April 1964

TV & Communications

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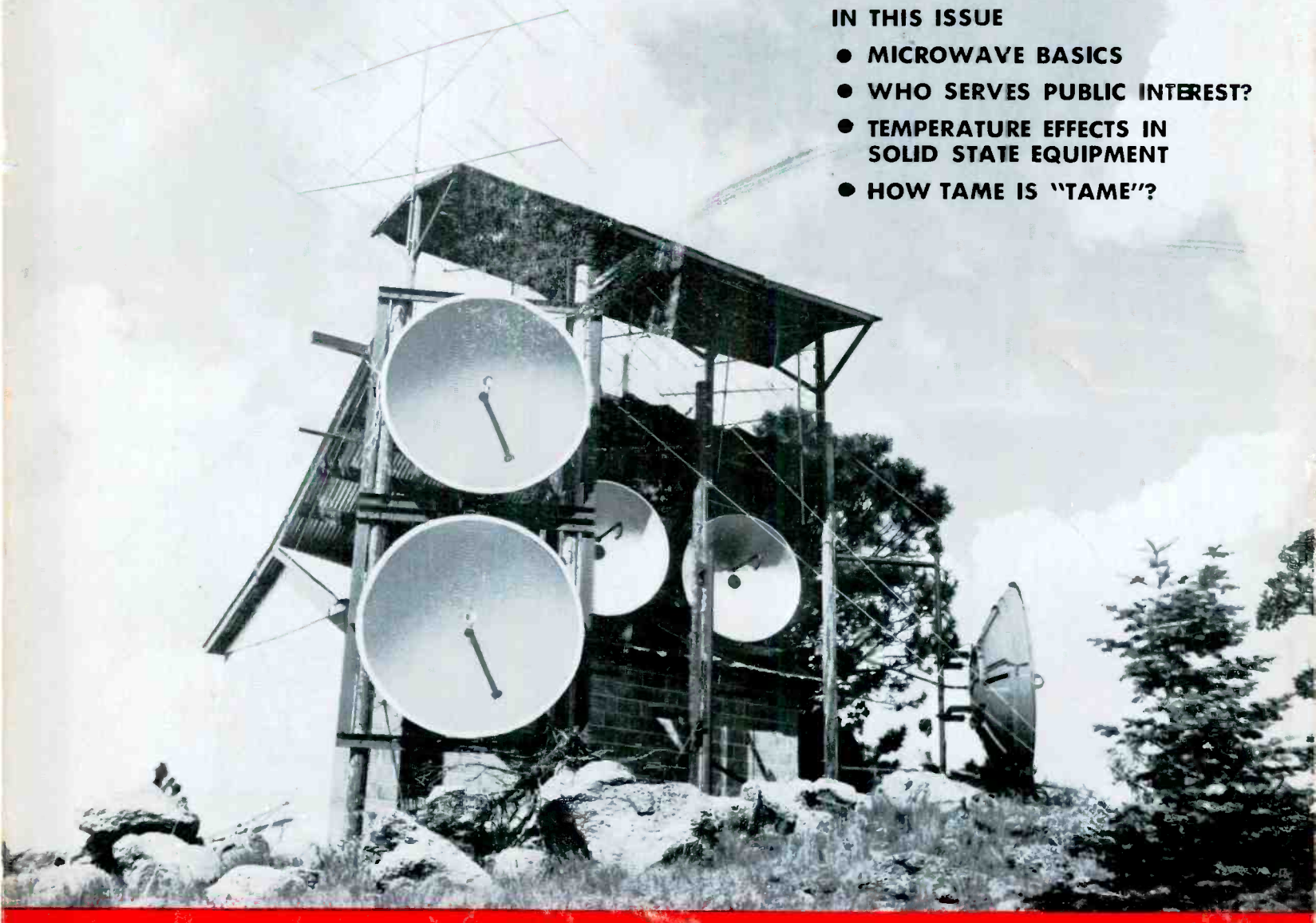

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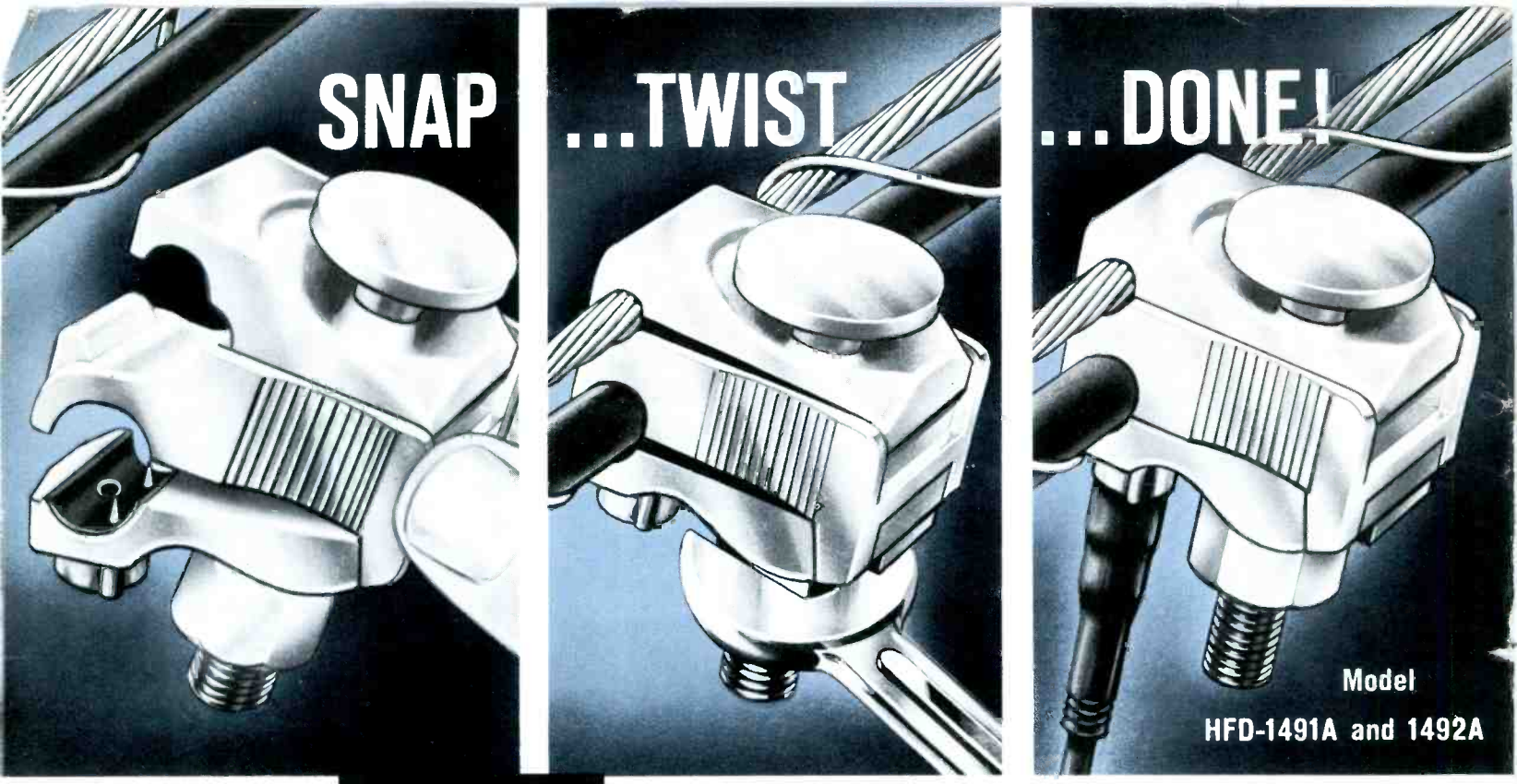


NEW JERROLD "MINUTEMAN" TAP FOR SPEEDY TAP-OFF INSTALLATION

Easiest, quickest, best-performing line tap ever made . . . that's what you get with Jerrold's new HFD-1491A & 1492A Minuteman Pressure Taps—and at no increase in price.

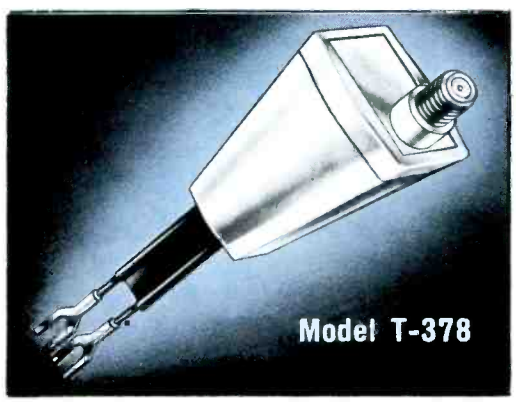
New unified assembly means no dropping or hunting for parts—the nut is swaged on to stay, yet unit opens up wide enough to quickly snap over the feeder-line cable. Pre-molded weatherproof gland is built right into recessed groove. Insert hole is pre-formed...no more clogged cutting tools.

New interlocking design eliminates troublesome swiveling of block sections. No going back for another unit . . . *every* unit works *every* time . . . completely weatherproof and corrosion-resistant. These features *plus* the added ease of fast installation make Minuteman Taps an *incomparable value.*

Model HFD-1491A is for single-shielded RG-11-type cables and JT-1412 aluminum-sheathed cables. HFD-1492A is for double-shielded cables.

NEW *"MINUTEMAN"* MATCHING TRANSFORMER

Here's the rugged new transformer designed to work with new Minuteman Pressure Taps to make your home installations fast and dependable. Built to take it, the Model T-378 is housed in high-impact plastic, has a big, hefty "F" fitting on one end, thick, tough 300-ohm leads on the other. The new transformer goes on in a jiffy, and features built-in isolation for both set and system. *All at no increase in price.*



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- LOW BAND COST FOR AN ALL BAND SYSTEM
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"VIKAL"

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LOWEST LOSS
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Semi flexible cables to compete with all flexible types.

Made to rigid standards.

Strict adherence to published specifications.

Prompt dependable service and delivery.

Guaranteed dependability.

EVERY REEL IS 100% SWEPT

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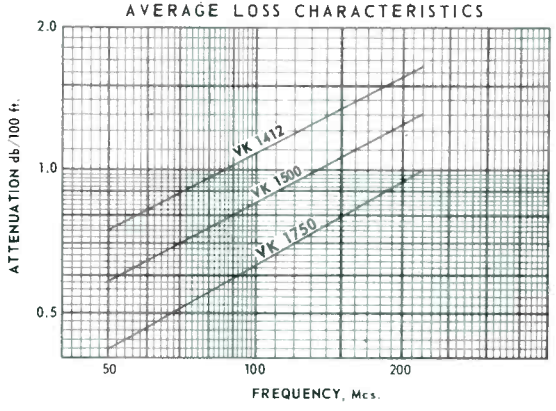

VK 1750 3/4 inch seamless aluminum sheath cable.
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INCREASED CASCADABILITY OF AMPLIFIERS

VK 1500 1/2 inch seamless aluminum sheath cable . . . . for trunk-feeder use.

VK 1412 .412 inch seamless aluminum sheath cable – low loss low cost feeder line.

PROPERTIES OF VIKAL CABLES

TYPE	Nom. Outside Diameter (in.)				Attenuation (max.) (db/100 ft.)		Ship. Wt. (incl. reel) (lb./ 1,000 ft.)
	Conductor	Dielectric	O.D.	Jacketed	Channel 6	Channel 13	
VK1750	0.140	0.680	0.750		0.60	1.03	280
VK1750J*	0.140	0.680	0.750	0.850	0.60	1.03	330
VK1500	0.098	0.450	0.500		0.80	1.25	130
VK1500J*	0.098	0.450	0.500	0.580	0.80	1.25	160
VK1500JM**	0.098	0.450	0.500	0.580	0.80	1.25	216
VK1412	0.075	0.362	0.412		0.95	1.45	100
VK1412J*	0.075	0.362	0.412	0.480	0.95	1.45	120
VK1412JM**	0.075	0.362	0.412	0.480	0.95	1.45	156

*J—With extra long life non-contaminating polyethylene jacket.
**JM—.109 galvanized steel messenger 1800 lb. test strength.

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CORR-O-FOAM COAXIAL CABLE

LOW ATTENUATION ■ EXCELLENT FREQUENCY RESPONSE ■ NO RADIATION LEAKAGE ■ MINIMUM COST

Available in 5,000 foot lengths, Corr-O-Foam construction consists of a copper center conductor and foamed polyethylene dielectric, outer conductor may be either a copper or aluminum corrugated tape. A resilient. semi-flexible Habirlene jacket fully eliminates moisture seepage, preventing deterioration and maintaining low attenuation.

Here's what C. M. Kirkeeng, General Manager, Cable-Vision, Inc., said after completion of a 4200 subscriber network utilizing 65 miles of Corr-O-Foam: "Corr-O-Foam cable was very easy to handle on the ground and in the air; extremely adaptable in connecting amplifiers, Multitap boxes, line splices and Chromataps. Much of the construction was made through heavy tree laden areas, but the usual problems were minimal."

Corr-O-Foam, available with a full line of matching connectors, is setting new standards of economy, ease of installation and reliable performance. Our new catalog provides full details on why Corr-O-Foam is first choice for CATV. Write for your copy today.

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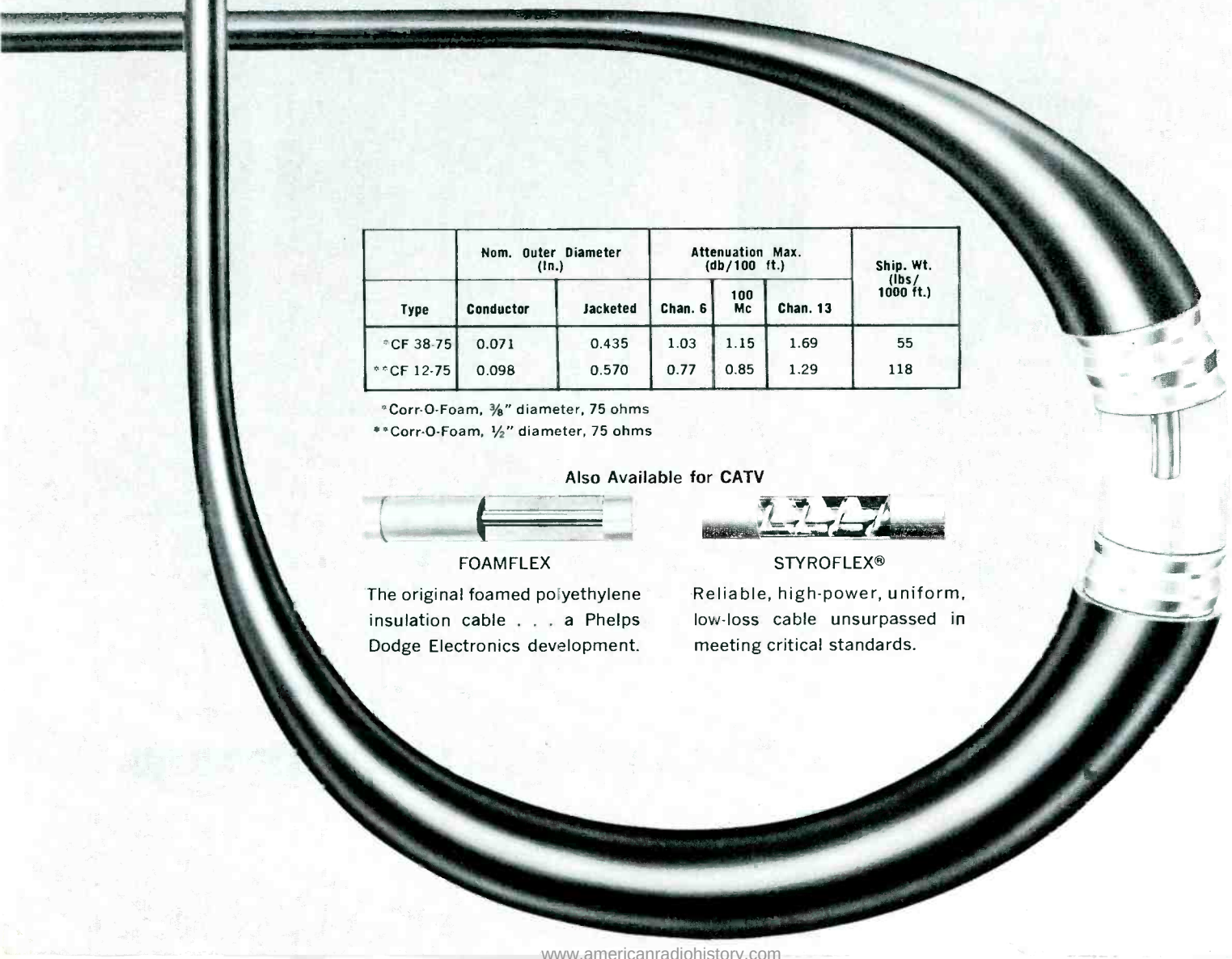

Type	Nom. Outer Diameter (In.)		Attenuation Max. (db/100 ft.)			Ship. Wt. (lbs/ 1000 ft.)
	Conductor	Jacketed	Chan. 6	100 Mc	Chan. 13	
*CF 38-75	0.071	0.435	1.03	1.15	1.69	55
**CF 12-75	0.098	0.570	0.77	0.85	1.29	118

*Corr-O-Foam, ⅜" diameter, 75 ohms
**Corr-O-Foam, ½" diameter, 75 ohms

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The original foamed polyethylene insulation cable . . . a Phelps Dodge Electronics development.

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Reliable, high-power, uniform, low-loss cable unsurpassed in meeting critical standards.

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Why?

★ Large Inventory
★ The Right Prices
★ Speedy Delivery

As the community antenna television industry has prospered and grown, there has developed a very real need for improved lines of supply. The efficient distribution of CATV components and supplies is vital to system owners and construction companies with completion dates to meet. And replacement parts and equipment needed to put a system back into operation are mighty expensive if the operator must remain "off the air" for precious days while his order is filled!

These factors are the reason for Davco Electronics Corporation . . . the "CATV Supermarket." At Davco we have proven many times over that careful, swift attention to each individual order results in satisfied customers who become steady customers. We have been able to grow along with the industry because we always put the customer's needs first.

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APRIL 1964
Volume 1 — Number 4

TV & COMMUNICATIONS

Published By COMMUNICATIONS PUBLISHING CORPORATION — P.O. Box 63992, Okla. City 6, Okla.

Editorial

Many broadcasters fiercely oppose community antenna systems, which they link with another supposed foe, Pay-TV. Therefore, it took an artful mixture of courage, tact and logic for FCC Chairman E. William Henry to stand before the NAB convention and define and defend CATV! Since Mr. Henry was speaking to broadcasters it was not surprising that some of his comments on CATV were calculated to win the respect, if not the affection, of broadcast interests. We believe, however, that his message revealed a genuine fairmindedness and constructive understanding of CATV and its importance to the public.

In a colorful speech the Commissioner touched on loud commercials and broadcasters' inordinate concern for their balance sheets as compared to the public interest. He then focused attention on pay television which he said "approaches on cat feet, but with the appetite of a ravenous tiger". Pointing out that "the concept of paying for television has become an accepted fact in over a million homes," Mr. Henry also noted the differences between Pay-TV and CATV. And he emphasized the importance of allowing CATV "to survive—to keep open for the public all of the choices which a free economy makes available".

The Chairman struck a blow for free enterprise and true public interest when he stated that community antenna and pay television systems are "primarily a response to expressed public needs." In modern America, he said, "people are not content to go without television, to rely upon inadequate signals or upon only one decent signal." He added that the men who provide the improved service "perform a real public service".

Considering the complexity of the problems confronting the Commission, and the divergent views of the strong economic and political interests involved, the FCC faces few easy decisions these days. The CATV industry is fortunate therefore, to have E. William Henry, a sincere and conscientious man, heading the Federal Communications Commission. **S.M.S.**

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Others may follow . . . but follow they must. Ameco is the *recognized leader* in solid-state in the CATV field.

Not, "coming out soon." Not, "being tested in the laboratory." Not, "we hope to have something in time."

Time has told . . . and it has told the entire CATV industry that Ameco is *first!*

First in advance engineering. First in field performance. First in proven dependability. First in doorstep delivery. First to offer *ten thousand* solid reasons for going Ameco solid-state in *your* cable system.

Yes, there are now over *ten thousand* Ameco solid-state amplifiers in use. From the Atlantic to the Pacific – from Canada to Mexico – they are all doing Trojan duty!

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[1]*Pioneer: "one who goes before to prepare the way for others"*
[2]*Pilot: "one qualified to act as a guide so that others may follow"*
[3]*Pacesetter: "one who takes the lead from another"*
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News SPECTRUM

NCTA AND NAB COMMENTS FILED ON PROPOSED MICROWAVE RULES

Culminating a six-month research and legal project, the National Community Television Association filed its extensive comments with the FCC last month relative to Dockets 14,895 and 15,233. Complete statistics and research findings were included in the weighty documents. The NCTA contends in the filing that the "only reasonable answer to FCC proposed rules to regulate microwave-served CATV systems" is a case-by-case approach. The NCTA further asked the Commission to terminate the proposed rulemaking and initiate hearings on specific complaints, as they may be received, alleging adverse economic impact on broadcasters resulting from CATV utilizing microwave.

Fred J. Stevenson, NCTA Chairman, stated that the Association's lengthy investigations have proved that a general rulemaking is not in order. Mr. Stevenson noted that research in areas of economic injury to broadcast stations, CATV reception of signals and television program duplication by cable systems has strongly supported the "comments to the FCC that the only reasonable answer to the Commission's proposed rules is the scalpel, not the axe." He further asserted that the most serious impact of the proposed FCC regulation of cable systems would be ". . . adverse to the public and, in turn the small market TV station which relies on local advertiser support."

NCTA research indicates "how strong public reaction can be in those communities where restrictive agreements asked by local television stations of CATV systems are in force," according to Stevenson.

The National Association of Broadcasters, meanwhile, contended in their comment filing that the proposed rulemaking should be adopted. Furthermore, the NAB asked the Commission to institute a policy of requiring CATV systems to demonstrate how their extending a station's service area will serve the public interest. NAB also called for a general fact-finding study of auxiliary services in CATV and their relationship to overall telecommunications policy at the Commission.

NAB contends that current developments in microwave service to CATV's "do violence to the basic objectives of the Communications Act and the Sixth Report and Order" and that they "also pose a serious threat to the National system of free TV."

Comments were filed in response to a proposed rulemaking to adopt regulations governing private and common carrier microwave grants for relaying television signals to community antenna systems. Key conditions of the proposed regulations are 15 day (before and after) nonduplication of local stations' programs and the requirement that cable systems carry local stations' signals if requested.

COX BROADCASTING PREPARES FOR CATV ACQUISITIONS

A public offering of 630,000 new shares of common stock (maximum of $18 per share) through Lazard Freres & Co., New York, is paving the way for purchase of additional Northwest CATV properties by Cox Broadcasting Corp. The company reportedly plans to borrow $15 million from an insurance firm to repay debts to stockholders incurred in last year's purchase of KTVU-TV, San Francisco, and 1962-63 CATV purchases.

"TAME" BATS .083 IN ANTI-CATV LEAGUE

TAME is reported to have been active or scheduled anti-CATV activity in 20 communities. Franchises have been granted in 11 of these cities and only one application has apparently been rejected as a direct result of TAME. No decision has been reached in the other 8 communities.

"TAME" is the designation chosen by the *Television Accessory Manufacturers Institute*, a comporation formed by several home antenna manufacturers to *"initiate and join campaigns waged against cable systems planned for scores of communities throughout the land."* In a mailing to distributors last fall the Institute urged *"a common effort against this looming ogre."* TAME's efforts have included the mailing of anti-CATV promotional kits.

TV CABLE OF AUSTIN LOSES BATTLE FOR FCC RULE WAIVER

In the much publicized Austin, Texas, CATV scramble, the Federal Communications Commission has answered with a very firm "No" to TV Cable's request for relief from the nonduplication rule required in the microwave grant held by the company. The case has received considerable extra attention due to the implication of KTBC-TV, Austin. President Johnson's wife and daughters own 84% of the station, with their stock now held in trust. Another controversial factor has been an option held by KTBC on 50% of the stock in Capital Cable Corp., competitor of TV Cable.

With considerable effort the FCC had secured a copy of the option agreement from Capital Cable prior to returning a verdict on the matter. Voting 6-0 (Commissioner Lee absent) against TV Cable's request, the Commissioners expressed some sensitivity to the amount of publicity aroused by the case. They also indicated some resentment against the petitioning cable firm, suggesting that TV Cable should have taken any exception to the nonduplication stipulation before their competitor had become thoroughly committed to its construction program. The FCC says, "In the circumstances, it would be clearly inequitable to grant the petition for waiver."

Capital Cable picks up off-the-air signals using antennas mounted on KTBC's tower and distributes them by cable. TV Cable is being required by the station to delay broadcast of certain programs of the three-network affiliate while Capital enjoys the competitive edge of supplying uninterrupted programming.

SKL ANNOUNCES EARNINGS

Mr. Donald Spencer of Spencer-Kennedy Laboratories, Inc., announced net sales of $1,273,000 for the six months ended Dec. 31, 1963. This was an increase of 32 per cent over the same period for 1962. Operating profits before investment gains and income taxes were $144,000, an increase of 46 per cent. Operating profits before Federal taxes were equivalent to 65

WHO IS THE

ONLY

CATV MANUFACTURER

WHO HAS

SOLID-STATE AMPLIFIERS

IN OVER

50%

OF THE CABLE SYSTEMS

IN THE NATION?

LIFT PAGE FOR ANSWER!

cents and 44 cents respectively in 1963 and 1962, on 221,635 shares outstanding.

For the six-month period, gains from investments amounted to $100,000 as compared to $18,000 in a similar period for 1962. Net profit was $148,000 after Federal income taxes as compared with $68,000 in the year before. Net profits for the six months were equal to 67 cents per share as compared with 31 cents a share for the last half of 1962.

93 CATV'S CARRY ETV

According to Mr. Loren Stone, Manager of ETV station KCTS, University of Washington, Seattle, Wash., 93 cable systems are providing educational television signals to 156,172 students in 435 schools and colleges. These figures were recently revealed in his study entitled "*Community Antenna Television: Its Role in ETV.*" The information was obtained from a survey conducted by Mr. Fred Goddard, Chairman of NCTA's Educational TV Policy Council.

Stone's treatise indicates that the cable systems are picking up signals from 33 ETV stations located in 24 states and the District of Columbia. Significantly, he points out that these 33 stations represent 76% of all ETV stations operating in areas served by CATV systems. Mr. Stone concludes that "in almost every area where a CATV system is capable of receiving the signal of an educational television station, it provides service to the schools within the area it serves."

DEATH CLAIMS BOB POTTER

Robert H. Potter, co-owner of Community TV, Elk City, Okla., passed away on April 18. Mr. Potter had resided in the Elk City area since childhood. He was 39. He is survived by his wife and two children, Mitzie and Rusty, his mother, Mrs. Earl Potter, and his brother, Jack Potter, all of Elk City.

NAB JOINS STV FOES; PAT WEAVER FIGHTS BACK

The National Association of Broadcasters Future of Television in America Committee has reportedly decided to actively oppose the pay-TV projects underway in San Francisco and Los Angeles. Subscription TeleVision, Inc., is already engaged in a bitter struggle with theatre owners who are vigorously attempting to block pay-TV in California.

A $117,000,000 suit has been

Continued on page 28

FOCUS
. . . On Progress

SKL ELECTS JOHN A. LUNN

It was recently announced by *Spencer-Kennedy Laboratories, Inc.*, that Mr. John A. Lunn has been elected to some of the positions held presently its Board of Directors. According to SKL President, *Mr. Donald Spencer*,

some of the positions held presently by Mr. Lunn include Board Member of The Kendall Company, director of American Research and Development Corporation, Laboratory for Electronics; Bystate Corporation, United Research and other companies. He is President of Franklin Foundation-Franklin Institute. Mr. Lunn is a former President of the M.I.T. Alumni Association and a member of M.I.T. Corporation.

JERROLD AND VISUAL SUPPLY WORLD'S FAIR ETV DEMONSTRATION

A complete model educational television system has been designed by *Jerrold Electronics Corporation* for the Hall of Education at the New York World's Fair. The project is a joint effort with *Visual Electronics Corporation*, supplier of the studio equipment employed in the system.

An operating demonstration, under actual classroom situations, is scheduled periodically each day. Entitled "The School of Tomorrow", the comprehensive RF and video distribution system has been constructed to accommodate an audience of 200 viewers. A permanent staff of teachers, technicians, and program coordinators will operate the realistic model ETV system.

Jerrold's distribution system will also be utilized in programming various exhibitor displays throughout the Hall of Education complex. Included among the exhibits is Jerrold's own display of reception products for home use.

B-T NAMES CCTV REPS

Four firms have recently been added to *Blonder-Tongue's* franchised outlets for closed circuit TV equipment. They are *Albright Electronics*, Maitland, Fla., *United Leasing*, Elkhart, Ind., *Sound & Communications*, Jackson, Miss., and *Norcon Electronics*, Brooklyn, N.Y. *Mr. Tom Shea*, CCTV Products Manager, says the distributors will serve as direct representatives of B-T, offering cameras, switchers, studio equipment, lens turrets and other accessories along with complete service from engineering to installation.

SHAFER NAMED TO HEAD NEW DEPARTMENT AT ENTRON

A new department which combines marketing and field operations has been created at *Entron, Inc.*, according to *Mr. R. J. McGeehan*, president. Heading the new department will be *Mr. Edward Shafer*, the firm's general sales manager. All of Entron's marketing activities as well as field operations which include system design, field engineering and system construction will be included in the new grouping. According to Mr. McGeehan, the organizational change will "introduce greater efficiency into the operation and offer better service to customers."

LONG ISLAND GETS CATV

Early this year *Long Island Cablevision Corp.*, went into full scale operation in Greenport, L.I., N.Y. According to *Mr. Philip J. Kenter*, President, the new cable system provides viewers with 10 channels of television plus FM. Constructed by *Spencer-Kennedy Laboratories* of Boston, the system incorporates a 350-ft. tower erected by *Fort Worth Tower Co., Inc.* of Ft. Worth, Texas, and approximately 35 miles of "Copperguard" coaxial cable supplied by *Superior Cable Corp.*, of Hickory, N.C. Time and weather service is provided by *TeleMation "Weather Channel"* which utilizes the TE-15 transistorized *General Electric* camera.

JARVIS RETURNS TO DALLAS TO JOIN NATIONAL TRANS-VIDEO, INC.

Mr. T. A. Rose, Jr., Board Chairman of *National Trans-Video, Inc.*, and its affiliated companies has recently announced the election of *Mr. Byron D. Jarvis* as President. The Dallas based community antenna network owns and operates CATVs in the U.S. and Canada.

Mr. Jarvis is a graduate of Southern Methodist University School of Engineering and holds a Masters in Business Administration from Harvard. Before joining N.T.V. he was assistant to the president of Divco-Wayne Corporation in New York City. Previously he was a member of the comptroller's staff at Ling-Temco-Vought in Dallas.

HUNTSVILLE TV CABLE ANNOUNCES NEW NAME

Earlier this month a special announcement was issued by *Huntsville TV Cable, Inc.*, to advise that the company has been changed to *Video Cable Systems, Inc.* The firm's new mailing address is P.O. Box 376, Huntsville, Ala.

HASTINGS NAMED SPECIAL PROJECTS MANAGER FOR JERROLD CATV DIVISION

Mr. J. E. Hastings has been named manager of Special Projects for the

Continued on Page 12

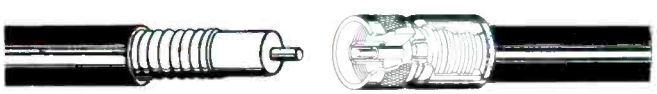
SHARP, CLEAR PICTURES WITHOUT INTERFERENCE

With

SUPERIOR'S

Cell-O-Air Coaxial Cable

with 'COPPERGARD'



Cell-O-Air Coaxial Cable, with Coppergard, provides up to 20% lower attenuation; far better long-term transmission stability, and far greater radiation protection. Solid tubular Coppergard shield also eliminates the radiation leakage apertures present in all braided coaxial types. Corrugation permits hand bending to acceptable limit of 20 times diameter.

Catalog Number "Coppergard" Shield	Attenuation (Nom. db @ 100 ft.) Ch. 6	Ch. 13	Nom. Overall O.D.
4920	0.88	1.50	.480″
4930	0.65	1.05	.652″

ALSO AVAILABLE: Self-supporting IM "Fig. 8" type and Double COPPERGARD shielded types for direct-burial use.

• SHIPPED IN 3M' REELS

EVERY REEL SWEEP-TESTED OVER ITS FULL LENGTH

Both cable and connectors have been designed exclusively by SUPERIOR for the CATV Industry.

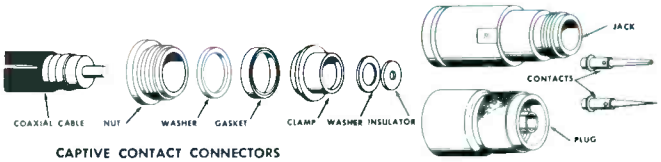
ELIMINATE "PULLOUTS" THAT CAUSE BLANK SCREENS

With

SUPERIOR'S

Captive Contact

CONNECTORS



CAPTIVE CONTACT CONNECTORS

Superior's Captive Contact Connectors eliminate the "pullouts" that cause blank screens by making positive never-fail contact between lengths of coaxial cable to maintain service. Designed to mate electrically and mechanically with #4920 and #4930 "Cell-O-Air" coaxial cable with "Coppergard" shield, Superior's captive contact connectors assure full-system compatibility.

HICKORY BRAND ®

ELECTRONIC WIRES AND CABLES

Manufactured by

SUPERIOR CABLE

Superior Cable Corporation • Hickory, North Carolina

Focus Continued

Community Systems Division of *Jerrold Electronics Corporation*. He will be in charge of special equipment projects under the direction of the Divisional Manager, *Mr. Lee Zemick*. Mr. Hastings will assume the responsibility of supplying the electronic equipment requirements for the communications industry in the areas of ETV, industrial closed-circuit and Pay-TV.

Prior to his recent appointment, Mr. Hastings was Sales Manager for Jerrold's Communications Systems Division. During his 11 years with Jerrold he has also served as Southeastern Regional Manager.

DAVCO ANNOUNCES V.P.

Mr. James E. Davidson has been named Vice President of *Davco Electronics Corporation* of Batesville, Ark. Having been active in the firm for the past five years, Mr. Davidson's experience includes work in both plant operations and field construction. He is active with his father, *Mr. Jim Davidson* involving both the Davco distributorship and the affiliated firm, *Community Antenna Company, Inc.*, which owns and operates a number of cable systems.

CATV SYSTEM PRACTICES GOOD PR

An outstanding example of good public relations work by a CATV operator was recently noted in Auburn, Alabama, where *Mr. Noel B. Morgan* manages *Auburn TV Cable Corporation*. Mr. Morgan volunteered the services of the cable company to hang Christmas decorations for the city—providing a savings of more than $1000.00 to the taxpayers. His generous act was noted in the local newspaper and the mayor, city council and city manager of Auburn all formally expressed gratitude for the assistance.

TELEPROMPTER EXPANDS CATV

TelePrompTer Corporation has sold its three operatng divisions to Defiance Industries, Inc. The $1.5 million transaction will enable TelePrompTer to expand its CATV holdings and its pay television system Key-TV, according to *Irving B. Kahn*, company President. □

Who Serves the Public Interest?

by Charles Wigutow
Telesystems Corporation

It lies in the nature of an industry to justify its existence. Whether it does so successfully or not, depends on the needs it serves.

No amount of public relations could have held back the growth of the automobile industry. The conditions that favored the use of the motor vehicle were: rising and scattered populations, dispersion of industry, and proliferation of means of communication. Transportation had no choice but to keep pace with this network of industrial and population developments. This was the final reason that no amount of resistance could keep wagon production from going into a steep decline.

A last ditch struggle to keep the horse drawn types of transportation in existence would have been understandable. But an active fight to bar automobiles from the roads could only end in defeat.

Even in the early nineteen hundreds, the idea of public interest was invoked to influence legislators to block the automobile. One of the laws which can be laughed at today, required a person to walk with flag in hand in advance of the moving motor car.

Currently the concept of public interest has been invoked by an organization of antenna manufacturers in their struggle to hold back the tide of cable television reception, and by doing so to promote the sale of individual household antennas.

Does the public have a public interest in the increased sale of antennas? Here is the core of this current campaign, but you would never know that the manufacturers have only this concern at heart from the editorial matter directed to the public. However, within their own trade circles, they are quite frank about their commercial purposes.

Public interest in broadcasting is definable in well understood terms. The First Amendment to the Constitution is the foundation. "Congress shall make no law . . . abridging the freedom of speech or of the press; . . .". The Supreme Court has firmly interpreted this classic statement in the Bill of Rights as meaning:

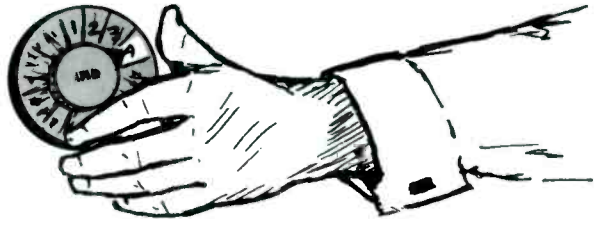
1. The right of the people to get their information and opinions from a variety of sources,
2. The right to express themselves.

Opinion is not haphazard; it comes out of information and knowledge. In a democratic nation, the people exercise their democratic function when they have access to as many voices as possible. Logically this means that forcing on any segment of the public a monopoly or near monopoly of sources and outlets of expression is equivalent to moving in the direction opposite to democracy, and certainly not in that of public interest.

Does cable television have to justify its existence when it helps the free flow of news by multiplying the sources?

In a world becoming increasingly interdependent, the need for intelligent choice is imperative. This is the background to the creation of newer and more complete methods of communications. The growth of cable television rests on this urgent background.

If community television finds itself popularly accepted this does not mean that those in the industry are endowed with exceptional persuasive ability. Rather, cable television fulfills a need and is timely and desired.



CATV multiplies information sources.

Television reception has carved out a place for itself different from all the other mass media. It brings to the person, at ease in his own home, living people, story, picture, and the excitement of being present at the instant an event is happening. An almost full panorama of human activity unfolds throughout the day on the TV screen.

Audience surveys show that the average viewing time is between five and six hours a day. No other voluntary form of human behavior takes up so much of a person's time consistently, day after day.

When this much attention is devoted to a medium among the ninety percent of the homes in the United States owning television sets, it becomes that much more important to recognize the need to supply the viewers with all the variety of channels of video communications that can be made available by technical and economic means.

This is exactly what cable TV does; and usually in the very places that would ordinarily be limited in sources of information supplied by television.

The voluntary nature of being a subscriber to a cable system cannot be overlooked. Those who subscribe do so of their own choice and it is by their own choice that they stay on the cable. Cable television has no other method of holding a subscriber excepting that it is a better, more economical way of bringing programs into the home.

What does the cable customer get for his money? He looks at more channels. That's the acknowledged reason a cable company is accepted in a community. Without the ability to bring more channels, the founders of a cable system could hardly be expected to invest their money in such a project.

Pictures are better. A single tower for the entire community is raised to a height necessary to bring in the desired signal strength. The cost of constructing similar towers by other individuals in the community would be prohibitive. Cable engineering makes it possible to maintain this received signal strength throughout the entire system.

To speak of cable television and pay TV in the same breath is to make use of the time worn trick of lumping

your opponent with some less than desirable character by talking of them at the same time. The plain fact is that cable television is not pay TV.

Cable television does nothing to the program as a whole or in part. It is simply a sensitive pipe line into the home for programs *that it controls* to its customers. Cable television cannot help nor hinder the coming of pay TV any more than can the use of the home antenna. Pay TV will ultimately have to stand on its own ability to supply programs in quantity for which the customers are willing to pay.

Where the number of signals into the home are multiplied, impetus is given to the consumer to own more than one set. When color signals are brought in by cable into communities ordinarily not able to receive these programs, naturally, color sets are sold by dealers. These almost obvious results have been demonstrated many times over in the communities served by cable. When more sets are sold, then that many more sets will require service. Since cable systems almost universally want no part of the set service business, these increased sales mean a bonus of increased service load for independent servicemen.

Why should anyone think that the interests of cable management, TV dealers and servicement are in opposition? Their common interest is to encourage satisfactory reception. The better and the greater the choice of reception, the more sets will be sold.

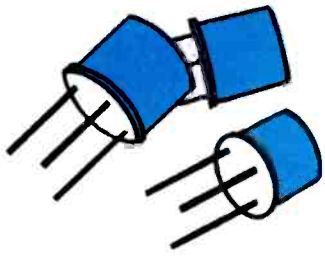
Cable results in increased set sales.

The better the set looks after it is repaired, the happier is the repairman, the customer and the cable company. A stronger, more consistent signal benefits everybody in the community, especially the serviceman who is not subjected to complaint after the repair is made because of weak signal variation from a home antenna.

The staffs of a number of community systems have joined hands with local servicemen in organizing technical sessions. Field engineers from major set makers have been invited to these educational meetings to explain their newest models. The participation of cable engineers has always been welcomed at these sessions. The atmosphere has been cordial, as it should be among men who are joined in a common vocational bond.

Radio stations, newspapers, printers; those in the community who help disseminate the printed or written word are friendly to the community system. Cable companies complement those who help bring information and entertainment to the local public. They, too, are advertisers and help provide their share of support to these local enterprises.

Cable management is joined with all the other responsible elements in promoting the civic and social welfare of their town; while the cable company is responsible for moving the idea of public interest one more step forward by bringing those extra channels. □



TEMPERATURE EFFECTS ON SOLID STATE CATV EQUIPMENT

by W. A. Rheinfelder
Chief Engineer, Product Development
Ameco, Inc.

The outstanding performance of transistorized equipment for CATV systems with regard to reliability and temperature is now widely recognized. Solid state amplifiers are performing well in extreme temperature ranges even to the point of exceeding the performance of comparable vacuum tube circuits. This is evidenced by the fact that in military systems designed for extreme environmental conditions, tubes have been fully replaced by transistors. Laboratory research and field testing have produced solid state amplifiers that perform in an excellent manner in CATV systems where the average operating temperature range might vary from minus 50 degrees to plus 160 degrees F. A temperature range this wide is not normally met by tube amplifiers.

Before discussing methods used to stabilize transistorized circuits, it is worthwhile to list all changes due to temperature encountered in CATV.

Changes Due To Temperature.

There are three significant changes possible with temperature: Drift in signal output level, change in response, and drop-out. There are also minor variations in noise figure, overload capability and input and output matching which will be neglected in this discussion.

The most severe effect is drop-out, where the output signal completely disappears and the system becomes inoperative. Drop-out is common in tube equipment at low temperatures and usually due to faulty circuit design, use of low quality components and the like. Transistorized equipment is generally more sophisticated and uses high class, military type components, however, transistors themselves show a variation with temperature and careful circuit design is necessary to achieve good results. In any event drop-out can readily be prevented by proper circuit design in both tube and transistorized amplifiers.

Changes of Response and Level.

The most important variation is then a change in frequency response and signal level. This change by itself is unavoidable in CATV systems and must be compensated for. The foremost source of change is found in the coaxial cable. It has been shown that for all practical purposes, temperature variations have the same effect on the cable as if its effective length were changed. For the range from minus 30° C to plus 70° C, the change is 1% per 5° C (9° F). Therefore at minus 30° C the electrical length is minus 10% the normal value, at plus 70° C, the increase in length is plus 10%. If a spacing of 20 db were used, the effective spacing would change from 18 to 22 db for this not uncommon total temperature spread of 100° C or 180° F. For a cascade of only 20 amplifiers a total variation of 80 db would exist which of course must be compensated since it cannot be designed out. This variation is, of course, worse with larger spacings than 20 db, or longer cascades.

Next to changes in cable attenuation, there are changes with temperature in the head-end equipment, as well as in amplifiers and passive components. Variations in the head-end equipment with temperature are corrected by properly designed AGC circuits. If the signal output level of the head-end equipment varies, this must be considered as due to inadequate circuit design and does not constitute a serious system limitation because it can easily be remedied.

We come now to the repeater amplifiers themselves and various passive components. Since all electrical components show variations of parameters with temperature, careful selection of components is needed. For example, to meet low temperature requirements standard aluminum electrolytic capacitors cannot be used in most circuits. It is necessary then to use military type components, such as tantalytic capacitors. Similarly, capacitors with zero or negative temperature co-

efficient exist which can be used effectively for compensation purposes.

Changes in Transistors with Temperature.

In transistors there are two major changes with temperature. As temperature is increased, leakage current rises. Also, all transistor capacitances increase due to the increased number of charge carriers. This increase is at first slow and becomes rapid at a certain break point. For typical resistivities, this point is reached at about 85° C for germanium and about 150° C for silicon. Many silicon transistors, particularly some planar types, exhibit very poor low temperature performance due to a loss of current gain at low temperatures. Leakage current, which is much lower for silicon transistors, is of no importance in CATV amplifiers because of the low base return resistances employed in RF circuits. Therefore, there is no clear superiority of one semi-conductor material over the other, rather different device parameters, such as high frequency gain, are of more importance. Generally, germanium transistors are more suitable for a temperature range from minus 50° F to plus 160° F, although silicon units can also be made to work over this range by careful selection for low temperature gain. The better high temperature performance of silicon units is of no benefit until temperatures above 200° F are reached, which is outside CATV usage. Silicon transistors, however, offer advantages in high resistance circuits of all kinds, such as in dc-amplifiers due to their lower leakage current. Low temperature stability with silicon transistors can be achieved with special feedback circuitry. This is covered further in this report under AGC circuits.

The Problem of AGC Circuits

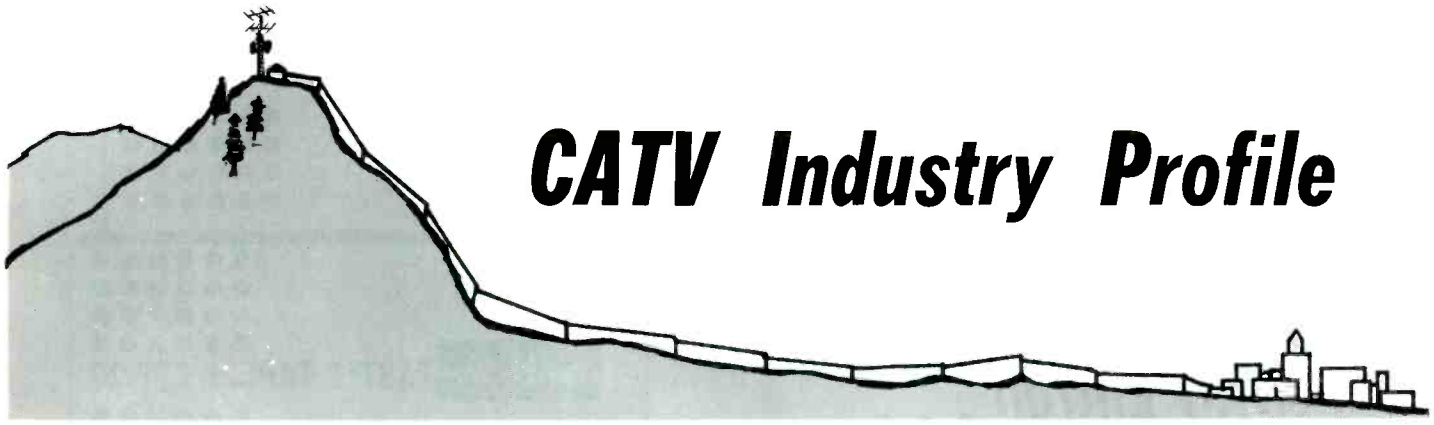
Since the transistor capacitances increase with temperature, there is a gradual loss in high frequency response, similar to the change in a coaxial cable. There are several approaches possible to this problem:

(1) Fully compensated amplifier. It is possible to make the amplifier independent of temperature in all its performance characteristics by using compensating circuits and components. This approach is, of course, costly, but cannot be avoided in some cases such as AGC circuits. In this case, capacitors with negative or positive temperature coefficient are used; the same is true with resistors (thermistors or sensistors). Also the supply voltage is regulated by using a reference (Zener) diode of the proper temperature coefficient, to compensate for variations in the series transistor circuitry. By these means changes in gain and response of less than 0.1 db over the full temperature range can be achieved.

(2) The amplifier is designed to behave like the cable. This is the easiest and most practical way for economic amplifier design. Since the cable has to be compensated anyway, any amplifier can be compensated simultaneously if it meets the cable characteristics, that is a certain loss in gain at Channel 13 must coincide with the proportional tilt. For example, with 22 db spacing at Channel 13, the cable loss at Channel 2 is 10 db. For an increase in temperature of 50° C, the cable loss at Channel 13 will be 10% worse or 24.2 db, while the loss at Channel 2 is now 11 db. The original tilt of 12 db has therefore changed to 13.2 db, for a change in gain of 2.2 db. Therefore, if the amplifier can be designed to change 1 db at Channel 2 for every 2.2 db change at Channel 13, it will match the cable and can be compensated by the stand-

Continued on Page 27

Vital Statistics from NCTA



CATV Industry Profile

The National Community Television Association estimates there are approximately 1300 community antenna television systems in 46 states and the Virgin Islands. The only states with no known CATV systems are Alaska, Delaware, Rhode Island, and North Dakota.

SIZE: The average size of a CATV system is estimated at 850 subscribers. Only 18 of the 1300 systems have more than 5,000 subscribers and only four of these are known to have more than 10,000 subscribers.

HOMES SERVED: CATV systems serve a total of approximately 1,000,000 homes. One out of every 52 United States television homes is connected to a community master antenna TV system.

PEOPLE SERVED: Estimating 3.3 persons per home, CATV systems receive television for about 3,300,000 viewers, or about 2% of the United States television audience.

AGE: The first commercial CATV systems were started in 1949 and 1950.

SERVICE: The (arithmetic) average CATV system receives four TV signals, with most systems receiving five signals. Some systems receive only one signal and others as many as 10 TV signals.

NCTA

BACKGROUND ON CATV INDUSTRY

The birth and early growth of the community antenna industry were stimulated during the "freeze" on TV station licenses between 1948 and 1952, by the desire of the public in rural and "fringe" reception areas to enjoy the advantages of television.

The first community antenna was installed on an experimental basis at Astoria, Oregon in 1949. The first commercial system, still operating at Lansford, Pennsylvania, was started in 1950.

The industry is frequently represented on technical television industry committees, at various functions in the television industry, before the Federal Communications Commission and in legislative matters, by its national trade organization, NCTA.

This organization includes in its active membership about 550 operating CATV systems and 37 associate members. Associate members are manufacturers, suppliers of CATV components, or organizations having a close interest in the CATV industry. The Association's offices are located in Washington, D.C.

There are 19 organized state or regional community antenna television associations which although not officially affiliated with NCTA work very closely with that organization on matters of common interest.

CATV OPERATION—WHAT IT IS AND WHAT IT IS NOT

Simply stated, CATV furnishes a master television receiving antenna service similar to master antennas found in apartment houses and hotels and comparable in function to the ordinary house top antenna.

The CATV operator actually does nothing that his individual subscriber is not entitled to do for himself and could do if economically advantageous. The community antenna is a substitute for a private antenna. The subscriber has the same freedom of choice among channels on his television receiver as if he had erected the antenna himself. The community antenna operator sells only an antenna service.

CATV systems are franchised or licensed by local authorities. Municipal permission or authorization for operation of a CATV system is almost universally required.

NUMBER OF CATV SYSTEMS BY STATES

STATES		STATES	
Alabama	16	Montana	26
Arizona	27	Nebraska	9
Arkansas	24	Nevada	5
California	109	New Hampshire	10
Colorado	15	New Jersey	5
Connecticut	3	New Mexico	19
Florida	23	New York	83
Georgia	5	North Carolina	4
Hawaii	3	Ohio	16
Idaho	32	Oklahoma	31
Illinois	15	Oregon	78
Indiana	11	Pennsylvania	229
Iowa	7	South Carolina	2
Kansas	16	South Dakota	6
Kentucky	36	Tennessee	8
Louisiana	6	Texas	102
Maine	14	Utah	10
Maryland	11	Vermont	22
Massachusetts	6	Virginia	12
Michigan	24	Washington	65
Minnesota	14	West Virginia	64
Mississippi	23	Wisconsin	15
Missouri	10	Wyoming	22

TOTAL: 46 States, 1,293 CATV Systems

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Whatever the requirements of your system, you can save valuable time and effort by contacting Entron first.

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- Fully Weatherproof
- Strand Mounting Clamp for Easy Installation
- Thru Line Loss As Low As 0.1 db

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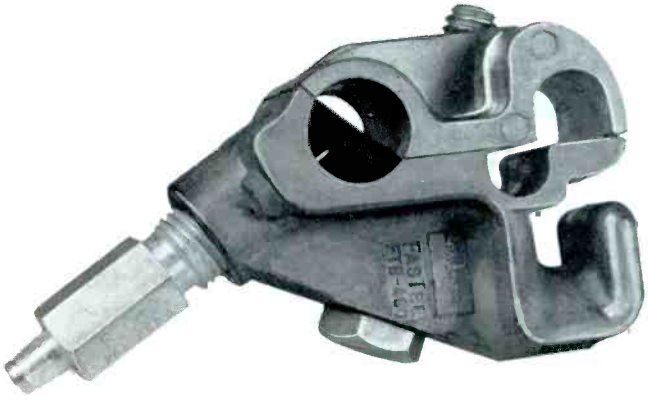
INSERT FTC-8



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With the introduction of the FTB412 for 412 aluminum cable and the FTB480 for 4920 Copperguard cable, Entron now supplies FASTEES in 5 block models for cable diameters from 0.405 to 0.480 inches.

- Rugged 2-Piece Block
- Single Bolt Assembly
- Installation without Disassembling
- Accommodates All Standard Messengers
- Permanently Waterproof Gasket
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To meet your all band tapoff requirements, Entron now introduces the FTT—transformer type FASTEE insert. The FTT fits all FASTEE blocks as does the FTC—capacitive insert and the FTR—resistive insert.

Compare all these FTT features

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- Insertion Loss As Low As .05db
- Flat Response from 50-220 mc
- Insertion Loss Virtually Constant

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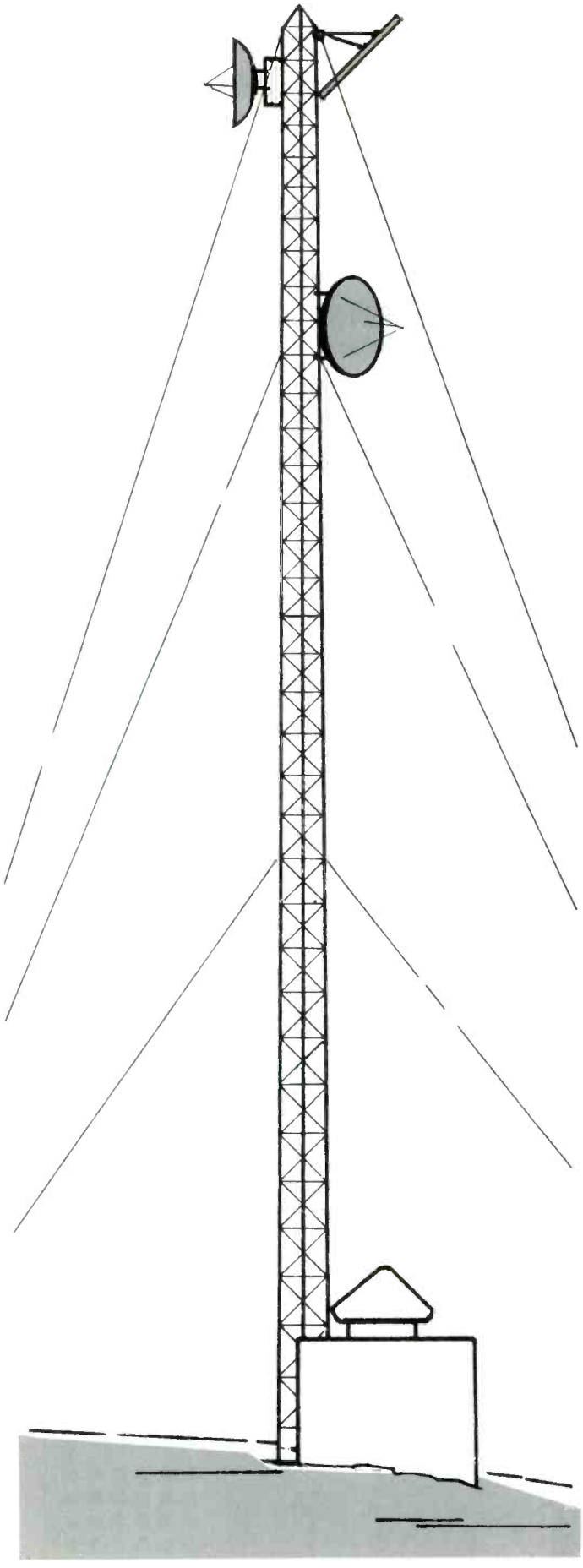
MULTEE TAPOFF MT-16



MICROWAVE BASICS

by Leo G. Sands

Microwave servicing is not difficult. A First or Second Class Radiotelephone Operators License is required. Technical information about microwave equipment may be obtained from equipment manufacturers' instruction books. (Don't expect to get them free unless a manufacturer is already planning to use your services. Since these books are large and costly to prepare, you may have to pay a nominal amount for them).

Another excellent source of basic information is a book entitled "Microwave Radio Relay Systems." available from the Rome Air Force Depot, Rome, N.Y. It is identified as T. O. 31R5-1-9.

There are many excellent texts on microwave principles. but they are of value mostly to the equipment and system design engineer. The service technician is not concerned with design, but should be well grounded in fundamentals.

Microwave equipment is available in several classifications. There are terminals and repeaters, with or without standby equipment. Repeaters may consist of two terminals connected back-to-back, or may be of the feedback or heterodyne type. Terminals and repeaters are classified according to bandwidth, low-density or thin-route types with capacity from two to 24 voice channels, medium-density types capable of handling up to 24 to 48 voice channels and high-density types with capacity from 48 to 600 voice channels. There are also broad-band types which can handle a TV channel or TV plus voice.

For short-haul, low channel density systems, 960-mc band equipment is widely used. A 960-mc band terminal consists of a superheterodyne FM receiver with crystal controlled oscillator, a multi-stage crystal controlled FM transmitter and a power supply, as illustrated in Figure 1. Separate antennas and frequencies are used for transmitter and receiving.

This kind of a terminal is essentially like a mobile radio unit, except for operating frequency and the fact that transmission and reception take place simultaneously.

2000-MC SYSTEMS

A 2000-mc band microwave terminal is similar in circuitry. However, the higher operating frequency and wider possible separation of transmit and receive frequencies permit use of the same antenna for transmitting and receiving.

A 960-mc or 2000-mc repeater may be formed by connecting transmitters and receivers back-to-back as shown in Figure 2. Or, a heterodyne repeater may be used. A block diagram of a heterodyne repeater is shown in Figure 3.

6000-MC SYSTEMS

Most long-haul microwave systems operate in the 6000-mc band. Equipment for this band is more expensive but less complex than 2000-mc band equipment. A single anten-

na is used for simultaneous transmission and reception, and waveguide instead of coaxial cable is used for feeding the antennas. Long waveguide runs can be avoided by using passive reflectors, as shown in Figure 4, to direct the beam in the desired direction.

6000-MC TRANSMITTERS

A tube-type 6000-mc band microwave transmitter is a simple device employing a self excited reflex klystron oscillator. The transmitting frequency is determined by the physical characteristics of the klystron cavity and by the value of the klystron repeller voltage. The transmitter is kept on frequency by regulating the temperature of the klystron, by mechanical adjustment of the cavity, or by automatic (AFC) adjustment of the repeller voltage.

The klystron is frequency modulated, as shown in Figure 5, by applying the modulating signal through an amplifier to the klystron repeller. The glystron frequency is deviated about 1 mc from the assigned carrier frequency in a typical 120 to 240 channel system. Wider deviation is employed in a 600-channel TV transmission system.

6000-MC RECEIVERS

A 6000-mc band receiver employs a superheterodyne circuit and a glystron local oscillator, as shown in Figure 6. The incoming microwave signal beats with the local oscillator signal in the crystal mixer, producing an IF signal, usually 70-mc or 90-mc. This beat signal is fed through a broadband IF amplifier which drives limiter stages. The FM signal is demodulated by a discriminator whose output is fed to a baseband amplifier.

The receiver is kept on frequency by an AFC circuit. The local oscillator klystron repeller voltage is automatically regulated to maintain the correct local oscillator frequency by the AFC signal voltage from a discriminator. Or, the AFC signal is used to control a mechanical device which adjusts the klystron cavity.

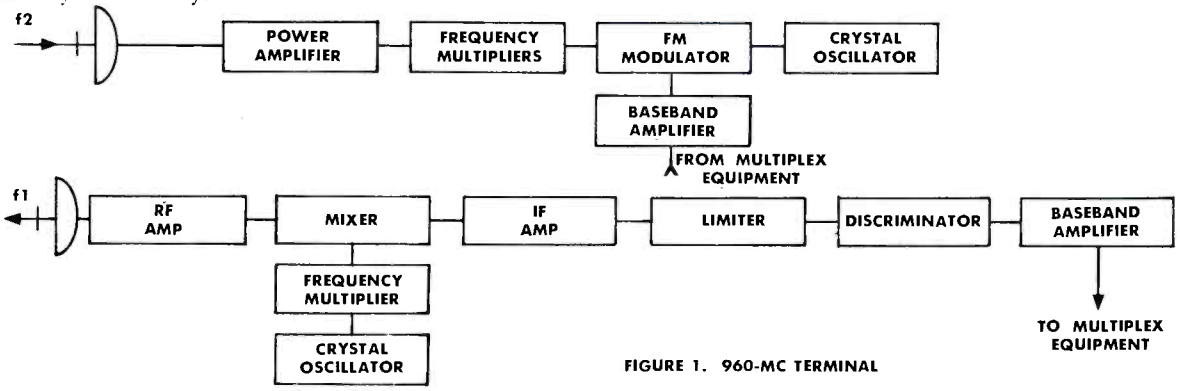


FIGURE 1. 960-MC TERMINAL

The power supply must furnish high negative voltages for both glystrons and lower positive voltage for the other tubes, as well as filament voltages. Until recently, power supplies operated from a-c. Now, most microwave equipment is equipped with power supplies operable from a 24- or 48-volt d-c source. Transistors are used for d-c to a-c conversion and solid-state rectifier diodes for conversion of the a-c to d-c at the required voltages.

Some types of 6000-mc band microwave equipment utilize transistors and diodes in lieu of tubes except for the transmitter and receiver klystrons. In some, the local oscillator klystron in the receiver has been replaced by a solid—state, crystal controlled, frequency multifplier employing transistors and varactor diodes. The transmitter klystron has

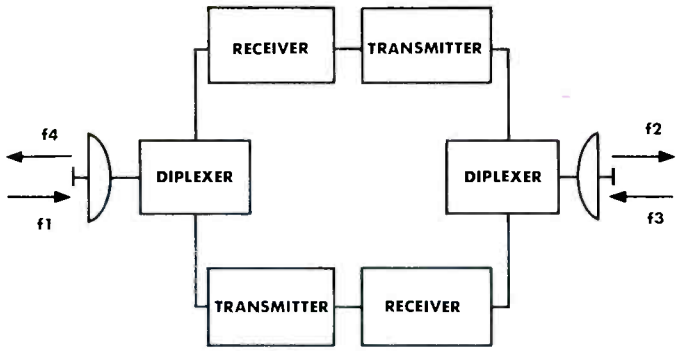


FIGURE 2. BACK-TO-BACK REPEATER

also been replaced by a solid-state frequency multiplier in recent designs.

STANDBY EQUIPMENT

Typically, two transmitters and two receivers are utilized at terminals. One is normally used; the other is a standby, ready to function when the primary unit fails.

In the event the primary equipment fails, a waveguide switch automatically transfers the antenna system from the primary equipment to the standby equipment. Relays also switch the multiplex input and output circuits from the primary equipment to the standby equipment.

In some equipment, transmitters and receivers are switchable individually instead of as a complete transmitter-receiver set. Also, ferrite switches are sometimes used in lieu of electro-mechanical waveguide switches for antenna transfer. Sometimes both receivers are connected to the antenna at the same time, their outputs being fed into a baseband combiner which utilizes both signals or the better of the two.

12,000-MC EQUIPMENT

Equipment for the 12,000-mc band is essentially the same as 6000-mc band equipment except for the microwave plumbing and klystrons used.

Table 1.

Approximate Antenna Gain in Decibels

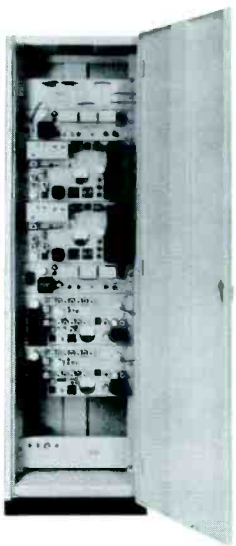
BAND (mc)	PARABOLA DIAMETER IN FEET (popular, Commercially Available Sizes)					
	2	4	6	8	10	15
450	—	—	17	20	22	25
960	—	—	22	25	27	30
2000	—	25	28	31	33	—
6000	30	36	40	42	44	—
12,000	35	41	45	—	—	—

POWER OUTPUT

Power output of 960-mc transmitters is generally around 2.5 watts. Boosters are available which raise power by 10 db. Power output of 2000-mc band equipment is around 3 watts, except in pulse systems which produce higher peak power. For the 6000-mc band, equipment is available in 100-milliwatt and one-watt power output ratings. Equipment for the 12,000-mc band is usually rated at 100 milliwatts.

Higher-powered 6000-mc band equipment is available which employs traveling wave tubes. Power output in this band is limited by the FCC to 7 watts.

Effective radiated power can be most readily increased by employing higher gain antennas. The gains that can be realized with various sizes of antennas in the industrial microwave bands are listed in Table 1. As power gain is increased by using larger antennas, the radiated beam becomes narrower and the rigidity requirements of the towers become tighter.



Microwave terminal employing crystal controlled transmitter and receiver.

SERVICING

Microwave equipment should be given periodic preventive maintenance to assure maximum reliability. Preventive maintenance chores include: (1) removing dust from the equipment, (2) checking power circuits and standby power generator or battery, (3) testing tubes, (4) checking receiver performance, (5) checking standby switching action, (6) inspecting antenna system and tower lighting, and (7) checking fault alarm functioning.

In some cases, it will be necessary to take test equipment to the microwave station being serviced. Often, a test meter is built-in, enabling the technician to measure important voltages and currents. The procedures for checking out equipment vary among manufacturers. The procedures specified in the applicable instruction book should be followed.

Special test equipment is required for servicing 6000-mc and 12,000-mc band equipment to generate test signals. Conventional test equipment, as used for radar and TV servicing, is required for IF alignment. Comprehensive information on microwave test equipment can be found in "Electronic Test Equipment", which is available from Hewlett-Packard Company, Palo Alto, California. An excellent

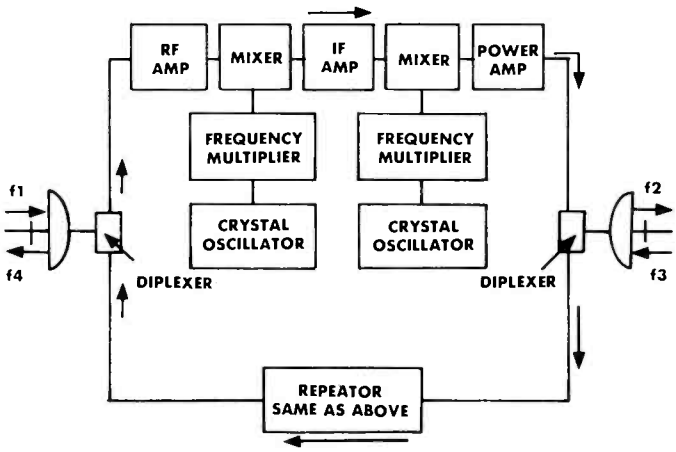


FIGURE 3. DUPLEX HETERODYNE REPEATER

source of basic information is "Transmission Systems for Communications," published in two volumes by Bell Telephone Laboratories, which is available through Greybar Electric Company branches.

Microwave servicing is simple if the equipment is looked at as a superheterodyne receiver and a self-excited or multi-stage crystal controlled transmitter. It differs from mobile radio equipment in the width of its modulation capacity. The baseband of a mobile radio unit is usually only 3 kc wide, whereas in microwave equipment, the baseband may be 15 kc, 150 kc, 1 mc or 3mc in typical equipment.

Tube failures are perhaps the most common source of troubles. By checking the tubes frequently and logging the condition of each tube, the technician will get an indication of when certain tubes approach replacement time. However, since an old tube is apt to be more reliable than an un-aged new one, tubes should not be replaced merely on the basis of hours of service.

Klystrons are known for their long life. When a klystron is replaced, the new one may not be satisfactory if it has been stored unused for a long time. They are subject to shelf deterioration. Hence, bargain surplus glystrons may not be a bargain after all.

Component failures are apt to occur more frequently if the equipment is not adequately ventilated. Since the equipment is ordinarily operated continuously, the temperature rise in the face of inadequate ventilation can be excessive.

Misalignment of antennas and passive reflectors is an occasional cause of excessive fading. If the antenna is in-

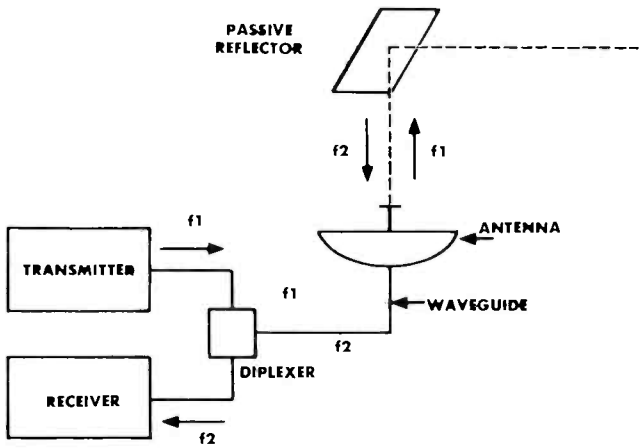


FIGURE 4. USE OF PASSIVE REFLECTOR

The NEW Coaxial Cables With The MODERN Design –

CT-48

CORRUGATED COPPER SHIELDED

Longitudinally Applied 5 MIL Corrugated Copper Shield

- Available for both **Trunk** and **Distribution** Lines
- Much **LOWER ATTENUATION** than Conventional Braided Shielding
- Greater Resistance to Crushing
- Protection Against Radiation Leakage Vastly Improved
- More Corrugations per Foot Provides Improved Cable Flexibility
- Longer Cable Life Through Tubular Shielding
- Impedance Uniformity
- Low Loss Foam Polyethylene Dielectric
- Symbolite® Polyethylene Jacketing
- Put Up Approximately 3000 Feet per Reel

PP-21732*— NOW AVAILABLE WITH .109" O.D. GALVANIZED STEEL INTEGRATED MESSENGER

PHYSICAL AND ELECTRICAL STANDARDS							
TYPE	NOM. O.D. Conductor	NOM. O.D. Dielectric	NOM. O.D. SHIELDING	NOM. O.D. Jacketing	NOM. db per 100 ft. Channel #6	NOM. db per 100 ft. Channel #13	Shipping Wt. lb. per M ft.
CT-48	.080"	.360"	.400"	.480"	.855	1.40	85
*PP-21732	.080"	.360"	.400"	.480"x.760"	.855	1.40	130
PP-21734	.1144"	.500"	.550"	.650"	.650	1.05	151

For Immediate Delivery and Special Pricing — Wire or Write.

PLASTOID CORPORATION

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advertently aligned to favor a lobe instead of the main beam, a considerable transmission loss may occur.

It should now be obvious that microwave equipment is not complicated. Aside from the use of waveguides, ferrite isolators and glystrons, the circuits and components are straight forward.

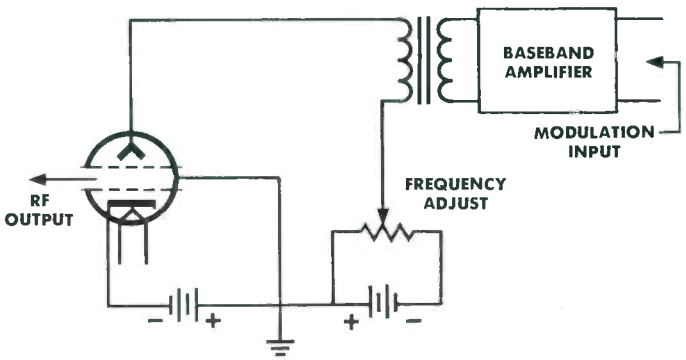


FIGURE 5. SIMPLIFIED SCHEMATIC OF KLYSTON TRANSMITTER

MULTIPLEX

Some early microwave equipment was designed for time division multiplex. But, most equipment is designed for use with frequency division multiplex. The baseband in FDM systems is divided into separate voice channels by utilizing DSB-AM. SSB-AM or FM carrier telephone equipment. Other intelligence is usually transmitted in the form of audio tones fed into one or more of the voice channels or directly into the baseband.

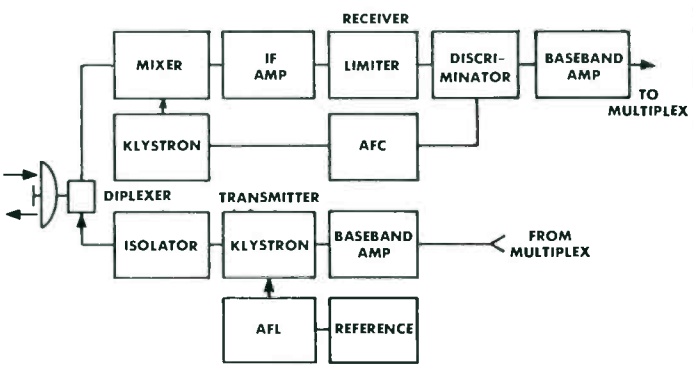


FIGURE 6. 6 OR 12 KMC TERMINAL

The baseband is terminated as a four-wire circuit. It is essentially the same as a four-wire telephone circuit with one pair for transmitting and the other pair for receiving. The bandwidth capability is usually greater than that of a wire line, and it won't pass DC.

PERSONNEL REQUIREMENTS

Thus, if a microwave system is looked at as a broadband 4-wire telephone circuit utilizing two uni-directional radio beams in lieu of wires as the transmision media, it is obviously simple.

To service microwave systems, technicians should be well grounded in basic electronics and video, which skills are acquired in TV servicing, as well as with transmitters. Also essential are an adequate knowledge of microwave principles and carrier telephone which can be learned through actual experience or sutdy of instruction books. □

PRESSURE TAPS

PANACEA . . . OR PAIN IN THE NECK?

Master Television Cable
Systems of Seattle

For years many CATV operators have considered "pressure taps" to be the most economical and satisfactory devise for "tapping" their distribution cable to feed subscriber drops. However, advances in the state of the television art have focused the attention of many CATV operators on the several characteristic defects inherent in the application of the conventional "pressure tap," which previously had not been considered detrimental to picture quality.

Basically, the pressure tap is a high impedance line bridging device and therefore provides no load or input match to the drop cable. In theory this does not pose any problem as long as there is a load at the output end of the drop cable that reasonably matches the characteristic impedance of the cable. Most of the signal energy is transferred (and) or absorbed with only a negligible amount reflected back. However, in the case of a poor drop terminal load representing a large mismatch, a substantial percentage of signal energy is reflected back up to the input end of the drop line. The pressure tap offers no load or match whatsoever, consequently most of this energy is again reflected back down the drop line. The resulting train of reflections can cause halo, "ringing" (and) or "smear" in the pictures.

For years many operators have provided an excellent match at the load terminal end of their house drops by simply using a configuration that effectively places a 100 ohm resistor in parallel with the twin lead terminals of the TV receiver. Although the energy transfer of this matching configuration is relatively inefficient, the tuner impedance can vary considerably from the theoretical 300 ohms, as it often does, and the parallel combination will continue to provide a very effective match minimizing reflections.

In many CATV communities, local television stations have recently gone on the air. And, systems are now being built in one and two station markets. This, in many instances, has created a "direct pickup" problem, especially for those operators who have been using the foregoing described means of matching their house drops to the receivers. The problem generally manifests itself as a leading ghost. The ghost is caused by the differential in time constants between the "direct pickup" of the local channel in the vicinity of the receiver and the transit time of the "on channel" CATV signal.

In a "direct pickup" area there is considerable "antenna effect" provided by the shield of the drop cable. Connecting the unbalanced drop line direct to the balanced input terminals of the TV receiver (provided by the 100 ohm configuration) will admit to the tuner, as unwanted signal voltage, any R.F. developed by the antenna effect of the drop shield. Most operators, who have been plagued with the problem and who have been using the economical 100 ohm terminal configuration, have found that the single, most effective remedy for "direct pickup" is to replace the 100 ohm configuration with a *good* symmetrically balanced matching transformer. The use of a symmetrically balanced matching transformer will, in effect, cancel out any R.F. voltage other than the true coaxial signal. This eliminates any antenna effect R.F. signal induced ahead of the transformer. In extremely acute direct pickup areas the antenna effect of the twin lead inside the set between the tuner and the twin lead terminal on the back of the set may be sufficient to cause a ghost. Obtaining a high ratio of cable signal voltage to direct pickup signal voltage is the only solution. A true transformer helps this problem in comparison to the

resistor configuration in that the voltage transfer efficiency ratio is approximately 10 db better. Therefore the use of a good symmetrically balanced transformer, electrically grounded to the chassis, represents the most economical approach to increasing your signal to direct pickup signal ratio.

It is at this point in the evolution of things that some operators, who are now using matching transformers for the foregoing reasons or otherwise, are beginning to cast a suspicious eye on the value of the continued use of pressure taps. These operators are discovering that the basic inherent defects of the pressure tap, considered to be of no consequence prior to the use of matching transformers, are reponsible for a number of problems. A few examples of problems that can be traced to pressure taps are: halo and ringing (especially on channel 2), extremely high insertion losses (especially in the high band), and increased radiation. It would be unfair to blame the pressure tap exclusively for all of these problems when a contributing factor is the TV receiver itself. The true 4:1 ratio matching transformer can provide a match to the 75 ohm coaxial cable only when a TV receiver input impedance is 300 ohms.

It has been universally observed that many TV receivers have an input impedance that varies widely from the theoretical 300 ohms. The use of a "true" transformer, in conjunction with the set having a tuner input impedance far removed from 300 ohms, can easily create highly objectional ringing on channel 2. *This picture distortion could not occur, regardless of receiver mismatch, if a form of "back match tap" were used instead of the conventional "pressure tap."* The reflection, resulting from receiver mismatch, would have been absorbed by the matched load at the input end of the line preventing their return to the receiver.

A "directional coupler back matched tap" has many other equally important benefits not provided by the conventional pressure tap. A partial list would include: drop radiation reduced, high band insertion losses reduced, much higher isolation in general achieved between subscriber drops. The latter factor is a result of the directional characteristics of such a tap device. The isolation loss between the drop and incoming line can be as desired by selecting the appropriate tap value, however, the isolation between the drop and the down line direction of the tapped feeder is always in excess of 30 db. The net result is that even the poorest of feeder lines will appear to the house drop to be a near perfect line exhibiting unusually low VSWR characteristics and a minimum of 40 db drop to drop isolation. The advantage and merits of a directional coupler tap device are therefore obvious.

Most operators, for various reasons, object to cutting their distribution cable to install a "matched tap" as is required. When we first used them in the Seattle systems and after fully evaluating the results, we found that the many advantages far outweighed the only disadvantage, (i.e., slight inconvenience in installing).

We found ourselves asking . . . "How did we get by without 'directional coupler back matched taps' all these years?" □

Temperature Effects Continued

ard cable correcting circuits. This approach is very economical since most transistor amplifiers exhibit a similar characteristic and need only a minor correction.

(3) The amplifier is designed to compensate the cable directly. This is the most expensive approach and can normally not be accomplished with solely passive compensation as in (1). This tilt and gain compensation can be achieved in a separate servo circuit, analogous to AGC system.

Methods for System Design

Of all possibilities, the second method where the amplifier matches the cable, appears best from an overall system viewpoint. Typically, with 22 db spacing half the temperature variation might be due to the cable and half to the amplifier. Both changes are simultaneously corrected by automatic tilt circuits (patent pending). These could either be made of passive circuits or, better yet, this automatic tilt compensation is incorporated in the AGC amplifier. The main advantage of a system of this type is that not only temperature changes are compensated but also errors in spacing. It can be shown that only this latter concept can ever lead to fully automatic CATV systems, with no manual adjustments whatever.

Automatic Tilt Compensation

While a temperature independent amplifier is not necessary for the normal repeater application, the AGC amplifier must hold the signal perfectly constant with constant frequency response. Theoretically, full compensation of earlier amplifiers and cables is accomplished here. This means that the output of the AGC amplifier must be an exact image of the output of the head-end equipment independent of temperature. It does not matter in principle whether AGC is derived from a pilot carrier or a TV Channel. As in any servo system it is desirable to obtain as large an error signal as possible. Therefore, ideally AGC and automatic tilt are controlled by a TV channel or signal close to the top of the high band channels. Also, with proper automatic tilt compensation, AGC action on one carrier is sufficient to keep all channels exactly level. Therefore, there would be no improvement possible using multiple pilot carriers or TV channels. Because of the complex requirements on the AGC circuit, method (1) for temperature compensation must be employed. That is, total compensation of all possible temperature sensitive circuit elements must be used. Also, since most AGC amplifiers use DC amplification, it is desirable to use special low drift transistors for this purpose. In this DC-amplifier application silicon transistors are preferable for their lower leakage current and together with thermistors as well as sensistors, it is possible to keep the AGC loop gain constant to 0.1 db over very large temperature ranges. Simultaneously all input level and tilt changes are compensated for by the compression ratio (loop gain) of the AGC circuit.

Comparison to Tube Equipment

Using these concepts it is possible to design systems of the highest quality. Some of the remarks given apply to tube systems as well, however, tube equipment shows some serious theoretical limitations. First of all, tube amplifiers due to their high power drain cannot be spaced freely. Generally a larger spacing must be used, increasing the effect of cable changes that must be compensated for. Larger spacing also leads to poorer system signal to noise. Second, few tube amplifiers use regulated filament supplies. This makes tube equipment much more supply voltage sensitive than transistor amplifiers where excellent. built-in voltage regulated power supplies are common.

Third, due to the rapid aging of tubes (change in gains of several db within only 6 months) no exact compensation techniques such as automatic tilt correction are possible. The aging of tubes is one of the most serious limitations in all TV circuits. For example, it is the main factor which made color TV impractical for so many years. No such fundamental limitations exist with transistors and the full impact of transistorized design in the TV field can hardly be overestimated. Already most major TV manufacturers have time schedules for the discontinuation of tubes in TV sets.

No theoretical limitations exist for solid state CATV system, in contrast to vacuum tube, circuitry and present day amplifiers already meet or exceed tube performance.

Literature

1) Considerations for optimum gain and spacing of repeater amplifiers, AMECO, Engineering Report No. 18.

Spectrum Continued

brought by STV and 18 other defendants comprising various theatre owner groups and individuals. Meanwhile, STV antagonists are advocating passage of special legislation to prohibit pay-TV.

STV vice president Robert F. MacLeod stated in a recent speech that the firm has "been persecuted by the rich and frightened broadcast media." He said, "We have been subjected to political bombardments by office seeking and office holding opportunists. We have been delayed by PUC hearings and rulings and now are facing a fight for survival on the Nov. 3 ballot in California, even though the issues involved have been curiously distorted, are unconstitutional, and are directly opposed to the concept of free enterprise."

Sylvester L. "Pat" Weaver, Jr., President of STV, has promised viewers "an exciting range of programming" starting with home games of the L.A. Dodgers and S.F. Giants in their respective home towns. Contracts with the teams call for a July 1 start date with at least 10,000 subscribers.

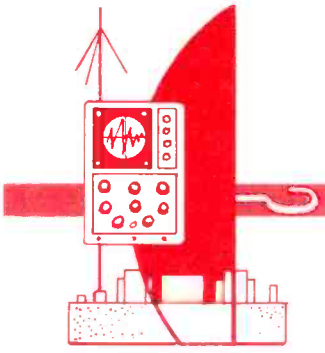
NCTA CONVENTION FEATURES VITAL, TIMELY TOPICS

The *13th Annual NCTA Convention*, to be held *June 14-19* in Philadelphia, Pa., will have as its theme "Community Service—More in '64." According to Mr. George J. Barco and Mr. Robert Tarlton, Co-Chairmen of the Convention Committee, subjects for meetings and discussions will include: (1) community service, (2) economics, financing and appraisals, (3) educational television, (4) legal and legislative matters, (5) business meetings and committee reports, (6) technical sessions, (7) UHF television, and (8) personnel and management problems.

Cable television operators are being advised to make advance reservations for the convention at the Bellevue Stratford Hotel in Philadelphia. System owners or interested manufacturers may contact the National Community Television Association at 535 Transportation Bldg., Washington 6, D. C.

OUR COVER

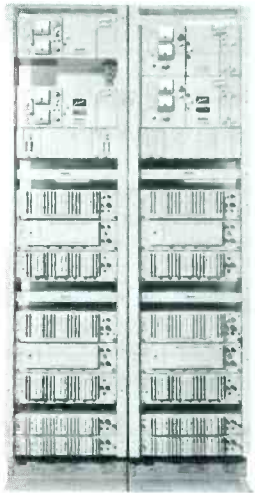
This month's cover photo shows off-the-air pickup atop 8,700-ft. Hutch Mountain in Arizona. Nine cable systems are served from this site by Antennavision Service Co., Inc., microwave common carrier representative for Ameco, Inc.



PRODUCT REVIEW

MICROWAVE SYSTEM

An all-solid state (except klystrons) microwave system for transmission of color or monochrome television has been introduced by Lenkurt. Designated **Lenkurt Type 76TV,** the system is designed for use in common carirer, broadcast, industrial and government radio bands. Either demodulating (baseband) or non-demodulating (heterodyne) repeaters are available in the 76TV. Audio portion of a program may be carried with the video signal by means of an optional program channel operating at a baseband frequency of 7.5 mc. Also, an optional clamper circuit can be provided if desired.



All components are accessible from the front, with most system circuits on plug-in cards. Built-in meter to monitor all necessary functions for normal maintenance. A one-way repeater, including power supply, occupies 41 inches of space in a standard 19-inch rack. Maximum depth is just 10 inches. For further information contact **Lenkurt Electric Co., Inc., Dept. A134, 1105 County Rd., San Carlos, Calif.**

ELLIPTICAL WAVEGUIDE

New flexible waveguides with elliptical cross section for 4.4 to 8.6 Gc. range have been announced by **Andrew Corp., P.O. Box 807, Chicago, Ill.** Construction is high conductivity copper, corrugated and covered with a polyethylene jacket. Waveguides are pressure tight and offer performance comparable to rigid rectangular systems. Supplied on reels or in coils, ready for installation. Selection of end fittings adapt elliptical waveguide to standard rectangular waveguide flanges. Contact Andrew at above address.

VHF BROADBAND MATV AMPLIFIER

Blonder-Tongue Laboratories, Inc. has recently introduced their **Powerhouse** amplifier, an upgraded version of the well-known MLA mastline series of broadband amplifiers. It has particular utility where there are high cable losses and added outlets creating sub-standard pictures on sets at the end of the line. The new unit can be driven by a broadband or single channel amplifier. It is capable of amplifying all VHF channels and the entire FM band.

The Powerhouse features two separate amplifying sections, one for low band and one for high band. Each tube in the low section handles a particular segment of the bandpass. This minimizes the effect of one channel cross modulating and interfering with other channels in the band, enabling the amplifier to handle far stronger signals. A tube failure will only affect a particular segment, rather than the entire system. Contact **Blonder-Tongue Labs, 9 Alling St., Newark 2, N.J.** for full details.

POWER FILTER

A completely protected power filter with over 60 db of attenuation over 20-220 mc has been introduced by **Viking Cable Company, 830 Monroe St., Hoboken, N.J.** An indicator light with 18-inch cord to permit convenient placement for ground level viewing is optional. The unit contains overload protection with surge delay, lightning arrester, dual knockouts in bottom and rear for either ½" or ¾" conduit and a hinged, one-piece cover. Completely shielded, internal RF filter prevents spurious power line radiation or inter-amplifier coupling.

ALL BAND MATV/CATV ANTENNA

A new antenna designed for all TV channels has been announced by **R. F. Systems, Inc., 356 South Ave., Whitman, Mass.** It has low side lobes and beam widths ranging from 75° at low frequency end to 50° at the high frequency end. Range is 50-250 mc. Stainless steel hardware. Made from special beam extrusions. Furnished with type-N72 ohm constant impedance input connector. Available from stock. List price, $90.00.

TECHNICAL BULLETIN

The first in a series of Technical Bulletins, entitled **"Delay Characteristics Of 1/2", 70 Ohm Styroflex Cable"** has been issued by Phelps Dodge Electronics. The four-page report covers the results of a test conducted to prove the suitability of Styroflex coaxial cable for transmiting color television signals. Included in the bulletin is complete data establishing the variation in phase velocity of 1/2", 70 ohm Styroflex coaxial cable over the frequency range between 800 kc and 8 mc. The test method is also explained.

For free copies, write: Technical Bulletin No. 1, **Phelps Dodge Electronic Products Corporation, P. O. Box 187, 60 Dodge Avenue, North Haven, Connecticut.**

Editorial

HOW TAME IS "TAME"?

The most recently organized foe of CATV is an outfit bearing the rather innocent title of "TAME." The group's tactics, however, are anything but tame! The nickname denotes the *Television Accessory Manufacturers Institute* which was formed a few months ago by nine manufacturers of roof-top antennas. They are Alliance Corp., Antenna Designs, Inc., Channel Master Corp., The Finney Co., JFD Electronics Corp., Kay-Townes Antenna Co., S & A Electronics, Winegard Corp., and Jersey Specialty Co.

Their large, orange propaganda packet is entitled "*How to TAME CATV*"; it bears the slogan, "*Keep TV Free . . . Fight U-Pay TV.*" A bright bumper sticker bears the same message.

Contained in the kit are more than a dozen pages of suggested editorials on the "*pitfalls of runaway CATV.*" In a bulletin called "*How to Fight Community Antenna Systems*" distributors are told to contact local city officials but, "*do not mention personal gain for service men or dealers.*"

TAME also supplies advertisements for local use. One is headed, "*Here's why Cable TV is bad for our Community!*" The same large ad exhorts, "*in the best public interest FIGHT Cable TV—note NO on CATV.*"

TAME's general arguments are that CATV is costly, unreliable, harmful to local TV stations, "kills" local radio stations, a "drain" on local economy, fails to serve rural families, is bad for TV dealers, and is unauthorized by networks and FCC.

We do not believe that TAME represents a serious threat to the CATV industry—simply because its arguments are completely devoid of any motivation or logic except for the purely mercenary and selfish desires of the home antenna manufactuers, their dealers and distributors. Their own awareness of this weakness is betrayed by the precautionary warning to distributors not to mention "*personal gain*" when they go to talk to the local authorities about "*the City Commission's responsibility in this matter of cable systems versus the public interest.*"

Another testimony to the complete frailty of TAME's position is the directive to discontinue local radio and television anti-CATV editorials whenever local cable interests ask for equal time to tell *their* side of the story!

The best answer to the challenge of TAME—or any other organized opposition to the community antenna concept—is for the individual system operator to do his utmost to perform a service that is genuinely in the public interest; the best possible service that he can practically and economically provide. Thus, the system operator who is giving his subscribers a good consistent signal does not need to worry about TAME. And, similarly, the well informed operator who can clearly present the basic CATV facts to elected officials is not likely to be seriously hindered by TAME in obtaining new franchises.

Stanley M. Searle

CLASSIFIED

Rates for classifieds are $2.00 per line or fraction thereof for advertising which, in our opinion, is obviously of a non-commercial nature. A charge of $20.00 per column inch (2¼" col.) is made to all commercial advertisers. We do not bill for advertising in the CLASSIFIEDS, nor can we acknowledge receipt of copy sent in. Full remittance MUST accompany all orders. Deadline for receipt of copy, 1st of second preceding month (i.e. Deadline for December issue is October 1).

NEW JERROLD TRANSISTORIZED "CHANNEL CHAMP" PREAMPLIFIER

LOWEST NOISE FIGURE IN THE INDUSTRY
(4db max., low band; 5½db max., hi band)

Jerrold's new Channel Champ beefs up weak signals to insure clear, sharp pictures on your customer's TV set.

This totally new solid-state preamplifier not only boasts a super-low noise figure but features a matched input and output that gives you *all* the signal your antenna picks up.

Built with a thick cast-aluminum housing protecting an inherently trouble-free transistorized circuit, the Channel Champ will *outperform* and *outlast* any other CATV preamplifier on the market.

Ultra-stable Hi-Q preselector circuitry employs helical resonators. AC-powered to eliminate electrolysis problems. Works with Jerrold 405-P power supply or new PPS-8 power supply which handles up through eight Channel Champs. Zener-diode regulation eliminates signal fluctuations due to voltage changes.

The "Channel Champ", like the famous Channel Commander signal processor, is another member of the Jerrold family of superior equipment designed specifically for the CATV industry. Contact your Jerrold man now . . . Channel Champs are now in stock and available for immediate delivery.

*Specify channel. Price does not include power supply.

JERROLD ELECTRONICS Community Systems Division

PHILADELPHIA, PA.
15th & Lehigh Ave.
Area Code 215 226-3456

SHARON, MASS.
#40 Lantern Lane
Area Code 617 828-0767

PITTSBURGH, PA.
1301 Highland Building
121 S. Highland Avenue
Area Code 412 441-3050

DENVER 22, COLO.
2110 South Ash Street
Area Code 303 756-6283

DALLAS, TEXAS
4924 Greenville Avenue
Area Code 214 368-1911

SAN CARLOS, CALIF.
1042 Terminal Way
Area Code 415 593-8273

COQUILLE, OREGON
88 East First Street
Area Code 503 396-3422

YAKIMA, WASH.
Ward Building
1 N. First Street
Area Code 509 248-1717

SKL System Owners Know From Experience That Quality Means the Best Economy

E. Nicholas Sanguinetti

Mr. Sanguinetti, President of Vermont Television, Inc., Barre, Vermont, is a CATV pioneer who knows from long experience that the high quality and reliability of SKL equipment give him the best economy he can buy.

Barre's Multiple Community Antenna System

Vermont Television, Inc.
61 NORTH MAIN STREET • BARRE, VERMONT
Phone GR 6-4901

May 16, 1963

Mr. Donald Spencer, President
Spencer-Kennedy Laboratories, Inc.
1320 Soldiers Field Road
Boston 35, Massachusetts

Dear Don:

It was just 11 years ago that we started operation of our Barre system, using SKL equipment. That makes me one of your first CATV customers. Then again last year I became your very first customer for a completely solid state head end setup.

All the amplifiers and other line equipment which were installed in 1952 are still in operation giving just as reliable service as the day they were put in, with very little maintenance.

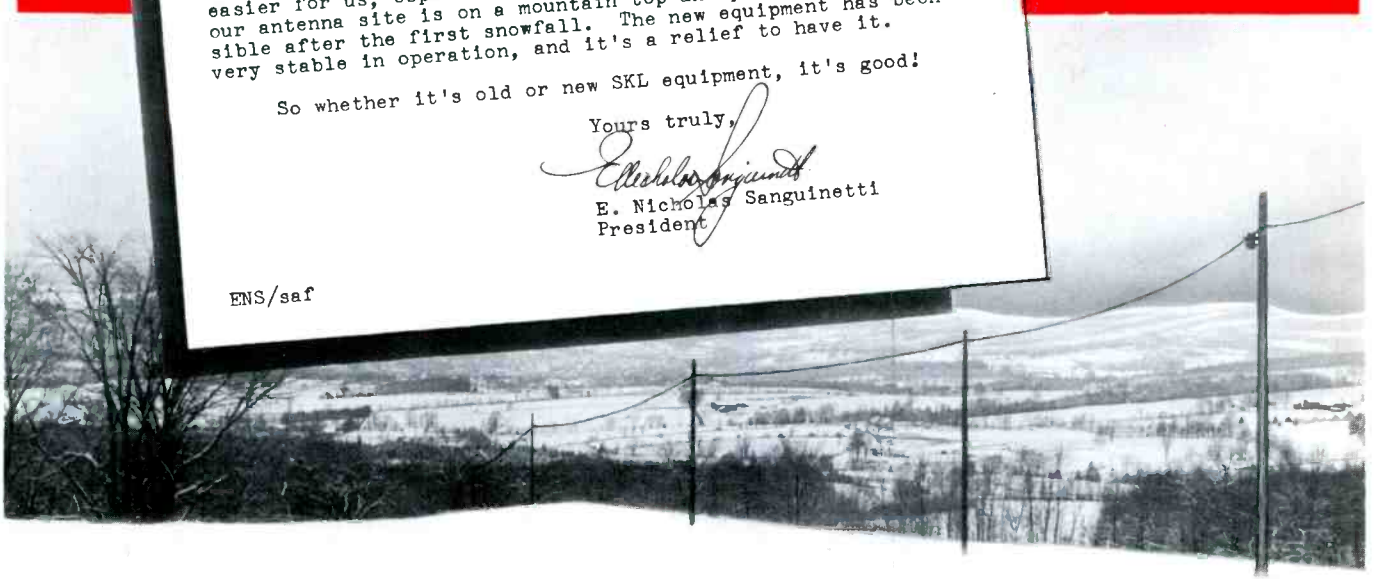
The transistorized head end is going to make life a lot easier for us, especially during the winter, since as you know, our antenna site is on a mountain top and practically inaccessible after the first snowfall. The new equipment has been very stable in operation, and it's a relief to have it.

So whether it's old or new SKL equipment, it's good!

Yours truly,

E. Nicholas Sanguinetti
President

ENS/saf



SKL

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