D.C.—Regulations for receive-only satellite earth stations should be different for common carriers and private users, the National Association of Broadcasters (NAB) has suggested to the Federal Communications Commission.

NAB said present regulations should be maintained for common carriers and others who desire long-term protection. This would require site coordination so that the carrier would not have to be concerned with the possibility of damaging future interference and resultant complaints from its customers. On the other hand, NAB believes site coordination should be optional for private users—television networks, broadcast stations, news wire services, cable television systems and private business data users.

However, the NAB said provisions should be made for conversion of a non-coordinated station to a coordinated one at a later date if subsequent engineering data would qualify the site.

NAB also said the commission should not jeopardize the privacy of satellite communications and should maintain an essential system of licensing.

Another One Down

TUSTIN, CALIFORNIA—On March 30th, programming from Trinity Broadcasting Corporation temporarily went off-the-air. Trinity uses horizontal transponder 14 on RCA's Satcom I, a pre-emptible transponder.

Three hours after transponder 14 failed, RCA permitted Trinity to use vertical transponder 13 for programming. Although Trinity has not experienced any problems using transponder 13, the programmer has lost some of its cable systems because those systems are not equipped for dual polarization.

According to an RCA spokesman, transponder 14 is not getting sufficient power to be received on the ground. The transponder is now in a test period to determine the problem.

Canada Makes Cable Advances

TORONTO, CANADA—The Canadian cable television industry must fight, not only to survive, but to grow. This was the message delivered to some 2,000 delegates at the annual convention and trade show of the Canadian Cable Television Association (CCTA) April 2-5 in Toronto by association president Michael Hind-Smith.

Hind-Smith went on to say that the industry has made significant advances in its dealings with the battles fought against restrictive regulation in public hearings over the past three years. "I tend to think of them as yesterday's issues," Hind-Smith said, because they represent the lifting of senseless bureaucratic restrictions that should not have existed in the first place.

"More important, I believe, are the development issues," Hind-Smith continued. "I characterize these as tomorrow's issues, which include the challenge of the industry to show there is a demand for pay-television in Canada. We know from experience that there is." Hind-Smith additionally pointed out the need to participate with broadcasters and independent producers in programming consortia that draw on

(Cont'd on page 21)

OWN THE BEST...
MICROSYSTEM I
FOR YOUR AUTOMATED SERVICES

- CUSTOMER PREFERRED
- OPERATOR PROGRAMMABLE
- MOST FLEXIBLE
- UNIQUE DISPLAY FORMATS
- PLUG-IN EXPANSION
- MAXIMUM VALUE FOR DOLLAR COST
- OPERATOR ALLOCATED MEMORY

vds
Video Data Systems
. . . IN TOUCH WITH THE FUTURE

VIDEO DATA SYSTEMS, corporate office, New York, NY (516-231-4400);
VIDEO DATA SYSTEMS, National Sales, Salt Lake City, UT (801-272-9296);
International Sales, ADCOM ELECTRONICS, LTD., Ontario, Canada
(416-251-3355); CATEC AG LUZERN, Luzern, Switzerland (041-22-66-19).

(Cont'd from page 16)
subscriber dollars to finance Canadian programming.

In other business conducted at the Canadian association meeting, Kevin Shea, Toronto area programmer, was named coordinator for Cable Satellite Network (CSN). A board of eleven members, representing the country from coast-to-coast and the Yukon, was elected, with officers to be selected shortly.

Initial priorities of the newly-elected body include the setup of an actual satellite earth receive station network coast-to-coast for the cable television industry. Additionally, the board will prepare two channels of entertainment and educational programming alternatives, probably to include coverage of the Canadian Parliament, public affairs and children's programming.

The Climax Jazz Band, standing in front of RF Communications' antenna, kicked off the Canadian Cable TV Convention.

News via RCA Satellite

PISCATAWAY, NEW JERSEY—On March 21st, RCA American Communications, Inc., filed a request with the Federal Communications Commission for authority to provide end-to-end satellite service for broadcast news and newswire distribution to United Press International. In addition, the satellite service will be offered to radio networks and radio program distributors, wire services, and others with appropriate communications network requirements.

RCA Americom proposes to install, maintain, and provide satellite transmission service to more than 600 receive-only earth stations, each having ten-foot diameter or larger antenna dishes. The earth stations would be located at or near radio and television stations which subscribe to UPI Audio Services and to local teleprinter news services.

In addition, RCA filed its proposed system description, together with documentation of the system's technical feasibility and earth station data, with the FCC. The filing requests specific authority to construct and operate the proposed system.

ARTEC's Traffic Control

ARLINGTON, VIRGINIA—Arlington Telecommunications Corporation (ARTEC), which operates the cable television system in the Washington, D.C. suburb, has contracted to implement bi-directional control mechanisms to link computers to traffic control lights at 300 intersections.

Over a ten-year period, ARTEC will receive $237,250, reportedly one-quarter of the over one-million dollar estimate submitted to the county by C&P Telephone. According to Bill Scruggs, Public Works Traffic Engineering Division Director for Arlington County, "We are the first to utilize an investor-owned television system to control traffic on a county-wide basis." The line equipment for ARTEC will be supplied by Scientific-Atlanta.

"Visions '79"

LAS VEGAS, NEVADA—"Visions '79' is the theme of the National Cable Television Association's 28th annual convention and exhibition, May 20-23, to be held at the Las Vegas Convention Center, Las Vegas, Nevada. Featured speakers announced so far include former President Gerald R. Ford; Senator Ernest F. Hollings, chairman, Senate subcommittee on communications; Congressman Lionel Van Deerlin, chairman, House subcommittee on communications; and Charles D. Ferris, chairman, FCC.

A sampling of management session topics includes "New Congress Considers Communications"; "Where To Regulate Cable and How"; Signal Carriage and Copyright: Here We Go Again"; Future in Communications"; and a rewrite update.

the best components for CATV amplifiers come from **TRW** RF SEMICONDUCTORS

SAVE TIME AND MONEY WITH THIS

MULTI-FUNCTION ELECTRONIC CONTROL

10 to 60 Channel 2 Digit Tone Receiver System Accepts 2 digit address plus the * to latch, and the # to unlatch. Available also with momentary contacts for "raise/lower" applications. Automatic telephone answering circuits built in.
Write for Brochure on
High Speed Tone Signaling Products

ME MONROE ELECTRONICS, INC.
216 Housel Ave., Lydonville, NY 14098
Phone: (716) 765-2254

Much Ado About Everything

By Pat Gushman
Washington Bureau Chief

The FCC has stamped its initial approval on the findings of the commission's economic and syndicated exclusivity inquiries. Late in April they voted in favor of issuing proposed rulemakings deregulating signal carriage and syndicated exclusivity—but not without some pain.

The commissioners listened patiently until Cable Bureau Chief Phil Verveer had outlined the major conclusions of the two-year investigations which have led the staff to conclude that it would be in the consumer's interest to remove the signal carriage and exclusivity rules. Verveer explained that when the syndicated exclusivity rules were promulgated, they were done so without the aid of any economic data. As for the short term and long term effects of deleting these rules, Verveer reported that the inquiry had determined that even in the worst case situation and even assuming that cable passed every home, in the next few years broadcasting would not lose more than one percent of its audience nor more than nine percent by even as far off as the year 2000.

At that point the formal presentation of the findings and recommendations of the staff was interrupted and the last three hours of the discussion degenerated into a debate over copyright and retransmission consent issues led by Commissioners Washburn, Lee and Quello. The commissioners, in varying degrees, were in favor of most of the findings, but were particularly put out by the fact that the Cable Bureau and General Counsel's Office were bent on dismissing the merits of Henry Geller's NTIA retransmission consent petition almost soley on jurisdictional grounds.

As it turned out, there was finally agreement that "yes", the NTIA retransmission petition as well as the broadcasters' super station inquiry petition were denied, but that language in the reports and notices of proposed rulemaking would not ignore that these issues were of concern and should perhaps be commented upon in relationship to deregulating signal carriage and exclusivity.

The problems arose when Commissioners Washburn, Quello and Lee indicated that, in spite of all the economic data assembled in the inquiry, in reality local television, particularly UHF would not be harmed. The reports indicated that in selected markets studied for the impact of cable on independents, UHF stations actually enjoyed "audience gains" in their own markets as a result of cable. One of the consultants explained that improved signal quality on cable tends to off-set whatever fractionalization that might occur otherwise.

Nevertheless, Lee emphasizing his belief that retransmission or the copyright issues implied in such a scheme are the underpinnings of such an economic study which the commission has undertaken, said, "I still have the feeling this has got to hurt UHF and I can't go for it at this time." Finally, Lee voted for acceptance of the reports, but he was the only commissioner to vote against issueing both the notices of proposed rulemaking as well as denying the retransmission and super station petitions, even with language amending the notices.

Quello urged that the commission put the question of FCC jurisdiction over copyright issues affecting communications out for comment. But, Commissioner Tyrone Brown asked what more could be heard from Henry Geller since parties have had ample time to comment on his petition. Quello insisted, however, that dismissing the petition on jurisdictional grounds was a "cop out." Finally, when Verveer and General Counsel Bob Bruce appeared to have heard enough, they inferred that the turmoil and distruption of the process was exactly what NTIA had intended to accomplish by filing the petition so near to the completion of the economic inquiry. Because of this and inconsistencies within the petition itself, Verveer suggested that what had been done should be considered an "outrageous afront to the commission's dignity."

Areas to be explored in technical sessions include satellites; education and training; small systems; advanced techniques; fiberoptics; testing and maintenance; and computers.

NTIA Seeks Earth Station Deregulation

WASHINGTON, D.C.—The Commerce Department's National Telecommunications and Information Administration (NTIA) has asked the FCC to eliminate its licensing requirement for domestic receive-only satellite earth stations.

In formal comments filed before the FCC, NTIA called the licensing requirement procedure "costly and time-consuming." The result is "unnecessary harm to potential earth station users, earth station manufacturers, the public and an overall dampening of the growth of a vital new communications technology." Because of the relatively low cost, NTIA said, receive-only earth stations are attractive to a wide range of communications users.

NTIA contended that the licensing process, which is often quite lengthy, is not necessary as a protective device against interference where such earth stations are in the path of terrestrial microwave radio transmission. Various techniques, primarily "artificial cite shielding," are available to reduce the potential of such interference.

NTIA recommended that earth station owners notify the FCC of the earth station's location prior to beginning operation in lieu of the licensing procedure. Notification, together with the use of telecommunications protection technology and enforcement of Communications Act violations would, NTIA contends, adequately provide for the security of satellite communications.

FCC to Review Recommendations

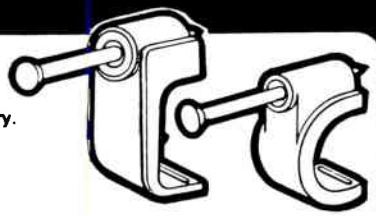
WASHINGTON, D.C.—On April 25th, the FCC will review recommendations by its staff and the Cable Bureau to issue notices of proposed rulemaking. The notices are reportedly largely deregulatory in the areas of signal carriage and exclusivity based on results of the commission's two-year inquiry into the economic relationships between broadcasting and cable.

Tower plastic cable clips.
Plated, hardened, flat headed steel masonry nails, pre-assembled ready for use.

First in England and now almost first in the United States.

Sold by leading distributors throughout the country. Write for samples and descriptive literature today, giving names of your supplier:

Weldone Trading Co. Inc.
1401 Legendre St. W., Suite 106
Montreal, Quebec H4N 2S2 Tel. 514-381-8861



EXCLUSIVE UNITED STATES IMPORTER.

Our Earth Station Analysis and Coordination goes one step beyond ....

and that one step beyond is service

comsearch

Our services mean fast response time, reliable advice, and a lot of extra personal attention, which has always been and will remain our trademark.

Take that one step beyond, from where you are now, contact:

Harry Stemple, President, for information about a Total Frequency Coordination package.

703 — 281-5550
Comsearch, Inc.
2936 Chain Bridge Road
Oakton, Va. 22124

Joplin Sees The Light

By Toni Barnett, Managing Editor

On February 28, a major step in two-way broadband technology occurred via the flip of a switch at the office of Cablecom of Joplin and Webb City in Joplin, Missouri. The switch sent cable television signals pulsating through three strands of hair-thin, ultra-pure glass fibers that span 3.56 miles.

The glass filament transmission lines comprise the longest, continuous, aerial fiberoptic television cable in the world. Initially, the futuristic system will carry up to four television signals. However, every one of the glass filaments, each the size of a human hair, is capable of transmitting as many as 60 signals.

The fiberoptics system is part of a major construction and improvement program which Cablecom has scheduled for 1979.

John S. Gailey, president of Siecor Optical Cables, Inc., compares his company's four fiberoptical cable to a conventional coaxial cable.

Three major corporations were involved in the Joplin, Missouri fiberoptics installation. Overseeing the operations of Cablecom of Joplin/Webb City is Cablecom-General, Inc. Cablecom-General also maintains cable television companies throughout the United States. In Joplin since 1972, Cablecom-General pursues ongoing plans to update television programming and reception quality.

RKO General, Inc., a subsidiary of General Tire and Rubber Company, is a multi-faceted company with nationwide interests. RKO General operates radio and television stations in major U.S. cities, as well as holding primary ownership in Cablecom-General, Inc.

Developed to meet the increasing demands of transmissions technology,

Siecor Optical Cables, Inc., is a joint venture between Siemens AG of Munich, West Germany, and Corning Glass Works. Siecor built the cables for the fiberoptic transmission system being tested in Joplin.

The companies mentioned previously have combined in a unified effort to make possible the fiberoptic transmission line inaugurated in Joplin.

C-ED asked Shane O'Neil, a member of RKO's corporate development group that specializes in mergers, acquisitions and special projects, what prompted the fiberoptic experiment.

"We decided to use fiberoptics for a number of reasons. First of all, RKO has always been a leader in entertainment. RKO was the first broadcasting company ever to acquire a cable TV system . . . RKO was also the first entertainment entity," O'Neil stressed, "ever to conduct a large-scale pay-TV experiment (WHCT in Hartford, Connecticut).

"We felt that the bandwidth that fiberoptic cable provides, and the subsequent number of channels of electronic information that fiberoptic cable makes possible, enables us to deliver more varied types of entertainment than would be capable over normal cable."

Another factor comes into play concerning the reasoning behind the fiberoptics experiment. RKO was looking for a way to further its marketing experimentation on a project that company has been working on called Tele-Ticket. This service is a pay-per-program package.

"Some of our marketing research had indicated that one of the problems was that there just weren't enough channels to be able to deliver a segmented service," stated O'Neil. "Our technical group told us about fiberoptics and its inherent capabilities."

After contacting Cablecom-General, RKO General and Siecor Optical Cables, we found that the most common denominator in choosing fiberoptics for Joplin, Missouri, was the extreme weather conditions.

John Ostermiller, regional manager of Cablecom-General, told *C-ED*, "Our basic desire was to design and test fiberoptics for a specific climate. Joplin, Missouri was chosen because of the extreme weather conditions—cold and humid in winter and very hot in the summer. There's enough ice, rain and wind in Joplin to provide a real challenge to the system," Ostermiller added.

Stated Shane O'Neil, "To our knowledge, the Joplin project is the first joint venture undertaken to create a fiberoptic cable specifically for local conditions. Plans call for the continued development of such custom-designed cables," O'Neil added. "The particular geographic and weather conditions of each Cablecom area will be kept in mind in the development of a cable suited to that area."

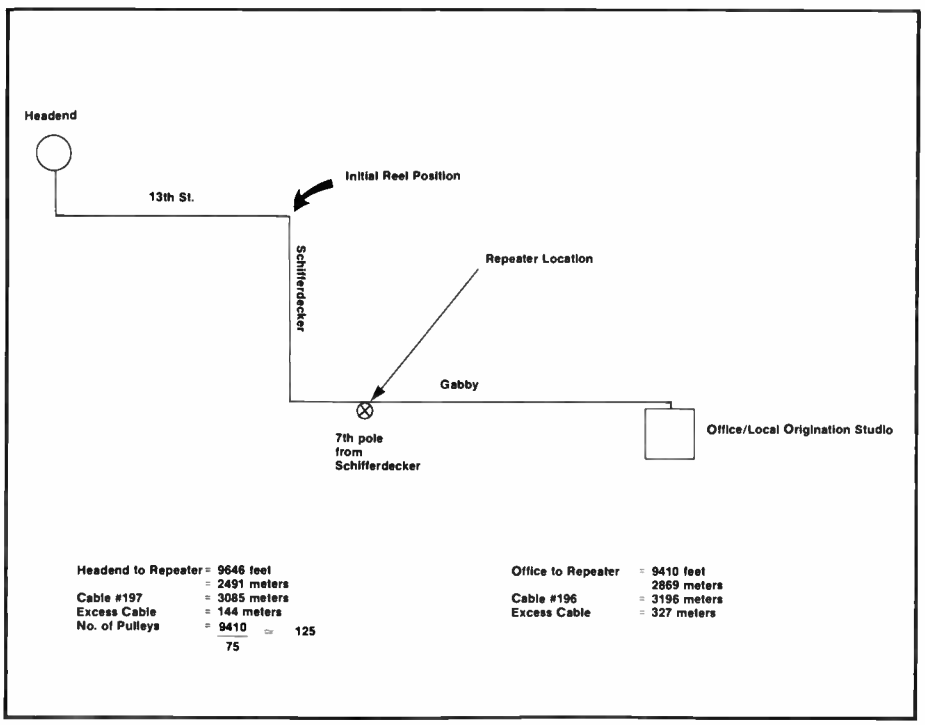


Diagram of route.

A member of Cablecom-General's construction crew strings a four-fiber optical cable from telephone pole to telephone pole in Joplin. The 3.56-mile aerial, fiberoptic cable replaces a conventional coaxial cable that carries video signals from the origination studio of Cablecom of Joplin/Webb City to the broadcasting tower on West 13th Street in Joplin. The smaller, lighter fiberoptic cable (attached to the pole held by the crewman) is easier to handle than the heavier coaxial cable seen below.

Fiberoptic Electronics

The advanced electronics for the Joplin, Missouri cable television fiberoptic trunk system was supplied by Siemens Corporation. The fiberoptic system links the cable television studio with its broadcasting tower on West 13th Street.

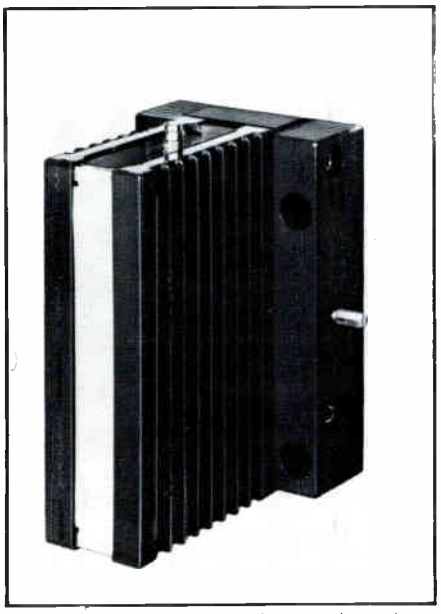
As in telecommunications, the benefits of fiberoptics in cable television networks are low attenuation, wide bandwidth, immunity to lightning and easy installation. The fiberoptic filaments substantially reduce electromagnetic interference from such outside influences as thunderstorms, C.B. radios and airplanes. Also, the cables are less susceptible to weather extremes, moisture and damage caused by squirrels and rodents.

At the present time, universal application of fiberoptics as a replacement for conventional coaxial cable is limited by performance limitations of available light sources.

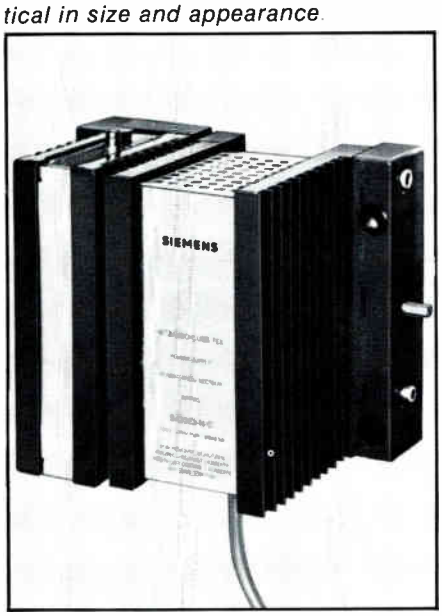
The Joplin/Webb City system provides three locally-originated video channels from the company's local

origination studio to the headend of the CATV system in Joplin, approximately 3.56 miles. In addition, a return video channel from the headend to the local origination studio is provided.

The equipment used in this system includes eight fiberoptic transmitters, eight fiberoptic receivers, six power supplies, mounting hardware for electronics, wiring and the repeater housing.



The fiberoptic transmitter (above) and the transmitter with power supply (below) are used in the Joplin cable television fiberoptic trunk system. The receiver units are identical in size and appearance.



As shown in Figure 2, the fiberoptic video trunk carries three channels of video signals (plus one standby or return channel) from the office to the headend.

A four-fiber, lashed aerial fiberoptic cable connects the office to the headend, with a repeater located about halfway down the 6 Km trunk. At the office, video and audio program material is applied to a modulator. The modulator develops an FM-modulated sub-carrier signal that is applied to a transmitter unit of the Siemens optic waveguide system (A5/D10-1). The signals modulate the current through a Burrus light emitting diode source in the fiberoptic transmitter.

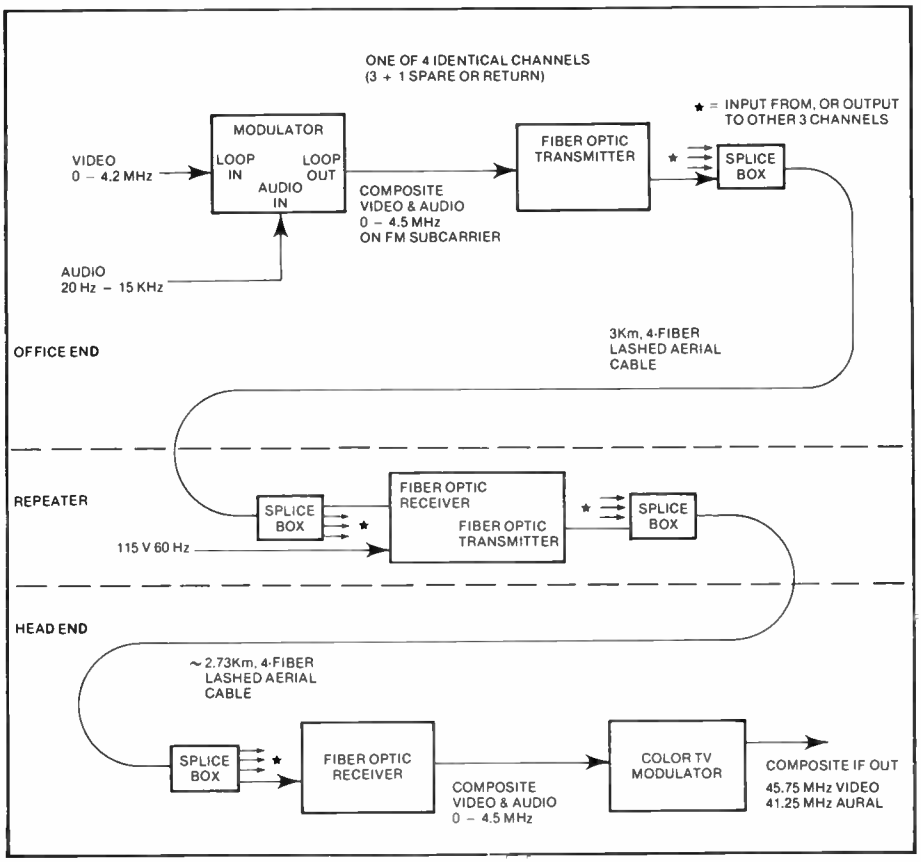


Figure 2: System block diagram.

Four channels are connected at a splice box to the four-fiber lashed aerial cable. At the repeater site, a Siemens fiberoptic receiver converts the light by means of a photo avalanche diode to electronic signals for amplification and regeneration. The processed signals are then applied to a Siemens fiberoptic transmitter for transmission over the remainder of the trunk to the headend. At the headend, a Siemens fiberoptic receiver demodulates the light signals to produce the DC video and audio replica of the office inputs.

A cable TV modulator converts the signals to the composite IF 45.75 MHz video and 41.25 MHz aural inputs required for the distribution system.

The audio signal on the system modulates the audio sub-carrier and the combined video/audio signal frequency modulates the light emitting diode. The bandwidth of the combined signal is 5 MHz. At the headend, the modulated optical signal is converted into an FM electrical signal which is

A technician prepares two lengths of fiberoptic cable for fusion splicing. The fusion splicer permits a technician to precisely align the tiny fibers and then to permanently join them in the field.

See Us At The NCTA SHOW Booth Nos. 103 & 105

We Thrive on Rejection...

and with VITEK's Band Reject Filters so can you!

You know VITEK Filter Cable Traps offer the best security because they're passive, negative and on-the-pole . . . and have the durability of coaxial cable.

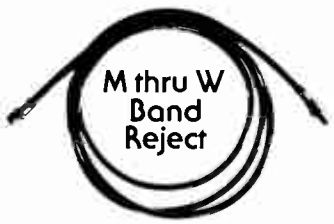
What you may not know is that in addition to single and multi-channel traps, they are also offered in 3 different Band Reject configurations . . . with 50 dB min. attenuation (-20° to +120° F).

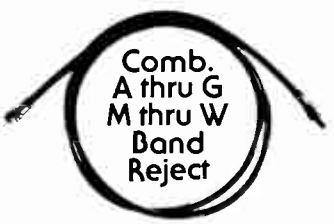
Now you can market blocks of channels in either Mid-band or Super-band (or both) to your subscribers. Or, you can start out with a single premium channel in either mid-or super-band, and, utilizing the band reject trap and a converter, you'll have all the security you need.

If you are rejected . . . so is their Pay TV Signal.

If a block is sold . . . simply remove the trap.

And if at some future date you wish to expand to additional premium channels and programming it's easy to do with VITEK Single or Multi-Channel Traps.





- Forget about illegal converters or varactor-tuned TV sets.
- Forget about maintenance, returns, "lock-outs", loaners and other TV security problems.

With Vitek you get maximum security . . . with maximum flexibility . . . at minimum expense.

That's an offer no one can reject.

For additional information, call or write:

VITEK

VITEK Electronics, Inc.
4 Gladys Court, Edison, NJ 08817
(201) 287-3200 TELEX-VITEK-EDIN

then demodulated to provide the combined video/audio signal. This signal is fed to an IF modulator and then to an IF switcher which routes the signal to the appropriate channel converter.

Optical Cable

The 3.56-mile aerial cable has four graded-index optical fibers and two copper wires. Each fiber is enclosed in a loose buffer tube filled with a viscous polyurethane compound to protect the fiber from moisture and freezing.

The optical cable specifications are:

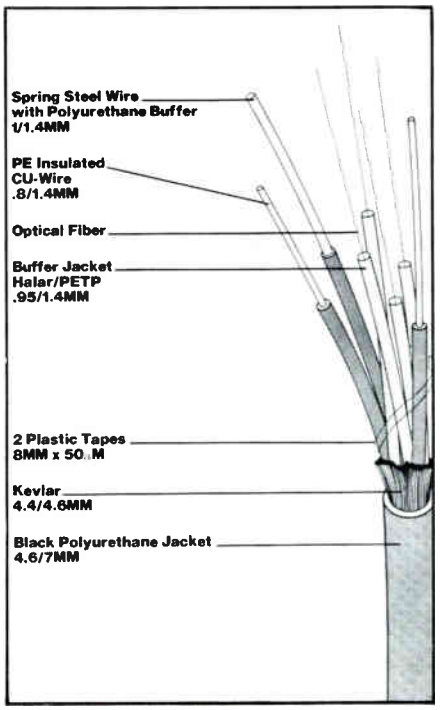
• Maximum attenuation at 820 nm	6.5 dB/km
• Bandwidth at 1 km (-3 dB optical)	500 MHz
• Cable Weight	64 kg/km
• Operating Temperature Range	-35 degrees C/+50 degrees C
• Radial Ice Loading	13 mm
• Tensile Strength	1,000 N (225 pounds)
• Reel Length	3 km

The cable construction begins with a steel wire central member around which the buffered fibers and copper wires are helically stranded. The spaces between the fibers, copper wires and steel strand are also flooded with the polyurethane compound. This cable core is reinforced with layers of Kevlar® yarn and enclosed in a polyurethane outer jacket.

The optical cable was specified and installed in such a way that the system can be expanded at a later date.

"The potential of fiberoptics is truly mind boggling," remarked Ostermiller. "It is the root of an eventual era of two-way television communications. With fiberoptics and cable television," he added, "people will one day be able to do all of their shopping, banking and even browse through the library without leaving their living room TV set."

Ostermiller explained that such uses are years in the future, but experience gained from the Joplin/Webb City venture might hasten their advent. Initial fiberoptics benefits to local cable television viewers in Joplin will be signal reliability and clarity. C-ED



A cross-sectional drawing of Siecor's fiberoptic cable.

The CR-1 gives you a radiation alert.

■ If you have no radiation the CR-1 is quiet. When a signal from the ST-1C transmitter is detected the alert lights flash and the audio tone is heard. The complete CR-1 and ST-1C system is only $495.00, and it is a time saver.

Write or Call Today

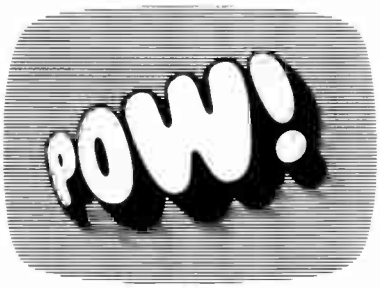
MSC
MID STATE Communications Inc.
174 South First Ave.
Beech Grove, Indiana 46107
(317) 787-9426

EASTERN MICROWAVE DECLARES

WOR!

VIA SATCOM 1 - TRANSPONDER 17, EFFECTIVE APRIL 1979

EASTERN MICROWAVE, THE NORTHEAST'S LEADING COMMON CARRIER, IS NOW PROVIDING THE SATELLITE SIGNAL OF WOR-TV, NEW YORK, FOR YOUR CABLE SYSTEM



WOR Leads the Assault On Boredom

WOR-TV offers full range programming that includes movie classics, popular original shows and sports. The incomparable sports line-up includes baseball, basketball, hockey, soccer and football, and makes for a strong schedule and loyal viewers.

WOR On Target With Real Alternatives

WOR has years of experience offering alternatives to its audiences in the most competitive entertainment market in the world ...metro New York. They offer top rate, station produced programming that draws an audience throughout the broadcast day.

NOW AVAILABLE FROM EASTERN MICROWAVE— THE VARIETY YOUR SUBSCRIBERS DEMAND

WOR Takes Command, Captures Profits

Very significant subscriber increases have been recorded by cable systems that have added WOR via Eastern Microwave. It takes a great independent to be a success in the biggest, most competitive market in broadcasting.

See Eastern Microwave at booth #191, NCTA Show, or call Sam Morse or Charlie Mills at (315)455-5955.

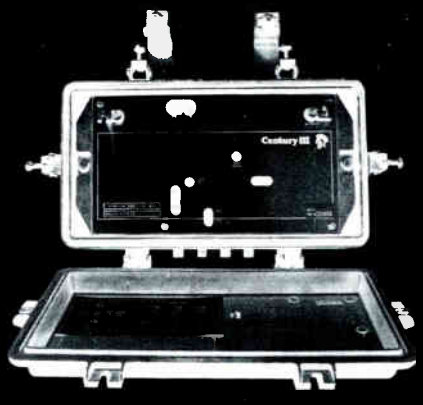
EASTERN MICROWAVE, INC.

3 Northern Concourse
P.O. Box 4872
Syracuse, NY 13221

Century III's Line Amplifiers

"Where Quality Never goes out of style"

2109B



2130B

2190B

Century III Distribution Amplifiers are Field-Proven, competitively priced and available now, with fast delivery.

- Rugged Die Cast Aluminum Alloy Housing is common to all three Models.
- Positive Closure of the housing is obtained by the use of standard 7/16 hex-head stainless steel captive bolts mated to specially designed stainless steel pivoting hinges at six carefully selected locations.
- Connector Entries are stainless steel bushings, locked into the housing to prevent stripping of housing and connector threads.
- Universal seizing mechanism allows the use of direct-entry or centre-seizing connectors.
- Integrity for both RFI and moisture is assured by the combination monelmesh/silicon-rubber gasket.
- Simplicity of installation and servicing results from one single die-cast aluminum alloy module containing all electronics and retained in the housing by two standard 7/16 stainless steel hexhead captive bolts.
- Inter-changeability allows choice of three modules in one housing for specific system requirements.
- Ordering information — Please specify bandwidth, pad and equalizer values, and AGC pilot carrier where required.

Models Available

2109B-11	MGC Station, Single Output, Built-in Multi-Tap
2109B-12	MGC Station, Dual-Output (Splitter), Built-in Multi-Tap
2109B-13	MGC Station, Dual-Output (Directional Coupler), Built-in Multi-Tap
2103B	MGC Station, Single Output
2190B	AGC Station, Single Output

Century III

Century III Electronics, Inc.

Head Office–Canada
1580 Rand Avenue
Vancouver, B.C.
V6P 3G2
Tel: (604) 263-0911
Telex: 04-55490

Head Office–U.S.A.
3880 E. Eagle Drive
Anaheim, California
92807
Tel: (714) 630-3714

Central Canada
#13–5200 Dixie Road
Mississauga, Ontario
L4W 1E4
Tel: (416) 625-6263
Telex: 06-961359

Eastern Canada
8439 Dalton Road
Town of Mount Royal
Montreal, Quebec
H4T 1V5
Tel: (514) 739-1976
Telex: 055-61633

Europe
Electro Service N.V.
Belgium Telex 46-34093
Richard Hirschmann Electric
Austria Telex 47-52239

See us at Booth #5 at the N.C.T.A.

TAPS OR TRAPS?

By Michael McKeown
Liberty Communications
Portland, Oregon

I would like to share my thoughts regarding pay-TV security, the use of addressable taps in converter and non-converter equipped systems, and the economics of addressable taps.

There is a wealth of information available regarding pay-TV security. I will not attempt to review this or judge which method is the best but only list the options available. Active protection of the premium service includes several electronic scrambling techniques. Where an active descrambler is used, it is often incorporated with a converter which may include two or three channels or up to 40 channels. A separate electronic descrambler is available from at least one manufacturer for outdoor or indoor use. Another type of scrambling places an interfering carrier at approximatley 2.25 MHz above the video carrier and provides picture and sound scrambling. A trap is used at the tap or at the set to remove the objectionable carrier. This trap is popularly known as a "positive option" trap.

Passive protection of the premium signal takes places when a notch filter or bandstop filter is placed at the tap to prevent the signal from reaching the basic subscriber's television. This unit is often called a "negative option" trap.

Both an interfering carrier and a "negative option" trap are available as options to the addressable tap with its basic service on-off function. The ability to turn a subscriber's basic service on and off, from the office or headend, is a cable operator's dream come true. Not only can service begin, possibly without a visit by an installer, but it can be terminated when the customer moves or becomes a nonpay. Many new marketing techniques become possible, such as providing previews of the basic service.

When the addressable tap provides pay channel control, not only can the service be handled on a monthly basis, but it can provide "per program" viewing and billing of pay programs. Impulse buying of basic and premium services is possible in a system equipped with addressable taps.

In most cable systems carrying more than 12 channels a converter must be used. Today's major market systems can typically handle 35 channels and use a converter costing from $40 to $60. When a customer disconnects in such a system, the recovery of the converter by the cable operator, becomes the highest priority. If the converter is not recovered, it represents an immediate financial loss and, potentially, loss of future revenues. This loss can occur because of unauthorized second outlets, illegal tapping into a neighbor's drop, a disconnect not actually performed, or for several other reasons. If an electronic descrambler is incorporated into the converter, the exposure to loss of future revenues becomes even greater since the unauthorized reception of pay services can occur. All of this points to the need, in one way or another, for a visit to the customer's home when the customer starts service. Even in a 12-channel system, without a converter, it is probably necessary to visit the customer's home when they begin service. The addressable tap's greatest advantage, in a converter equipped system, would seem to be the ability to deliver pay services on a per-program basis.

Assuming you opt for addressable taps, how much does all of this cost? The cost of a four-output addressable tap is approximately $130 with basic service on-off capability. With one channel of premium service control, it is $160 and with two channels it's approximately $188 for each four-output tap. A non-addressable four-output tap costs approximately $7. A negative option trap installed at the tap is also about $7. For one channel of pay service the added cost of an addressable tap is about $38 per home passed. In a system serving 40 percent of homes passed with a pay-to-basic penetration of 60 percent, the added cost per subscriber for the use of an addressable tap versus the use of a conventional four-way tap and negative option trap is approximately $91.

The operating costs of an addressable tap system should be considerably less than a conventional system and, while I have not attempted to analyze that here, the addressable tap manufacturers have excellent outlines available to calculate this difference.

The costs are high for an addressable tap and one wonders if there are viable alternatives, especially for delivering per-program pay service. Several manufacturers are working on addressable converters which would allow on-off control of the converter and per-program of pay. Theft of a converter would no longer pose the threat of loss of future revenues since the converter would simply not work without an authorization code from the cable operator. If the added cost of incorporating addressability into converters is not too great, it could not only provide per-program pay, but also help the converter control problem.

Addressable taps offer some exciting operating possibilities but, because of their cost, an operator should consider the alternatives before making that costly financial decision.

TRAPS OR SMART TAPS?

By Hugh Bramble
Staff Engineer
UA-Columbia Cablevision Inc.

Sounds like an easy question doesn't it? Unfortunately it is sort of an apples and oranges type. Besides, what about convertors, or descramblers, or positive traps, or what job did you have in mind? Now that everyone else is as confused as the author, let's see if there is a way to define the problem so that an answer is possible. For this article we will ignore the question of how good, or how reliable the various vendors' equipment is, and presume that each type of security system will perform according to its published specifications.

The most basic question is "What job needs to be done"? Some secondary questions are: 1) Is the long-term requirement for only one protected channel or will it be desired to protect more than one channel in the forseeable future? 2) What is the cable theft potential in the area to be served? (A 1,000 subscriber system in a retirement community is probably different than an area bordering a military electronics base). 3) What is the existing churn for basic subscribers? 4) What is the projected churn for pay subscribers? 5) What penetration of pay subscribers is anticipated? 6) Are convertors in use in the system now or will they be in the future? 7) What type of auditing procedure will be used? 8) Will the channel ever be used for non-secured services? 9) What employee turnover rate is to be expected? 10) Does the system operator or the subscriber own the convertor? After somehow getting answers to these questions we can then procede toward a solution.

In high churn areas it might pay to investigate the smart tap approach. A full economic analysis will have to be made. Outlines of how to do this are available from your favorite vendor. If the economics seem to work, some thought about convertor use and auditing, are in order. Remember that when a disconnect on either full service or pay service is done with a smart tap, there is no person around for the subscriber to vent his wrath on. If your terminal equipment is available, it might be the object of revenge under these conditions. If the subscriber owns the convertor or no convertor is used, an iron-eared phone person should be located and put on the payroll immediately! Note also that the audit is now done totally by the computer and the only way to field check it is to measure signal levels in each drop. It sounds really good to have the computer in charge unless your boss is paranoid about them or unless the smart tap fails in the "on" mode. Employee turnover and outside technical skill should not be a problem with this plan.

Presuming that the churn data did not indicate that smart taps were right for the conditions, a look at the other answers may again be used to lead us. For the sake of convenience (and our paychecks), let's start with the economics part of the problem. If the projected penetration for the pay service is high, traps may be the answer. Remember that the garden variety trap will not allow reuse of the channel and expansion to more channels later could require another visit to each non-subscriber of the second pay service.

A word of caution about employee turnover; it is not now common practice to account fully for the traps as they are installed. As a consequence of this, employees could easily get extra traps which could be modified to not be traps. This could confuse the results of any ordinary audit. Because of this problem, and the fact that the ordinary failure mode for traps is to pass signal, routine trap effectiveness tests should be run and operational procedures modified so that all service calls include checking for presence of the pay signal in the non-subscribing home.

If none of the above answers suits the conditions, and/or the anticipated penetration is small, the descrambler is an available choice. This generic term includes all things which must be in place in order to deliver the pay service. They can range from simple to very complicated depending on price. If the system in question is the previously mentioned 1,000 subscriber retirement community, and employee turnover is small, a simple mid-band convertor might be effective. The main point is that possession of the device allows reception of the service; therefore strict accounting from day one for all boxes is mandatory! Expect theft rates from vehicles and even the warehouse to go up. Auditing the system becomes virtually impossible. In exchange for these bad points, depending on the vendor, several channels can be protected for one price. The military electronics techs will have a more difficult time and the channel can be reused.

Oh yes, back to that title question. The answer is: Whatever suits you tickles me plumb to death!

SCI

SPECIALISTS IN

SATELLITE VIDEO RECEIVERS

The SR-4000 and SR-5000 Satellite Video Receivers provide quality picture and sound reception of satellite television transmissions. They have been specifically designed to cost/performance criteria for CATV earth stations.

The SR-4000 is a fully agile, synthesized 24 channel selectable model. The transponder number is selected by thumbwheel switches on the front panel with LED readout of the selected transponder number.

The SR-5000 is the fixed channel version with provision for transponder selection by a crystal change and selection of a bianary code on a five position dip switch.

Both units are compact with module interchangeability between unit types except for synthesizer/L.O. source modules. They each have phase-locked loop demodulators to provide excellent FM threshold performance.

The compact design of these units allows two complete receivers to be mounted in a standard 19 inch rack only 3½ inches high. This feature minimizes the rack space required for multiple receivers when several satellite transponders are to be utilized.

A unique feature of these receivers is the availability of a second subcarrier demodulator. This feature is pre-wired on all units so that the addition of a printed circuit card can provide a second subcarrier for audio, slow scan TV or other software which may be offered by the programming originators.

The SCI receivers were specially engineered to provide simple methods for testing in an operational environment. A meter and selector switch on the front panel permit the monitoring of critical voltages and the IF monitor output is available at the front panel to facilitate C/N testing. An AGC/MGC switch and a manual gain adjustment are located on the front panel to further facilitate testing. The rear panel contains an auxiliary video output to allow monitoring of video performance without disrupting programming and an extra pair of audio outputs to facilitate audio monitoring.

Scientific Communications, Inc.

SPECIALISTS IN MICROWAVE RECEIVER TECHNOLOGY
3425 Kingsley • Garland, Texas 75041
214-271-3685 • Twx: 910-860-5172

"See us at the NCTA in Las Vegas"

CARS Band Microwave System Planning

By Cliff Fields
Farinon Video
San Carlos, California

Community Antenna Relay Service Systems (CARS) can be classified into four types:

- Distant signal pick-up (importation)
- Local distribution
- Portable remote pick-up (local origination)
- System interconnect

I will discuss distant signal pick-up first since I believe that it has more factors that may bring about sub-standard performance or outright failure.

More than line-of-sight is required for a good microwave path. One should plot the path on 7.5 minute topographic maps from the U.S. Geological Survey, then profile the path allowing clearance over all obstructions for:

- 0.6 fresnel zone radius
- "K" factor
- Tree growth allowance

The fresnel zones are a series of concentric ellipsoids surrounding the path. The first fresnel zone at any point represents the point where the distance between the antennas for signal passing through that point is exactly one-half wavelength longer than a straight line between the two antennas. The second fresnel zone represents the point off the straight line where the reflected signal would travel one full wavelength longer. It might help to think of the signal path and its fresnel zones as an elongated football in space.

The K Factor

The amount and direction of bending undergone by the microwave beam is defined either by the refractive index gradient or, more often, by the effective earth's radius factor K. This factor, multiplied by the actual earth radius, gives the radius of a fictitious earth curve. The curve is equivalent to the relative curvature of the earth; that is, it is equal to the actual earth's curvature minus the curvature of the beam of microwave energy. Any change in the amount of refraction caused by atmospheric conditions can then be expressed as a change in K.

Normally the beam is bent downward so that the "K" factor falls in the range between 1.2 and 1.6. Atmospheric conditions can change so that the beam is bent downward to the point where the beam follows the curvature of the earth (K = infinity) and beyond (negative values of K). Also, under some conditions the beam is bent upward making the K factor less than one. It is necessary to engineer the path for a minimum value of K which will be passed for only a small percentage of the time.

Exempting multipath fading changes in K from one to infinity has little influence upon the received signal level of a properly engineered microwave path. Anomalous propagation occurs outside of this "normal" range of K. With K less than one, the path could become obstructed and vulnerable to extreme multipath fading. When negative values of K occur, the path may become trapped and susceptible to blackout fading.

Path Profile and Obstruction Clearance Calculations (Flat Earth Method)

Many methods exist for representing point-to-point radio path clearance between two locations on the earth's surface. The method presented here offers the highest degree of accuracy and greatest flexibility. The advantages of this method are:

1. Profiles are made on linear graph paper.
2. Any combination of vertical and horizontal scales can be used.
3. Equivalent earth curvature is provided for exact area "K" factor.
4. Tower height determination is made using straight line display on profile graph.

Tower height calculations are made by the following procedure:

1. Plot path profile on linear graph paper from area topo-

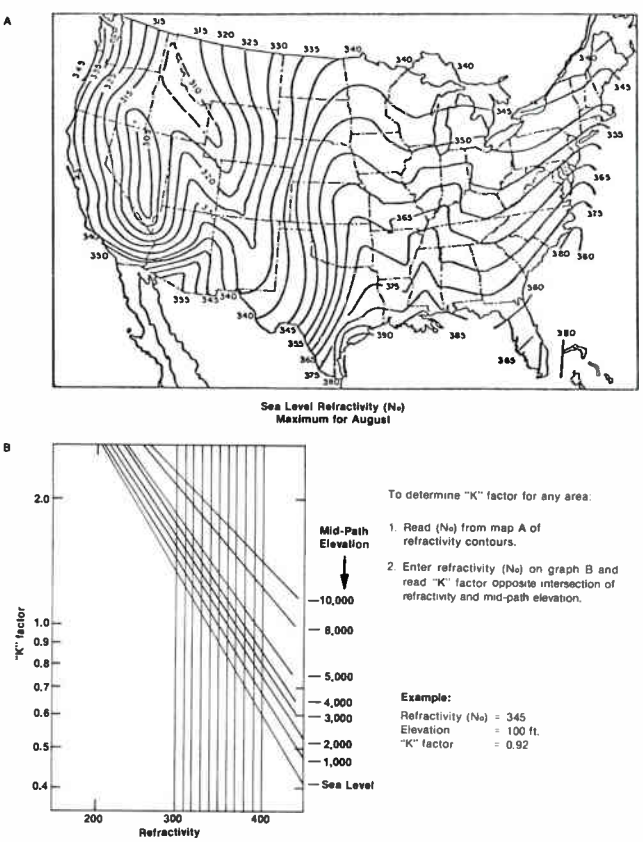


Figure 1: "K" factor.

graphic maps using any convenient scale of path miles and feet of elevation.

2. Locate critical point(s) and list the distance from transmitter to each critical point (d1) and distance from each critical point to receiver (d2). Example shows four points: "A," "B," "C," and "D."
3. Determine area "K" factor from refractivity map, Figure 1. (Example: "K" = .92.)
4. Assign tree clearance and growth allowance to critical point(s) based on knowledge of local tree conditions, field survey, etc. (Example shows 40-foot trees and 10-foot growth allowance.)
5. Determine fresnel clearance required above each critical point from Figure 2 and plot on profile above tree allowance.

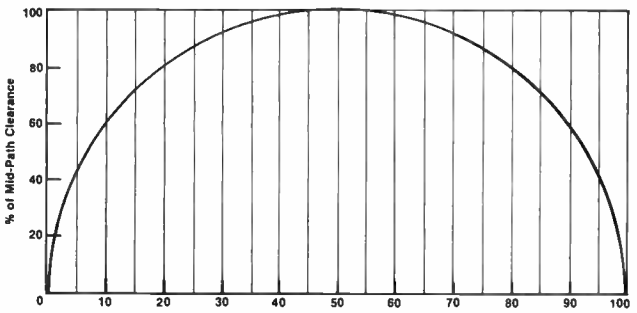


Figure 2: Percent of total path length.

6. Compute equivalent earth curvature clearance for each critical point by satisfying the following equation for each point:

$$E.C. = \frac{.66\,(d_1) \times (d_2)}{K}$$

where E.C. = Earth curvature in feet
D_1 and D_2 = Distances in miles

(Example: equivalent earth curvature for critical point

$$\text{"A"} = E.C. = \frac{.66\ 7.5 \times 28.5}{92} \quad 155 \text{ feet})$$

7. With all clearance requirements plotted on the profile, determine minimum tower heights by drawing a straight line from terminal to terminal through mid-path critical path clearance(s). Example shows two possibilities:
   - for clearance above critical points A and B towers are 120-feet and 290-feet.
   - for clearance above critical points B and C towers are 210-feet and 205-feet.

   Caution: When using large scales, be careful not to overlook any possible critical point. A quick observation of the example would give the impression that point "D" would be the critical point; however, point "C" is actually the critical point.
8. If the microwave path includes an over-water area, adjust tower heights to avoid multipath reflections (Figure 3).
9. Using Table A, read mid-path clearance.
10. Determine distance from transmitter (or receiver) to critical point; convert to percentage of total path length.
11. Using Figure 2, locate intersection of curved line and applicable percent total path length. Read percent of mid-path clearance. (Example: 16.6 percent = 76 percent.)

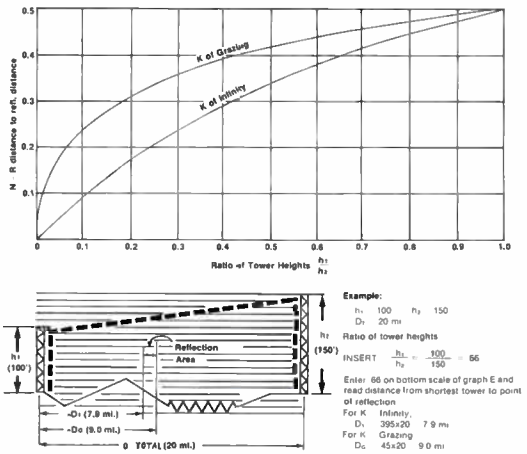


Figure 3

12. Multiply mid-path clearance derived from Table A and Figure 2.
13. Round off this result to nearest whole number and enter on profile plot.

When the microwave path includes an over-water area, care should be exercised to avoid possible multipath reflection. The area in which a reflection can occur falls between points along the path for variations of "K" factor from infinity to grazing. This area will be located along the path between the shortest tower and the path midpoint. To determine the area over which such reflections can occur, enter the ratio of tower heights (shorter tower height in the numerator) into the bottom scale. Opposite the intersection of the tower height ratio with the "K" of infinity and "K" of grazing curves, read the distance to points of reflection in percentage of total distance away from the shorter tower. The objective is to adjust tower height requirements to locate the reflection area on land areas where the reflected energy will be broken up or scattered.

0.6 Fresnel Zone Radius Mid-Path Clearance in feet
CARS Band 12.8 GHz.

Miles	0.6 Fresnel Zone (feet)
2	9
4	12
6	15
8	17
10	19
12	21
15	24
20	27
25	30
30	32
35	35
40	38
50	43
60	47
70	51
80	54

$$0.6F = 43.25\sqrt{\frac{d_1\ d_2}{FD}}$$

Table A

If 100 percent or more of the fresnel zone is unobstructed and the terrain at that point along the path is properly oriented, the possibility of signal reflections exists. These reflections are similar in nature to reflections of light from a

Somewhere in this picture there's a trouble shooter aimed straight at you.

You'll find an HBO regional manager, a real life original of the people in this picture, right near your market.

They understand your home territory because it's their home territory too.

If you're not an HBO affiliate, they're the people to contact. They'll explain exactly how profitable HBO can be to you. And handle all the details when you're convinced.

They can work with you personally to develop a launch marketing campaign customized to your needs. They can hold orientation sessions to familiarize you and your staff with HBO service. And they'll personally do all they can to help you launch HBO in your system.

If you're already an affiliate, you know that these people can help you with on-going marketing programs to enlarge your subscriber base and increase your profits.

They're on our payroll, but they work for you.

Call one of our eager-to-help VP/General Managers: Peter Frame (212) JU6-1212; Bill Hooks (214) 387-8557; Don Anderson (415) 982-5000.

HBO

You know us. We know you.

flashlight off of a mirror, and can be caused by flat surfaces such as: fields, water, parking lots, buildings, signs, etc.

These reflections can cause possible microwave signal enhancements or cancellations depending upon the phase relationship between the main signal and reflected signal. If the reflective terrain along the path is hidden from either antenna, reflections cannot occur even though 100 percent of the signal is unobstructed. A possible reason for both sites not being able to see the reflection would be if buildings were located in the reflective path.

The two most common reflection problems are reflections from the side of large buildings, particularly metal or one-way glass buildings in the larger cities, and reflections from water in lakes and bays. Transmission of microwave signals over water can be very difficult, particularly over tidewater. As the tide rises and falls, the length of the reflected path changes, causing the signal to change from above normal to cancellation. There are several methods to make an over-water path work—to locate the antennas so that the reflected signal is blocked by a building, storage tank, billboard or thick pine trees. Another method is to adjust the antenna heights so that you have a high-low shot—for instance, a 400-foot tower on one end looking at a ten-foot tower at the other end. With such a high-low antenna system, the reflection point will move toward the lower antenna. If this lower antenna is near the shore, an operator might consider moving to another location farther inland, thereby moving the reflection point at the same time.

Reflections are worse when the water is smooth—when the water is rough, it is non-existent. Slight movement in the water will cause rapid changes in receive signal levels. If AM modulation is used, rapid changes in level will show up as modulation changes similar to airplane flutter. With an FM modulation microwave system, the flutter will still show up but to a lesser degree. Now that we have profiled the path and have determined the tower heights, we can do the path calculations. Table B lists antenna gains and waveguide and radome losses for CARS band frequencies. Table C shows the gain or loss of various size passive reflectors which may be tower-mounted to eliminate long waveguide runs. The Federal Communications Commission discourages the use of tower-mounted passive reflectors so these devices should be avoided in your plans unless doing without tower-mounted passives would lower the reliability of the system to a point that just could not be accepted.

Diameter in Feet	Gain - dB
2	35.5
4	41.5
6	45.0
8	47.5
10	49.0

Waveguide Loss

PE-122 or EW-122 elliptical	4.2 dB per 100 ft.
WC-109 circular	1.25 dB per 100 ft.
WR-75 flexguide	1.0 dB per 10 ft.

Radome Loss

Unheated Diameter in Feet	Loss - dB
2	1.2
4	1.4
6	1.5
8	1.7
10	1.8
Heated Diameter in Feet	**Loss - dB**
2	1.4
4	1.6
6	1.8
8	2.0
10	2.2

Table B: Antenna gains for estimating purposes.

Antenna To Reflector Separation in Feet	Four Foot			Six Foot		
	4' x 6'	6' x 8'	8' x 12'	6' x 8'	8' x 12'	10' x 15'
100	-1.6	+1.2	0	-1.0	-0.8	-0.1
125	-2	+1.4	+0.7	-1.15	0	-0.1
150	-2.5	+1.6	+1.1	-1.2	+0.2	0
175	-3.3	+1.5	+1.2	-1.25	+0.3	+0.4
200	-3.8	+1.2	+1.4	-1.43	+0.4	+0.7
225	-4.3	+0.7	+1.5	-1.6	+0.5	+1.0
250	-4.8	+0.4	+1.6	-1.8	+0.6	+1.2
275	-5.5	0	+1.6	-2.0	+0.6	+1.3
300	-5.8	-0.8	+1.5	-2.2	+0.5	+1.4
325	-6.3	-1.2	+1.4	-2.4	+0.4	+1.5
350	-6.8	-1.6	+1.3	-2.7	+0.3	+1.5
375		-2.0	+1.0	-3.0	+0.1	+1.6
400		-2.4	+0.8	-3.2	-0.2	+1.6
425		-2.7	+0.6	-3.5	-0.4	+1.6
450		-3.0	+0.3	-3.7	-0.7	+1.5
475		-3.3	0	-4.0	-1.0	+1.5
500		-3.6	-0.3	-4.2	-1.3	+1.4

Table C

Another thing that should be considered in CARS band microwave planning is the effect of antenna decoupling. Antenna decoupling is a condition brought on by super refractive atmospheric conditions that cause the microwave beam, which normally travels in a straight line between the two antennas, to actually leave the transmit antenna at a different angle, go through bending in space, and actually enter the receive antenna from a high angle such as might make the receive antenna believe that the transmit antenna had just been raised a couple of thousand feet. This condition occurs in areas that have hot, humid atmospheres supported by swamps, irrigated land or other nearby warm bodies of water.

Antenna decoupling refers to a partial or complete loss of signal that occurs when a direct ray moves vertically off the peak of the main lobe of either or both the transmit or receive antennas. The antennas are temporarily misaligned to the incoming wave front. The antennas should be aligned, and usually are, to the direct ray, since antenna decoupling rarely occurs during daylight hours. The exception is a cool, windy day when air temperature decreases as altitude increases. This causes the warm air near the ground to rise and mix with the cooler air aloft. In all areas of the country, regardless of the K factor used in system calculations, the normal K factor, in effect for something like 98 percent of the time, is between 1.2 and 1.6, indicating standard atmosphere. Therefore, it can be expected that the initial antenna alignment will occur under this condition of K factor. This means that both antennas will be pointed slightly downward. Then, if under super refractive conditions the actual K factor should increase to infinity or go beyond into negative values during nocturnal hours, a major upward change in the ray departure angle and the ray arrival angle results.

If the antenna beam widths are narrow and the path is long, the angular change causes antenna decoupling or "misalignment." Narrow beam widths are characteristic of larger antennas used in the CARS band. A ten-foot diameter parabolic antenna used in the CARS band has a half power beam width of ± 0.25 degrees. If such an antenna were aligned during a K = 1.2 standard propagation period, then

Manpower, Engineering, Construction, and Equipment Rental

Now for the first time, total services available from one experienced source for installation or expansion of your satellite earth station facilities.

USC DOES IT ALL!

- Feasibility and field studies
- All FCC filings and legal work
- Hardware recommendations
- Hardware purchases
- Construction supervision
- Complete testing
- Turn-on and training
- Equipment rental

You can save time and money by using all or any part of USC's years of experience in satellite and microwave technology. AND if you're using or preparing to use No. 1 independent television WGN from Chicago on Satcom I, Transponder Three, we'll have special rates to help you TURN ON QUICKER!

CALL TOLL FREE TODAY: 1-800-331-4806
IN OKLAHOMA COLLECT: 1-918-749-8811

EQUIPMENT RENTAL RATES

SCIENTIFIC ATLANTA

Model 414 frequency agile receivers

$30 per day
Maximum charge: $600 monthly
Minimum charge: $60

120° Low Noise Amplifiers
$15 per day
Maximum charge: $160 per month
Minimum charge: $75

AND ASK FOR:

Tom

John

Shaun

United Satellite Corp.
5200 South Harvard ● Suite 4-D ● Tulsa, Oklahoma 74135

A Subsidiary of United Video, Inc.

the upward change in arrival angle for K = -1 super refractive atmosphere would be .5 degrees over a 30-mile path. A 14 dB power fade in received signal level would result. If the atmospheric conditions changed to produce a K = -0.5 factor, the arrival angle would move upward .8 degrees and a 30 dB power fade would result. Atmospheric conditions producing K = -0.5 factor are not uncommon in some areas. Large antennas and large passive reflectors, which have even narrower bandwidths than antennas, may have to be avoided entirely in some areas. Antenna decoupling has been identified as a major cause of severe nighttime fading on several microwave paths. On several paths it has been corrected by first carefully aligning the antenna for maximum received RF signal then elevating the orientation of each dish for a 2 dB loss. In other words, an operator would purposely misalign the antenna for a slight loss during normal atmospheric conditions so that the beam would have to bend upward to a much greater degree in order to cause a complete outage. The following points might be used as a checklist to avoid antenna decoupling problems:

- Avoid narrow beam width antennas and passive reflectors on long paths over (a) basin-like characteristics; (b) areas with extensive irrigated lands, swamps or bodies of warm water; and (c) areas parallel to coastlines, rivers, lakes or other bodies of water.
- If decoupling is suspected, antenna alignment must consist of more than simply orienting for maximum RF receive level. The antennas should be aligned to the peak then elevated for a 2 dB loss. The alignment should be done during stable, non-fading daytime periods. Both antennas should be aligned in this manner.

  One point worth mentioning is that this upward tilt will provide increased discrimination against reflections coming in at a low angle. If antenna orientation is not completely effective, then the only choice left is to reduce the size of one or both antennas. If all else fails, you could put in a space diversity system where you use two receivers with automatic switching and the antenna for one of the receivers could be aligned high by an angle equal to two times the half power beam width.

An interesting correlation exists between microwave propagation conditions and chimney smoke. If the smoke rises vertically, propagation conditions are good; if smoke bends and travels parallel to the earth or has a downward movement, conditions are conducive to a microwave propagation environment which will cause antenna decoupling.

The path calculations shown in Tables D and E were made for radio equipment which had +27 dBm output power at the transmitter. The transmitter uses FM modulation and a deviation of ± 4 MHz and employs CCIR 525 line television pre- and de-emphasis. The receiver noise figure is 9 dB and the practical threshold is -79 dBm. Practical threshold is defined as that point where the signal-to-noise equals 37 dB.

All signal-to-noise ratios in this discussion will be considered to be EIA weighted. At some point below the practical threshold, the "FCC threshold" occurs. This is the point where the one-to-one relationship between carrier-to-noise and signal-to-noise deviates by 1 dB.

Tables D and E are sample path calculations for a system that would be used to import an eastern Pennsylvania TV signal into Newark, New Jersey. Here the towers have been mounted on high ground, with the exception of the one in Newark which is mounted on a building, and both paths are dish-to-dish.

Farinon

PATH LOSS AND FADE MARGIN CALCULATIONS FOR VIDEO LINE-OF-SIGHT MICROWAVE SYSTEMS

Customer/System: Newark CATV — Project ID:
Engineer: Cliff Fields — Frequency: 12906.25 MHz — Date: 3/6/79
Radio Equipment Type: SS12000VC — Configuration: Single Channel Simplex

		Mt. No More	Woods Tavern
SITE DATA	1. Site ID		
	2. Latitude	40 ° 47 ' 13 "	40 ° 30 ' 11 "
	3. Longitude	75 ° 03 ' 09 "	74 ° 41 ' 04 "
	4. Azimuth (From True North)	135 ° 14 ' 18 "	315 ° 28 ' 41 "
	5. Site Ground Elevation (Ref. MSL) . . ☐ Mtrs. ☒ Ft.	1843	531
	6. Tower Type/Height (Note #1) . . . ☐ Mtrs. ☒ Ft.	SS/90	SS/130
PATH DATA	7. Path Length . . . . . ☐ Km. ☒ Mi.	27.531	
	8. Free Space Path Loss . . . . . dB	147.6	
	9. Obstruction Loss . . . . . dB		
OUTSIDE PLANT LOSSES	10. Transmission Line Type/Length . . ☐ Mtrs. ☒ Ft.	PE-122/100	PE-122/150
	11. Transmission Line Loss . . . . . dB	4.3	6.5
	12. Jumper Connection Type/Length . ☐ Mtrs. ☒ Ft.	Flex/2	Flex/2
	13. Jumper Connection Loss . . . . . dB	0.2	0.2
	14. Antenna Radome Type/Loss (Note #2) . . . dB		
EQUIPMENT LOSSES	15. Transmitter Standby Switch Loss . . . . . dB		
	16. Receiver RF Hybrid Loss . . . . . dB		
	17. Transmitter Power Splitter Loss . . . . . dB		
	18. RF Branching Loss . . . . . dB		
	19. Misc. Connector and Safety Factor Losses . . dB	1.0	1.0
	20. Total Losses (Sum of 8 thru 19) . . . . . dB	160.8	
SYSTEM GAINS	21. Antenna Polarization/Size (Note #3) . ☐ Mtrs. ☒ Ft.	V/6	V/6
	22. Antenna Height (Ref. Line 5) . . . . ☐ Mtrs. ☒ Ft.	85	125
	23. Periscope Reflector Type/Dim. (Note #4) ☐ Mtrs. ☐ Ft.		
	23A. Antenna-Reflector Separation . . . ☐ Mtrs. ☐ Ft.	45.0	45.0
	24. Antenna System Gain . . . . . dB		
	25. Total Antenna Gain . . . . . dB	90	
	26. Transmitter Power . . . . . dBm	+27	
	27. Total Gains (25 + 26) . . . . . dBm	117	
	28. Unfaded Received Signal Power (27 − 20) . . dBm	-43.8	
SIGNAL & MARGIN	29. Required Received Signal Power for 37 dB P-P Signal/RMS Noise - CCIR Weighted . . . dBm	-78	
	30. Available Fade Margin (29 − 28) . . . . . dB	34.2	
	31. Propagation Reliability, Rayleigh Fading . + Rain %	99.96	

NOTES: 1. SS — Self Supporting; G — Guyed; R — Roof Frame. 3. V — Vertical; H — Horizontal. 2. U — Unheated; H — Heated; Y — Hypalon Type. 4. F — Flat; C — Curved.

Form 7325. Printed in USA

Year Outage - rain 130 minutes
multipath 60 minutes

16

Table D

Farinon

PATH LOSS AND FADE MARGIN CALCULATIONS FOR VIDEO LINE-OF-SIGHT MICROWAVE SYSTEMS

Customer/System: Newark CATV — Project ID:
Engineer: Cliff Fields — Frequency: 12806.25 MHz — Date: 3/6/79
Radio Equipment Type: SS12000VC — Configuration: Single Channel Simplex

		Woods Tavern	Newark
SITE DATA	1. Site ID		
	2. Latitude	40 ° 30 ' 11 "	40 ° 42 ' 37 "
	3. Longitude	74 ° 41 ' 04 "	74 ° 11 ' 11 "
	4. Azimuth (From True North)	61 ° 12 ' 31 "	241 ° 31 ' 58 "
	5. Site Ground Elevation (Ref. MSL) . . ☐ Mtrs. ☒ Ft.	531	80
	6. Tower Type/Height (Note #1) . . . ☐ Mtrs. ☒ Ft.	SS/130	Bldg./283
PATH DATA	7. Path Length . . . . . ☐ Km. ☒ Mi.	29.841	
	8. Free Space Path Loss . . . . . dB	148.3	
	9. Obstruction Loss . . . . . dB		
OUTSIDE PLANT LOSSES	10. Transmission Line Type/Length . . ☐ Mtrs. ☒ Ft.	PE-122/150	PE-122/50
	11. Transmission Line Loss . . . . . dB	6.5	2.2
	12. Jumper Connection Type/Length . ☐ Mtrs. ☒ Ft.	Flex/2	Flex/2
	13. Jumper Connection Loss . . . . . dB	0.2	0.2
	14. Antenna Radome Type/Loss (Note #2) . . . dB		
EQUIPMENT LOSSES	15. Transmitter Standby Switch Loss . . . . . dB		
	16. Receiver RF Hybrid Loss . . . . . dB		
	17. Transmitter Power Splitter Loss . . . . . dB		
	18. RF Branching Loss . . . . . dB		
	19. Misc. Connector and Safety Factor Losses . . dB	1.0	1.0
	20. Total Losses (Sum of 8 thru 19) . . . . . dB	159.4	
SYSTEM GAINS	21. Antenna Polarization/Size (Note #3) . ☐ Mtrs. ☒ Ft.	H/6	H/6
	22. Antenna Height (Ref. Line 5) . . . . ☐ Mtrs. ☒ Ft.	125	280
	23. Periscope Reflector Type/Dim. (Note #4) ☐ Mtrs. ☐ Ft.		
	23A. Antenna-Reflector Separation . . . ☐ Mtrs. ☐ Ft.		
	24. Antenna System Gain . . . . . dB	45.0	45.0
	25. Total Antenna Gain . . . . . dB	90	
	26. Transmitter Power . . . . . dBm	+27	
	27. Total Gains (25 + 26) . . . . . dBm	117	
	28. Unfaded Received Signal Power (27 − 20) . . dBm	-42.4	
SIGNAL & MARGIN	29. Required Received Signal Power for 37 dB P-P Signal/RMS Noise - CCIR Weighted . . . dBm	-78	
	30. Available Fade Margin (29 − 28) . . . . . dB	35.6	
	31. Propagation Reliability, Rayleigh Fading . + Rain %	99.96	

NOTES: 1. SS — Self Supporting; G — Guyed; R — Roof Frame. 3. V — Vertical; H — Horizontal. 2. U — Unheated; H — Heated; Y — Hypalon Type. 4. F — Flat; C — Curved.

Form 7325. Printed in USA

Year Outage - Rain 140 minutes
Multipath 60 minutes

Table E

TOCOM INC Introduces

A New Low-Cost BLOCK CONVERTER

- $17 unit price
- April delivery
- Single switch operation
- Converts channels G, H, and I to channels 2, 3 and 4

For specifications and more information call or write Jim Smith today.

TOCOM INC

The Total Communications Company
P.O. Box 47066 • Dallas, Texas 75247 • 214/438-7691

Rain Attenuation

Rain attenuation accounts for most of the outage time for 13 GHz systems in the United States. Several people have conducted studies to determine the effect that rainfall rate has on microwave signals. There is quite a bit of variation between the findings of the studies. Table F shows the findings of Ryde & Ryde (Wembley, England, 1945) and the findings of an FAA study. The most complete study to my knowledge on rain attenuation and its effect on microwave radio paths was done by W.F. Bodtmann and Clyde Ruthroff of Bell Labs. This study was made during 1972 and 1973.

Rainfall Rate Inches Per Hour	Attenuation in dB Per Mile
0.2	0.3
0.5	0.95
1.0	2.2
1.5	3.4
2.0	5.6
2.5	6.4
3.0	8.0
4.0	13.0
5.0	18.0

Rainfall Rate Inches Per Hour	Attenuation in dB Per Mile
0.5	2.1
1.0	3.6
2.0	5.2
3.0	7.8
4.0	10.4
5.0	11.7

Table F: Rain attenuation vs. rain rate at 13 GHz. Ryde and Ryde, Wembley, England, 1945.

They constructed a funnel and measuring container system by which they could measure the amount of rain in one minute, dump it, then measure the next minute. They took measurements at 20 locations within the U.S. These locations were chosen along the equal precipitation contours customarily used in the continental United States to calculate outage time. Therefore, it should be possible to determine the expected time in minutes per year that any rainfall rate occurs at nearly any location within the United States by taking the rate for the nearest tested location along the same contour. The contour of equal precipitation attenuation and the test locations are shown in Figure 4.

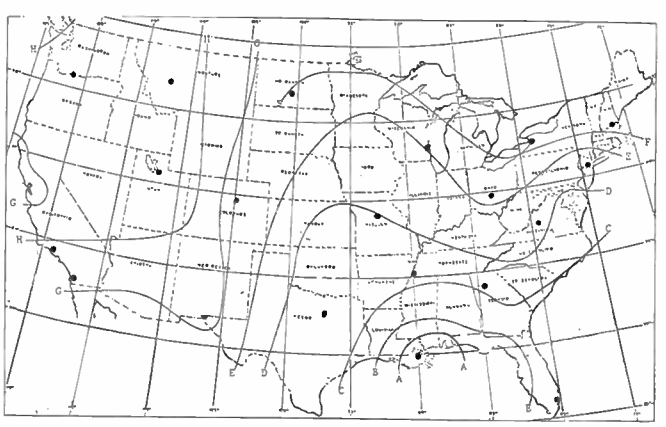


Figure 4: Contours of equal precipitation attenuation.

Bodtmann and Ruthroff also performed microwave attenuation studies for various rain rates at frequencies from 11 GHz to 100 GHz. Except for some slight variations above 30 GHz, they found that the rain effect above 11 GHz is linear with frequency. In Table G, I have shown the expected number of minutes that various rain rates occur in the 20 locations tested. I have also shown the attenuation per mile

Number of minutes per year rain rate exceeds ABSCISSA

Inches/Hour	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Miami	700	500	450	400	220	90	30	10	4
Dallas	500	400	300	150	60	20	10	2	
Atlanta	450	370	200	130	100	12	6	1	
Columbia, Mo	400	240	160	100	50	12	5	2	
Milwaukee	200	100	50	36	16	4	2		
New Orleans	600	450	320	240	120	40	8	2	1
Memphis	450	300	180	130	40	8	2	1	
Newark, NJ	250	150	80	40	30	6	1		
Buffalo, NY	250	160	100	50	8	2			
Columbus	250	160	110	60	20	10	6	1	
Lynchburg, Va.	220	130	80	60	30	6	2		
Hudson, NH	100	60	35	22	12	3	2	1	
Bismark, ND	160	100	50	32	14	4	1		
Denver	100	60	40	30	10	4	2	1	
San Diego	60	40	16	10	4	1			
Helena, MT	40	20	8	6	4	1			
Portland, OR	20	14	11	8	1				
Salt Lake City	20	12	8	4	1				
Burbank	120	40	18	8	1				
El Paso	120	40	20	10	3	1			

Attenuation per mile vs. rain rate 12.8 GHz.

0.5 inches/per hr.	0.9 dB per mile
1.0 inches/per hr.	1.7 dB per mile
1.5 inches/per hr.	2.5 dB per mile
2.0 inches/per hr.	3.3 dB per mile
2.5 inches/per hr.	4.9 dB per mile
3.0 inches/per hr.	6.6 dB per mile
4.0 inches/per hr.	9.2 dB per mile
5.0 inches/per hr.	10.9 dB per mile

Estimated size of rain cells vs. path length

1-5 miles	same as path
6.8 miles	path - 2 miles
9-12 miles	path - 3 miles
13-16 miles	10 miles
17-25 miles	14 miles
26-32 miles	18 miles
33-40 miles	20 miles

Table G: Rainfall data from Bell Labs.

versus the rain rate at 12.8 GHz. Except for very short paths, it is seldom that hard rain will occur over the entire path, since as the rain rate increases, the storm cell decreases in diameter. As a general rule of thumb, rain cells, when the rate exceeds one and one-half inches per hour, are four to six miles in diameter. Therefore, on paths longer than five miles, we should use a corrected path length curve for rain attenuation calculations. I have used this rainfall data of Bell Labs in my high frequency microwave calculations since 1974 and have found the information to correlate very well with the experiences of installed systems.

The two-hop system calculations feeding Newark CATV in Tables D and E approach my minimum system reliability requirement of 99.9 percent. The total rain outage per year is expected to be 270 minutes. If a system with the same path lengths and other losses were installed in Miami, the rain outage time would exceed 1,000 minutes per year. A two-hop

system having all of the same conditions in the Salt Lake City area would only have a rain outage of 25 minutes a year.

If a low power FM system was used on the Newark two-hop system, the rainfall outage would then become approximately 600 minutes per year. The multi-path outage for the Newark two-hop system would be expected to exceed 40 hours per year, for a total outage time of about 50 hours per year. This would yield a reliability of 99.4 percent, clearly not acceptable for CATV standards; however, if the path lengths were reduced to approximately 12 miles, the 99.9 percent propagation reliability could be achieved.

Computer Calculations for Distance and Azimuth

MT. No More	Azimuth	Back Azimuth	Distance
40D 47M 13.0S N 75D 3M 9.0S W	135D 14M 17.5S	315D 28M 40.5S	27.531SM
Woods Tavern 40D 30M 11.0S N 74D 41M 4.0S W	135.238190D	315.477936D	44.306KM
Woods Tavern 40D 30M 11.0S W 74D 41M 4.0S W	**Azimuth** 61D 12M 30.8S	**Back Azimuth** 241D 31M 57.8S	**Distance** 29.841SM
Newark 40D 42M 37.0S N 74D 11M 11.0S W	61.208557D	241.532715D	48.025KM

If it were decided to use anything other than the standard FM microwave for the paths calculated in Tables D and E, it can be seen that the reliability for a system in that area would drop so low because of rainfall alone that the cable system manager and chief engineer would have to spend a lot of time explaining to city council. Therefore, the other systems should be considered only for shorter hops.

For multi-hop importation systems, hetrodyne microwave equipment should be considered. With hetrodyne equipment modulation and demodulation from video to 70 MHz occurs only at the initial transmitter and at the receiver. All receivers and transmitters at the repeater points interface at 70 MHz. The main benefits of a hetrodyne system when three or more hops are involved are avoiding the additive effects of differential gain, differential phase and chroma delay distortions. These distortion effects are, for the most part, additive and should be considered directly additive for system design purposes. Consideration for these distortions practically eliminate the low cost microwave equipment from consideration for cascaded systems since their distortion characteristics are already pushing the limits for one hop.

So far we have discussed only a single channel system. If you need to import multiple channels, you will very likely be requested by the FCC to use adjacent K channels unless the hop is very long or in a very remote area. If you are required to use the K channel plan where the channels are spaced at 12.5 MHz, it will be necessary to use a dual polarized antenna system, putting the odd channels on one polarization and the even numbered channels on another polarization. This requires very narrow band and expensive filters on both the transmitter and receiver, since the spacing on each polarization is now 25 MHz center channel to center channel.

These filters introduce approximately 1 dB of additional loss at both the transmitter and receiver. These losses must be taken into consideration. An alternate method, which is preferred on shorter microwave hops, is to use a dual polarized antenna system with each polarization split, using a hybrid coupler, providing four stacking legs for the radios. This allows 50 MHz spacing on each leg and also allows the use of standard RF filters. The additional loss by this method is 3.5 dB per end or 7 dB overall for the path.

While we are discussing multiplexer losses, it might be good to point out that there is quite a variation among microwave equipment manufacturers in where they spec their output power and noise figure. Some spec the output power and noise figure on the equipment side of the RF filter; some spec it at the equipment flange; and some spec it at the top of the multiplexer for five to eight channels when using standard RF filters.

Local Distribution

Local distribution systems can be designed using most of the information that I have previously discussed for distant signal importation systems. All paths should be profiled in the same manner. Consideration should be given to the possibility of reflections, especially from bodies of water and tall buildings. Multi-path fading and fading due to decoupling rarely affect local distribution systems due to the shorter paths usually involved. The fresnel zone and K factors, however, should be given the same consideration on the shorter paths for local distribution as was given to the longer paths for importation. Local distribution of a smaller number of signals, say, six or less, can be done with either the standard FM equipment, low power FM equipment or double sideband AM equipment. Because all the above mentioned equipment requires a 12.5 MHz channel for distribution, it is my feeling that in the interest of frequency conservation and availability, only the single sideband AM equipment should be considered for larger numbers of channels for distribution in several directions.

Portable Remote Pickup

For portable remote pickup, any of the four equipment types could be used. I don't believe, however, that any single sideband AM equipment is available for portable applications. For portable remote pickup, I would suggest circularly polarized antennas with an antenna capable of switchable polarization at the receiver.

The reason for recommending circular polarization for portables is the superiority of this type of polarization in eliminating or minimizing reflections. Circular polarization is almost universally used for portables by the broadcast industry. One problem is that the FCC rules prohibit the use of circular polarization by cable operators. This problem has been waived on some occasions, and I would definitely suggest that any cable operators planning a portable system request this waiver.

System Interconnect

System interconnect planning should be done on the same basis as distant signal pickup. System interconnect is different from distant signal pickup only in that it usually involves just one or two channels, quite often one in each direction, and the input signal comes from the studios or earth station of a cable system rather than a demodulated off-air broadcast signal.

While it may seem that I have pointed out all of the reasons why your cable system should not consider CARS band microwave, 13 GHz microwave systems used for cable television can, if proper design planning is used, provide good service to most areas of the country. The exceptions are Florida and the Gulf Coast where long distances are involved. In those areas I would encourage a request of waiver to use the 7 GHz broadcast band or the 6 GHz common carrier band. C-ED

The System

5 METER SATELLITE TVRO ANTENNA **MODEL 807-6-5M**

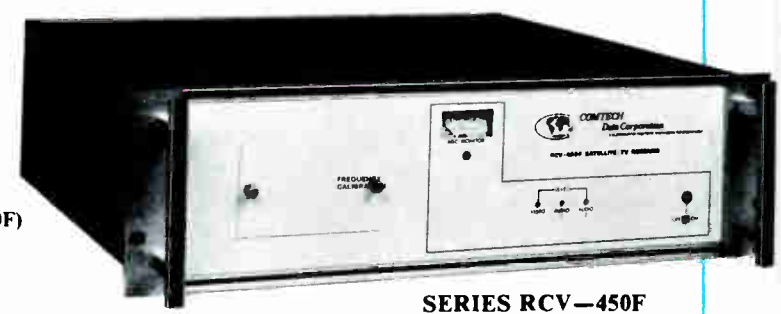
- ECONOMICAL
- LIGHTWEIGHT
- LOW SHIPPING VOLUME
- HIGH-EFFICIENCY PERFORMANCE
- ADJUSTABLE ELEVATION/ASIMUTH MOUNT
- PRIME FOCUS BUTTON-HOOK FEED SYSTEM
- 32-25 LOG O PATTERN
- RAPID INSTALLATION AND PERFORMANCE VERIFICATION

Designed specifically to meet the growing demands for small, economical antenna systems for the television receive only and special application of satellite communication earth terminals, Comtech Data's Model 807-6-5M antenna system offers a unique combination of high efficiency, performance levels, compact design allowing ease of installation.

Comtech Data's TVRO system is a dual-polarized prime focus feed system. When coupled with the RCV-450F fixed tuned video receiver or the RCV-450A agile video receiver this is **THE SYSTEM**.

SATELLITE EARTH STATION VIDEO AGILE RECEIVER (450A)

- FULL 500 MHZ RF BAND TUNING CAPABILITY
- FULL AND HALF TRANSPONDER VIDEO OPERATION
- FREQUENCY CHANGE IN LESS THAN 1 MINUTE
- COMPUTER RF TO VIDEO AND PROGRAM AUDIO IN ONE UNIT
- INCORPORATED POWER SUPPLY FOR LNA
- THRESHOLD AT 8 DB C/N
- EIA AND CCIR COMPATIBLE
- ALL CONTROLS ON FRONT PANEL



SERIES RCV—450F

SATELLITE EARTH STATION VIDEO FIXED TUNED RECEIVER (450F)

- SINGLE CONTROL TUNING
- FULL 500 MHZ RF BAND TUNING CAPABILITY
- INFINITE FREQUENCY RESOLUTION
- FULL AND HALF TRANSPONDER VIDEO OPERATION
- NO CRYSTAL OR FILTER REPLACEMENT REQUIRED FOR RETUNING
- LOCAL OR REMOTE TUNING CAPABILITY
- COMPLETE RF TO VIDEO AND PROGRAM AUDIO IN ONE UNIT
- INCORPORATED POWER SUPPLY FOR LNA
- THRESHOLD AT 8 DB C/N
- EIA AND CCIR COMPATIBLE
- FAULT REPORTING UPON LOSS OF CARRIER
- ALL CONTROLS ON FRONT PANEL
- REMOTE CARRIER LEVEL OUTPUT

SERIES RCV-450A

COMTECH
Data Corporation

Represented in the United States by Northern CATV Distributors, Inc. 1-800-448-5174. Represented in Canada by RF Communications, LTD. 1-416-495-1030.

Comtech Data Video Systems Division, 613 S. Rockford Drive, Tempe, AZ 85281, 602-968-7756.
Wholly owned subsidiary of Comtech Telecommunications, Inc.

Simulcasting on The Birds

By Toni Barnett, Managing Editor

The Christian Broadcasting Network, Inc., (CBN) is the first Christian organization to own and operate a satellite earth station with installation of two ten-meter transmit/receive dishes at its Virginia Beach, Virginia headquarters. In addition to the second ten-meter dish, CBN has signed a new contract with RCA Americom for 24-hour use on the Satcom I satellite.

Phil Francis, director of CBN's Technical and Satellite Services Division noted the second earth dish and the new contract "both reflect CBN's firm commitment to the satellite delivery system. As a result," Francis emphasized, "we will have much greater flexibility for programming and delivery."

With the utilization of the second dish, CBN now has the capability to broadcast to almost every domestic satellite system. According to Francis, the dual system will be used initially on an occasional basis for special events and telethons with uplink capability to both satellites.

Simultaneous uplink capability with RCA's Satcom I and Western Union's Westar satellites, together with the installation of the earth dishes, provides CBN with the capacity of live network programming to a major cross-section of the country—a vital phase in CBN's move toward a fourth major or alternative network status.

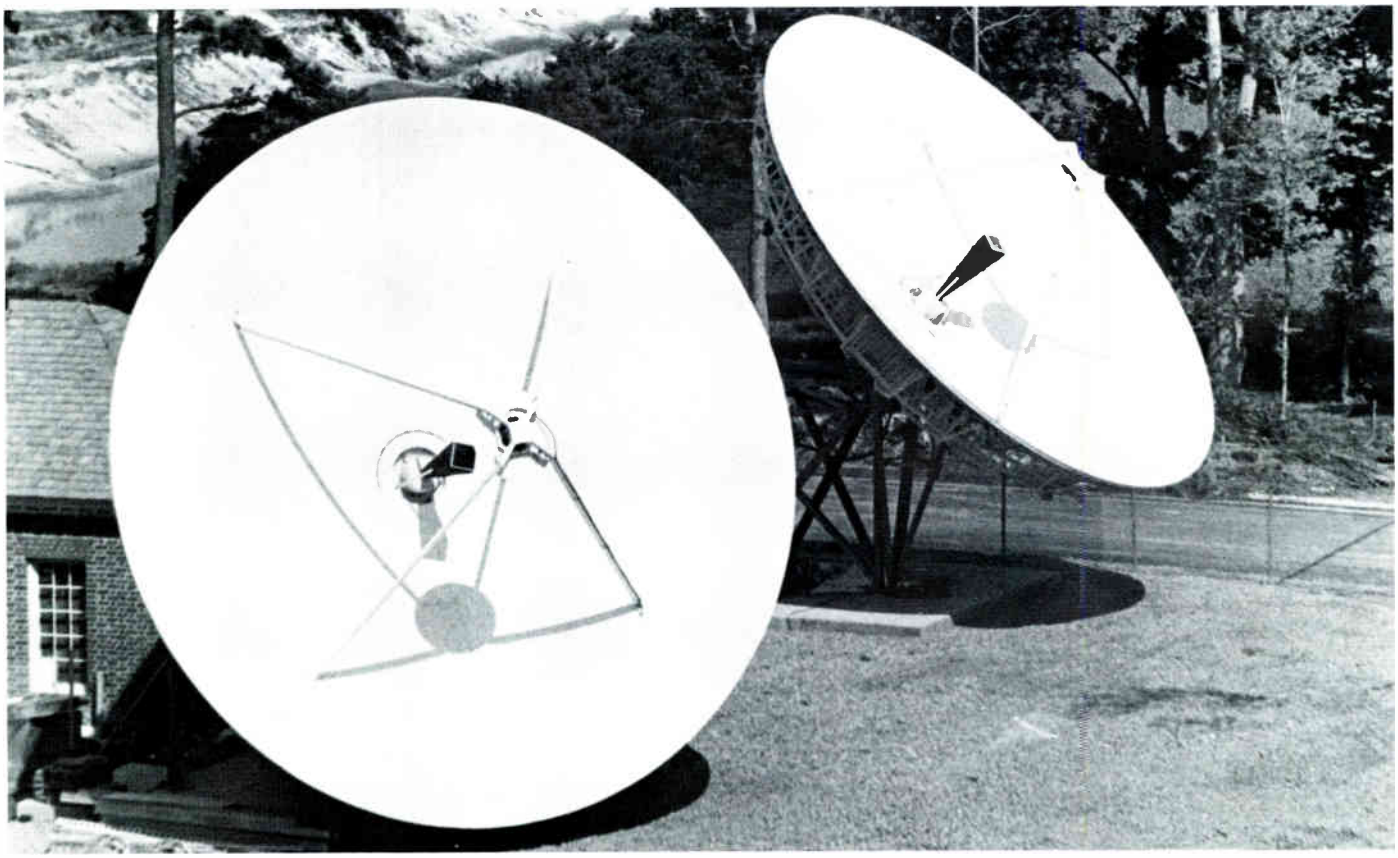
CBN built its first system to serve the cable industry (Virginia Beach, Virginia). At the same time, however, CBN was also supposed to service the commercial broadcast stations. The problem of programming to cable operators and commercial broadcasters was that most broadcast stations take all of their programming from Western Union's Westar satellite, and RCA's Satcom I is totally dedicated to cable operations.

Therefore, CBN required a separate system to send programming to both satellites. A second ten-meter antenna (Scientific-Atlanta) was installed next to the existing system. The final result was that CBN used two completely separate satellite earth terminals. The only thing common about the two systems is that the earth terminals share the same building, and equipment such as exciters and receivers can be switched from one system to the other.

C-ED asked Scott Hessek, cable and radio services manager for CBN, about simulcasting from Satcom 1 and Westar. "With these two trends developing [cable on Satcom I and commercial broadcasting on Westar], it became obvious to us that there would be a need to transfer from one bird to another as the occasion demanded," Hessek explained.

"We have, on a contractual basis, some time on the Westar bird. We also have the capability," he added, "of switching back and forth from one satellite to the other."

"Because we were going to go to satellites, we had to think about what we could do that would be efficient, inexpensive,



The two ten-meter transmit/receiver dishes located at the CBN center in Virginia Beach, Virginia.

promising for the future, and almost black-out free. That's how we came up with the satellite and back-up satellite."

C-ED asked Hessek if CBN encountered any problems with switching from Satcom II to Satcom I and using Westar. "We did have a slight problem when we switched from the Satcom II to Satcom I," Hessek stated. "I had a number of complaints from people who were on the fringe of the footprint about poor signal quality. These operators complained that the signal they received degraded slightly."

"The footprint pattern [Satcom I] isn't as good as we'd like it to be," Hessek noted. "We had contractual agreements with cable systems in Hawaii, and we were under the impression that we'd have a footprint that would cover that state. Then we discovered that we didn't have that pattern when we switched to the Satcom I. We had people out there trying to get a good look angle and they couldn't do it. I don't know when we'll get one," he added. "I find it a continuing source of frustration . . . "

Receive Equipment

On the receive side, parametric amplifiers are used to obtain a better noise temperature for monitoring the equipment. In this way, CBN engineering personnel can "see" the exact signal fed to the birds.

CBN uses four Scientific-Atlanta 414 receivers with threshold extension. These units are totally switchable between antennas, allowing all four receivers on one antenna, all four on the other antenna, or any combination of the two.

The receivers are all backed-up by an *n by one* auto switch. If a receiver fails, the standby receiver will automatically retune to the frequency and replace that unit.

Sam Tolbert, CBN's director of engineering, makes some final adjustments on CBN's second satellite earth dish. The satellite stations are located 12 miles from Cape Henry, the site where America's first permanent settlers claimed the new land for God and for the spreading of the gospel.

Uplink Equipment

On the uplink side, CBN uses three exciters and three high-powered amplifiers (HPAs). The HPAs were built by Varian Associates and the exciters were made by Scientific-Atlanta.

Tom Rogelburg, manager of program scheduling for CBN, gave us his input on simulcasting. "The satellites are used for two separate purposes: the RCA Satcom I is used for distribution to cable affiliates; and the Westar satellite is used for selected broadcast entities—like our station in Dallas, Texas (KXTX), and KTLA, channel 5 in Hollywood, California."

CBN President and founder Pat Robertson at the site of the ministry's new international broadcast headquarters. The headquarters is scheduled to open in the fall of 1979 and will house both offices and broadcast production facilities.

"On Westar, with the exception of some specials," Rogelburg explained, "the only show we have that actually is fed to that satellite is the *Ross Bagley* show and the *700 Club*. The *Ross Bagley* show is a kind of video disc jockey program where we have taken the music segment from the *700 Club* and developed a program around it."

What Lies Ahead?

Sam Tolbert, director of engineering for CBN, provided *C-ED* with a glimpse of CBN's future developments. "A new concept that we hope to get into in June," Tolbert stated, "is that the whole site [in Virginia Beach] will be computerized. The equipment will be computer-controlled so that any exciter can be switched into any HPA, or any group of HPAs can be put on any antenna."

"We would buy a motor drive for the third HPA," Tolbert added, "and this would become a standard back-up unit. If we lost the Western Union HPA, the alternate HPA would automatically retune itself to the frequency of Western Union. If the RCA HPA failed, the alternate HPA would automatically retune and replace the defective RCA HPA.

At the present, Christian Broadcasting Network is investigating many types of future expansion plans, and it is also looking at the feasibility of including a radio network on the system. A detailed analysis of CBN and its counterpart, PTL, was first featured in the December 19, 1977 issue of *CableVision*. **C-ED**

Showtime Expands Use of Tone Switching

A Staff Report

Showtime has announced it will expand its system of dual tone multifunction (DTMF) control tones, giving its affiliates the capability of automatically controlling various portions of the Showtime feed on their system. The four-digit tones can be used by systems for such purposes as automatically signing on or off the Showtime feed; activating descramblers to open up selected satellite programming to all basic cable subscribers; blocking Showtime advisories and signal tests from being seen by subscribers (for those systems that have primary access to the feed); and/or switching between the satellite feed and local access programming. Tones also bracket *Front Row* features, giving *Front Row* affiliates the capability of offering both Showtime and the movie portion of *Front Row* service on the same channel.

The actual tones are similar to telephone Touch-Tones™ and have three digits and a non-numerical character. Tones at the beginning of a segment end with (*), and tones ending the segment end with (#)—the two non-numerical buttons on the Touch-Tone™ telephone.

In order to utilize the tones, operators must acquire tone decoders which can be hooked up to the equipment necessary to provide the desired automation. The specific tones Showtime is using are as follows:

1) Access Cut-in (843*) and Access Cut-out (843#).

These tones will bracket all scheduled and unscheduled programming and advisories. The tones mark the daily start and end of Showtime's leased transponder time, and would include any additional time being utilized in special situations.

2) Off-line Content Cut-in (753*) and Off-line Content Cut-Out (753#).

These tones will surround Showtime's advisories, signal test, and any other information meant for affiliate's use only and not for Showtime subscribers.

3) On-line Content Cut-in (679*) and On-line Content Cut-out (679#).

These tones will bracket material transmitted prior to the programming day, which the operator may want to make available to all his basic cable subscribers. This may include program information, promotion, or special programming. Showtime will use these tones during its national previews to enable systems to automatically access local programming for between-movie telethons.

4) Showtime Program Cut-in (576*) and Showtime Program Cut-out (576#).

These tones will surround Showtime's regularly scheduled programming.

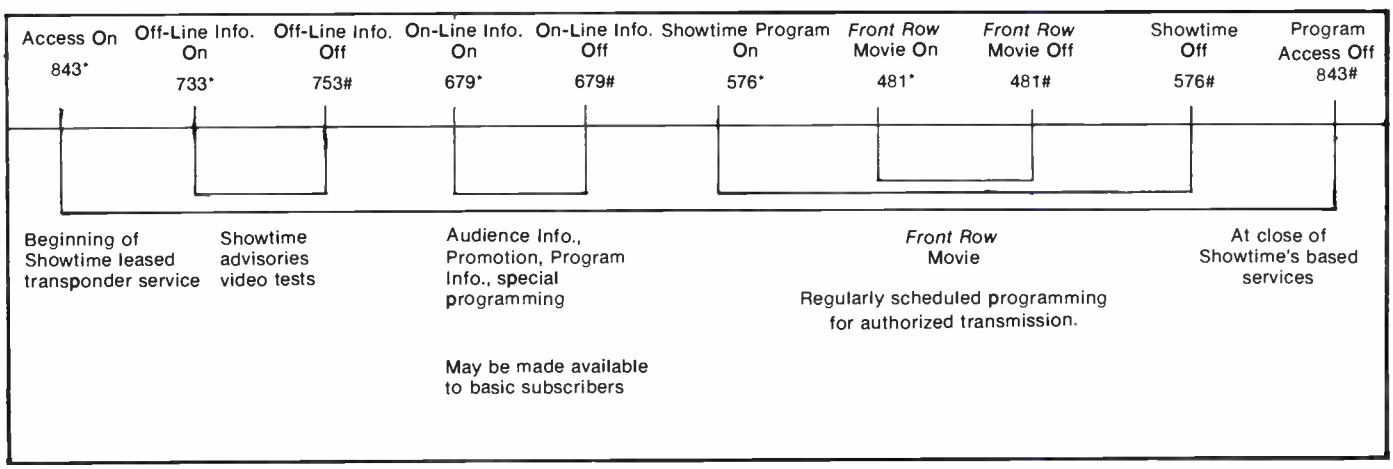
5) *Front Row* Cut-in (481*) and *Front Row* Cut-out (481#).

These tones bracket the *Front Row* features. They can be used to activate a descrambler for *Front Row* subscribers in a system where Showtime and *Front Row* are offered on the same channel. This option enables systems desiring a two-tiered service, but having only one available channel, to offer both services.

"With the issues of copyright infringement and the unauthorized use of signals becoming increasingly controversial, it is now more important than ever for cable systems using satellite services to shut off the satellite feed during its service's non-leased time periods," stated Stephan Schulte. Showtime's director of production and operations. "Operators can unknowingly broadcast television programs, sports events, network news feeds, and even private closed-circuit transmissions to their subscribers, leaving themselves open to any number of lawsuits. At its most basic level, automatic sign-on and sign-off tone switching can facilitate accurate control of satellite signal reception."

"At Showtime," Schulte noted, "we simply took tone switching one step further to build more flexibility into the system. Operators can use these tones to improve their on-air look, create a new source of on-air promotion, and simplify the use of locally originated telethons during previews." **C-ED**

Typical Daily DTMF Tone Sequencing on Showtime



This chart represents a relative sequence of DTMF tones that will occur during a typical Showtime day. The above chart does not necessarily correlate to real time.

The Impact of Earth Station Configuration on System Performance

By Ray Stuart
Manager, Systems Engineering
Satellite Communications Division
Scientific-Atlanta, Inc.

This paper presents system design consideration which can impact the performance of a video, telephone or data earth station.

This discussion specifically involves two earth station parameters, G/T and EIRP, and the impact of system configuration on those parameters.

Link analysis, the quality of a signal such as video, is a function of S/N which is in turn a function of C/N which is a function of G/T. That is,

$$Q_P = F\,(S/N) = F\,(C/N) = (G/T)$$

or,

$$Q_P = F\,(G/T)$$

where

Q_P = Picture quality for video
S/N = is output signal to noise ratio
C/N = is the input carrier to noise ratio
G/T = Gain of the receiving antenna minus the system noise temperature in decibels.

Therefore it is apparent that in order to maximize picture quality the G/T should be maximized.

Earth Station G/T can be defined as follows:

$$G/T_S = G_N - T_S \text{ (in dB)}$$

where

G_N = the net antenna gain and is defined by

$$G_N = G_A - L_V \text{ (dB)}$$

where

G_A = the gain of the antenna at the Orthomode Transducer (OMT) output ports and
L_V = effective gain loss due to Voltage Standing Wave Ratio (VSWR)

and where

T_S = receive system noise temperature (°K)

T_S is defined as follows:

$$T_S = T_A + T_V + T_{LNA} + T_L$$

where

T_A = antenna noise temperature referenced to the LNA input
T_V = noise temperature contribution due to antenna and LNA VSWR
T_{LNA} = LNA noise temperature
T_L = post-LNA noise temperature contribution (K), due to cable length and downconverter

Generally the antenna temperature is set by the design of the antenna and the elevation "look" angle. The same holds true for the LNA and VSWR contributions; that is these values are generally set by the system design.

The post-LNA noise temperature contributions, referenced to the LNA input, can be determined, from:

$$T_L = (P\ N\ F - !)\ T_o/G_{LNA}$$

where

P = insertion loss of cable between the LNA and downconverter
NF = downconverter noise figure
G_{LNA} = LNA gain
T_o = ambient temperature

The post LNA contribution can change depending upon the earth station configuration. That is, the post LNA contribution increases with the length of cable between the video receiver and the LNA. This in turn causes a decrease of the system G/T.

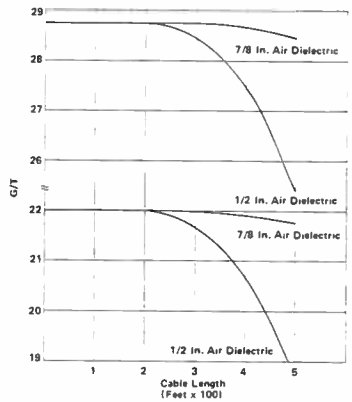


Figure 1: System G/T versus post LNA cable length.

Figure 1 shows how the G/T of an earth station degrades with length of cable between the LNA and the receiver. Both 1/2-inch and 7/8-inch air dielectric cable are shown. Since 1/2-inch cable is lower in cost it should be utilized for runs up to about 200 feet. For longer runs 7/8-inch cable should be used. After about 500 feet it becomes necessary to add an amplifier between the LNA and receiver to overcome the cable loss and its contribution to system noise temperature.

The EIRP of an earth station is a function of the transmitter size, the antenna gain and the system configuration. That is:

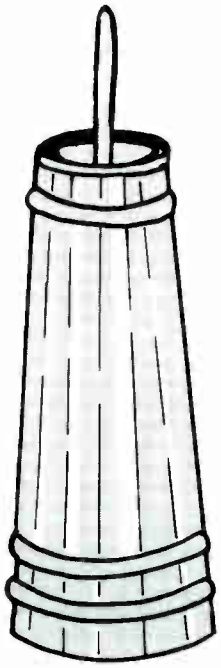
EIRP = (Effective Isotropic Radiated Power)

$$EIRP = P_T + G_A - L$$

where

P_T = output power transmitter
G_A = Antenna Gain relative to an Isotropic Radiator
L = Loss between transmitter and the antenna

Both the antenna gain and transmitter output power are generally set by the products selected. That is, the antenna gain is generally determined by the size (five-meter, ten-

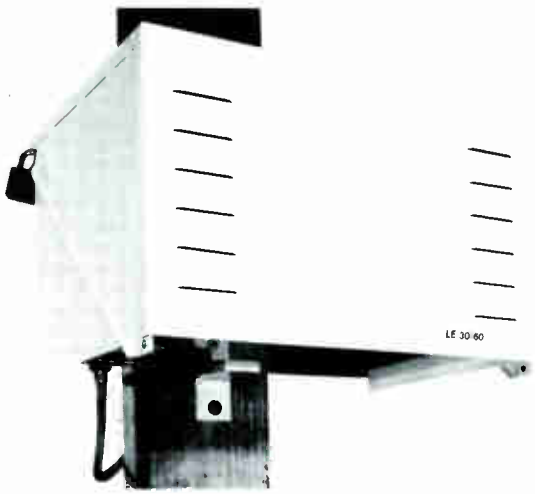


STOP CHURN AND START BUTTERING YOUR BREAD ON BOTH SIDES

Standby Power System

. . . LE30/60

USES EXISTING POWER SUPPLY • EASY INSTALLATION • LIGHTWEIGHT
ELECTRONICS CAN BE REMOVED WITHOUT SERVICE INTERRUPTION
UNITIZED CONSTRUCTION • COMPACT SIZE 11" X 14" X 19"
COMPLETE ACCESS TO BATTERY • ALL ELECTRONICS ON ONE PANEL FOR EASY REMOVAL
TIME DELAY RELAY ADJUSTABLE FROM 6 TO 60 SECONDS
LOW VOLTAGE CUTOFF FOR BATTERY PROTECTION • STATUS LIGHT
TEST SWITCH CAN BE OPERATED FROM GROUND LEVEL
ONLY ONE INTERCONNECT CABLE REQUIRED



See our card on page 18.

Stop by Booth #23 for your free chips.

LARSON ELECTRONICS

ERNIE LARSON 817/387-0002
CHUCK HASTY 214/242-2167
BOX 185, CARROLLTON, TEXAS 75006

meter, etc.) and the output power of the power amplifier is determined by that selected.

The loss (L) between the antenna and the transmitter is dependent upon system configuration. Again, as with the cable between the LNA and receiver, the length of the waveguide between the antenna affects the EIRP. Therefore, if possible, the site layout should be such that the waveguide run between the antenna and transmitter is as short as possible.

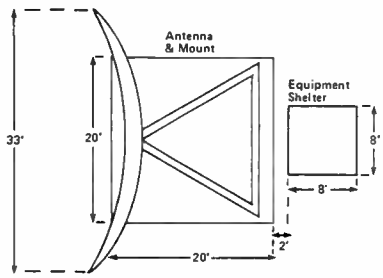


Figure 2: Typical TVRO site layout.

In general the site layout is determined by the size of the earth station and the amount of available space for the earth station site. The antenna and electronics equipment should be co-located, if possible, to prevent long, costly, cable runs. If it is not possible to locate the electronics equipment with the antenna, it is advisable to run large diameter air dielectric RF cable from the LNA, located in the antenna hub, to the receiver rack, located in the equipment shelter.

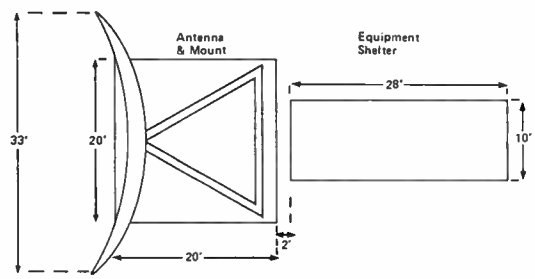


Figure 3: Typical redundant T/R earth station layout.

Transmit stations should not have the HPA located more than 100 feet from the antenna. This is because of losses in the 6 GHz waveguide. These losses can be extremely inefficient in terms of power loss. Long waveguide runs could require larger sized HPA's. This would be a costly mistake. However, the exciters may be located some distance from the HPA's if sufficient drive is available to excite the HPA's to the required output power. This might allow a reduction in the shelter size necessary at the antenna location.

Site layouts for several different types of earth stations will now be considered. These layouts are typical of those now installed in the domestic satellite service.

Figure 2 shows a typical site layout for a small TVRO ten-meter earth station. Generally the TVRO GCE includes only one or two video receivers and possibly a protection switch. Thus, the equipment shelter size can be kept to a minimum. If a five-meter antenna were used instead of the ten-meter, the antenna pad size would be 9 x 9 feet.

Figure 3 shows a typical site layout for a redundant T/R earth station. An equipment layout for the shelter is shown in Figure 4. This layout allows room for expansion to four uplinks along with room for a workbench or desk.

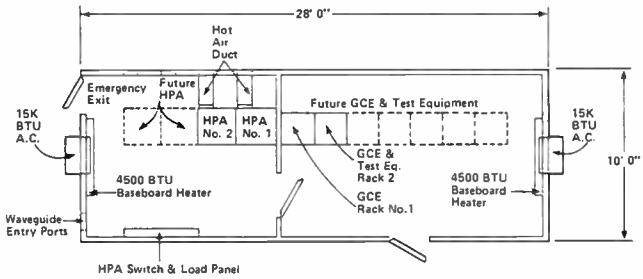


Figure 4: Electronics equipment shelter floor plan.

Figure 5 shows the site layout for a large T/R earth station. A typical shelter layout is shown in Figure 6. Large amounts of work room and desk space are provided. Expansion may take place freely.

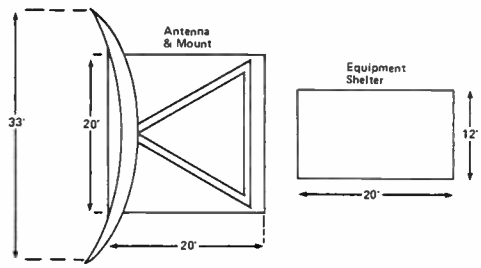


Figure 5: Typical message/video T/R earth station layout.

The antenna should be located such that no objects (trees, buildings, etc.) are positioned in the look angle of the antenna. If the RF path to the satellite arc is not clear, signals will be reduced and cross-polarization alignment may be affected.

The area which must be clear in front of the antenna extends to approximately 150 feet from the front of the main reflector. A cylinder 33 feet in diameter extended this distance may be visualized. This area must be clear.

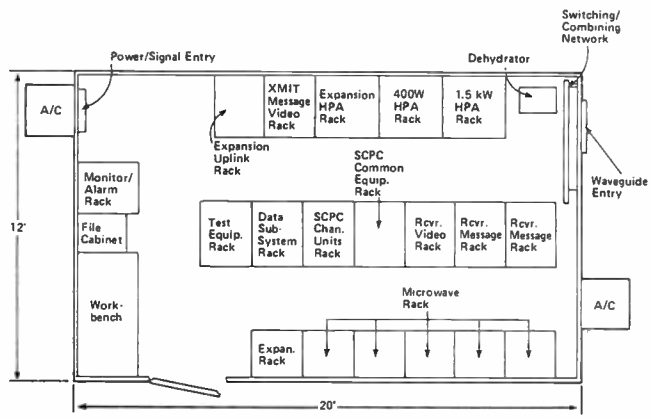


Figure 6: Typical shelter equipment layout.

Actual antenna height above the surrounding area is not a factor in site selection. The reduction in RF path gained by locating the antenna on a mountain is small compared to the total path length. In fact, locating the antenna in a low area will probably prove to be a blessing for frequency coordination.

Cable Programming for June

Signal	Day	Start/Stop	Alert Times	Satellite/ Transponders
C-SPAN (times approx.)		12 pm-6 (6:30) pm (Mon., Tues., & Fri.) 10 am-6:30 (7:30) pm (Wed. & Thurs.)	No	F1, #9
Caliope		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 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	5:30 pm-2:20 am 2:30 pm-2:45 am 3:30 pm-1:43 am 6 pm-2:16 am 6 pm-1:58 am 6 pm-2:16 am 6 pm-1:12 am 6 pm-2:57 am 2 pm-1:12 am 2 pm-1:50 am 6 pm-2:14 am 5 pm-2:21 am 6 pm-12:40 am 5 pm-1:50 am 5:30 pm-1:07 am 2 pm-2:29 am 3:30 pm-2 am 6:30 pm-1:39 am 6 pm-1:05 am 6:30 pm-1:12 am 5:30 pm-2:03 am 5:30 pm-1:20 am 2:30 pm-2:20 am 2:30 pm-1:48 am 6:30 pm-2:25 am 5 pm-2:30 am 6:30 pm-2:20 am 5 pm-2:21 am 5 pm-2:30 am 2:30 pm-2:20 am	Before & after programming & promos.	F1, #24 F1, #22 F1, #23 F1, #20
HTN		8 pm-10 (11) pm	No	F1, #1
KPIX (time permitting)		2-4 hrs. per day	No	F1, #1
KTVU		7 am-10 am (Mon.-Fri.) 7 am-2 pm (weekends)	No	F1, #1
MSG Sports		Schedule unavailable at press time.	No	F1, #9

Signal	Day	Start/Stop	Alert Times	Satellite/ Transponders
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
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		7 am-10 am (weekdays) 7 am-12 pm (weekends)	No	F1, #1
Showtime		E 5 pm-2 am (weekdays) 1:30 pm-2 am (weekends) C 4 pm-1 am (weekdays) 12:30 pm-1 am (weekends) M 6 pm-3 am (weekdays) 2:30 pm-3 am P 5 pm-2 am (weekdays) 1:30 pm-2 am (weekends)	1 minute before and after programming.	F1, #12 F1, #12 F1, #10 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.

Finally, the headend satellite receiver.

We never stop trying to make a good thing better for you.

If you like the way Scientific-Atlanta headends handle off-the-air and imported programming, you'll like what our cost effective single channel 6601 does for your satellite schedule. The newest addition to our headend line brings you the same quality as our processors, modulators and demodulators. And because it's a third generation satellite receiver, there are other significant advantages.

If you manage a CATV system, you get dual conversion from the manufacturer with long experience in building receivers with dual conversion. Channel selection as simple as changing a single crystal in the front panel without further tuning or adjustment. Top threshold extention demodulation that's been field proven in all other models. And the long list of Scientific-Atlanta options makes this satellite receiver into something more than a no frills unit.

For example, the baseband output can be made compatible with microwave systems by including our 4.5 MHz subcarrier card. And for additional audio services, you'll find provisions for 3 extra audio demodulators. So like our other headend products the future's built right in.

For more information call Mike Smith at (404) 449-2000. Or write us.

Scientific Atlanta

United States: 3845 Pleasantdale Road, Atlanta, Ga. 30340, Telephone 404-449-2000, TWX 810-766-4912, Telex 054-2898
Canada: 1640 Bonhill Road, Unit 6, Mississauga, Ontario, L5T 1C8, Canada, Telephone 416-677-6555, Telex 06-983600
Europe: 1-7 Sunbury Cross Centre, Staines Road West, Sunbury on Thames, Middlesex TW16 7BB, England,
Telephone Sunbury on Thames 89751, Telex 896015

See us at NCTA - Booth #82.

NCTA Technical Paper Abstracts

The 28th annual National Cable Television Association convention and exhibition will be held May 20-23 at the Las Vegas Convention Center in Las Vegas, Nevada.

The following abstracts are from technical papers that will be presented at the convention.

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

This paper examines the small earth station portion of the cable television business. The objective is to look at the protection of equipment and service. The first step is a review of the CATV companies and growth of the business over the last ten years. This shows that the availability of new programming sources has produced industry growth. A quick examination of what is available in the programming area is provided. Also, a prediction of future availabilities in the next three-to-five years is made. This growth has and will continue to require more equipment to handle the added service. The requirement for dual antennas is discussed briefly.

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

Cox Cable Communications' Design/Drafting Department uses three minicomputers to aid in CATV system design. Using custom software, the computers handle the repetitious calculations involved in system design and bill of materials, allowing the designers to concentrate on routing, amplifier placement and cost effectiveness. The resulting improvement in designer efficiency enables development of higher volumes of design than would be possible using non-computer methods.

"A Wide Band Data Transmission Link Utilizing Existing CATV and Microwave Facilities" by Edward J. Callahan, Jr., American Television and Communications Corporation, and William J. Deerhake, International Business Machines Corporation.

IBM's computing center at Research Triangle Park (RTP), North Carolina, is now linked with two other IBM locations in Raleigh, North Carolina, by means of conventional CATV and microwave facilities provided by ATC. The link consists of a six-mile cable run from RTP to ATC's microwave tower in Durham, an 18-mile microwave hop, and a 1.5-mile cable run from ATC's Raleigh tower to the Raleigh IBM sites. The cable system is of low-band split design capable of providing 30 forward and four reverse TV channels. The microwave channel is 6 MHz, full duplex.

"When All Else Fails, Do It Yourself" by Glenn Chambers, American Television and Communications Corporation.

An updated look at what some companies are doing to assure themselves a ready supply of well-trained technical personnel. At least two large CATV corporations have decided they would "rather do it themselves" and have started their own technical schools.

"EIRP of the Satcom Cable Television Spacecraft" by J. Christopher and W. Braun, RCA American Communications, Inc.

This paper will describe the field test program undertaken by RCA Americom to establish the EIRP of its F1 spacecraft now in orbit. This satellite is used primarily for cable television program distribution. The study was performed as a service to the industry in order to provide actual EIRP measurements as opposed to calculated measurements. The results of that exercise will be presented and discussed and suggestions for prudent, conservative system designs for users of the F1 will be put forth.

This paper will also address proposed design of the Americom F3 spacecraft to be launched in the fourth quarter of 1979. Enhancements incorporated for the benefits of the cable television community will be presented and projected contours will be shown. The F3 spacecraft has been designated as an all cable television bird, and RCA Americom would propose to provide actual EIRP measurements for future satellites used within this industry.

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

Abstract unavailable at presstime.

"A Versatile, Low-Cost System for Implementing CATV Auxiliary Services" by Robert V. C. Dickenson, E-Com Corporation.

In the expanding role of cable in the community as well as in commercial and industrial areas, there are a host of new services and CATV control and maintenance functions which are suitable for carriage on the cable. The major problem for such implementation usually lies in the fact that separate hardware must be generated for all of these services. Therefore, the development costs and low production efficiencies lead toward economic non-viability.

This paper describes a relatively universal concept for implementation of both down- and upstream functions for a wide variety of services using a basic module which is simple and low cost. In addition, this module can be expanded to include more complex functions in a modular manner requiring only the cost increase in the specific locations where the more complicated task is undertaken. This type of system lends itself to many areas such as security, energy management, traffic control, industrial data gathering and process control, CATV system status monitoring and spectrum analysis, hotel security and room services, low and medium speed data communications, addressable taps, premium CATV control, remote switching of all kinds and a host of others.

"Installation and Performance of a Fiberoptic Video System at Viacom" by Paul J. Dobson and Tad Witkowicz, Valtec Corporation, and Jerry Marnell, Suffolk County Cablevision.

This paper describes the fiberoptic video system installed by Valtec Corporation at Viacom's Suffolk County Cablevision in Long Island, New York.

An aerial installation of a three-fiber, 8,000-foot-long fiber video system is discussed.

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

Just as reliability within a piece of equipment, for

example an amplifier, is the multiplied product of the reliabilities of the separate components, so the reliability of a CATV system, as far as the customer is concerned, is the product of the reliability of every piece of equipment in series with the signal path—from antenna to the television set.

Further, in line with the customer's point of view, reliability must be defined as the steady producton of a good quality picture, and any operation below that standard, whether due to ice or co-channel at the headend, excessive hum or power outage in the system, or drifting of a converter at the subscriber must be counted as a failure.

This article will discuss system reliability from this point of view using both theoretical and system history to illustrate. Still existing deficiencies will be identified, the overall object being to firmly establish a totally service-and system-style of thinking and work in regard to CATV reliability.

"Manitoba Telephones' 'Electronic Highway' " by William E. Evans, Manitoba Telephone System.

Early in 1978 the Manitoba Telephone System announced its intension to proceed with the construction of a bi-directional coaxial cable intercity transmission network for the initial purpose of delivering television and FM broadcast signals to newly-licensed CATV operators in more than twenty communities throughout southern Manitoba. This facility would provide a multi-purpose, user-shared "electronic highway" for the transmission of television, radio, data and new broadband telecommunications services.

A new superlinear amplifier, using the feed-forward technique and developed by a Canadian CATV equipment manufacturer to meet M.T.S. specifications, was the key to the provision of adequate transmission performance over the lengthy (several hundred miles) distances required. A new microprocessor-based status monitor system, field power supply and other peripherals were requisite to meet reliability and maintainability objectives.

The first 28-mile trunk was activated in February, 1978 with the major 145-mile system from Winnipeg to Brandon placed in service on September 29. Performance test results using both frequency domain and baseband measurement techniques are presented along with operational experiences.

"Microprocessor Control for CATV Test Instruments" by Syd Fluck and Marv Millholland, Wavetek Indiana, Inc.

When we label ourselves part of the "CATV Industry" we make several implicit assumptions. One of these assumptions is that we have some proficiency which is in common with others of this label. Another is that our technology, while parallel to some others, has its own uniqueness.

This paper deals with how the microprocessor can be incorporated in test instruments to relate directly to our unique requirements. The microprocessor control of instruments for an improved method of simultaneous system sweeping, will be presented.

Emphasis will be on improved measurement capability, simplified operator control and application of such a system. The system uses a microprocessor-controlled sweep transmitter and a portable microprocessor-controlled sweep analyzer.

Communication from the transmitter to the analyzer via the CATV system, sets up accurate measurement parameters. The CATV systems gain vs. frequency response is processed to minimize interference and improve measurement resolution. It is then stored in a digital memory and refreshed on an integral raster scan display. Battery life of the sweep analyzer is extended due to high efficiency switch mode regulators and control from the microprocessor.

"System Design and Operation with 'BASIC' " by James B. Grabenstein, Potomac Valley Television Company, Inc.

This paper will present a list of basic programs that can be used with microcomputers for day-to-day operation of cable TV systems. The programs can be used in microcomputers now on the market. The use of "basic" is a good introduction to learning computer concepts and the digital technicality.

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

Design goals and performance criteria for a modern FM video receiver for satellite microwave links are discussed.

Topics include integrated microwave front-ends, agility considerations, IF bandwidth, AGC, demodulation, threshold extension, clamping and audio demodulation.

Production techniques pertaining to a high volume market are also discussed.

"Calculations and Balancing Techniques Using a Return Signal Path" by Bert L. Hensheid, Texscan/Theta-Com Corporation.

Many systems are using or considering using a return signal path on at least a part of their normal cable system. This paper presents some of the calculations and balance techniques which may be used in setting up a smaller, dedicated line. It does not include the complex task of balancing a large fully implemented two-way system.

Techniques presented include the use of one carrier, two carriers and sweep methods. Discussions on thermal compensation includes pilot carrier AGC and thermal equalizers. Some comments on data transmission will also be made.

"Development of a CATV Technical Operations Manual" by Michael McKeown, Cox Cable Communications.

The design goal in developing a cable system technical operations manual was to provide technical personnel with a basic operating and training reference text which would help provide improved customer service and lower system operating expenses. This goal will be achieved if the manual assists in producing better technical management, better trained and motivated employees and greater control of plant expenses.

With systems ranging in size from under 1,000 to over 160,000 subscribers, Cox Cable needed a technical operations manual which would serve a diverse group of people. This required flexibility, in design and application of the operational guidelines and technical standards established in the manual.

Since each system and the community it serves is unique, no written document could hope to cover every situation. The manual was conceptualized as a set of guidelines and a training reference rather than a hard and fast set of rules. It is not intended to be a substitute for individual initiative and judgment. The involvement of corporate staff and system operating personnel in drafting the manual was needed to ensure that it met the design goal. What resulted from all of these considerations was a document covering: customer service, preventive maintenance, corrective maintenance, installation standards and practices, construction standards and practices, technical standards, warehouse practices and

inventory control, safety and vehicle operation and maintenance.

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

The BCN fiberoptic experiment in London, Ontario, is the first major fiberoptic CATV supertrunk installation in North America.

The link transmits 12 NTSC color television channels and 12 FM stereo channels over an eight fiber cable 7.8 Km in length. Audio, video and FM signals are digitized and multiplexed into a single 322 Mb/s bit stream modulating an injection laser diode transmitter.

This presentation describes the installation and field operation of the link, outlines construction problems and their solutions and describes the field maintenance procedures employed. Information is also presented on the reliability and performance quality of the system.

Videotape highlights illustrating cable installation practices, splicing, connectorization and electro optics installation and maintenance will be shown.

"Gambling by Cable" by Thomas A. Muth, Ph.D., J.D., Michigan State University.

Cable television lends itself to prospects for development of numerous games involving both skill and chance. Little work has been done to examine the related technical, legal, social and commercial status and potential for gaming in cable television. Games have long been popular in broadcasting. Gambling, in the form of lotteries, off-track-betting and other games of chance, are becoming popular as tax-alternative revenue generating devices for a number of state and local governments. Also, many private charitable institutions have traditionally relied on games for their subsistance. Cable television systems offer these state agencies and private charitable entities opportunities to expand the base of their appeal, tap new patronage and provide new and alternative games for community consumption.

Many early cable systems held weekly bingo and quiz games, however this practice was generally abandoned with adverse regulation and additional carriage of broadcast signals. New multi-channel systems have ignored the potential for significant community service and fund raising through gaming programs. In so doing they have ignored an additional source of cable system revenues from fees for facilitating the fund raising and gaming.

This paper examines the potential gaming channels offer to open a wholly new base of economic support for cable television. It considers the prospects that cable service can offer to legally franchised and authorized gaming and lottery agencies. It suggests entirely new approaches to state and local revenue based on gaming. It demonstrates how properly developed cable gaming services can supplement government and charitable revenues. Further, the paper examines games, gambling laws and policies of various states in relation to games of chance and games of skill that now exist or are potentials for cable television.

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

This paper describes the result of a study done under field conditions as to the measure and perceptibility of composite triple beat. Two interesting conclusions are drawn: (1) the threshold of perceptibility under field conditions, particularly with regard to pay-television signals and their contents, occurs at a ratio of 57 dB carrier to composite triple beat; and (2) measurements of the composite triple beat near system generated thermal noise, such as those conducted on the trunk lines, require special consideration and technique to insure accuracy.

"Education: The Means to an End" by Thomas J. Polis, Magnavox CATV Systems, Inc.

We are an industry which is currently enjoying a fantastic growth rate. With the advent of pay-cable, deregulation and the increasing use of the system to provide services such as alarm systems, peak power management and data communications, we find ourselves faced with an enormous problem; "The Lack of Effectively Trained Personnel." In other industries this problem can be reduced by going to the colleges of our nation and selecting personnel from a large graduating roster. Whenever any segment of our industry has made this attempt we have all received the same basic question; "What is a CATV?"

The purpose of this paper is to lay out the procedures which must be undertaken if our technical competance is to be respected by both regulatory bodies and competitive industries.

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

Control of pay channels, security systems, energy controls and meter reading have been talked about or demonstrated on an experimental basis. This paper describes the implementation of an actual CATV system located in Wemme, Oregon, to begin operation in early 1979.

The system will utilize two-way data communications on the cable to offer each resident a choice of cable, premium TV, security and energy control systems. Metering and load shape reading will be demonstrated in conjunction with the local power company.

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

In a small system the problems encountered are many but all could fall into three cateories: equipment, personnel, and management.

Equipment problems could be the most common but also the most difficult to deal with. In most small systems, the repair of defective equipment has to be accomplished by sending them to an outside company. In small systems, modernizations of existing equipment is often neglected due to inadequate facilities and funding.

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

A radiometer that measures RF leakage from CATV drop cables in absolute values has been introduced. The instrument yields separate figures for the two parameters of energy transfer that determine radiation into or out of the drop cable, namely the transfer impedance and the capacitive coupling impedance of the shield. Previously, only relative ratings of shielding effectiveness could be established so that one cable could be rated only with respect to another.

Research revealed that the relative ratings were not always reliable indicators, since the instrument available

could not separate the transfer impedance from the capacitive coupling impedance. The radiometer, which also measures the characteristics of the specimen apart from those of the test chamber, is able to separate the two critical parameters.

A theoretical analysis and measurement of these parameters is discussed. Graphs of transfer impedance and capacitive coupling impedance characteristics are included.

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

The production of a 15-minute "Newstime" program uses conventional video signal sources and a standard three-fourths-inch U-Matic videocassette recorder. The final, edited tape is played back through a sampling scan converter to generate a "slow-scan" TV signal with a bandwidth of approximately eight kilohertz. Both narrow-band video and normal audio components are multiplexed with the video signal of WTCG, Atlanta, by use of subcarrier frequencies of 6.2 and 7.4 megahertz and are uplinked to the RCA Satcom satellite.

At each receiving earth terminal a subcarrier demodulator is required to recover audio and narrow-band video signals. A solid-state scan converter is used to reconvert to normal 525-line TV standards, and the resulting program of still pictures and sound is distributed throughout the cable system by conventional RF.

The technology used is readily accessible to individual cable systems. The small video bandwidths required are easy to fit into "cracks" in the cable spectrum, and may be used in a variety of specialized applications where a full motion video channel is not available or is not economically justified.

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

Satellites that utilize 24 transponders, 12 transponders that are horizontally polarized and 12 transponders that are vertically polarized are discussed. Care must be taken to ensure that the earth station is properly aligned to keep the transponders from interacting with one another.

This paper presents principals behind the changes that occur in the received polarization direction and suggests the appropriate times for making polarization adjustments. Faraday rotation and rain depolarization are considered, as well as satellite position and antenna pointing error.

In addition to the theoretical analysis of depolarization, practical methods for aligning antenna feeds are presented.

"Program Management in CATV Implementation" by Ernest O.F. Tunmann, Tele-Engineering Corporation.

What are program management techniques? Program management techniques consist of a set of management tools that permit accurate planning and control of all project activities from inception through completion. Program management consists of:

- Planning Tools
- Control Tools
- Quality Enforcement Tools

The planning of a program consists of: work breakdown structure, work order numbers, PERT chart, monthly cost budgets and cash flow, and monthly performance budgets.

The control of a program consists of: inventory control system, performance reporting, cost collection system, cost vs. performance comparison and remedial activity programs.

Quality enforcement tools consist of: construction specification assurance, quality assurance program, and a safety assurance program.

It is time to take a look at the mistakes that our industry has made in the past two decades.

The "low bidder will do it somehow" principal, or the "we just order the pieces and do it ourselves" attitude, has to be substituted with our insistence for accurately planned program implementation already in the conceptual and proposal phase. Only in this manner will it be possible to assure timely completion and quality system performance and, at the same time, minimize cost overruns and loss of revenues due to late system activation.

"Power Supply Requirements and Voltage Calculations for Cable Powered CATV Systems" by James K. Waldo, Teleprompter Corporation.

I am reminded repeatedly of how very basic and straightforward calculating voltage drops and subsequent amplifier voltage inputs are. I have learned that, unless calculations are made on a consistent basis, though they're basic, they aren't quite as straightforward to the average technician as one may think. If the chief engineer, design engineer or whoever, isn't familiar with how to calculate voltage drops and subsequent voltage inputs to the various amplifiers, the end result can be very costly.

The following is an attempt to show and/or explain how these calculations are made, so that the end result will be a well-designed power distribution system as well as a well-designed RF system.

"Design of Fiberoptic Baseband Video Systems" by Tad Witkowicz, Valtec Corporation.

System and circuit design considerations for a single channel baseband video fiberoptic system are presented. Such system parameters as light power, fiber loss, chromatic dispersion, detector and receiver noise and connection losses are discussed. A practical, commercially available system is used as the basis for a discussion of these parameters and various system blocks.

Key system elements, such as the transmitter and receiver circuits, are explained in detail. The effect of transmitter distortions on system parameters are discussed and experimental results are presented. Trade-offs between the differential gain and the modulation index for Burrus and Edge emitter-type diodes are discussed.

Two types of low noise photodetector amplifiers—a field effect and a bipolar type—are presented and characterized in terms of noise current, frequency response and signal-to-noise ratio. Experimental results for the FED amplifier are presented.

Included in this paper is a performance and cost comparison between the graded index and plastic clad silica-based fiber systems.

Finally, a discussion on application of fiber video systems will be included.

"Fiberoptic Supertrunk in Lompoc, California" by Sol Yager, Times Fiber Communications, Inc.

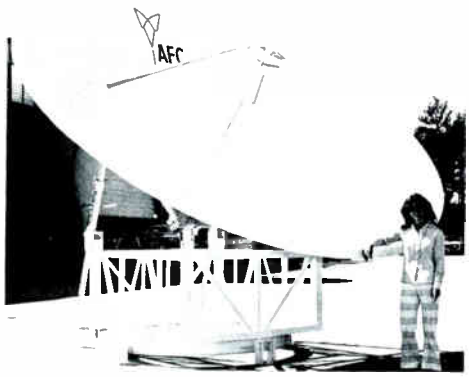
I would like to speak of the fiberoptic supertrunk completed in late 1978 for Teleprompter of Lompoc, California.

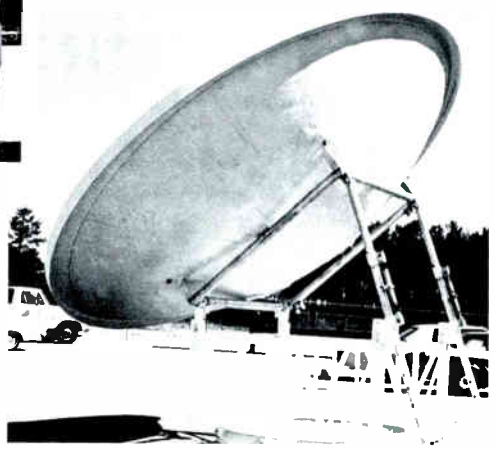
I will fully describe the optical system, it's measured performance, our installation experience and the system's reliability and maintenance history.

NEW FROM TONER

5 METER EARTH STATIONS

TOTAL TURNKEY INSTALLATION

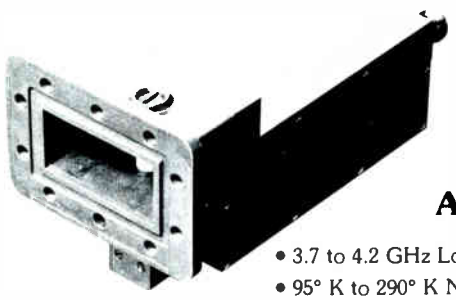




- Antenna
- Low Noise Amplifier
- Receiver
- Frequency Coordination
- FCC Filing
- Installation

ANTENNA

- 4 GHz & 12 GHz Operation
- High Gain — 44 dBi @ 4 GHz, 53.5 dBi @ 12 GHz
- Polarization, Azimuth & Elevation Adjustments
- Easy to Install — 2 men, 4 hours
- Maximum 750 lb./individual component
- Meets FCC Side Lobe Regulations



AMPLIFIER

- 3.7 to 4.2 GHz Low Noise Amplifiers
- 95° K to 290° K Noise Temperature

RECEIVER

- Low Cost Tunable Receiver
- C Band to Video and Audio in One Compact Unit
- Threshold at 8.0 dB C/N
- EIA and CCIR Compatible
- Additional Audio Subcarrier Available

Toner cable equipment, inc.

"Where Experienced People and Proven Products IN STOCK Make the Difference!"

969 HORSHAM ROAD • HORSHAM, PA. 19044

TOLL FREE
800-523-5947
IN PA DIAL
800-492-2512

Fiberoptics

Corning Introduces Low Loss Waveguides

Optical waveguide fibers with attenuation of less than 2 dB/km and bandwidth greater than 400 MHz at 900 nm wavelengths are now available from Corning Glass Works.

The new fiber, identified as Corguide 2041 fiber, is part of Corning's long wavelength fiber series designed for optimal operation at 900 nm or greater. With its maximum 2 dB/km attenuation, Corguide 2041 fiber can meet the most stringent demands for low-loss signal transmission.

This low-loss graded-index waveguide is produced by Corning's doped deposited silica process.

Additional information is available from the Telecommunications Products Department, Corning Glass Works, Corning, New York 14830, (607) 974-9000.

Power Supplies

PTS Electronics' New Digital Power Supply

PTS Electronics' DG-1 digital power supply has proven itself to be an excellent power supply for the servicing dealer.

Made in the USA, the solid state DG-1 provides an external power supply for substituting voltages in televisions, stereos, radios, computers, microprocessors, appliances, CB equipment, telephone equipment, electronic cash registers, security systems and other electronic devices.

The digital voltage meter is accurate to .05 percent and indicates to .1 volt. The vinyl cabinet available in optional walnut, black or blue, dealer net is $114.95.

The DG-1 digital power supply is now available at any of PTS' 43 company-owned service centers or stocking distributors.

For additional details, contact PTS Electronics, Inc., P.O. Box 272, Bloomington, Indiana 47401, (812) 824-9331.

TEST Introduces Scramble Booster

Multiple apartment and hotel MATV systems often require input levels in excess of one volt for signal distribution. To enable the TEST EC and LS scrambling signals to achieve these high levels, the 15 dB gain TEST scramble booster amplifier is being offered by that company.

The broad bandwidth and low distortion characteristics of this amplifier makes it useful in other headend applications. The internal power supply is highly filtered to maintain high isolation from the AC line, and the hybrid amplifier utilized in the SB-1 is capable of running at very high levels without compressing or producing spurious signals.

For additional input, contact TEST, 16130 Stagg Street, Van Nuys, California 91409, (213) 989-4535.

Test Equipment

Texcan Offers a New Portable Sweep System

The Texscan 9900C is a versatile instrument composed of a sweep generator, display oscilloscope, return loss bridge and attenuators. The 9900C provides bench sweep capability in a battery generated, field ruggedized, portable package. The size is 8-inch x 13-inch x 10.5-inch and the weight, including battery, is approximately 25 pounds.

Applications of the new 9900C include: amplifier alignment, cable sweeping for insertion loss and return loss, sweep testing of active and passive devices, detecting illegal hookups by interpretation of return loss patterns, and numerous other sweep measurements.

Standard features include: medium persistence phosphor on the CRT, 50-10-1 MHz markers standard, provisions for four additional markers, 4 to 350 MHz frequency range, +57 dBmV output, ± 0.25 dB flatness, 1 dB step attenuator, adjustable tilt, internal switching for dual trace display of test and reference traces.

For more data, contact Texscan Corporation, 2446 N. Shadeland Avenue, Indianapolis, Indiana 46219, (317) 357-8781.

Low-Cost Portable DMM

The Model ME-521DX multimeter from Soar Electronics, is a 3½-digit battery-powered unit. The unit features a high-low ohm switch for all ranges, five function modes, automatic zero adjustment, automatic polarity and overload protection.

Low current drain assures long battery life and thousands of measurements without the need for battery replacement. This accurate and completely portable device (27 ounces) features: a voltage measurement capability to 1,000V DC and 600V AC; a current measurement range to 1,000 ma (AC or DC); and a resistance measurement range to 20 megohms. Accuracy is 0.5 percent (typical). The price per unit is $115 and delivery is from stock.

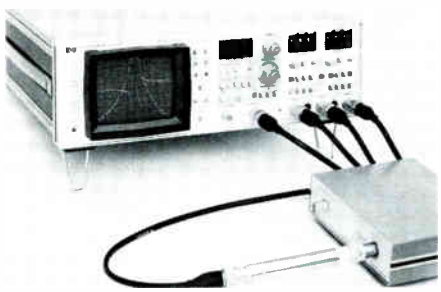
For further details, contact Soar Electronics (U.S.A.) Corporation, 813 2nd Street, Ronkonkoma, New York 11779, (516) 981-6444.

Compact, Low-Cost 4-1300 MHz Network Analyzer from Hewlett-Packard

Precise measurements of magnitude, phase, absolute power and polar reflection coefficient from 4-1300 MHz are available in this compact, low-cost instrument. Called the Hewlett-Packard model 8754A network analyzer, the instrument includes a built-in source, a three-channel 80 dB dynamic range, spurious-free receiver and a CRT display, all in one 5-¼ inch-high cabinet. Its small size and light weight, combined with its performance and

versatility, make the unit ideal for field tests as well as laboratory and production applications. Its sensitivity and wide range make it useful for antenna gain and impedance measurements.

Measurements that can be performed easily and rapidly by the 8754A include swept magnitude and phase, return loss and impedance, simultaneous transmission and reflection, transmission magnitude and phase and S-parameters. Three signal separation accessories, available for these specific measurements, include: the model 11850A/B three-way power splitter for precision transmission measurements; the model 8502A/B test set for simultaneous transmission and reflection measurements; and the model 8748A S-parameter test set which measures both forward and reverse S-parameters. High-impedance probes for in-circuit measurements, matched cable sets, adaptors and transistor fixtures are available for maximum versatility.



For additional information, write to the Inquiries Manager, Hewlett-Packard Company, 1507 Page Mill Road, Palo Alto, California 94304.

New Data Communications Tester From Textronix

Tektronix, Inc. has developed the 832 Data Comm Tester, a truly portable test instrument for comprehensive on-site service of data communications systems.

Priced at $1,595, the 832 offers many of the same diagnostic capabilities previously found only in bench-type analyzer/emulators costing $6-12K and more. Operators can verify system performance, identify and troubleshoot faulty system elements, solve hardware handshake problems, and perform alignments and adjustments with a minimum of time and difficulty. The 832 is easy to operate, requiring only a few hours of training. Weighing only five kg. (11 lbs.) and measuring only 33 cm. (13 inches)

wide, 10 cm. (4 inches) high and 31 cm. (12 inches) long, the 832 represents the ultimate in portability—complex operations and extensive software have been eliminated. The 832 also contains an LED display which supplies all information in an unambiguous readout.

The 832 Data Comm Tester can be used in servicing all the major components of a data communications system which use either EIA standard RS-232-C or C.C.I.T.T. V.24 or current loop interfaces. By "pointing the finger" at a faulty subsystem, the 832 can eliminate hours of frustrating and futile activity, and then be used to stimulate the subsystem, locate the malfunction, and check its operation after repair.

The Tektronix 832 Data Comm Tester is expected to fill the wide gap between sophisticated analyzer/emulators priced in the $6K to $12K range and simple control line status monitors priced at $50 to $200. Its widest application will be as the primary tool for data communications system installation, maintenance and service.

For more information, contact Tektronix, Inc., at (503) 644-0161.

Microwave

Small Sound Reducer From Microwave Filter Co.

The model 3469 sound reducer from Microwave Filter Company, Inc., is a compact device measuring one inch by one-and-a-half inches by three inches. The reducer adjusts with single screwdriver adjustments to reduce sound up to 12 dB. Three models are available covering low, mid and high bands; and the reducer is priced at $25. Connectors are 75 ohm type F.

For more information, contact Microwave Filter Company, Inc., 6743 Kinne Street, East Syracuse, New York 13057, (315) 437-3953.

Miscellaneous

Flux Valve S/D Converter

Transmagnetics, Inc. has announced a unique converter that represents a breakthrough in transducer to computer interconnect technology.

The conversion of flux valve data into digital form has proved difficult and cumbersome in the past because a flux valve compass accepts a 26V 400 Hz reference and then delivers an 800 Hz signal that consists primarily of a series of spikes. The conversion process is further complicated by the fact that the output voltage is dependent on latitude location and can thus vary from 50 mV to 370 mV.

Transmagnetics has developed proprietary designs that enable a single module to extract signal data from the spike outputs and to compensate for the wide dynamic range. The converter delivers jitter-free digital angle data.

For additional input, call or write Fred Haber, Transmagnetics, Inc., 210 Adams Blvd, Farmingdale, New York 11735, (516) 293-3100.

Sheath Fault And Cable Locator

The new Dynatel model 573 sheath fault and cable locator will be displayed and demonstrated at the International Construction Utility Equipment Exposition (ICUEE 79) in Olathe, Kansas, August 28-30, 1979. The unit can locate buried telephone, CATV and electrical cable, trace its path, compute its depth and pinpoint sheath faults. The unit comes complete with cabling, coupler, earth contact frame and long life batteries in weather-proof case.

For more data, call David R. Creel at (312) 986-9402.

MOD-KITS®

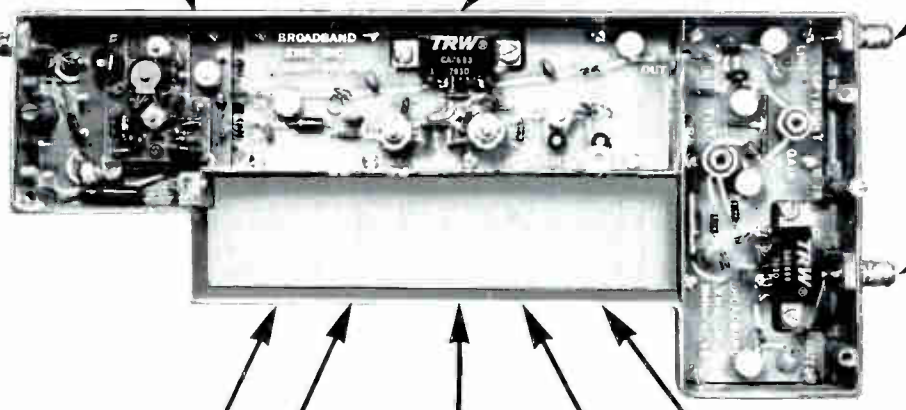
The Economic Alternative

JERROLD SA-SERIES PUSH-PULL HYBRID

Double Sided G-10
Glass Circuit Boards

Single I.C. in Trunk and
Bridger for Lower Heat & Power

6 dB Noise
Figure
@ Ch. "R"



21 Ch. +32/29
dBmV

Xmod: – 93 dB
S.O.: – 85 dB
T.B.: –110 dB

21 Ch. +48/43
dBmV

Xmod: –65 dB
S.O.: –75 dB
T.B.: –80 dB

Automatic Thermal Shutdown

M.O.V. Surge Protector

Automatic Circuit Breaker

30v or 60v Powering

Tapped Power Transformer

★ A completely new power supply is furnished with every kit
★ SA-1 thru 5 available
★ SLE 1 & SLE 20 available
★ Prices start as low as $165.00

BROADBAND
ENGINEERING, INC.

See us at Booth 147-148 at the N.C.T.A. in Las Vegas

1525 CYPRESS DRIVE, JUPITER, FLORIDA 33458
(305) 747-5000

New Flat Cable Guide Issued by Belden

Bonded and laminated flat cable are described in a new guide published by Belden Corporation's Electronic Division. Also covered in the eight-page illustrated booklet are bulk and prestripped flat jumper cable.

The publication, No. ED79-1, describes the space-, weight-, and cost-saving benefits of Belden's UL-recognized flat cable for multi-point interconnection applications. Specifications and technical data are presented for 26 bonded constructions, rated at 80 degrees C/300 v, with 10 to 30 round conductors. Similar charts and tables detail two types of 105 degrees C/300 v laminated cable with 10 to 64 round conductors at standard 0.050-inch spacing for mass termination: 1) a white vinyl-jacketed 13-item series with polarity codes repeating every five conductors, and 2) a color-coded 13-item vinyl-jacketed line that utilizes a 10-color sequence.

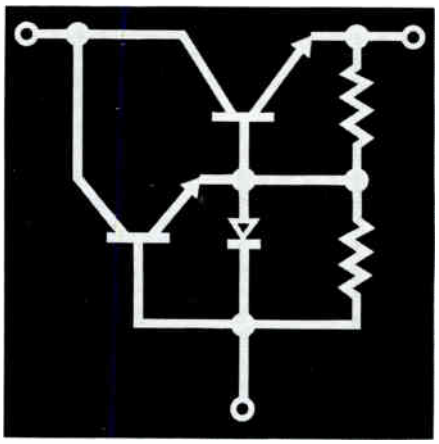
For a copy of the flat cable guide, Publication ED79-1, write Manager, Marketing Communications, Belden Corporation, 2000 S. Batavia Avenue, Geneva, Illinois 60134.

TRW Offers Booklet on High-Frequency Power Switching

TRW Power Semiconductors has published an eight-page "How-To" booklet describing various techniques for designing power processors with high-power Darlington transistors and Schottky diodes.

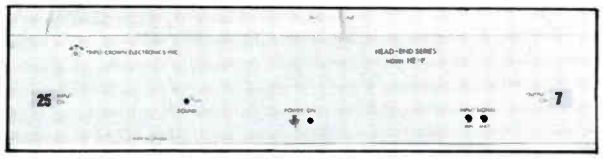
Designers of low-voltage, high-current switching power supplies will benefit from a section illustrating six proven designs for "switchers." Designers of speed/torque controllers for rotating motors will benefit from a section discussing pulse-width modulation for two- and three-phase systems.

The booklet is available free of charge by writing to TRW Power Semiconductors, 14520 Aviation Boulevard, Lawndale, California 90260 and requesting a copy of the "Darlington/Schottky Blue Book on High-Frequency Power Switching, TRP-4302" or by calling Mack Queen at (213) 679-4561.



"How-To" booklet from TRW.

TRIPLE CROWN
ELECTRONICS INC.



MODEL HE-P SIGNAL PROCESSOR

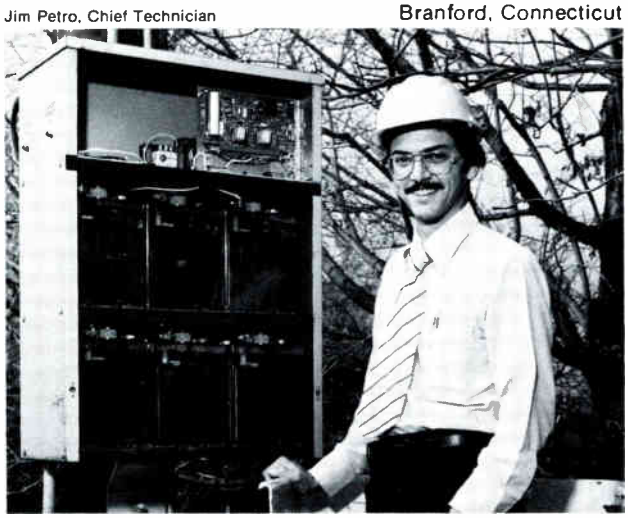
The HE Series of processors and modulators was designed to meet todays needs of small systems for high quality processing and adjacent channel loading at an economical price. All frequency conversions are crystal controlled and have IF accessibility. Input signal range: baseband or 5-900 MHz. Output signal range 5-300 MHz.

Write or call: 42, RACINE ROAD, REXDALE, ONTARIO, M9W 2Z3.
Tel. (416) 743-1481

We specialize in being active!

Not a single failure through four New England winters . . .

Jim Petro, Chief Technician
Rollins Cablevision
Branford, Connecticut



With over 35 Powervision Standby Power Supplies in service, Rollins has not had a single service interruption due to power loss, or a component failure, in over four years. Not one.

For dependable cable service . . .

POWERVISION STANDBY POWER

1044 PIONEER WAY • EL CAJON, CA 92020 • (213) 374-1035

CATV On Top of the World

By David Fause, Executive Vice President
ASRC Communications, Ltd., Anchorage, Alaska

Cable television was introduced to Barrow, Alaska, in 1969, and operated intermittently from 1/2-inch reel-to-real tape equipment via an outside plant constructed without engineer's planning for several years. Then, from 1973 until 1977, under another sole proprietorship, the major improvement in the headend and cable plant was accomplished. In addition, the current programming source, Seattle, Washington, was established in a stable flow of relatively regular commercial programming on a 3/4-inch videocassette format.

The present owner and operator of America's most northern cable television utility is ASRC Communications, Ltd., a wholly-owned subsidiary company of the Arctic Slope Regional Corporation. The latter is one of 12 regional businesses for profit corporations established and developing in Alaska following the passage of the Alaska Native Land Claim Settlement Act in December, 1971. The native corporation has a responsibility for managing land, resources and economic development in a geographic area equal to most of Washington and Oregon; inhabited by only several thousand permanent citizens-shareowners, and with only eight village communities located on a geographic span from Siberia to the Canadian border.

Due to the complexity of the Alaska Native Land Claim Bill itself, and the costly logistics of applying the stipulations to the people of the Arctic Slope Region, the Regional Corporation determined in 1974 to begin using locally-produced, Eskimo language programming distributed on videocassette by bush plane as a means of conveying information and instructional materials relating to corporate and economic development.

A small video production facility was established in Barrow by the native corporation. It produced programming for the shareowners as well as other agencies in the community, such as the school district and local borough government for the following three years. When the local cable television utility became available as a business acquisition by the corporation, it was a natural association of an existing community production facility with a potentially better means of distribution via cable. That is the situation today in Barrow. The Regional Corporation occupied a new, three-story corporate office in Barrow in the summer of 1978 and it contains the headend of the Barrow cable television system as well as the fully-equipped, non-broadcast, 3/4-inch format production studio that serves communities, public access needs as well as the ongoing corporate production objectives.

The ongoing engineering and maintenance for the small, 500 subscriber system at latitude 71 degrees north is very definitely a challenge to both technical and economic trends. The plant is principally aerial with original construction. However, the current operator is varying the main trunk portion as feasible during the summer months when ditching

can be raised and gravel pad road beds can be done. There is a tendency for the distant observer to assume that Arctic weather just gets progressively worse for each mile north of Fairbanks. However, there is a tempering effect caused by the Arctic Ocean. Wind, temperatures and snow loads are not significantly different for plant maintenance personnel in Barrow than for their counterpart in northern Montana or Minnesota. The more significant factor is the extended winter darkness from November to February when all outside plant work is done "at night."

The plant survived due to the dry cold conditions of the high Arctic region, with the principal weather damage occurring during late spring. Melting conditions are interspersed with the spring storms to drive fine, dry snow into aerial equipment at connection points. During new plant construction, and when existing plant maintenance is required, extra effort is taken to seal and caulk all apertures completely in order to offset fine snow penetration and the freeze-thaw-freeze damage cycle.

The present system continues to operate from the signal source provided by 3/4-inch videocassette machines to full time program channels. The taped programming arrives in Barrow on a taped bicycle route that begins in Seattle and includes several other Alaskan communities. As a consequence, the network entertainment programming runs three to four weeks behind the national broadcast stations.

The programming format also includes a three-by-five card message wheel for local announcements and advertisements that occupies one full-time channel; an AP Newswire feed on another channel that includes local weather display information and horizontal crawl; and a dedicated education/movie information channel.

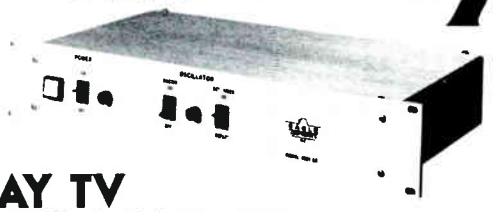
In terms of major system engineering developments there are two efforts that are presently underway. The first involves the extension of the outside plant by varied aerial routing, a distance of five miles along the shore of the Artic Ocean to the Naval Arctic Research Laboratory where full-time staff and their families now enjoy television entertainment for the first time. The MCE-2000 addressable tap system is being employed in this segment of the plant in order to offset the operational costs of sending personnel back and forth to service customer calls. The adjustable tap system will be extended to portions of the existing network this summer as older plant is replaced.

The second major development relates to the delivery and construction of a ten-meter TVRO earth station by barge this summer with an expected turn-on date of September, 1979.

This project is being done on a turnkey basis by ASRC Communications, Ltd. in association with Microwave Associates, Inc. EIRP studies conducted by Andrew Corporation and Microwave Associates for the Barrow cable system determined the necessity of the ten-meter antenna.

With the successful turn-on of the receiver this fall, subscribers at the top of the world will enjoy the usual seven channel format of satellite programming in addition to the local services of public access video. ASRC Communications, Ltd. is also in the process of installing a Microwave Associates MA-12XC two-way microwave cable between the headend sites in Barrow and the RCA Alascom ten-meter, mid route earth station two miles out on the tundra.

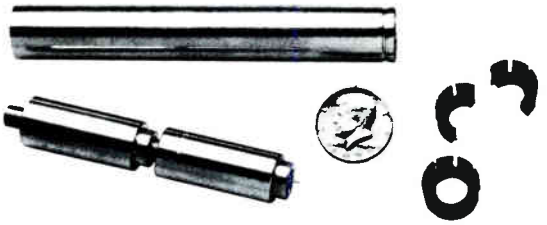
Eagle Quality



PAY TV SCRAMBLER

This generator is made to complement the Eagle Model 2-DF outdoor decoding filters to form a system that economically secures pay channel reception for the CATV system operator.

This scrambler is designed to deliver the encoded signal to the system without additional and possibly expensive peripheral equipment.



an outdoor-tap mounted DESCRAMBLER

Model 2-DF is ruggedly constructed and potted for temperature stability. The solid metal construction eliminates any RFI leakage problems. Outdoor application (Tap-Mounted) keeps it out of the hands of the subscriber. It requires special tools for installation and removal, making it tamper proof and theft proof.

NOTCH-FILTER TRAP

Eagle 2-NF is easy to install, hard to damage. Its' tamper proof security shield protects against theft. Special tools are required for installing and removing. There's no problem with RFI leakage in the Eagle Notch-Filter.

CALL OR WRITE FOR DATA OR SAMPLE

EAGLE COMTRONICS INC.

P.O. BOX 93
Phoenix, N.Y. 13135
(315) 638-2586

Canada "Turns On"

By Toni Barnett, Managing Editor

North America's first major fiberoptic digital CATV super trunk link is now operating in London, Ontario carrying 12 color TV channels and 12 stereo FM channels over six hair-thin optical fibers.

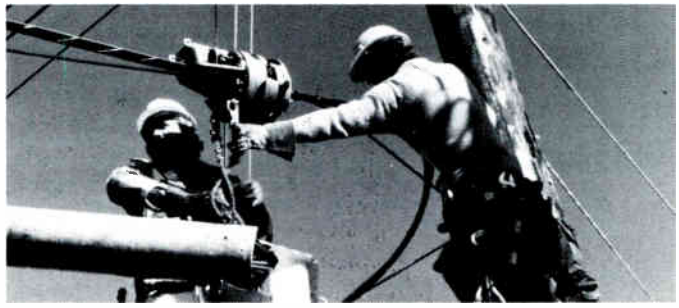
Canstar Communications, of Toronto, served as prime contractor for the $1.65 million, 7.8 Km transmission link that has the highest operating rate in North America—322 million bits/second.

The link was officially opened at the Canadian Cable Television Convention, April 2, by Dr. John Madden, director of Canada's Department of Communications, in a television conference with E.R. Jarmain, president of BCN Fibre Optics and Mayor Al Gleason. The fiberoptic super trunk is capable of providing cable television services to 60,000 subscribers of London Cable TV, Ltd.

There were ten cable lengths in the 7.8 Km system that required field splicing. Fusion splicing in the field is now a routine task using techniques that have been developed by Canstar engineers. The more critical procedure was found to be in preparing the protective cables prior to splicing. Current installations are incorporating a redesigned cable which simplifies and shortens preparation time.

The system parallels a state-of-the-art coaxial system which requires eight repeaters. This fiberoptic test link requires one repeater for regular transmission, with a second repeater installed en route for test purposes. In addition to the technical superiority of fiberoptics, the costs of fiberoptic systems are decreasing significantly. Fiber prices alone have fallen by 50 percent in March.

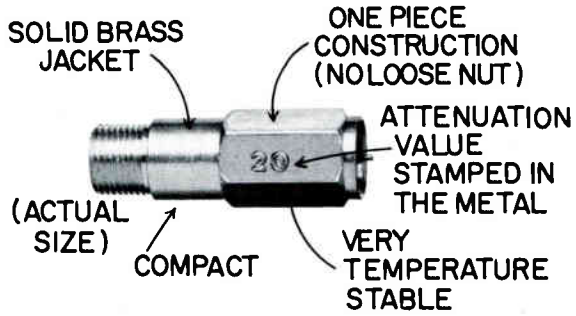
"We are very pleased with the performance of the London system, which exceeds our earlier expectations," said J.W. Proctor, Canstar's project manager. "The attenuation losses in the fiber, cable, splices and connectors are significantly less than those that were predicted two years ago by our systems engineers."



Installation engineers lash the fiberoptic cable onto the messenger wire in London, Ontario.

Come on over to Our Pad!

LRC Attenuator Pad



LRC Attenuator Pads are available in values of 3, 6, 10 and 20 db with an accuracy of 5% or ± .5 db.
The specified frequency Range is 5 to 300 MHz.
75 ohms impedance in and out.
A 20 db minimum return loss.

See Us at Booths 61-62

LRC ELECTRONICS, INC.

901 SOUTH AVE., HORSEHEADS, N.Y. 14845 PHONE 607-739-3844

AVAILABLE IN EUROPE THRU: Electro Service N.V., Kleine Nieuwendijk 40, B 2800 Michelen, Belgium
CANADA THRU: Electroline TV Equipment, Montreal, Quebec

CATV EQUIPMENT REPAIRS

* LINE & DISTR. AMPLIFIERS
* FIELD STRENGTH METERS
* HEADEND & CCTV GEAR
* FAST TURNAROUND
* QUALITY WORKMANSHIP
* REASONABLE RATES

All units checked to meet manufacturers spec's.

90 days unconditional warranty from shipping date.
48 hours burn in period before final test.

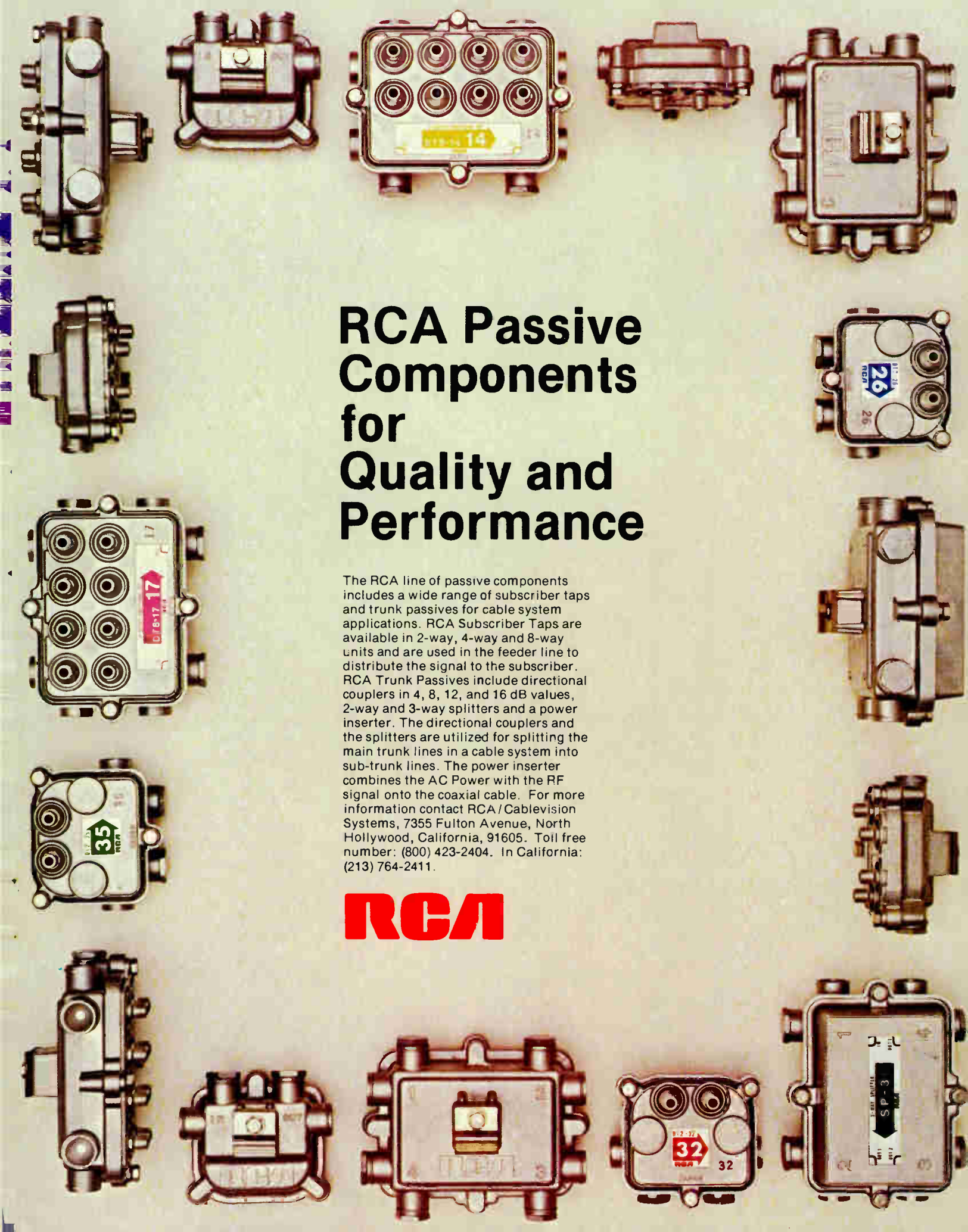
ALSO AVAILABLE

* MODIFICATION KITS
* EMERGENCY SERVICE
* CASH DISCOUNTS
* FIELD SERVICE
* FCC COMPLIANCE TESTS

There is much more,
just call us collect for complete information.

VideoTech Service Inc.
CATV - MATV - CCTV

4505-D W. ROSECRANS AVENUE
HAWTHORNE, CALIFORNIA 90250
213-675-3266



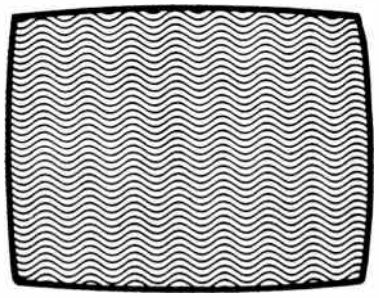
RCA Passive Components for Quality and Performance

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

RCA

Low Band Channels, Signal Leakage and Waterproofing

Q Our underground plant is plagued with water collecting in the underground equipment enclosures or vaults. We use pedestals wherever possible but the majority of our customers don't want such a device sticking up from their front lawns.



We've tried everything we can think of to keep the vaults dry, but the water table in our area is rather high and only compounds the problem. Isn't there some way of easily keeping the water out of the vaults or waterproofing the equipment inside?

A Your problem is industry-wide and expensive to solve by installing waterproof vaults.

A high water table rules out placing your vaults on top of a few feet of crushed stone to act as a dry well, because the dry well will fill up and be useless.

There are many products available for sealing taps and connectors, but most of them are either permanent or are destroyed when servicing the device they are meant to protect.

Some manufacturers, however, make a flexible PVC housing that is sealed with stainless steel hose clamps and is completely waterproof. The housing, with cables and top enclosed, can be directly buried or placed in a vault or pedestal.

Q I work for a medium size MSO, and during my visits to our systems, one of the most common problems I have seen is radiation from a cracked or broken sheath in the aluminum cable. Is there any way to prevent this?

A The sheath cracking you mention is one of the most common problems found in most cable systems. It is preventable, but unfortunately, the problem is created in the initial construction. This makes correction in an existing system difficult.

The primary cause is improperly designed expansion loops, either in form or method. For many years, the industry built systems with expansion loops that looked like those in Figures 1, 2 and 3.

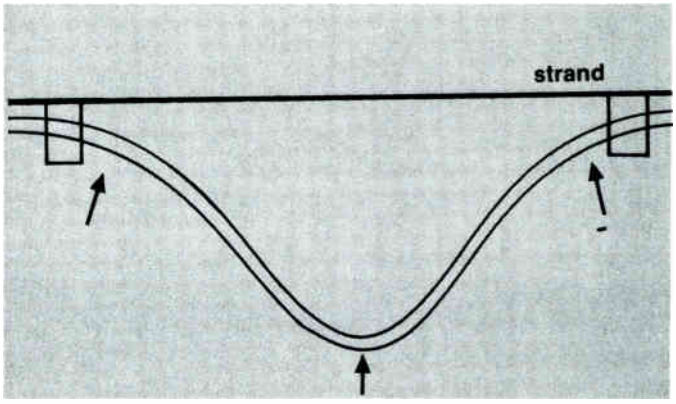


Figure 1

The arrows indicate stress points where cracking is most likely to occur as the cable expands and contracts with temperature. The loops tend to concentrate stresses at these points, aggravating the problem. Additionally, many times these loops were formed by hand or by means of poorly designed templates, forming small kinks in the aluminum which later cracked to create a break in the shield.

Tests conducted by some of the industries leading cable manufacturers and construction companies indicate that the form of expansion with the longest life, is shown in Figure 4.

In this case, the stresses are distributed across the bottom

TEST TEST TEST TEST

The Technology Leader
For CATV or MDS
Pay TV Equipment . . .

Call Van Nuys, Ca. (213) 989-4535 — Atlanta, Ga. (404) 993-7249
or Write TEST | Tanner Electronic Systems Technology, Inc.
16130 Stagg Street, Van Nuys, Ca. 91409

of the loop rather than at a point. This form of loop will give a much longer life than any of the first three. Equally important, however, is the method by which the loop is formed. The idea is to handle the cable as if it were a hollow aluminum tube. As you can imagine, it is impossible to form the loop around a template for the same reason. There are tools available which do an excellent job in forming this loop with virtually no deformation to the cable.

So far as what to do with your existing systems, the only real correction is to make sure that all rebuilds and new extensions are constructed properly. Any attempt to convert the existing expansion loops to this configuration would just accelerate your sheath cracking problems.

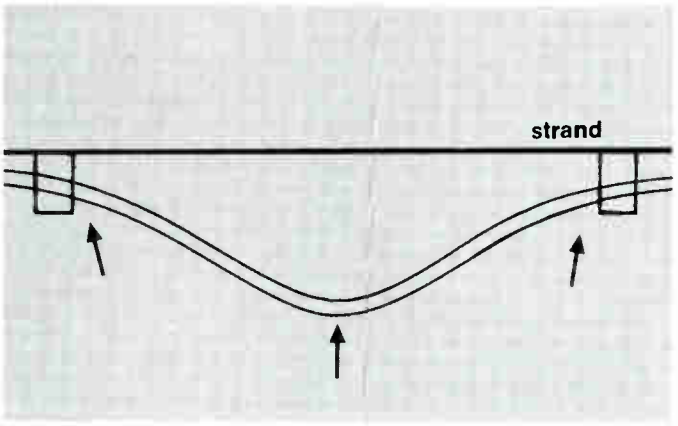


Figure 3

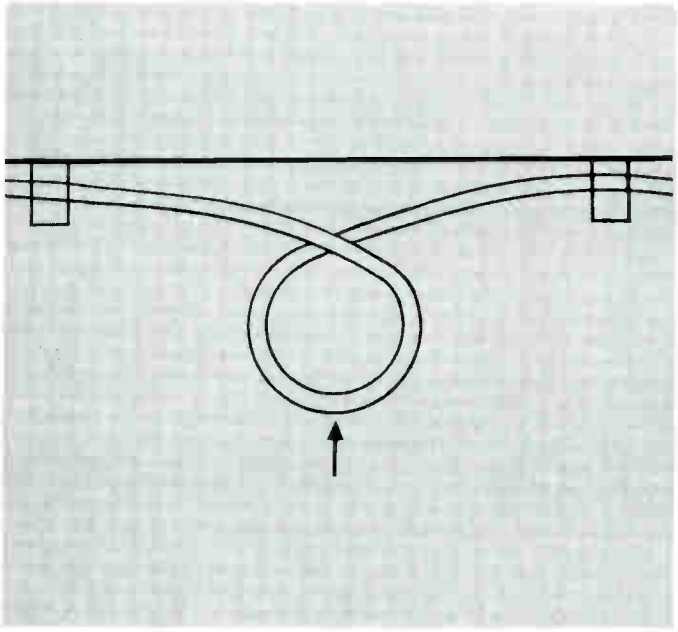


Figure 2

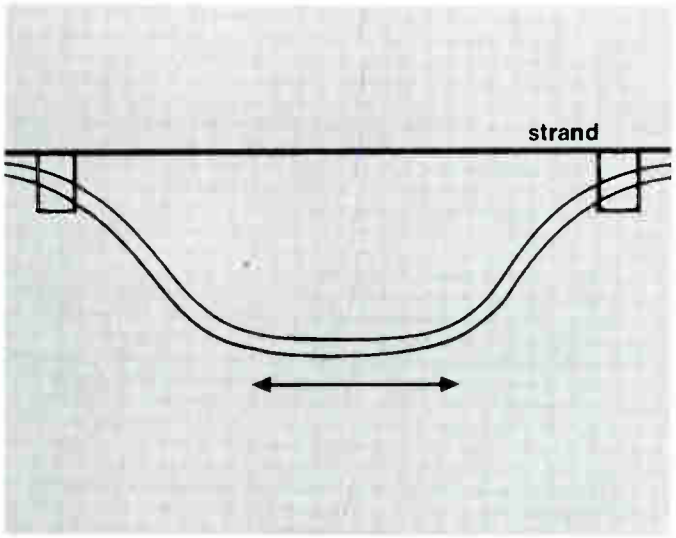


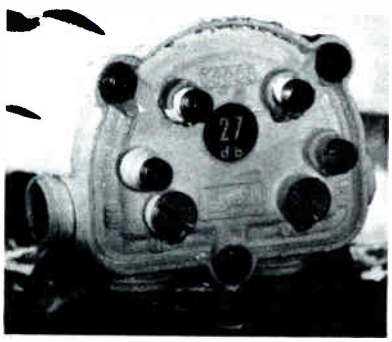
Figure 4

A Product for your Pay TV Requirements

New, The MDS Mini-Combo...

Combines the antenna and downconverter into one, economical unit.

THE ONLY TAP OF ITS KIND



MOISTURE SEALED & CORROSION RESISTANT

AND ONLY $7.25 ($5.50*)

No other tap provides this protection:

- Baked-on, Polyurethane Finish plus a Totally Water Sealed Assembly
- Patented Non-Shearing Center Seizure Mechanism
- Modular
- 5-300 MHz
- Eye-level Center Seizure Connections
- *With a standard irridite finish

ARVIN/CATV

AN ARVIN COMPANY
4490 Old Columbus Road, N.W.,
Carroll, Ohio 43112
614-756-9211

For Delivery — Call

Cablevision Equipment Company
Garland, Tex. 75042
214-272-8551

Signal Vision, Inc.
Laguna Hills, Calif. 92653
714-586-3196

Comm-Plex Electronics
Montreal, Quebec CANADA H4P1V4
514-341-7440

Emjay Electronics
Drexel Hill, Pa 19026
215-461-0353

ComSE Sales Corp.
Lawrenceville, Ga. 30245
404-963-7870

Video Systems
Route 1 — Box 235
Lodi, Wisconsin 53555
608-592-3272

Stock Electronics
RueDe Hennin 74
Brussels, Belgium B1050
Telex 846-23.704

★ **Helmut Beierke** has been named administrator of product research and design for **PTS Electronics, Inc.** He will be responsible for new product research and development and will investigate new products and services to market. PTS is the largest independent television tuner repair company in the world and also rebuilds modules and manufactures test equipment and accessories. Beierke's professional experience includes serving as a technician for Magnavox in aviation production quality control; research on the design and testing of the NIMBUS weather satellite infrared radiometer with ITT, and a position with International Harvester in the test engineering department, where he also served as an electronic data analyst.

Helmut Beierke

★ **Neil A. Fladeland,** a twelve-year veteran of cable television engineering and electronics, has been named chief operating engineer for **Citizens Cable of Fort Wayne, Inc.** Fladeland will be directly responsible for the electronic operation of the Fort Wayne cable television system. Prior to joining Citizens Cable, Fladeland was chief technician for Lynchburg Cablevision; Lynchburg, Virginia. He also has operating cable TV system experience in Minnesota, Wisconsin, and California - where in San Diego he was an electronics/microwave technician for the largest cable television complex in the United States.

★ **Neil Heller** has been appointed vice president and technical training director for **Instant Replay Equipment Company** in Southern California. The appointment is effective immediately. Prior to joining Instant Replay Equipment Company, Heller was western regional field service manager for Matsushita Electric Corporation of America. Covering the twelve western states, he was responsible for training service people to repair new Panasonic Industrial video products including video home systems, three-fourths-inch U-Matic recording equipment and color cameras.

Neil Heller

★ **Phillip Clapp** has replaced Lucille Larkin as public affairs director for the **National Cable Television Association.**

★ Alvin Barshop, **Panasonic Video Systems** Division general manager, has announced the appointment of **Morris Washington** to the position of national sales manager for Professional Video Products. In his new position, Washington will be responsible for directing and establishing sales goals in the professional video market with industry, broadcasters and higher education. He will also advise factories on new products that would be capable of meeting competition and setting sales quotas and objectives for regional and district sales managers for Panasonic professional video products.

Morris Washington

Employment Oppt.

LOOKING FOR QUALIFIED JOB APPLICANTS OR A NEW POSITION?

We are an employer-paid personnel service organization maintaining data on positions and personnel available nationwide. Call or write for our free "Top Job Candidates" or "Job Opportunities" bulletins. Confidential services. Licensed by the California Bureau of Employment Agencies.

Research, Brokerage, Personnel and Marketing Services. Established 1971

COMMUNICATIONS MARKETING, INC.
PERSONNEL SERVICE
2326 Tampa Ave., El Cajon, Ca 92020 (714) 461-7891

Help Wanted

TECHNICAL ENGINEER

Experienced cable operator is desirous of adding an experienced technical supervisor to a progressive management team. This individual must possess strong technical and management qualities. This top 50 CATV market is in a desirable Northeast location. Salary and excellent benefit package available to qualified individuals.

Send resumes with salary requirements to Box CED-0479-1, c/o C-ED, 1139 Delaware Plaza, Denver, CO 80204.

CHIEF ENGINEERS IN ROCHESTER, NEW YORK: IOWA CITY, IOWA: COUNCIL BLUFFS, IOWA: & LITTLE ROCK, ARKANSAS

ATC is the second largest MSO in the country, a rapidly growing cable company offering an opportunity to work with top professionals in the CATV industry.
These new systems, when completed, will vary in size between 150 and 500 miles of plant. Qualified candidates should have solid technical experience in cable and proven supervisory ability. Unlimited growth potential and an attractive compensation and benefits package is available to qualified candidates. Send resume and salary requirements in confidence to:

Personnel Department
American Television and Communications Corporation
20 Inverness Place East
Englewood, Colorado 80112

Equal Opportunity Employer M/F

CHIEF TECHNICIAN

Chief technician needed for independent system with construction program under way. Duties include supervision and training of technician personal, supervision of plant construction and maintenance. Call 609-779-1770 or send resume to:

Mr. Nase
2 East Main Street
Maple Shade, NJ 08052

ENGINEER

Engineer needed for 3 new 35 channel 2 way interactive cable systems with satellite receivers. Contact.
Stoney Kahn
Troy Cable Communications, Inc.
Dye Building - Public Square
Troy, OH 45373
513-339-4770

Experienced foreman, linemen and splicers needed for long term work in the Southwest. Please call or write:
David L. McBee
Lone Star Cable Company
Box 826
Round Rock, TX 78664
512-255-5779

REGIONAL ENGINEER

Travel in the Midwest. Assist new and existing systems, including FCC proofs. Some microwave and earth station work which requires FCC license. Construction knowledge important. Immediate opening. Call or write:

Art Hutzler
515-245-7585
Heritage Communications, Inc.
2195 Ingersoll Avenue
Des Moines, IA 50312
E.O. E. M/F

CONSTRUCTION PERSONNEL

Springtime in the Rockies, we need good construction people for several turnkey projects. Pay will match ability. Call 406-722-4955. Kable Constructors. Company in Alberton. Montana, 59820

TECHNICIANS

Continental Cablevision is constructing 1300 miles of plant in sunny and historic Richmond, Virginia. Located just an hour from the beaches and mountains, Richmonders enjoy a mild climate for most of the year. Technicians are needed for this fast growing company that offers an attractive benefit package.
The company seeks Service Technicians and Field Technicians. All technicians should have two years of cable experience and field technicians should also have electronics education. Continental needs personnel who desire rapid advancement.

Write or Call
Richard Ashpole
Continental Cablevision
2040 Westmoreland Street
Richmond, Virginia 23230

CHIEF ENGINEER IN MID-ATLANTIC REGION

Qualified applicants should have 3-5 years experience in a large cable TV system, CATV supervisory experience, and a First or Second Class FCC license. Construction/build and microwave experience helpful.
This is a new 400 mile system. We are one of the largest MSO's with growth opportunities for professional personnel willing to work hard. Good fringe benefit package. Salary based on experience. Send confidential resume with salary history and requirements to: Box C-ED-0579-1.

Equal Opportunity Employer M/F

CATV TECHNICIAN

Central Arizona system needs good technician with experience in system maintenance, design and construction, headend maintenance and bench repairs. 3 to 5 years experience preferred. Managment capabilities a plus as this position could lead to Manager for system. Salary DOE, good fringes. Send resume to Manager, Casa Grande Cablevision, P.O. Box 1217, Casa Grande, AZ 85222 EOE.

CHIEF ENGINEER FOR KANSAS CITY, MISSOURI

This is a new metropolitan system just beginning construction. Completed system will be about 1500 miles of plant.

Requirements include a First or Second Class FCC license, 3-5 years experience in a large cable TV system, and supervisory background in cable. Construction/build, microwave and B.S.E.E. helpful.

ATC is a rapidly expanding MSO with many growth opportunities. Salary commensurate with experience and an excellent benefits package are ofered. Send resume and salary requirements to:

Personnel Department
American Television and
Communications Corporation
20 Inverness Place East
Englewood, Colorado 80112

SAMMONS COMMUNICATIONS, INC.

Wanted (2) area CATV engineers - one based in Dallas, TX and one based in a southeastern CATV system. Staff position reporting directly to the Vice President of Engineering. Considerable travel. Theoretical and practical knowledge of all facets of CATV construction, installation and maintenance desired. FCC license desirable but not mandatory. Following company paid benefits: holidays, vacations, group medical including dependents, group life insurance, group accidental death and dismemberment, long term disability, pension, employee stock ownership, sick leave. Salary commensurate with experience. Call or write:

Hank Cicconi
214-670-9860
Vice President of Engineering
Sammons Communications, Inc.
403 S. Akard
Suite 708
Dallas, TX 75202

MICROWAVE ENGINEER

To maintain 193 miles of Microwave path with up to seven (7) channels per hop. Challenging job while working with the latest state of the art equipment. Largest MSO in the country. Send all resumes to Mr. Ed Shaman, Teleprompter District Office, 6820 Ventnor Avenue, Ventnor New Jersey 08406.

Equal Opportunity Employer M/F

Business Directory

RONALD C. COTTEN & ASSOCIATES

Professional Engineers
ENGINEERING MANAGEMENT AND CONSULTATION

Phone: 303-770-4175

5726 S. Jamaica Way **Englewood, Colorado 80110**

CATV EQUIPMENT REPAIRS

- Line & Distr. Amplifiers
- Field Strength Meters
- Headend & CCTV Gear
- Fast Turnaround
- Quality Workmanship
- Reasonable Rates

All repairs are
unconditionally guaranteed.
For more information call collect

VIDEOTECH SERVICE INC.
4505-D W. Rosecrans Avenue
Hawthorne, CA 90250
(213) 675-3266

MHz Mega Hertz Sales

Manufacturers Represented:

Blonder Tongue
Broadband Engineering
CCS Hatfield
Control Technology
EEG Enterprises
Intercept Corp.
Insulation Systems
LRC Electronics
Multiplier Industries
Power Conversion Products
Vitek

STEVEN W. GROSSMAN
DIRECTOR OF MARKETING

3501 S. Corona, P.O. Box 2001
Englewood, Colorado 80110
303-761-3304
800-525-8386

Equipment for Sale

EQUIPMENT FOR SALE

3,000 + Jerrold DST-1 5S01 descrambler with encoder and modulator. Good condition. Contact Dick Herman at (415) 676-0225.

FOR SALE

NEW 60 VOLT AC, 14 AMP, REMOTE POWER SUPPLY CLOSE OUT UNITS

Keystone 60 VAC Remote Power Supply provides 14 Amp square wave output. The power supply can be pole or cross-arm mounted. The internal duplexer permits inline installation, or an external power duplexer can be employed. The power supply can accommodate a Time Delay Relay to delay the application of primary power until all transients and surges have ceased or have decayed to a low level. The removable front panel allows access to circuit breaker, convenience outlet and current test point. External test point monitors the output voltage.

Call Keystone Electronics Corp.
(201) 869-3679

Equipment Wanted

WANTED

Used working 1- or 2-channel converter. 215-527-4848.

C-ED'S CLASSIFIED RATES AND INFORMATION

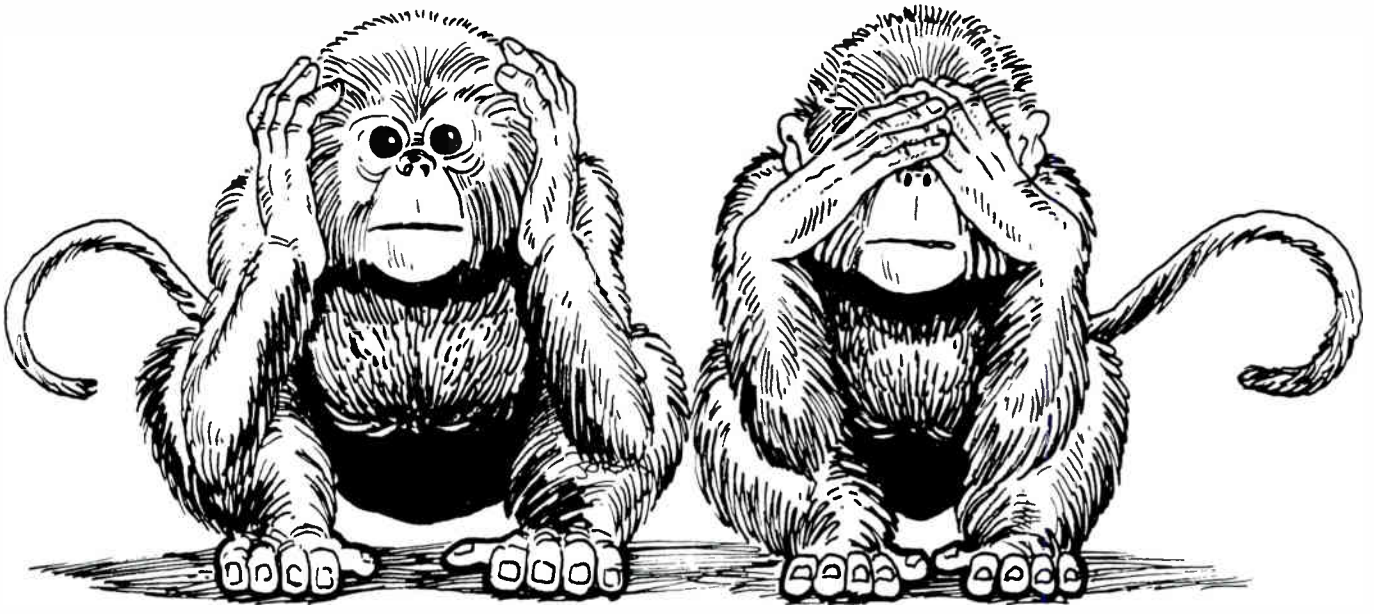
Payable in advance. Visa, Master Charge, check or money order will be accepted. (Billing charge $1.00 additional.)

Deadline is two weeks prior to cover date. Orders will be accepted by written confirmation or taken over the phone.

Rates: $25.00 per column inch. Minimum order one inch.

For further information or to place your classified advertisement, contact Joyce Hemmen at (303) 573-1433.

Audio And Video Descrambling for Under $10.00*



Eagle's Descrambler for Pay TV

You can economically descramble both audio and video on your Pay TV applications with the Eagle 2-DF. The added security of audio and video scrambling with our 1001-SG Encoder will enhance the viability of your system to many potential subscribers, and the descrambling is extremely cost effective.

(* - low band channel, minimum 1000 quantity, security shield optional)

Outdoor or Indoor Application With Great Security

Eagle's outside- and inside-the-home security shields are not accessible to the subscriber. Completely potted to prevent moisture absorption, the 2-DF is temperature compensated – 30° to + 140° . . . it is an Eagle quality system that will give long, reliable service.

EAGLE COMTRONICS INC.

7841 West River Road, Baldwinsville, New York 13027
(315) 638-2586

When Quality Counts . . .

. . . count on RMS CATV DIVISION

ELECTRONICS, INC.

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

© RMS Electronics Incorporated 1977