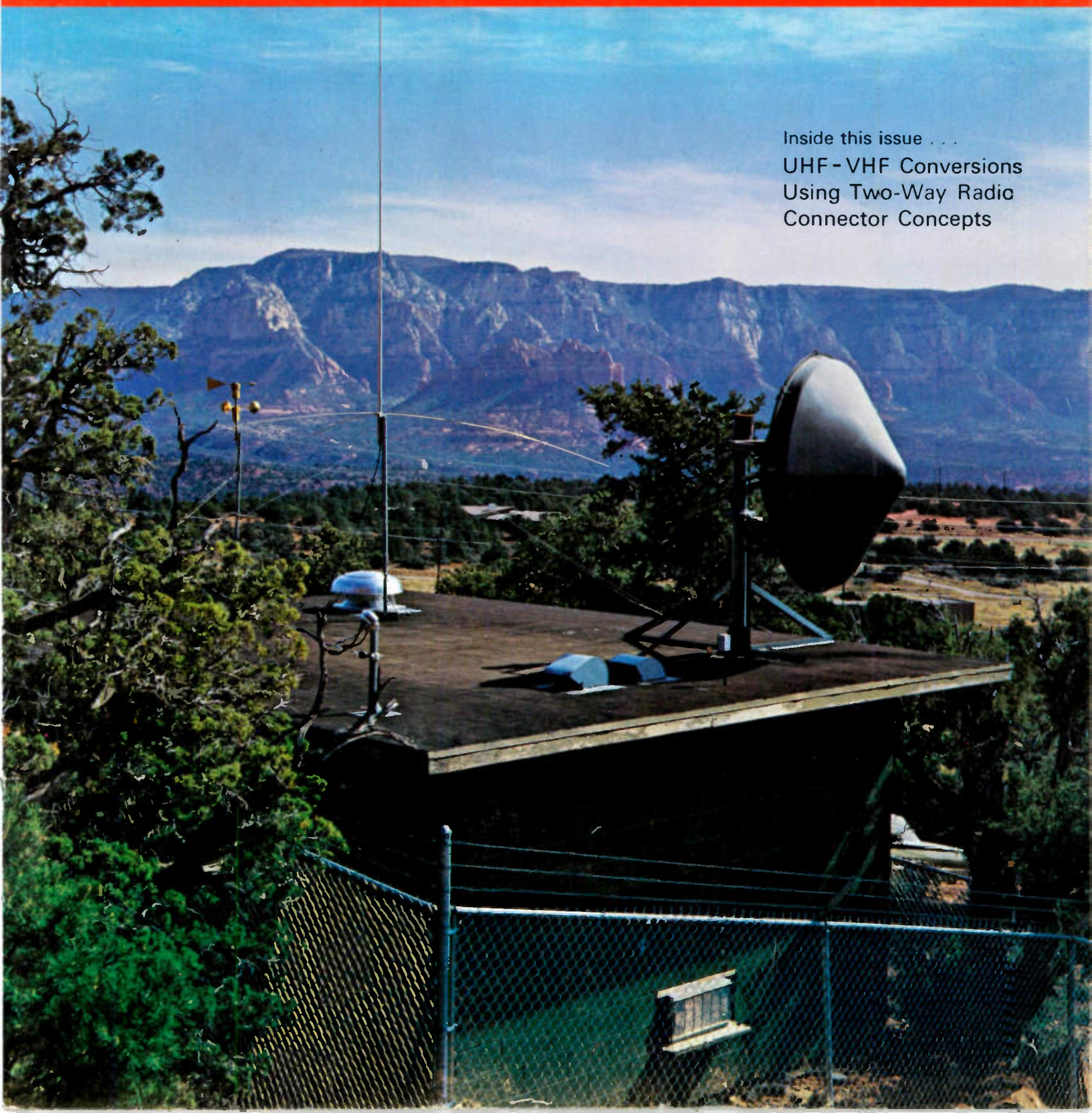
DECEMBER, 1966

TV & Communications

The Professional Journal of the Cable Television Industry



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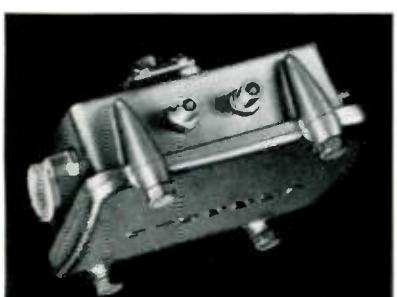

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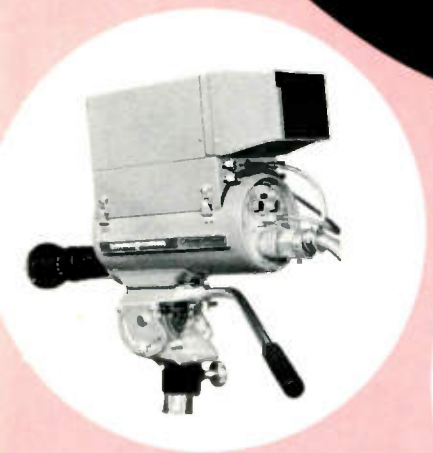

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IN THIS ISSUE

OUR COVER: This month's cover features the head-end facility of the cable system serving isolated Sodona, Arizona. Photo courtesy of Sherrill D. Dunn, Ameco, Inc.

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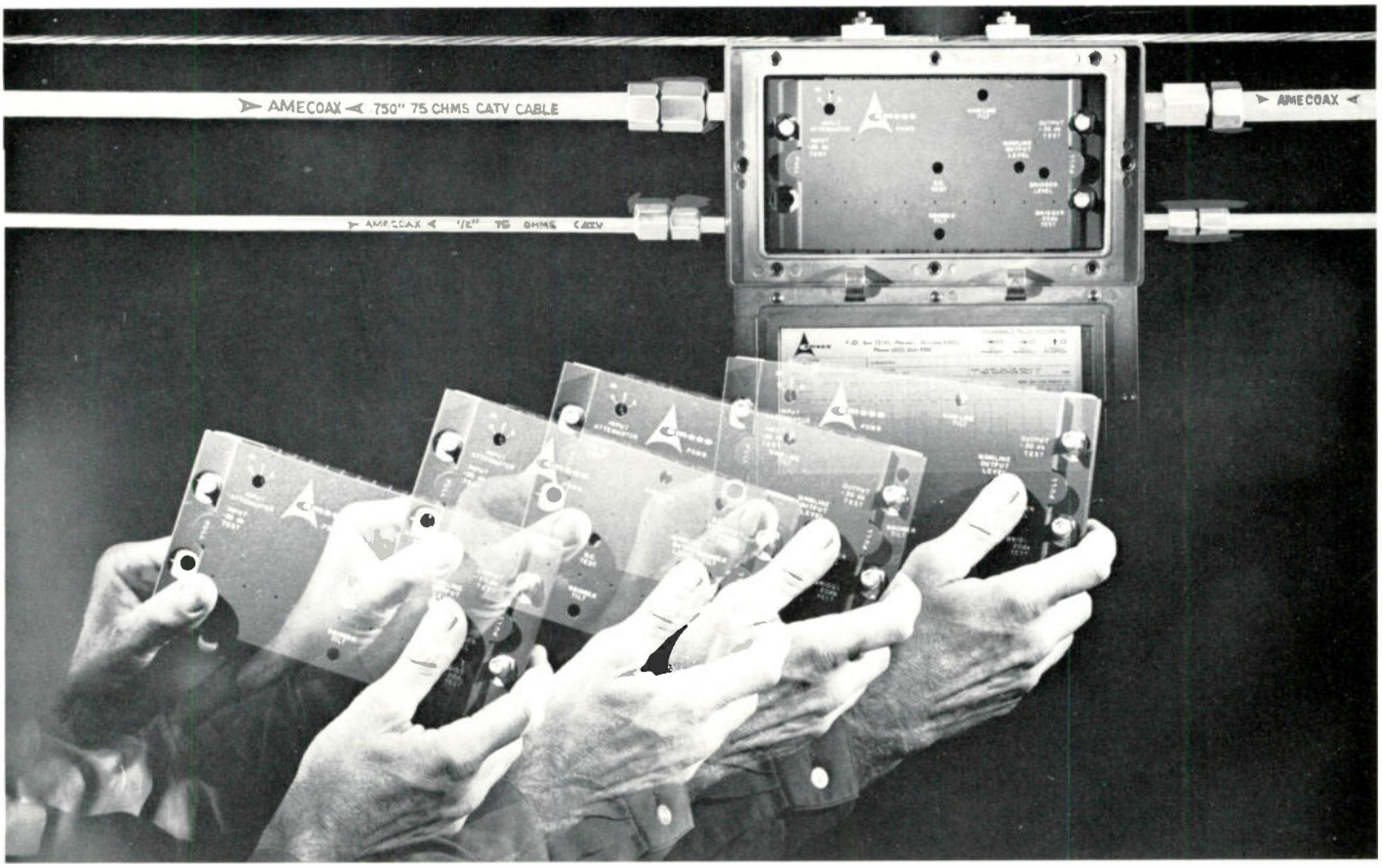

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EDITORIAL

By Stanley M. Searle

The Hard Facts

During the recent series of NCTA Regional Meetings, various Bell Telephone executives assured cable operators of their good intentions. They emphasized that Bell intended to show no preference in favor of leaseback customers as opposed to pole contact CATV operators. Many were encouraged with the evident spirit of fairness manifested by the AT&T representatives.

Some CATV people were even moved to suggest that perhaps Bell had been miscast in the role of the villain. It was suggested by some that the light was now dawning on a new era of understanding and cooperation between AT&T and cable television interests.

Was the multi-billion dollar telephone giant really going to let independent CATVs operate without unfairly advantaged competition from telephone lease customers? While the olive branch was yet extended, some unsettling indications to the contrary were brought to light.

In New York City a company had leased facilities from New York Telephone Company to provide unfranchised "telephone cable TV" to residents of a dozen and a half square blocks of Manhattan (see story page 28). Although the telco emissaries from 195 Broadway had repeatedly told system operators that no leaseback service or pole contact would be provided to a CATV operator who does not hold a franchise, the same executives somehow managed to overlook this *unfranchised leaseback system just three miles from AT&T headquarters!*

About the same time we discovered the unpublicized plans of New England Bell to provide leaseback CATV service in several Maine communities where the customer does not have a franchise. Amenia, New York is the scene of still another attempt by Bell Telephone and a leaseback CATV customer to extend cable service into a community where the operator doesn't hold a local franchise.

How can the inhabitants of the AT&T ivory tower hope to sell CATV operators a line that is in obvious contrast to telco actions? *Apparently the Bell Telephone Company executive staff has mistakenly assumed that cable television operators are ignorant, naive or totally powerless to defend their own rights.*

Unfortunately, the cable television industry *is* overwhelmingly outweighed by Bell Telephone Company with its enormous wealth and monopoly status. Barring action by the Justice Department or the FCC, cable system operators face virtually insurmountable odds in any tangle with the telephone company.

There is, however, every reason to believe that elected and appointed members of government will take action against the obvious disregard shown by AT&T for free enterprise in the CATV business.

Developments in cable TV across the country, including telephone company activities, could easily escape the attention of the FCC and our elected officials. However, Bell Telephone Company's open disregard for public policy and fair play in the nation's largest city clearly expresses AT&T's ambition to control cable television.

How can AT&T expect cable operators to swallow their "fair and impartial treatment" doctrine while this gigantic utility is working quietly behind the scenes to foster unfranchised leaseback systems? *The soft words of the AT&T giant cannot cover the hard facts.*

Stan Searle

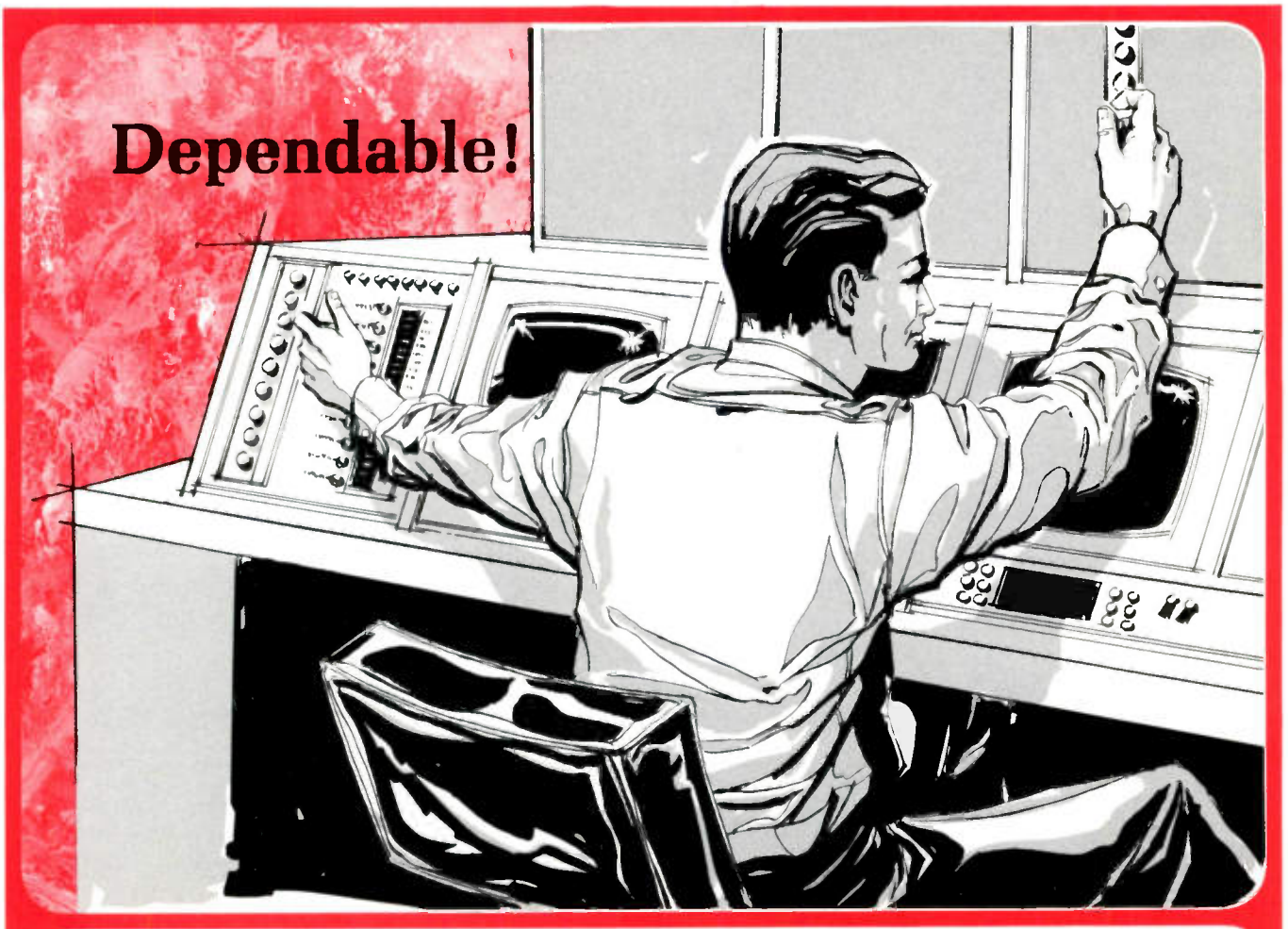
Extending ETV

The extent to which CATV has helped educational television is well known—to cable operators. Unfortunately, many educational broadcasters are laboring under the gross misconception that CATV in some way hurts ETV. Nothing could be further from the truth!

CATV is, in fact, one of the few friends ETV has. One need only to look at a few cases in point to see how helpful CATV has been: the extensive efforts by the Pennsylvania operators to aid ETV in that state; the pledge by each Vermont operator to provide free service to the schools in his community when the state's ETV station goes on the air; and the unique relationship between ETV and CATV in Michigan's Northern Peninsula, where Northern Michigan University microwaves programs to dozens of cable systems which, in turn, distribute the programs to the schools.

Since the critics in educational broadcasting apparently are not going to approach the cable operator for information, it is up to the CATV owner to take the initiative and establish rapport with the educational broadcasters in his state. The operator must make sure that the ETV people know about the added program exposure afforded by CATV. A concerted effort to educate the educational broadcasters should still some of their scattered criticism of cable television.

Educational television and CATV are natural allies. Through mutual cooperation and joint efforts they can greatly expand the public outreach of ETV.



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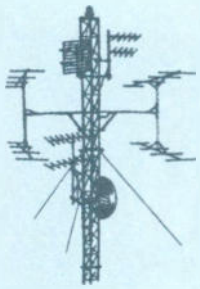


CATV Industry PERSPECTIVE

Life Magazine's feature article on CATV was, on the whole, surprisingly comprehensive and objective. While most system operators cannot be reconciled to its presentation of "audience fragmentation" and other supposed results of CATV as proven facts, they can be grateful for the incisive coverage of many of the industry's problems and potentials. Life business editor Chris Welles and his staff did give the public a clear and interesting account of what CATV is, and what it can do for the viewer. As for the shortcomings of the article, CATV'ers will do well to take the "as long as they spell my name right" attitude. The readers of Life have been exposed to CATV, and the industry can only benefit from the exposure. The attractive financial picture presented by Life may prove particularly helpful to operators seeking construction financing in the future.

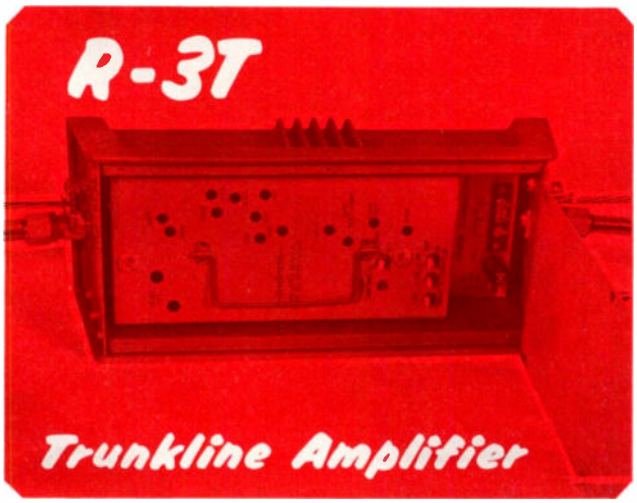
Complaints against leaseback tariffs filed with the FCC will likely be consolidated into one hearing before the Commission. The issues involved are the same, and the FCC is understaffed due to budget cuts at the hands of Congress. The pre-hearing conference set for December 19 will shed some light on possible consolidation of the complaints. Still in question is whether the Justice Department will look into telco dealings in the CATV industry. There have been no formal complaints to that agency yet, although a Cartwright anti-trust suit has been filed in California Courts against Pacific Tel and Tel. In light of the stepped up push for leasebacks in recent months, an anti-trust complaint to the Justice Department would not be a surprise.

Tax legislation aimed at the nation's inflationary ills now appears much less likely to get through Congress next session as a result of conservative gains in last month's elections. The administration's margin of liberal votes in the House, where all tax law must originate, has been cut thin--perhaps thin enough to cause concentration on alternate means of curbing inflation With removal of business tax credits less likely, and with prospects improved for trimming Federal budgets, many businessmen are grateful for the election outcome.

Public service originations on cable systems are creating vital support for localized cablecasting. City councils are increasingly making promises of such services prerequisite to obtaining a franchise. Existing systems which have added program originations of local sports and civic affairs are enjoying improved status in their communities. In the future, however, operators can look for some violent objections to cablecasting. The first volly was fired recently by NAB president Wasilewski...AMST will not likely be silent long. Most broadcasters, however, are taking a "let's wait and see" attitude toward CATV originations--especially the increasing number who are in the cable business or seeking franchises themselves.

Educational telecasters will receive increasing attention from the CATV industry in the next few months. Establishing better lines of communication with ETV people is a current objective of several state and regional CATV associations and of the NCTA staff. The strong Pennsylvania and California associations are among the more active groups in establishing ETV-CATV relations. In the first half of 1967, much will be done to replace the somewhat negative view of CATV held by some ETV personnel, with a better knowledge of what CATV means--and can mean--to educators. NCTA's enlarged information and public relations capacity should play a large role in strengthening industry ties with educators and educational broadcasters.

ENTRON's SOLID-STATE



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LETTERS

MORE ON LOCAL ORIGINATION

● Please accept my gratitude for the outstanding service that you rendered our industry in the publication of your October, 1966 issue on system origination. It is my opinion that this one issue was worth my whole year's subscription to your fine publication. Would you please send me five additional copies of that issue so that I might send them to interested friends?

W. Clark Swanson, Jr.
President
Highlands Cable Television Corp.
Avon Park and Sebring, Florida

● I note your October articles on closed circuit programming. The first system we started, 11 years ago, used nothing but closed circuit programming—no outside channels. We used a flying spot scanner and one vidicon camera on common sync (we could even superimpose lettering, etc.). We ran live shows including basketball games, as well as filmed programs. Incidently, why don't you run an article on how to carry bingo on cable systems? We used to do that, and it was a sensation!

Harlan L. Jacobsen
Jacobsen Electronics
Rapid City, South Dakota

Cable-Bingo sounds great—maybe we'll hear from operators currently carrying bingo on their systems. We will be happy to report their methods and results to the rest of our readers.

CATV IN LIFE

● It finally happened, after all these months of delay! Chris Welles and I have closed the CATV story for the November 18 issue of *Life*. It is a fairly lengthy text, and, we hope, a good comprehensive look at what is happening in and to the industry right now. We want to thank you for keeping us up to date via your fine publications—believe me, it was a big help, and especially useful in updating our knowledge after the long delay! Again, my thanks for everything.

Nancy Fraser
Life Magazine
New York, New York

WELCOME TO BPA

● One of the privileges of being BPA's (Business Publications Audit) Chairman is signing the Certificate of Membership which you will receive shortly. On behalf of the board of directors, I am happy to extend welcome and congratulations to TV & COMMUNICATIONS for joining the more than 550 business publications providing media buyers with objectively audited circulation data.

The complete BPA audit of qualified circulation will be an important addition to the other values provided by your publication to advertisers and agencies.

Gene Wedereit
Director of Advertising
Chemetron Corporation
Chicago, Illinois

SAVING TIME

● The September 1966 issue of your publication, TV & COMMUNICATIONS carried an article, "Saving Time" which certainly gives good advice to executives. It would seem that our members could learn much from it, so we would like to reproduce it in our magazine, *The NATESA Scope*. We shall await your reactions.

Frank J. Moch
Executive Director
NATESA
Chicago, Illinois

Permission readily granted. The exchange of sound management techniques between the CATV industry and the television service industry holds obvious potential. After all, both the TV service man and the cable system operator are basically engaged in assuring top quality viewing to the public.

CATV FILM PACKAGES?

● I read a very interesting article in your September issue of TV & COMMUNICATIONS concerning possible booking of a motion picture film package for CATV. I wrote for additional information to the Girard Projection Service, Houston, Texas, and my letter was returned for insufficient address. Can you supply me with a more complete address for this firm.

W. Robert Felder
General Manager
Imperial Broadcasting Company
Louisville, Ohio

Our files show the address of Girard Projection Service as: 4433 Bissonnet, Bellaire, Texas 77401.

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With the new Community Antenna Relay Service (C.A.R.S.), CATV operators can relay distant programs to the head-end on their own microwave system.

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CATV Legal VIEW

BY JOHN P. COLE, Jr.

Humpty Dumpty and the "Public Interest"

The phrase most often repeated by the FCC in its legal decisions is: "The touchstone of our responsibility is the 'public interest'." What therefore constitutes the "public interest?" One FCC Commissioner is fond of saying privately that, "when we cannot think of a good or logical basis for an action taken, then we justify it by finding it to be in the 'public interest'." To us, the "public interest" brings to mind a classical dialogue:

> "When I use a word," Humpty Dumpty said in rather a scornful tone, "it means just what I choose it to mean—neither more nor less."
>
> "The question is," said Alice, "whether you can make words mean so many different things."
>
> "The question is," said Humpty Dumpty, "which is to be master—that's all."
>
> *Carroll, Alice in Wonderland & Through The Looking Glass.*

This past February, the FCC first announced its policy prohibiting the establishment of new CATV services within the 100 top television markets in the United States except, of course, where the CATV would propose only to carry the "local" stations. The adoption of these policies was necessary, the agency said, in the "public interest." As part and parcel of this uniquely restrictive policy, the Commission, in an obvious attempt to confer some semblance of at least the basic requirements of due process, further stated that where applications were made to it by persons seeking to conduct a CATV business in these prohibited regions, it would proceed to hold "hearings." Such applicants for CATV authority were advised that they need only demonstrate to the Commission that their CATV proposals "would be consistent with the public interest, and specifically the establishment and healthy maintenance of television broadcast service in the area." At this same time, the Commission also promulgated additional regulations whereby applicants for authority to construct a CATV system within the prohibited market area could even petition the agency to waive the mandatory hearing requirements by filing a "petition for waiver" and demonstrating to the Commission that "such relief would serve the public interest."

As of the date of this writing, there are pending considerably more than 130 requests for hearing or petitions for waiver of the prohibition on CATV construction in the top 100 television markets. A large number of these petitions for waiver or hearing have stimulated the filings of "oppositions" to the requested relief by many television broadcast stations. Several of these petitions for waiver have been acted upon and granted in full or part. However, it is singularly significant to observe that the Commission has granted no relief where an opposition, no matter how frivolous or contrived, has been interjected. These few actions by the Commission have obviously been nothing more than a grand-stand play to lend some credence to its announced waiver and hearing policies and thereby to perpetuate what can only be charitably characterized, in these circumstances, as the myth of due process.

The staff of the Commission has admitted both publicly and privately that the rules and policies established by the Commission back in February, as a practical matter, are totally unrealistic and, in fact, wholly unworkable. If full-scale hearings were to be held in each situation, as required under the announced rules, the Commission would literally have to call all of its other regulatory functions to a halt. Even then the agency simply does not possess sufficient personnel or resources to engage in or even supervise the procedures called for by its own recently enacted CATV rules.

John P. Cole, Jr. is a member of the Federal Communications Bar Association and a ber of the Bar of the District of Columbia and the States of Maryland and Georgia.

The simple, normal, obvious and, we believe, desired result of the new CATV rules is a dramatic curtailment of CATV business expansion throughout the nation. In simple terms the FCC's CATV policy is one of industry containment. Since approximately 90 percent of the U. S. population reside within the prohibited "top-100" market area, the growth of new CATV facilities is reduced relatively to a standstill.

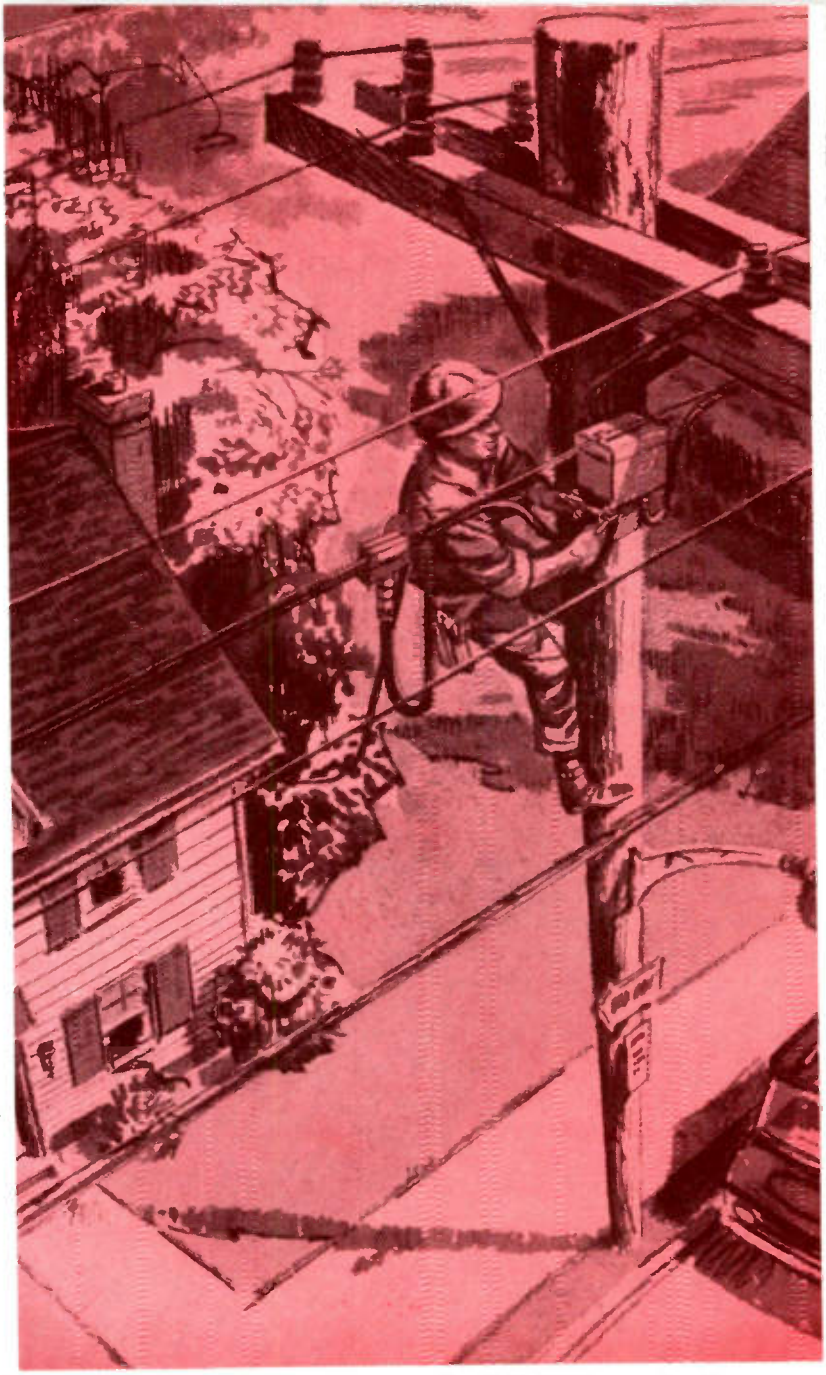
The circumstances which have developed here however are by no means unique in the regulatory tradition established by the FCC over the activities of the commercial broadcasting industry.

In the electronics mass-media communications industry, the word "competition" has long been a profanity to the "landed gentry." And it is of little consequence whether the competition comes from within or without. The legal history of commercial broadcasting is written literally in competitive controversy—always the "ins" or "haves" versus the "outs" and "have nots."

Ever since, and even long before, the Supreme Court enunciated the principle that commercial broadcasting is to be conducted and regulated in a "free enterprise" competitive environment, broadcasters, government regulators, and even the courts, with increasing consistency, have worked both together and apart to devise novel, often times ingenious schemes, rules and regulatory theories, the basic effects of which have been generally to thwart rather than to promote genuine, free competition.

Today, as has normally been the case, the majority of the FCC's adjudicatory activities as exercised over the broadcasting industry involve basically the single issue of whether the entrenched will be encroached upon by additional stations or services in "their" markets. "Maintenance of the status quo" and "don't give up without a hearing" are the watchwords for any self-respecting broadcaster as well as for his Washington communications legal counsel. Ingeniously, and with great persuasive-

(Continued on page 68.)



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So before you install a so-called "economy" cable that will send your men back up the poles for costly replacement, look into Times JT1000 cable. The payout makes the big difference.

Cable: Available in seamless lengths up to ½ mile

TIMES WIRE AND CABLE/A Div. of The International Silver Co./Wallingford, Conn. /Transmission System Design & Engineering/Standard & Special Purpose Coaxial Cable/Multiconductor Cable/Complete Cable Assemblies

CATV MANAGEMENT CORNER

Management Reports

If your management reports are written properly, they can help you do a more efficient job; if they're not, they can waste your time and effort, as well as that of the readers. A properly written report contains all the necessary information but no unnecessary details. It not only makes its point; it leaves no doubt about just what that point is.

If it's as simple as that, why are so many management reports unsatisfactory? Why are many too long, too hard to read, or too rambling in their approach? Why do some supervisors have to waste time puzzling over system progress reports? Or on the other hand, why do some managers receive phone calls from their superiors asking for more information when a detailed report was just sent?

Here are some suggestions to follow when you prepare your next management report. When you gather your material, ask yourself: Why is the report needed? Who will read it? What, if anything, should the reader do? Use these questions as a standard against which you measure anything you say in your report. The answers should be clear in your own mind before you undertake any serious work on the report.

Many reports bog down in unnecessary detail. Avoid this by taking a cue from the journalist, who often limits his story to answer these questions: What was done? Who did it? Where? When? Why? How did it happen? If recommendations are in order, one more question will have to be answered: What should be done?

The importance of language in a report is often overlooked. A report is designed to present facts, conclusions, or recommendations. Avoid elaborate phrases like "it is the considered opinion of the writer," in favor of simple ones like "I think." Remember that you don't always know who your reader will be. A report written primarily for your own boss might be forwarded to someone in the finance office or accounting who doesn't have your technical knowledge, and technical terms might only confuse him.

State the subject first. Your boss will appreciate this. If the subject happens to be one in which some other person or department is primarily interested, he can immediately forward it. This saves time for him, and helps you by making quicker action possible. Even if the boss doesn't forward your report, he will be able to decide quickly whether the subject needs his immediate attention.

Set your conclusions or recommendations clearly apart from the body of the report. This may be at the very beginning, again as a help to the busy executive, or at the end, following the facts or opinions on which you have based your conclusions or recommendations.

State the facts clearly and simply. Avoid long, involved sentences which might obscure your meaning.

Be brief, but complete. Obviously, there is no one length that is ideal for all management reports. Say what you have to say: but say it once, and stop. □

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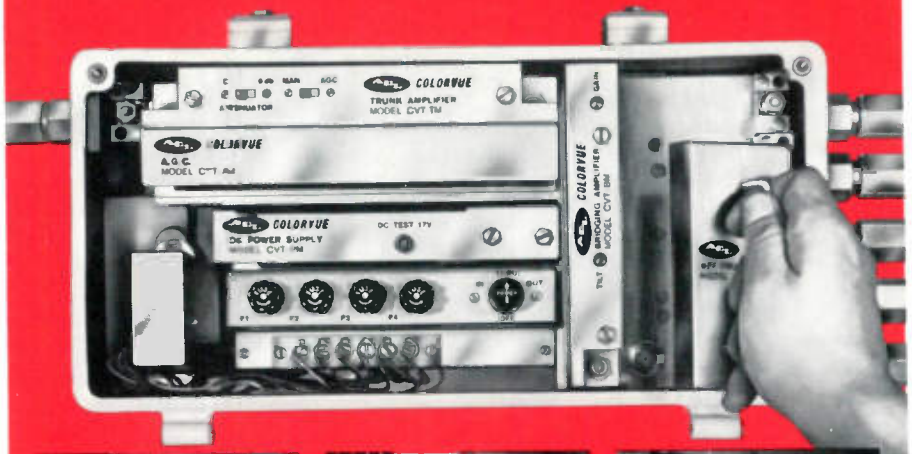
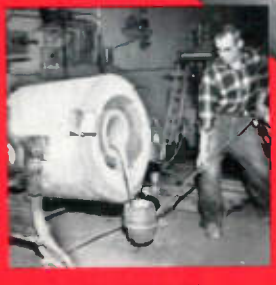


MAIN PLANT MACHINE SHOP

AEL MODEL SHOP



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News SPECTRUM

FCC Orders AT&T Tariff Investigation

The Federal Communications Commission, on its own motion, has ordered an investigation of CATV tariffs filed by the Bell System Telephone Companies. The Commission's landmark decision to investigate the tariff filings came only a week after the National Community Television Association filed an extensive complaint charging American Telephone & Telegraph Company with illegal manipulation of the industry through pole attachment tariffs and leaseback agreements. (The NCTA later filed similar complaints in respect to General Telephone and Electronics Corp. and United Utilities.) And it followed close on the heels of petitions from the California Community Television Association, the Texas CATV Association, and the Pennsylvania Community Antenna Television Association, requesting examination of tariffs charged by the California Water and Telephone Company, GT&E, and General Telephone of Pennsylvania, respectively.

Complaints by the separate associations are similar, and are comparable to those the Commission has ordered undertaken in its investigation of the tariffs of the eighteen Bell systems. Most of the petitions allege that the telcos are, among other abuses, violating the antitrust laws in their CATV dealings.

NCTA Filings

The NCTA request asked for an investigation and hearing, charging that the telco's CATV tariffs are "unlawful, unjust, unreasonable and against public policy." The filing also charged the Bell Companies with failure to comply with Section 214(a) of the Communications Acts which prohibits construction of leaseback facilities without Commission permission. "The acceptance by the Commission," the filing stated, "of tariffs for the furnishing of CATV distributional facilities whether under Special Permission No. 4831 or otherwise does not constitute an authorization to construct CATV systems."

The NCTA filing charged that the Bell tariffs "constitutes (sic) a part of a plan or scheme to benefit the Bell System in two essential ways; namely, it provides a method whereby CATV underwrites the construction of coaxial cable capacity which can be converted to Bell System use, while at the same time producing profit to the Bell System; and it provides a method by which the Bell System can limit uses of coaxial cable to prevent present or future competition for services which the Bell System presently offers or may offer in the future."

Such activities in serving CATV, NCTA pointed out, could place the Bell System in a monopolistic position to "take over the control coaxial cable used by CATV operators," i.e., threaten the independent survival of the CATV industry.

NCTA later petitioned the FCC for permission to intervene in the AT&T tariff hearings. In asking to be awarded legal status in the hearing, NCTA said that the Bell System tariffs in question are "a root cause of serious problems to many CATV operators and have been the source of Bell System practices which, in some cases, have resulted in irreparable harm to CATV operators."

Initial Filing.

Traced to a fine point, the system that raised the initial question of the legality of telco tariffs was International Cable TV Corp., of California, which filed a complaint against the Pacific Telephone and Telegraph Co. The Commission dismissed the International Cable filing on the grounds that it was submitted to the Commission too late, but by a procedural method that the FCC can use if it thinks there is merit in an untimely filing, the Commission "on its own motion" suspended the Pacific Telephone tariff revisions until January 24, 1967, and upon decision to investigate all Bell System filings, lumped the eighteen companies together for a hearing.

Texas Filings

The Texas Association filings against GT&E were essentially the same as those filed against Bell by the NCTA and the California Association. The Texas organization said the GT&E tariffs "are not legal . . . because the service offered thereunder is not a communications common carrier service," and charged that "the tariffs would allow the telephone company to enter and gain control of the community antenna television business of its customers" through the process of lease agreements.

The tariffs, said the organization, "give rise to fundamental anti-trust problems which require full investigation by the Commission and rejection of tariffs." Arguing that "the specific conditions and regulations of the tariffs are unlawful in that they are unjust, unreasonable and discriminatory," the CATV association said, "the tariffs should be rejected because of the lack of a public need or interest in the offering," and concluded by arguing that there should be a hearing.

New England Tel Joins Association

The Community TV Association of New England, meeting at the Howard Johnson Motor Lodge in Burlington, Vermont, delved into a spirited discussion of the recent New England Telephone and Telegraph Company actions in the State of Maine. The pros and cons of the New England Telephone-Bartell Media leaseback arrangement were discussed at length, and reports indicate that some emphatic objections were voiced. Nevertheless, the association granted a request by New England Tel for an associate membership to the organization. (The telco's application had been pending before the Association since last spring.)

Other items on the meeting's agenda included a speech by Odell Skinner, head of the Vermont Television Network, an ETV presently under construction. Association members pledged to carry the signals of the new network, and to provide the signals to the schools in their respective communities. Other speakers were Jim Stillwell of TeleSystems and a representative of Spencer-Kennedy Labs.

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Connector: Type "F" female.

Dimensions: 6¾" x 4½" x 3½".

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TPT Requests More Experiments

TelePrompTer Corp. has petitioned the FCC for permission to combine its experimental 18,000 MHz re-broadcasting project in New York City with the CATV system currently under construction there. TelePrompTer asked the Commission for permission to: (1) construct another transmission site; (2) use more frequencies in the same part of the band; and (3) modify its experimental grant to permit its use in conjunction with TelePrompTer's commercial CATV operation.

TelePrompTer received authorization from the city of New York last December to construct a system in an area which covers about half of Manhattan. The FCC last April 27, in an unrelated action, approved TelePrompTer-Hughes Aircraft Co. plans to experiment with picking up and rebroadcasting New York TV signals on a high-frequency band—in the18,000 megahertz range—well out of the part of the spectrum used by broadcasting. By using this high frequency, the firms reasoned, the gaps in New York coverage would be filled without interference to stations by rebroadcasting the station signals to equipment which then could pick up the original signal. The FCC agreed to let TelePrompTer and Hughes conduct the experiment.

The more recent TelePrompTer petition requested a two-year authorization to use the experimental device, which would sidestep much of the problem of stringing cable underground. The rebroadcast would be only of the New York television and FM signals approved for carriage on the system, and would go to the receiving sites, where they would be sent by wire to the system's subscribers. Under the proposal, subscribers would pay nothing extra; therefore, according to TelePrompTer, "permission to use the point-to-point circuits provided through utilization of the experimental microwave in the conduct of the Manhattan CATV project will produce no direct or indirect monetary effect upon the public except perhaps to eliminate the dangers, inconveniences, congestion of other services and disruption which is always occasioned by installation of underground cable-ducts in densely populated urban areas."

"In many favorable respects," the filing noted, "the grant of this request would be analogous to the current Hartford pay-TV experiment now being conducted pursuant to the Commission's experimental authorization in a full commercial environment in Hartford, Connecticut. And in this regard ... unlike the Hartford experiment, the removal of the commercial limitation in this case produces no change or other modification in existing, authorized program services for the area in question."

In the filing, TelePrompTer also advised the Commission that "further experimentation shall soon be made seeking authority to operate in other environs which present different physical problems to practical utilization of the proposed service as well as different propogation characteristics. More specifically, it is anticipated that in addition to the presently requested location which represents an area of high density of population with many man-made obstacles, extended experimentation opportunities will shortly be requested in: (a) a mountainous rural region of the northern United States having severe climatic conditions; and (b) a densely populated region having many natural barriers and terrain irregularities and subjected to climatic conditions of heavy fog and thermal inversions."

Theta Communications of California, a firm owned jointly by TelePrompTer and Hughes Aircraft, recently paid more than $845,000 for three franchises in the Los Angeles, California area. Reports indicate that Theta-Com, which is headed by Dr. Norman C. Peterson, is currently seeking a franchise in Seattle, Washington. Peterson reportedly has told the Seattle city council that, pending successful testing and FCC approval, Theta Communications would utilize its 18,000 MHz system in that area.

Jim Evans of Continental Cablevision happily displays the field strength meter he won during the Blonder-Tongue Laboratories "eyeball calibration sweepstakes," held during the NCTA Convention in Miami.

FCC Acts on Petitions

The Federal Communications Commission reached into its file of waiver requests and came up with a few favorable decisions for the CATV industry. Three of the decisions resulted in the Commission granting waivers of its nonduplication requirements.

The FCC denied the request of Springfield (Massachusetts) Television Broadcasting Corp.'s WRLP-TV in Greenfield, Mass., which asked that the Commission issue a cease and desist order to Mohawk Valley TV, a firm which operates systems in Athol and Orange, Mass. The Commission also granted Mohawk Valley's petition for a waiver of the nonduplication rules.

The Commission denied a petition for reconsideration which was filed by Desert Empire Television Corp., a firm which has applied for a new UHF television station in Palm Springs, California. Desert Empire wanted the FCC to reconsider its earlier order granting a system in Desert-Hot Springs permission to bring in Los Angeles TV signals via microwave.

Two systems won Commission approval for temporary relief of the nonduplication requirements: Cablesview of Selah (Washington) and Southern Television System Corp., which operates systems in Cisco and Eastland, Texas. However, Back Mountain Telecable Inc., which owns and operates systems in several Pennsylvania municipalities, lost a round of its battle to carry distant signals. The FCC refused to enlarge the issues in the case, as requested by Back Mountain, saying that the boarder issues have been dealt with by the Commission in other cases and are not relevant to the Back Mountain case. Back Mountain earlier had asked the Commission to include six issues in the case, all of broad scope and all variations on the theme that the FCC has no "statutory authority to assume and exercise jurisdiction over the conduct of (Back Mountain's) business."

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Jackson Firms Merge; Court Suits Left in Mid-Air

Jackson (Mich.) TV Cable Co. and Cascades Cable Television Co. merged interests last month, and brought to a climax the long struggle for CATV priority in that city. Cascades Cable—a Grand Rapids-based firm which planned to operate a leaseback from Michigan Bell Telephone without a franchise from the city of Jackson—has for the past few months been engrossed in two suits filed by the city.

The first suit evolved around an attempt by the city to enjoin Cascades from going into business in Jackson without a franchise. The circuit court, ruling on the question, decided that Cascades could operate in the city without a franchise, because it was using cable owned by Michigan Bell, which has a state franchise. The action is currently under appeal to the Michigan State Court of Appeals.

The city also took the issue to the Michigan Public Service Commission, asking the PSC to interpret a section in Bell's state franchise which city attorney's claimed meant that Michigan Bell could not let Cascades Cable use telephone company poles and cables without first compelling with all local ordinances. The Michigan PSC, at the request of Cascades Cable deleted the sentence from the Michigan Bell state franchise, saying it was ambiguous.

W.Va., Mid-Atlantic Operators Meet

Over one hundred members and guests of the West Virginia and Mid-Atlantic Community TV Associations gathered at the Greenbrier Hotel in West Sulphur Springs, West Virginia, for the group's fall meeting. Guest speaker for the meet was AT&T assistant vice president William M. Ellinghaus, who spoke on "The Bell System and CATV."

Ellinghaus told the operators that, "Frankly—we in the Bell System are both perplexed and concerned by the fact that we continue to share equal billing with the F.C.C. as being one of the major threats to the CATV industry in what it considers to be a struggle for its very existence." His appearance before the Association, the Bell official noted, was for the purpose of assuring operators that "the Bell System holds no threat to the future healthy existence of a privately owned CATV industry."

Each of the Bell Companies, he said, "is a regulated utility offering to the public communication services. Not just telephone service, but also data, telemetry, video, audio, and others. The Bell System's job is the transporting of intelligence. It does not originate or change it—it simply delivers it."

In closing, Ellinghaus noted that "While the Bell System has offered CATV operators a free choice of constructing their own facilities or taking common carrier service, some members of the NCTA believe an operator should be prevented from using common carrier service." He added that "We have never understood the reasoning of these people in the NCTA and perhaps never will . . . it seems unnecessary to expend such great energies over whether a CATV operator should be forced by the NCTA to build his own distribution system or whether he should be allowed to . . . chose between common carrier service and building his own system."

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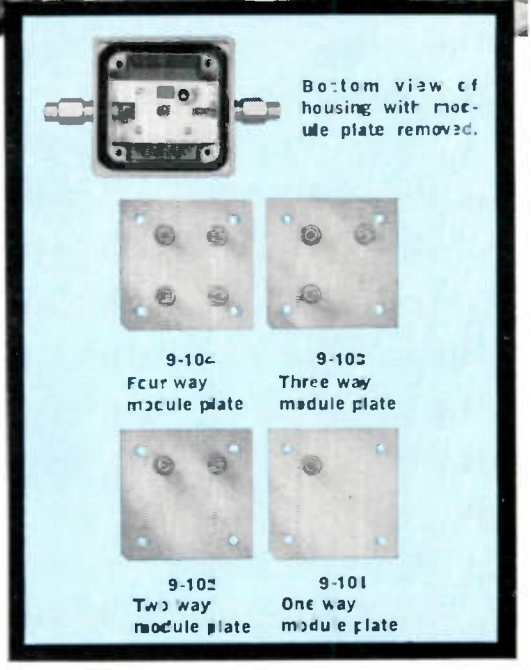

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Regionals Turn Out 800

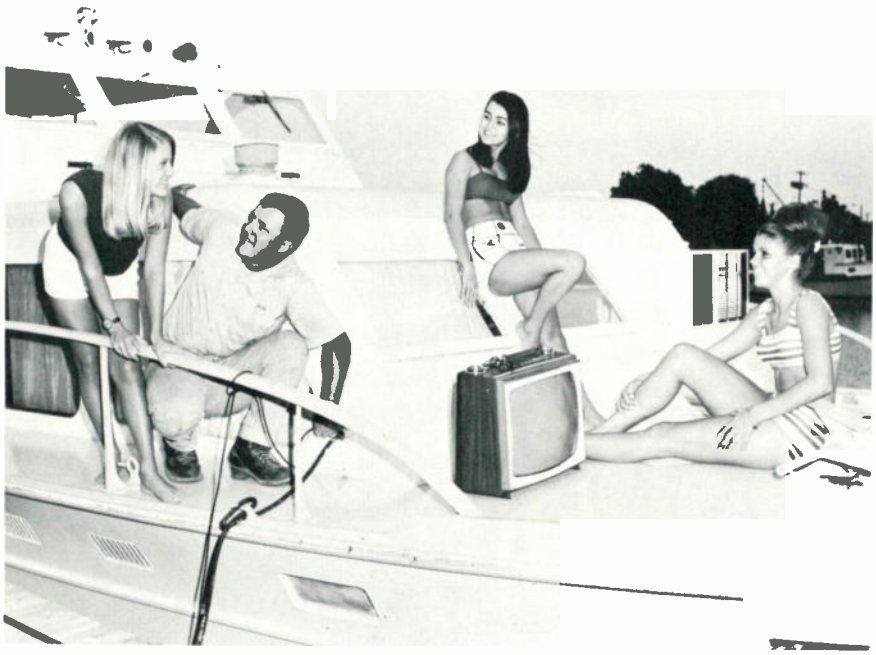
The National Community Television Association wound up its Fall series of regional meetings early last month, and traveling staff members returned to regular duties, weary of the circuit, but encouraged by the exceptional turnout and participation of industry members. The meets brought forth nearly 800 operators and guests.

NCTA began the meetings in New York City, where CATV Task Force Chief Sol Schildhause made his first appearance before the industry. Schildhause also spoke at regionals held in Las Vegas, Nevada and Atlanta, Georgia. At each of the meetings Schildhause expounded cordially on his favorable views of the industry, asked the industry's tolerance of Commission delays on industry decisions, and promised expediency to the greatest extent possible. Edward J. Brown and Stanley S. Kaufman, Task Force aides, also attended several meetings, reiterating Schildhause's optimism.

Panel discussions on local origination highlighted most of the sessions, and NCTA's Assistant General Counsel Bruce Lovett did battle with officials at AT&T on current CATV-telco problems facing the industry. (See separate story in this issue.) Of note is the fact that, at NCTA's invitation, AT&T supplied a high-ranking official for every meeting; most independent telephone companies did not respond. As a result of these open and often frankly spirited discussions, AT&T executives were informed of CATV-telco problems from the "ground up;" operators were given the opportunity to voice their objections and viewpoints; and industry members were enlightened as to basic AT&T policies.

Other guests included FCC Commissioner Lee Loevinger, John Dille of the National Association of Broadcasters, and J. Leonard Reinsch of Cox Broadcasting Corp. NCTA staff members rounded out the programs with discussions of sundry Association functions and services.

The meetings as a whole served as a demonstration of NCTA's progression in its attempts to serve both the local and national needs of the industry. President Frederick W. Ford, in an open letter to NCTA members via the NCTA Membership Bulletin, noted that the NCTA staff and board were "encouraged . . . by the large turnout and the active interest participation." Ford said that the meetings benefited the NCTA staffers, who gained "deeper understanding of problems and your feelings," and hopefully also benefited those who attended the meetings because, "I believe that we were able to give you a better picture of where the industry stands today and what your Association is doing to assure the future prosperity and growth of the industry." He also noted that the Association will add several improvements to next year's sessions.



"So who's complaining?" asks Benny Masters, cable TV technician for Florida Antennavision, Inc., at Panama City, Fla. Three stunning straw bosses slowed him down a bit as he cable-connected this set aboard the 54-foot yacht Margaret, out of Pittsburgh. The CATV system connected a Coast Guard cutter two years ago, and serves a Pullman car on a siding in which a retired railroad executive makes his home.

Altadena Ruling Handed Down

The California Public Utilities Commission has announced its long-awaited decision on the complaint of International Cable TV Co. against Pacific Telephone and Telegraph Co. and All-Metal Fabricators, Inc., but the outcome was definitely not to the satisfaction of California CATV operators. The Commission, by a three to two vote, ruled that it could not rule on the merits of the complaint.

The 32-page decision noted that CATV by leaseback is of an entirely different nature from CATV by independent ownership. It held that "the furnishing of lease channel facilities is of a public utility nature; pole attachment agreements are not," and that, "in the absence of a public offering, the rental or licensing by Pacific of vacant space on its poles by CATV operators does not constitute a CATV service." Therefore, "since they are unlike, there can be no discrimination between the two." On these grounds the Commission dismissed International Cable's complaint.

International Cable had alleged a conspiracy between the telephone company and All-Metal to overbuild a lease-back and put it into operation before allowing International access to poles pursuant to its pole attachment agreement. The action alleged that the acts and deeds of the two firms eliminated and destroyed any competition for the supply of CATV services in the area. A Cartwright Anti-Trust suit on the same question is now pending in the California courts.

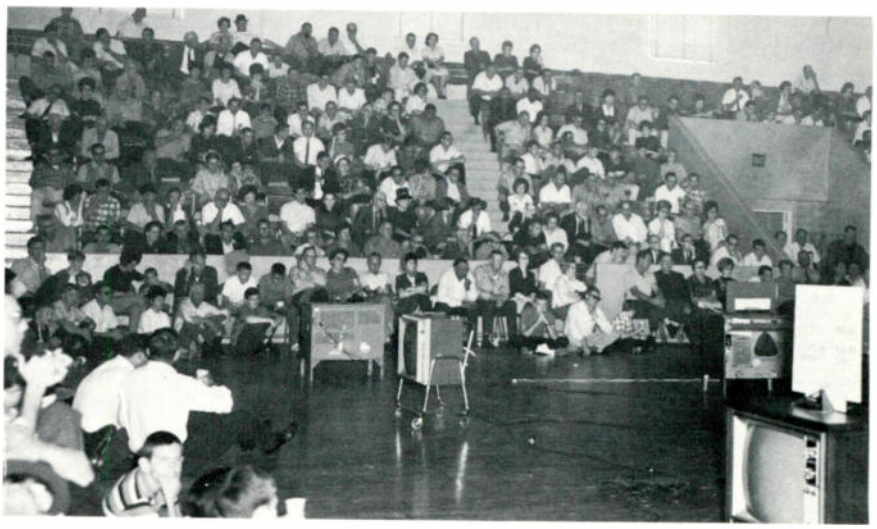
Westinghouse Asks For Waiver Consolidations

Westinghouse Broadcasting Company, Inc., owner of systems in Florida and Georgia, has petitioned the Federal Communications Commission to adopt a policy of consolidation for CATV applications in a single community. The procedural change as requested by Westinghouse would provide for a thirty-day cut-off date for consolidation of the applications, and would "fairly and adequately protect the rights of those interested in pursuing CATV operations." Such a procedure would, according to the group owner, "at the same time provide an efficient method of avoiding the necessity for repetitive orders of designation on proposals subsequently filed for the same market."

The request stated that CATV proposals in the same market are essentially the same, with the same questions raised. "These questions and issues," it submitted, "can be most effectively considered and answered through proceedings which would consider a particular market as a whole rather than in a number of separate proceedings, each of which would concern itself necessarily with identical issues and all of which, realistically, would have to be ultimately considered together if the true impact of a particular CATV proposal is to be assessed effectively." A procedure of the type suggested, the request said, would fairly and adequately protect the rights of those interested in pursuing CATV operations and would, at the same time, provide an efficient method of avoiding the necessity for repetitive orders of designation on proposals subsequently filed for the same market." The petition noted that since the top 100 market rule has been adopted, the Commission has received 120 CATV proposals in communities within some 52 of the top 100 markets.

PA. Operators Discuss Origination

The Pennsylvania Community Antenna Television Association's annual fall meeting, held at the Pittsburg Hilton Hotel in Pittsburg, Pennsylvania, turned out over one hundred operators and guests. The meeting featured a legal report by Washington attorneys E. Stratford Smith, Lew Cohen and Jack Cole, and a report on state legal matters by George Barco. Officers elected by the group include: James R. Palmer, president; Joseph Gans, vice presi-



Ardmore, Oklahoma, subscribers tuned up their television sets and invited visitors across the state to watch the sell-out Oklahoma-Texas football game via CATV. The city itself sponsored a complimentary showing of the game in the Civic Auditorium: Junior Chamber of Commerce members donated their efforts; local television dealers furnished sets; and Vumore Co. hooked up the cable. A crowd of some 1,500 viewers (pictured above) converged on the city to take advantage of the offer, and Vumore manager Bob Lewis reports that local business enterprises enjoyed a healthy profit from the venture.

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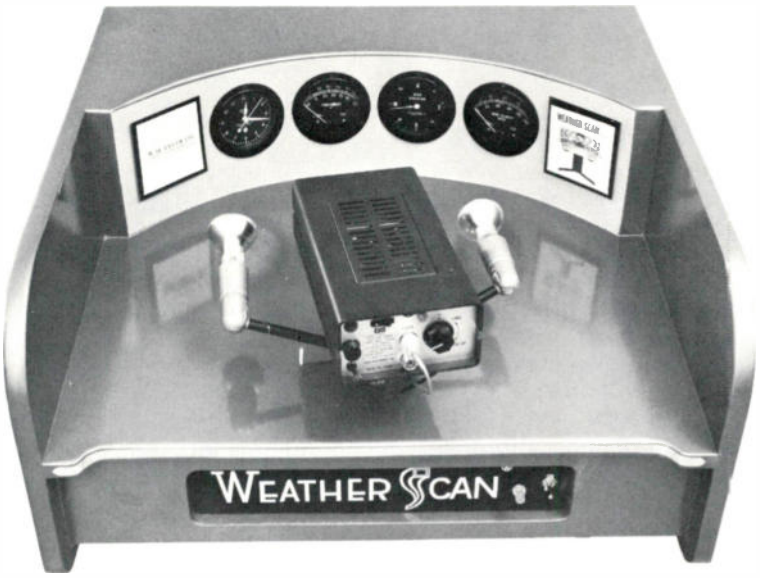

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dent; George Gardner, secretary; and Arthur Reagan, treasurer. The association directors for 1966 are: Frank Nowaczek, John Arnts, Walter Kinask, Yolanda Barco, Jay L. Sedwick, Paul Slickinger, Jim Durham, William Dimerling, John Rigas and John Walson.

Speaker at the annual banquet was Stan Kaufman, Deputy Chief of the CATV Task Force. Reemphasizing the Task Force's concern for fairness, Kaufman stated that the FCC is "trying to achieve a fair accommodation for CATV."

Chief topic of discussion at the meet was local origination. Lyle O. Keys of TeleMation spoke on "The Practical Problems Relating to Public Service Program Origination."

Dal-Worth Protests Objections

Dal-Worth Microwave, Inc. continues to wage battle to secure FCC permission to provide relay service to several Texas systems. The firm's applications with the Commission, protested vigorously by several of the state's broadcasting interests, have been re-enforced with a recent objection to the broadcasters' petitions.

Dal-Worth's lengthy objection asks the FCC to investigate "the propriety of its broadcast licensees engaging in . . . concerted efforts for the express purpose of preserving their own collective economic position *vis-a-vis* the business activities of others who might also seek to engage in another form of mass-media communications."

The document pointed specifically to petitions filed on behalf of twelve television stations; the Association of Maximum Service Telecasters (AMST); the National Association of Broadcasters (NAB); and the Texas Television Broadcaster Association.

The petition concluded by pointing out that Dal-Worth's quarrel is only with the broadcaster who believes that the "grant of a television license also confers some devine right." Dal-Worth also expressed an inability "to understand (or) appreciate the mentality which asserts that because one is granted the exclusive privilege to operate, in his own commercial pursuits, on six megacycles of spectrum . . . the government is obliged to issue for his own special benefit a unique edict restraining the legitimate business activities of others not so fortunate as to hold television licenses."

Maine Cities Petition Legislature

The Bartell Media-New England Telephone Co. agreement to provide CATV facilities for several Maine communities has brought forth so much consternation from municipal officials that the Maine Municipal Association has decided to present two CATV measures to the forthcoming state legislature. According to Thomas L. LaPointe, Rockland city manager, who was designated to draft the measures, the proposals will, in essence, state that "under present state statutes, Maine communities are permitted to regulate and contract on such terms and conditions as are in the best interests of the municipality for the placing and maintenance of appurtenances along public ways."

"To date," said LaPointe, "the responsibility for controlling of this service which is for the public convenience, rests solely with the municipality in Maine. To enable municipalities to effectively carry out their responsibilities, the law should be clarified to give municipal offices definite jurisdiction over community antenna television systems utilizing the utility lines of telephone companies. In addition, municipalities should be permitted to include in the contract provisions guaranteeing the community a portion of the revenues received through the CATV franchise."

N.Y. City has "Telephone Cable TV"

A "pilot run" cable television system in New York City is offering residents of some eighteen square blocks of Manhattan a "new" service—"telephone cable TV." According to promotional letters and subscription forms, the system's rates are "far less than (those of) any independent underground cable system," and installation is "as simple as adding another phone in your apartment." The system in essence is the result of a "special arrangement" between Com-Tel, Inc. (a subsidiary of Bell Television Inc., a New York City MATV firm) and the New York Telephone Company.

According to Martin Sugar, Com-Tel president, the firm is utilizing conduits of Empire City Subway Co., Ltd., a wholly-owned AT&T subsidiary which handles the AT&T understreet communications in New York City.

Commission '68 Budget Requests

The Federal Communications Commission's 1968 budget request asks for $23.1 million, with $537,000 earmarked for the newly-established CATV Task Force. The sum, the Commission noted, provided for a staff of fifty. The Commission told the Budget Bureau that it expects 278 petitions on the top 100 market ruling during the forthcoming year, some 193 of which will be waiver requests.

CATV Utility Ruling Reversed

An opinion classifying CATV as a public utility has been reversed by the Attorney General of the State of Texas. The opinion, issued last June, stated that ". . . it is apparent that corporations providing TV cable service are public utilities in contemplation of law and subject to regulation . . ." The more recent ruling, issued by Attorney General Wagoner Carr, states that "Upon consideration and a review of the authorities, we have concluded that we were in error in stating that corporations providing TV cable service are public utilities in contemplation of law."

Entron Opens New Warehouse

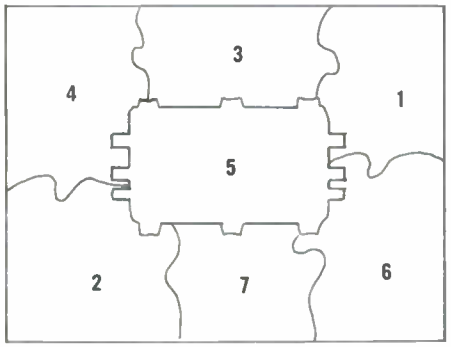
Entron, Inc. has announced the opening of a warehouse, sales and distribution center in Huntsville, Alabama. According to Edward P. Whitney, Entron president, the warehouse will enable overnight service to a majority of customers in the South. Paul W. McInnish, district sales manager for Entron, will be in charge of the center. It is the first of several regional centers planned by the company.

Superior To Acquire New Division

J. L. Robb, president of Superior Cable Corporation, Hickory, N. C., has announced that an agreement in principle has been reached for Superior Cable to acquire the assets of S & G Manufacturing Corporation in a cash transaction. The S & G Corporation, located in New Orleans, Louisiana, produces cable pressurization equipment, flow metering devices, as well as mobile power and cable splicing units for the communications industry.

Where does Kaiser-Cox fit into your CATV plans?

Everywhere!



KAISER-COX CATV

1 **Surveys & Estimates** — Feasibility studies, reception surveys, strand maps, pole make-ready studies, system layouts and complete estimates so you will know from the beginning whether your proposed system is practical not only from a technical but also from an economic standpoint.

2 **Turnkey System Construction** — Kaiser-Cox will assume full responsibility for the installation of your complete CATV system, right down to the last bolt. The industry's most knowledgeable personnel will relieve you of every detail, including the red-tape and paperwork required by Federal, state and local laws. When it's completed (on time and within budget) we hand you the key and you're in business!

3 **Financing** — Kaiser-Cox will work with you on your system financing requirements. Our experienced personnel will help you to procure the best financing possible, custom-tailored for your particular needs.

4 **Engineering Assistance** — If you're already in the business, or do not need the complete Turnkey service, we can offer a competent staff of construction supervisors and systems engineers to assist you on a per-job basis. Quotes will be supplied on request.

5 **Space-Age Product Technology** — The Kaiser-Cox Phoenician series of CATV amplifiers is the most advanced, most efficient, most copied equipment in the industry today.

6 **Research & Development** — A continuing program of product design, testing and field study assures you of the finest most economical products available, end-to-end.

7 **Quality Control** — Kaiser-Cox not only conducts exhaustive QC tests on its amplifiers and the separate modules that go into our products — but we also check-out each individual component as it's delivered to us — **before** it is installed in the equipment! Our standards exceed military specifications because your profits are geared to reliability of service.

Check the facts! Kaiser-Cox has all the pieces for your total CATV needs . . . and they fit together perfectly to form a picture of progress and prosperity.

KAISER-COX CORPORATION / *P. O. Box 9728, Phoenix, Ariz. 85020, Phone (602) 944-4411*

When you install Kaiser-Cox equipment, you never wonder what's new in CATV — you know!

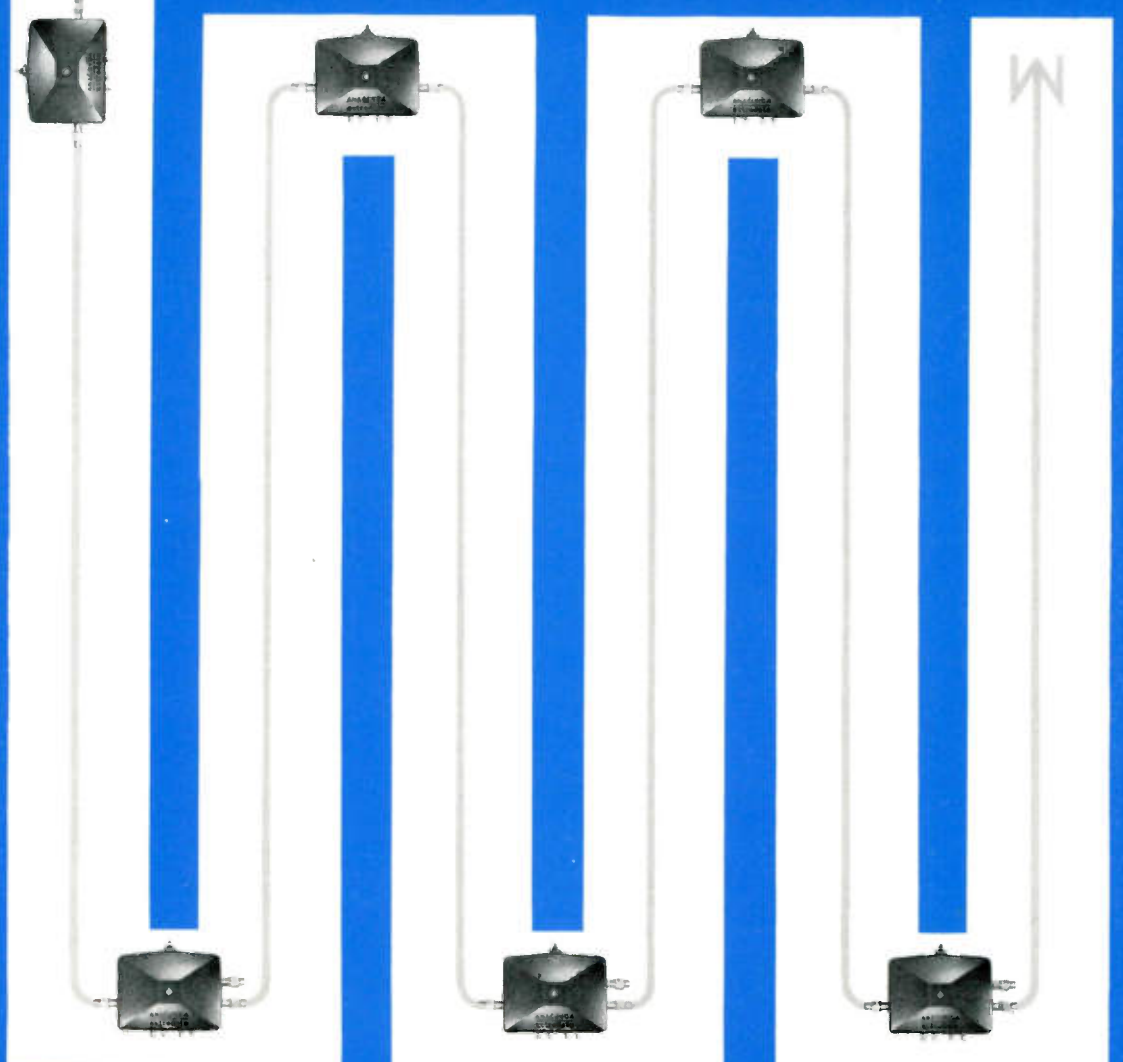
XDR
Trunkline
Bridger
Amplifier

XDR™ Bridgeability

Bridgeability is a new CATV distribution concept. The two subsystem companions that make Bridgeability possible are the XDR Trunkline Bridger Amplifier and the XDR Distribution Amplifier.

SIX XDR DISTRIBUTION AMPLIFIERS PER OUTPUT

XDR
Distribution
Amplifiers



XDR™ Bridgeability sets new performance standard for CATV distribution

Bridgeability – the number of subscribers that can be served from a single trunk bridging location.

Anaconda Astrodata introduces the concept of Bridgeability with the XDR (extended dynamic range) Amplifier line. The XDR Trunk Bridger, together with its subsystem companions, XDR Distribution Amplifiers, can serve up to 1104 subscribers from a single trunk location.

This new dimension of CATV performance is achieved only with the XDR Bridger Amplifier operating at a high output level feeding longer cascades of XDR Distribution Amplifiers – up to six Distribution Amplifiers may be cascaded from each of the four Bridger Amplifier outputs. A single Bridger Amplifier output will serve 36 subscribers and six Distribution Amplifiers, each with a capability of 40 subscribers. Hence, 276 subscribers for each of four outputs, or 1104 total for each XDR Bridger Amplifier.

Even when maximum distribution cascading is not required, the new dimension of Bridgeability provides a high-level distribution system with improved picture quality, and makes it technically feasible to install high quality systems in large communities, or financially feasible to install profitable systems in smaller communities.

For additional information on the Bridgeability concept offered by the advanced XDR equipment, contact your Anaconda Astrodata representative.

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FOCUS
...On Progress

Systems

Bill Britton has been appointed manager of See-More TV Co. of Canadian, Texas. **Bob Orrick** was formerly manager of the system.

Billy G. Cadle has been named manager of Beckley (W. Va.) Telecable. Cadle fills the vacancy recently created by the resignation of **Gary Dent**, who was named manager of a system in Lancaster, Pa.

Comer Lee Owens, Sr. has been appointed vice president and general manager of Rentavision of Elberton (Ga.) Inc.

T. M. Mayers has been appointed Angola (Ind.) CATV manager for GT&E Communications, Inc.

Don Bridgman has been appointed manager of the Vumore system operating in Hugo, Okla. **Dana Harris**, formerly with the Ardmore, Okla. system, has been named manager of the system in Bonham, Tex. **Steve Woods** has been named manager of the Vumore system in Page, Arizona. He formerly served as technician at the Safford, Ariz. system.

Don Montieth has been elected president of the newly-formed East Elgin (Ontario, Canada) Cable TV Ltd. **Fred Charlton** will serve as vice president of the firm.

Joseph Nickel has been named manager of Kane (Pa.) Cablevision Co. Nickel replaces the late **Joseph Morasco** as manager of the system.

William M. Collins has been elected president of Penn-Mar CATV, Inc. **Leland B. Hallet** has been named vice president of the firm, and **Richard J. Guerin** will serve as secretary-treasurer.

Howard W. Moffat has joined the community operations division of Jerrold Electronics Corp. Moffat serves as field representative on special assignmei for the division, which handles the overall planning and operations of systems in which Jerrold has an ownership interest.

Arthur O. Barnes has been appointed manager of Cox Cablevision's Harbor Television Corp.

Suppliers

R. Duane Hall has been named vice president of marketing at Ameco, Inc. He comes to Ameco from Koppers International, Inc., for whom he handled long range planning and business development programs in Europe, Latin America and in this country.

Robert E. Bricker has been promoted to vice president-operations at Henkels & McCoy, Inc. **Edward J. Tierney** has been named treasurer. **Robert Farmer** has been appointed manager of the E. H. Staples Construction Co. in East Stroudsburg, Pa. And **Stanley A. Woodman** has been named Pacific Coast vice president, with offices at Camas Valley, Oregon; Boise, Idaho; and Baldwin Park, California. The firm has also announced the recent acquisition of **Kinnan Engineering Co.**, Camus Valley, Oregon, as a wholly-owned subsidiary.

Duncan M. Freel has been appointed director of Viking Industries, Inc. Prior to joining Viking, Freel was senior engineer for Western Electric Co. **Michael J. Rodriguez** has been named director of engineering for the firm. Rodriguez was previously manager of the radio engineering department for Westrex Communications.

Kenneth D. Lawson has been appointed CATV sales manager for TeleMation, Inc. Lawson will aid TeleMation customers in planning and initiating local program origination.

E. Mark Wolf has joined Anaconda Wire and Cable Co. as chief engineer of the communications division. Wolf was formerly chief adminisrative and special products manager for Rome Cable Co.

Benco Television Corp. has established a national sales office in Jacksonville, Florida.

Ronald C. Mandell has been appointed chief engineer, CATV systems for Anaconda Astrodata Co. Formerly senior systems engineer with the Anaheim company, Mandell spent five years with International Telemeter Corp. before joining Anaconda Astrodata.

N. C. Cox, Jr. has been appointed Mid-Atlantic district sales manager for Superior Cable Corp. **Elmer L. Huffman** has been named Mid-Atlantic sales representative, assigned to assist Cox in territorial sales.

Matthew J. Lysek has been named national sales manager for Craftsman Electronic Products Inc. **Bob Monroe** has been named far west regional manager for the firm. **Robert Griner** is now serving as eastern regional manager; **Richard Spencer** as midwestern regional manager and **Mrs. Annette Andrusyszyn** as credit manager.

Johnny Mankin, Jr. has joined Fort Worth Tower Co., Inc., and will be active in the firm's sales, promotion and advertising departments. Mankin was formerly with Stan Socia Corp.

W. Brock Johnson has been appointed director of purchasing for Superior Cable Corp. Johnson has been with Superior since 1957. **R. E. Wohlberg** has been named midwestern district sales manager for Superior. **Edward W. Lindquest** will assist Wohlberg in the firm's Kansas City, Missouri, district sales office. **Clarence E. Schnegelsberger** has been appointed northeastern district sales representative for the firm. **Ron J. Westwood** has been appointed Superior west coast district sales manager. **Donald F.**


Duane Hall


Robert Bricker


Edward Tierney


Duncan Freel


Michael Rodriguez


Robert Regan

Larkin will assist Westwood with territorial sales and customer service.

George S. Howard has been appointed production manager of the new Brand-Rex division, American Enka Corp. communications wire and cable plant in Siloam Springs, Arkansas.

Gary T. Case of Homer, Michigan, died October 13 in an automobile accident in Albion Township, Michigan. Case was an employee of Harris McBurney Co. of Jackson, Michigan, CATV contractor for Michigan Bell Telephone and Wolverine Cable Television Co.

Professional

Robert M. Regan, president of the Minnesota TV Signal Distributing Co. of Mankato, Minnesota, has been named chairman of NCTA's 1967 convention committee. Regan is a former NCTA board member. John Campbell, associate member representative on the Association's board of directors, has also been named to the committee.

Sam C. Haddock, TV Cable Co., Moscow, Idaho, has been named to the NCTA Board of Directors, replacing Mrs. Pat Hughes, who resigned. Claude Stevanus, Tower Antennas, Inc., Coshocton, Ohio, has been named to replace Bob Clark, who also resigned.

Harry Levin has been elected president of the New York State CATV Association for the coming year. Dawn Fribley will serve as vice president; Les Reid as treasurer; and Larry Flinn, as secretary. Newly elected directors are Richard Sabino and Sterling Highley.

Marcus Bartlett, George Barco, Richard Moore, Sam Haddock and Fred Stevenson have been named to serve on the NCTA Code Committee.

Ben Conroy, Bill Adler, Yolanda Barco, Marcus Bartlett and Doug Jarvis have been named to serve on the NCTA Nominating Committee.

Robert Lewis, general manager of the Ardmore, Oklahoma Vumore Co. system, has been elected president of the Mid-America CATV Association for the coming year. Other officers include: Raymond W. Baker, vice president; Peter Ruiz, 2nd vice president; and Kenneth Schuelein, secretary-treasurer. Fred McElroy, Ralph Weir, Jr., Hurshel Tyler, and Weldon Johnson were elected to serve on the board of directors.

James Graves has left the CATV brokerage firm of Williams & Associates and has joined the investment banking department of Hayden Stone & Co., Inc., New York City. Graves will continue his activities in CATV brokerage and finance with Hayden Stone.

Two-Way Radio for CATV

By John Monroe
Vumore Company

Have you ever had your entire system go off; hear the phone start to ring off the wall; ask your office girl "where's Joe?" and be told that he is in such and such a section of town working on an amplifier but nobody knows just where and no one knows how to get in touch with him. Not an every day occurance, perhaps but it does happen and customers do get irate.

Knowing where your key personnel are when such a situation develops is more than half the battle. The easiest way to do this is with economical, efficient two-way radio equipment. Not only could you locate Joe hours quicker, you would know where he was to start with. In fact, it could have been Joe who turned the system off to change a defective amplifier. With two-way radio he can tell you where he is, what he is doing and how long it will take.

Of course, two-way radio has been used for many years by power companies and many, many industries. They equip their trucks with radios capable of reaching back to their base stations wherever they may be. They keep in constant touch for just such a contingency as Joe's boss encountered. Their radios do many other things for them but the main function is to keep in touch.

The requirements of two-way radio for CATV systems is fairly modest. We don't have to reach into the next county to contact a man. Only the town or city in which we operate concerns us, and this allows us to buy and operate equipment with considerably less power and range. We need equipment that will reach into every street and alley in our town but, in most cases, this is only two or three miles from our offices. This allows the CATV company to utilize frequencies that wouldn't work for long range requirements.

We have found that the 450 mc (UHF) band does nicely for our use. It isn't as congested as the

lower bands. So we have more privacy to conduct our business.

Most CATV operators are searching for more efficient ways of conducting their business. Skilled technical personnel are scarce so it behooves management to utilize methods and devices in such a way as to get full benefit from these skills. And two-way radio certainly fits into this pattern. Knowing just where your people are and getting messages to them quickly is of the utmost importance. Here are just a couple of the many ways that radio can be used to better utilize your technical people:

Have your technician or hook-up man keep in constant touch with the office. He should give out the familar "10-7," along with the address whenever he leaves his vehicle. If he is urgently needed he can, in the majority of cases, be reached by phone at the subscriber's home. Or, by mounting an all-weather speaker on the truck he can be summoned even if he is up a pole or working on an amplifier. A small switch can disable the outside speaker when it is not needed.

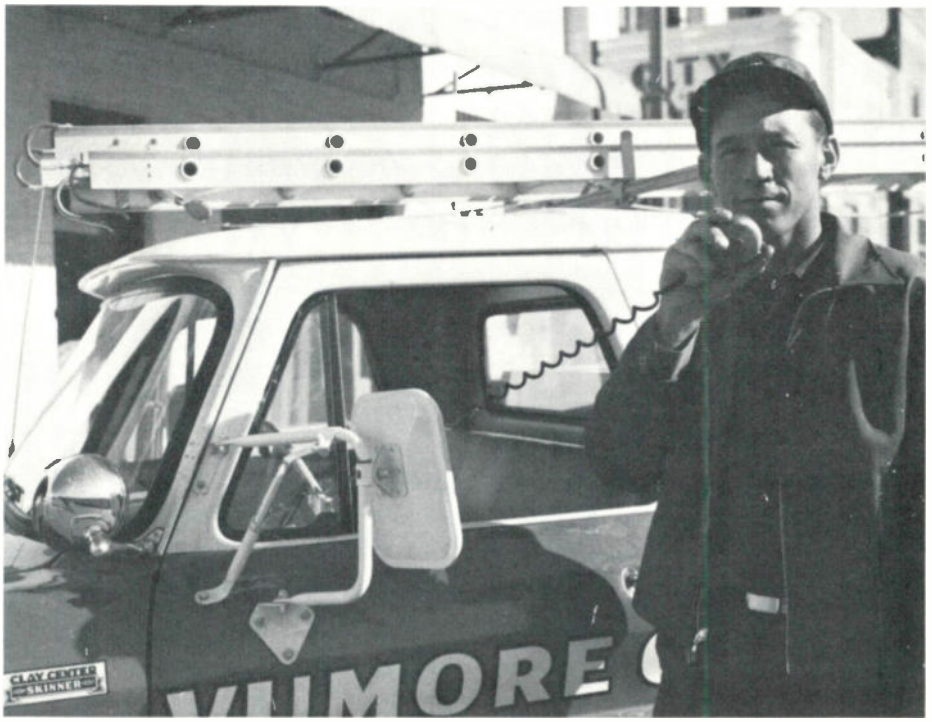
The technician will notify the office when he again enters the truck. This allows the office to pass on to him any new trouble calls or connections that have come in since his last transmission. Often he will be in the very vicinity where he will be needed. This saves many man hours and considerable vehicle mileage.

Construction crews find radio invaluable. It enables them to coordinate their people during the various phases of building a system. It makes the foreman's work easier as he can keep tab on several crews at the same time. Many questions come up during construction and with proper communications the foreman knows just where he is most needed. Often he can answer the questions while he is on the move. During outages or severe trouble your two-way equipment speeds up restoration of service by helping the crew locate the trouble spot. In this way the local office is kept informed and can relay this information on to the sometimes irate patron.

Many CATV operators place their two-way base station antenna on the tower below their television pickup antennas, with the base station equipment in the control house below. By leasing a pair of wires from the phone company the unit can be remotely controlled, thereby getting the benefit of the CATV tower height.

Whatever band you choose, you should consult your two-way radio representative. He can advise you on the best type of equipment for your particular operation. He can also help you with the license requirements.

Once you have this modern day aid you will discover many other benefits. We use radio to help us in the inventorying of our systems. When your technician finds a drop he isn't sure of he can consult the office and determine in a matter of minutes if the subscriber is legitimate or if he has found a "pirate." It doesn't take too many of these to convince the operator that the cost of modern communications is the best money he has ever spent. □



Ray Capper, manager of Vumore's Clay Center, Kansas, system uses time saving radio.

New drop orders or customer complaints are relayed by Vumore office staff.

Technicians are always within easy reach of cable system headquarters.

This is NCTA

dedicated to the growth and security of the COMMUNITY ANTENNA TELEVISION industry

Frederick W. Ford, President, National Community Television Association

Fred Ford is a man of quiet action. A former Chairman of the Federal Communications Commission, he knows the ins and outs of Federal politics. A lawyer by training, he has had over 25 years of legislative and judiciary experience.

Fred Ford is helping to keep NCTA healthy and progressive. He guides both the Association's present course of action and its planning for the future.

Fred Ford is an important reason why it's good business to join and support NCTA.

Grow with the NCTA — it's good business

LEGAL MEMOS: Another important service of the NCTA. This advisory letter informs members of the meaning and effect of legislation on CATV systems throughout the country. The NCTA Legal Letter is clearly written to help members understand, comprehend and evaluate the legislative procedures that are affecting their business.

For further information, write

NCTA

NATIONAL COMMUNITY TELEVISION ASSOCIATION, 535 TRANSPORTATION BUILDING, WASHINGTON, D. C. 20006.

Control head of GE UHF radio fits limited spaces.

Selecting Two-Way Radio For Your Cable System

By Peter S. Carr
St. Mary's (Pa.) TV Co.

Communications devices come in all shapes and sizes to serve every phase of industrial and private requirements. With such a large variety available it may seem difficult to make the proper choice to meet your needs. The best approach is to take a long look at your system. Is it twenty amplifiers or a hundred in size? It is in the mountains or can you shoot pool on the sidewalks? Do you have one or more nearby systems that you would like to link together by radio? To justify the outlay involved, your choice of equipment must fill your every communications need. In short, what is your total communications requirement?

Technically speaking, radio is divided into two primary types. Amplitude Modulation (AM) is the most common and, therefore, the least expensive but is sensitive to most types of interference. Frequency Modulation (FM) is somewhat more expensive but offers better interference rejection, especially in mobile use.

The radio's operating frequency is another consideration. Range, for a uniform power, varies inversely with frequency. Interference will also vary inversely but, in general, equipment cost is directly proportional. So these listed types of transmission and frequency conditions may be considered as the basic areas from which your choice is to be made.

Now let's look at some typical systems, their requirements, and what their best communications mode would be.

System A: 600 subscribers, one truck, in a small town on fairly flat terrain. Without great distances or high local interference to consider, cost may take priority. Here the owner might choose AM type Citizen's Band gear since it would cover his area at a conservative price. A hidden bonus is that local maintenance is probably available where more exotic gear might have a problem. For somewhat greater range, at conservative cost, new 27-30 Mc transceivers are available from several manufacturers.

System B: 4500 subscribers, five trucks, located in a large urban area in a mountainous region. Here you have both distance and terrain working against you. Also, with that many customers you may want to utilize an answering service for after hours calls. In many larger cities it is possible to lease two way radios in conjunction with an answering service as a package deal. You would also need plenty of output power to fill in the "shaded" parts of your desired coverage area, plus good interference rejection in mobile use. Your choice here might be FM for these reasons.

System C: 4000 subscribers, three trucks, in a heavily industrial city on low rolling hills. Since heavy industry is a big user of the commercial and business bands, it would be difficult to get a clear channel all to yourself in any service. There will also be plenty of RF. interference. 450 mc. equipment probably will serve best here, because of relative immunity to ignition noise and other types of electrical interference. Low band (30-50 mc) and the less expensive 27 mc. AM equipment, conversely, will be most subject to bothersome interference.

If you still are not sure which mode is the best for you, then look at what the other businesses in town are using. If most are using FM business band gear then it's a good bet that Citizen's Band won't fill your bill. Of course, in many communities CB serves small businesses satisfactorily.

If you are making an outright purchase as opposed to a lease contract check to be sure that the maker you purchase from has service facilities close by. A radio on the service bench for weeks at a time isn't paying you a return on your investment.

Remote control head (top photo) allows trunk-mounting of transceiver chassis in system manager's car.

The final test of a radio is how it works in day to day use. Consequently, some transceiver makers are more than willing to let you try out their gear. This is the best way to evaluate the results of your choice.

Two-way radio is a valuable tool in a highly mobile business like community antenna television. Its proper selection and utilization will enable you and your crews to coordinate your efforts and greatly increase overall efficiency. □

A Visit To Nogales, Arizona's Clear-Vision Television System

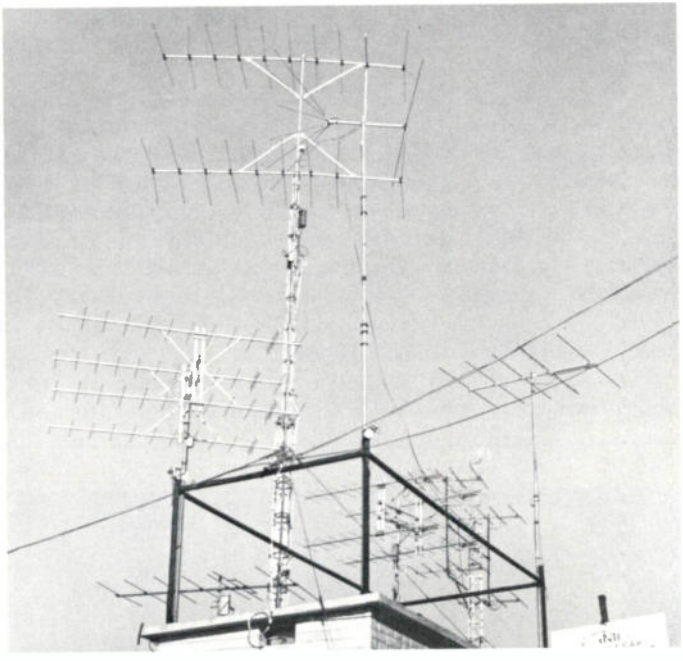
By S. S. Street
Director of Membership Services
National Community Television Association

Just across the border from Nogales, Arizona, lies Sonora, Mexico. A few blocks north of the border and United States Customs is the home of Clear-Vision Television, servicing more than 1,800 homes on this side.

After a quick tour in Mexico on Sunday morning, I called Mr. Jesse Allen, owner and manager of the Nogales system, and met him at the cable office.

I'd like you to meet Mr. Allen, cable system owner, MIT graduate, Arizona state legislator, scout and 4-H leader, and efficient businessman. A long-time Arizona resident, Mr. Allen built the Nogales system in 1953, started operations with hook-ups to one household and three TV shops! Today, Clear-Vision Television has a fleet of service trucks (which are painted annually), two office girls, two technicians, an attractive office, head-end building and 1,800 subscribers.

Nogales, Arizona is located on the Mexican border in Southern Arizona. Nogales Clear-Vision brings in six channels from Tucson and Phoenix. Nogales is an important trade center and tourist attraction of the Southwest. It is a bilingual community with strong cultural ties with the neighboring town of Nogales Sonora.



Head-end site of the Nogales cable system picks up five video channels for distribution to local viewers.

It took long, hard work to make the system a going concern, but Mr. Allen has personal work habits to contribute to any business. His advertising techniques, community public relations, engineering and business acumen can be utilized profitably by almost any cable system. I'll try to highlight some of the techniques which have made Clear-Vision of Nogales a success.

Know Your People

As a resident and hotel keeper in Nogales since 1946, Jesse was well-known before he built his system. But even though he had goodwill then, he has established business and human relation policies that have solidified his position in the community. The average Nogales family, from low to high middle class, earns $4,000-$7,500 a year, yet, a small percentage of subscribers earn over $50,000! Cable TV service costs $6.50 per month, except for the old-timers, who are frozen at $5.00. He offers two subscriber plans for getting cable TV service: one, the *Cable Purchase* costs $90.00 for hookup, $5.00 for monthly charge.

Cable Rental costs $10.00 for hook-up and $6.50 per month. Reasonable, but still a steep investment for the average income around here. Jesse understands his town and considering some 75% are bilingual (50% are Mexican and Indian) this takes a man of unusual talent and perception.

Community Public Relations

Jesse Allen does more public relations than advertising. His position in the community and his election to the Arizona State Legislature attest to his effective, subtle methods. A Republican in a county 7 to 1 Democrat, he was elected two years ago, and is well on his way to a second term.

Regardless of your politics, one can't help but be impressed with Jesse Allen's sincerity, and total involvement with the community. Instead of specific public relations for his cable system, he invests his time and money in his community—and it pays dividends.

For instance, he runs a $75.00 monthly advertisement in the local newspaper. He then donates the space to various charities and organizations to use as they see fit. He is genuinely concerned about his subscribers and he has earned their respect and confidence. In addition to public service donations, he also sponsors the local Little League and utilizes the cable system as a community public service institution.

Technical Considerations

Jesse Allen likes to plan ahead. His system is one of the most efficient CATV systems I have visited. The system is being converted from low band to a 12 channel system. All the maps are drawn in telephone company scale (1" = 100') and are color coded in reference to trunk and feeder. In addition, each subscriber drop is electrically and physically measured and then recorded on a master file. The service trucks also carry a copy of this catalog file and can tell the aging and exact electrical measurement of the individual drop. Inline taps are used throughout the system to minimize insertion loss. The spacious head-end building is cinderblock and is temperature controlled. An interesting note was that the main trunk goes directly into the cable office before being split. This was done to allow for any future switching, and local origination plans. As the conversion to solid state, all band continues, every piece of equipment is documented on the maps and performance standards are carefully watched. Only solid sheath, aluminum cable is being used and each reel is swept and visually checked before installation.

Jesse Allen, system owner-manager, is shown outside Clear-Vision's office in Nogales.

If you had to point to one outstanding management characteristic of Clear-Vision of Nogales, I'd guess you'd say it was Jesse Allen. He knows his business, he understands his town and he enjoys the responsibility and public service that a cable TV system offers its community. □

Editor's note: Sam Street, Director of Membership Services, NCTA, is currently traveling the country, attending regional association meetings. For the next few months, he will be visiting system owners and bringing the story of these systems to our readers.

Using Cable Attenuation To Improve Video Transmission

By Clay Marohnic
Head of Quality Assurance
Amphenol Cable Div. Amphenol Corp.

To determine whether a coaxial cable will function properly in a community antenna television system as a medium for video-carrying VHF signals—such as the cable's voltage standing wave ratio (VSWR) must be determined for the frequency band in which it will be used. Normally, CATV cables are manufactured in lengths of at least 1000 feet. Small diameter variations unavoidably occur along such lengths. These diameter variations cause impedance changes which collectively raise the cable VSWR.

When cables are tested first from one end, and then the other, VSWR results from both ends are not always identical, due to variations in a cable's physical profile. This suggests the dependence of structural return loss (SRL) results on attenuation to improve video transmission.

Determining VSWR, SRL

Cable VSWR is most often determined with a sweep generator, electronic switch, amplifiers, detector, oscilloscope, variable attenuator and a balanced bridge with a variable load. Figure 1 is a block diagram of the test setup.

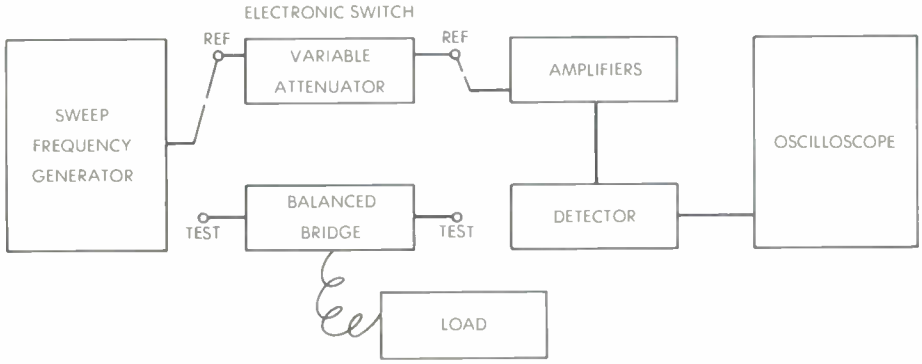


Figure 1. Test equipment for measuring VSWR.

With the cable under test connected to the bridge, a signal proportional to the cable reflection appears at the bridge output. This output is compared with that of a variable attenuator connected to the other arm of the electronic switch. By superimposing these signals, the cable VSWR can be read out in terms of structural return loss (SRL), expressed in decibels (db). This value of SRL may then be converted to reflection coefficient and VSWR.

Periodicity—Cause and Effect

The unusual length of CATV cables sometimes causes VSWR due to periodicity—a problem seldom apparent in shorter lengths.

Periodicity is the result of numerous small discontinuities—usually diameter variations—spaced at intervals one-half wave length apart along the cable. To a signal passing through the cable, these diameter variations appear as small changes of impedance. Each impedance variation is so minute that with the aid of a time domain reflectometer, it is difficult if not impossible to locate them. Moreover, the reflected voltage of each discontinuity in themselves, may be unmeasurable.

But because each discontinuity is one-half wavelength apart, the individual reflections arrive at the source IN PHASE. Because CATV cables are so long, the cumulative effect of these numerous discontinuities is a high VSWR.

Figure 2 is an oscilloscope pattern of a cable suffering from periodicity. In this test, the frequency range is 4-230 Mc, swept from right to left. The upper trace is a reference line representing an SRL or 26 db or a VSWR of 1.105:1. The middle reference line is 30 db,

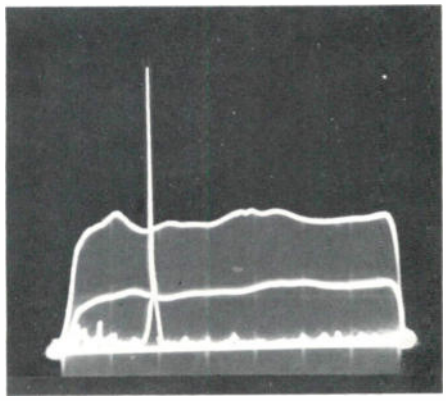


Figure 2. SRL test of outside end.

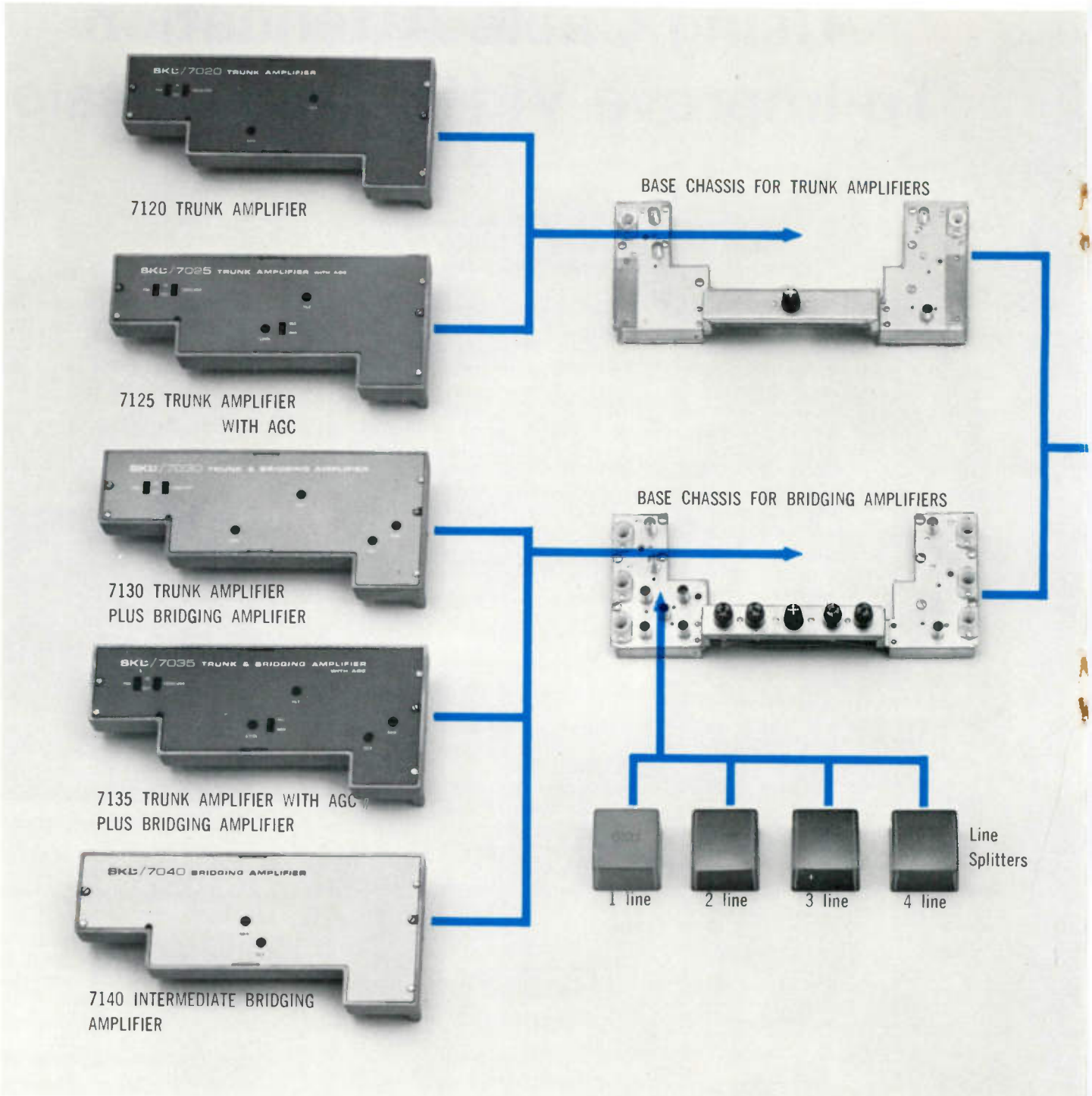
or a VSWR of 1.065:1. The uneven trace near the base line is that of the cable under test as seen by the bridge.

The large VSWR spike near the center of the photograph is due to periodicity. The frequency at which the spike appeared was 133 megacycles. The cable is basically flat, having an SRL of greater than 30 db, except at the frequency of periodicity. At this frequency, the cable had an SRL of 19.5 db or a VSWR of 1.24:1. One-half wavelength at this frequency is three feet.

Cable Length vs. SRL

The difference in test results when a 1000-foot length of cable is tested from both ends, prompted further investigation of SRL versus length. Tests were conducted on 1000-foot lengths of .412 inch, 0.500 inch, and 0.750 inch diameter cables.

Each cable was tested at its full length. Then, 100-foot sections

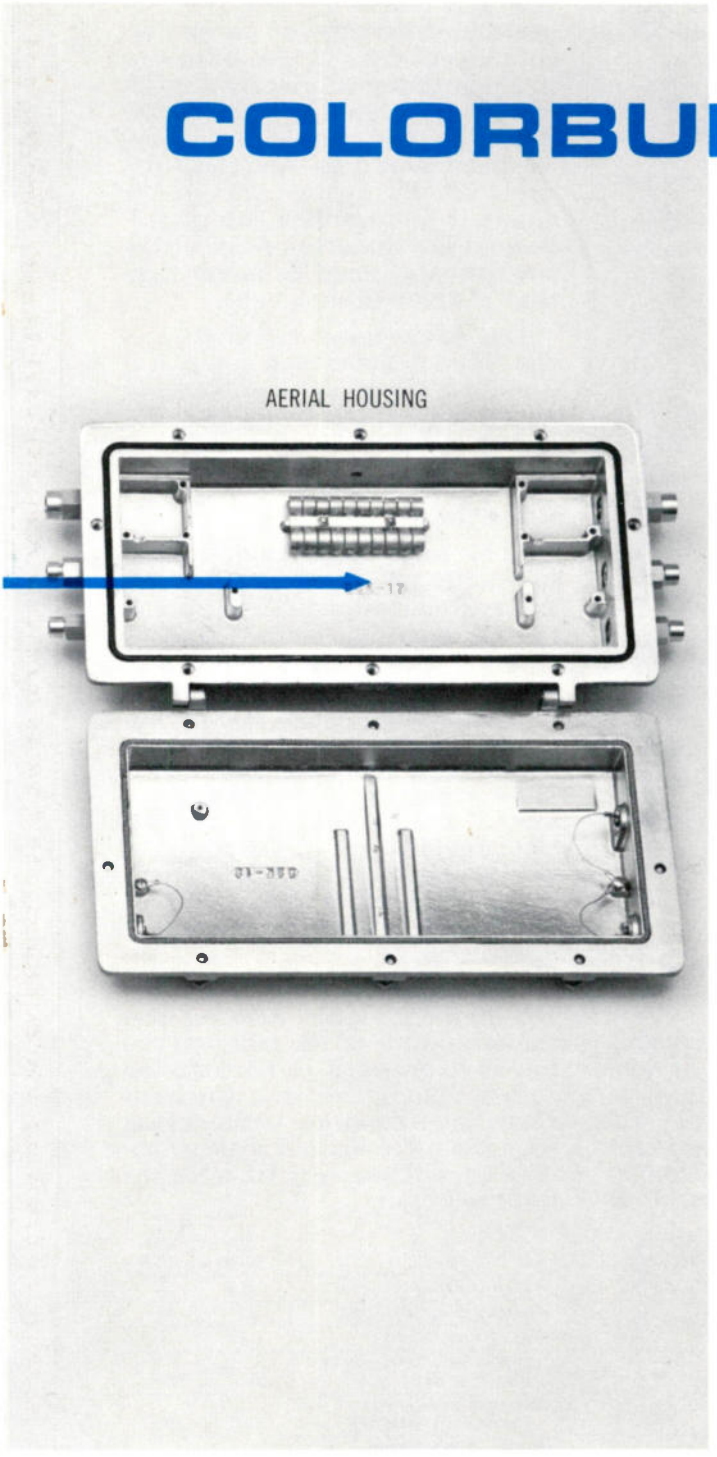


BRIEF SPECIFICATIONS

	TRUNK AMPLIFIERS	BRIDGING AMPLIFIERS	INTERMEDIATE BRIDGING AMPLIFIERS
Frequency Band	50-220MHz	50-220MHz	50-220MHz
Response Flatness	±.25 dB	±.5 dB	±.5 dB
Min. Full Gain —Ch. 13	26 dB(1)	18 dB(2)	33 dB(3)
Min. Return Loss, I&O	16 dB	16 dB	16 dB
Max. Noise Figure Ch. 2	8	—	26
(Full gain) Ch. 13	11	—	22
Min. Output Level	48 dBmv.(4)	48 dBmv.(4)	48 dBmv.(4)

(1) 25 dB for trunk/bridging units. **(2)** Above trunk amplifier output level. **(3)** Before splitting. Splitter loss is 0 to 6.5 dB. **(4)** Output at high channels for 12 carrier cross-modulation of -57 dB. Bridging amplifier output before splitting.

COLORBURST/7000



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were removed and the remaining cable again tested to determine its SRL.

Results of these tests are displayed in Figure 3. Starting with the 0.750 inch cable, the SRL at

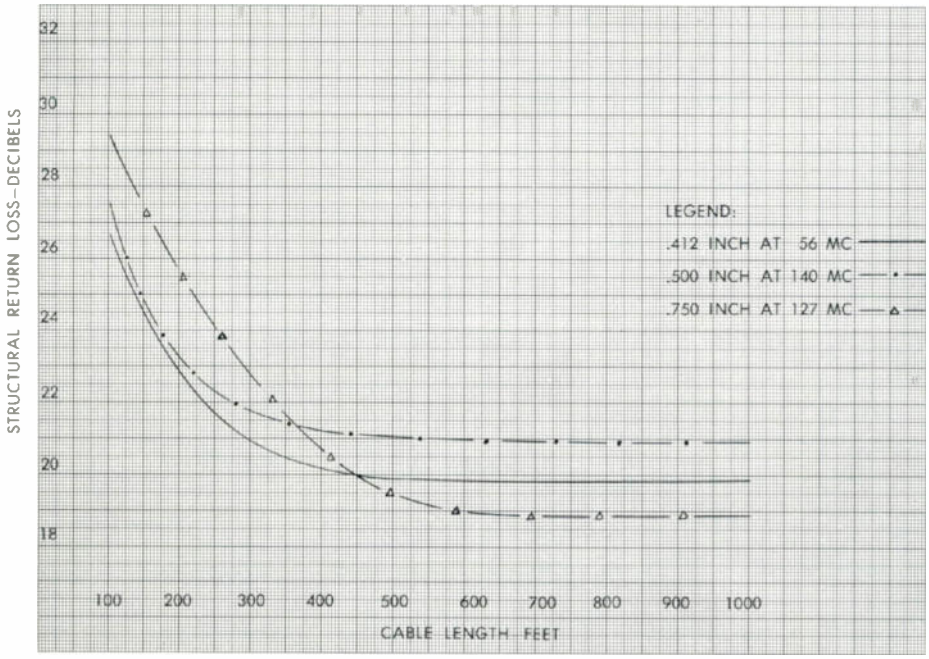

Figure 3. CATV cable; structural loss vs. length.

1000 feet was 18.5 decibels. It was necessary to cut off 400 feet of cable, leaving 600 feet for test before the SRL began to rise. Cutting off an additional 200 feet of cable, leaving a 400 foot length, the SRL had risen from 18.5 db to 20.3 db. When measured in a 100-foot section, the SRL was 29 db. This curve shows that discontinuities which are further than 600 feet from the end of the cable being measured do not contribute to the total SRL of the cable.

In the .412 inch and .500 inch cables it was necessary to remove approximately 600 feet of cable before the SRL began to rise. The higher attenuation of these cables as compared to that of the three-quarter inch cable limits even greater the length of cable that contributes to low SRL due to periodicity. In all cases, the total cable length did not contribute to the SRL. The length of cable which contributed to the low SRL was governed by three factors:

(1) Frequency at which the periodicity existed.

(2) Attenuation of the cable at that frequency.

(3) Magnitude of the discontinuities.

To better illustrate the results of the tests, a tabulation of data on all three cables is shown in Figure 4. The data on the .412 inch and .500 inch cables are very similar. The total length contributing to the SRL, attenuation in db/100 feet and total attenuation necessary to limit reflections are almost identical. They do differ at the frequency in which the periodicity exists. The different frequencies are due to the spacing of the discontinuities. In both cables, it is possible to see only slightly greater than one-third the total number of discontinuities in a 1000-foot length of cable. The important difference of these two columns of data is the difference in the number of discontinuities contributing to the periodicity. Since the .412 cable can see only 54 discontinuities and the total SRL of the cables are almost equal, it follows that the magnitude of the discontinuities of the smaller cable must be larger than that of the half inch cable.

	.412 INCH	.500 INCH	.750 INCH
SRL (Decibels)	19.5	20.5	18.5
Frequency of Periodicity (Mc)	56	140	127
Half Wavelength (Feet)	7	2.5	3.1
Length of Cable Contributint to Periodicity (Feet)	375	375	500
Number of Discontinuties Contributing to Periodicity	54	150	161
Number of Discontinuties Per 1000 Feet of Cable	143	400	322
Attenuation at Frequency of Periodicity (Decibles/100 Feet)	1.0	.92	.65
Attentuation Necessary to Limit Reflections (Decibels)	3.75	3.65	3.25

Figure 4.

Due to the lower attenuation of the three-quarter inch cable, it is possible to see discontinuities which are 500 feet away from the end of the cable being tested.

Attenuation Limits Reflections

Cable attenuation, being a limiting factor on the total reflection, was not unexpected. Theoreticcally, an incident wave traveling down a cable is attenuated. The first discontinuity sees almost all of the incident signal. As this signal propagates down the transmission line, the attenuation of the cable reduces the magnitude of the incident signal. The discontinuities located further down the line see less and less of the input signal. Therefore, the reflected voltage is less than that of the first discontinuity.

The attenuation which reduces the incident signal, also reduces the magnitude of the reflected signal as it propagates back to the source. Therefore, it is apparent that the attenuation is the reason why the more distant discontinuities contribute very little to the total reflection.

	.750 INCH	.750 INCH
SRL (Decibels)	18.5	—
Frequency of Periodicity (Mc)	127	56
Half Wavelength (Feet)	3.1	7
Length of Cable Contributing to Periodicity (Feet)	500	720
Number of Discontinuities Contributing to Periodicity	161	103
Number of Discontinuities Per 1000 Feet of Cable	322	143
Attenuation at Frequency of Periodicity (Decibels/100 Feet)	.65	.45
Attenuation Necessary to Limit Reflections (Decibels)	3.25	3.25

Figure 5.

The relationship of SRL to the frequency of periodicity and attenuation can be better understood by comparing two three-quarter inch cables which suffer from periodicity but at different frequencies.

The cable in the left hand column of Figure 5 is the same as

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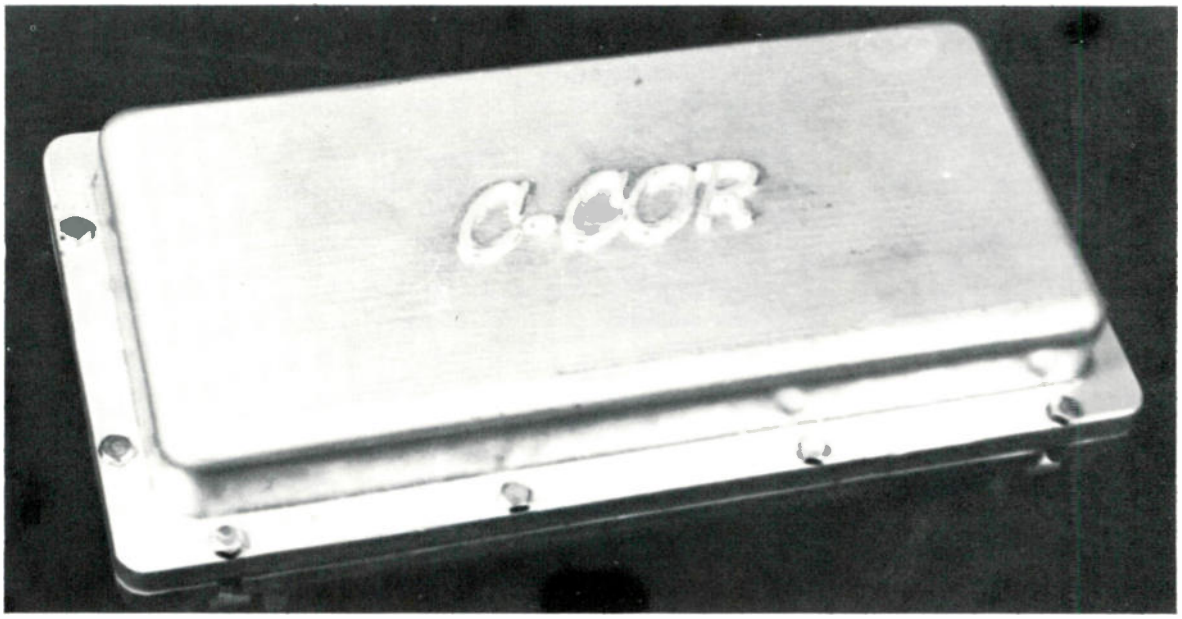

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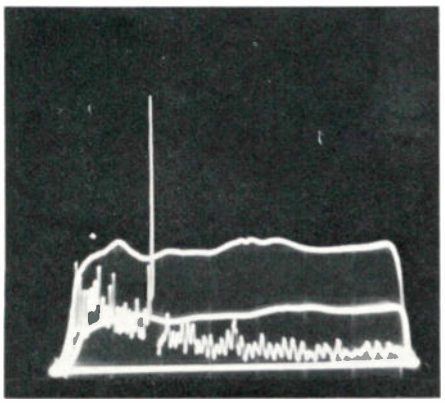

Figure 6. SRL test of outside end with intentional fault 100 feet from end.

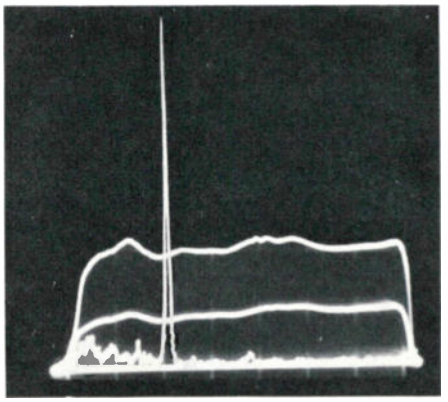

Figure 7. SRL test of outside end with intentional fault 930 feet from end.

seen in the previous figure. As a comparison, the frequency of the cable in the right hand column was assumed to be 56 megacycles. This is the same frequency as that of the .412 inch cable. At this frequency, the attenuation is .45 db/100 feet. Holding the limiting attenuation constant at 3.25 db, it is possible to see 720 feet into this cable. Even though a greater length contributes to the periodicity, the spacing of the discontinuities differs. The result is that a 56 megacycles, 103 discontinuities contribute to the total SRL while 161 can be seen at 127 megacycles. The calculated SRL at 56 megacycles was 23 db. In other words, the VSWR has been reduced from 1.27:1 at 127 megacycles to 1.15:1 at 56 megacycles even though the total length of the cable contributing to periodicity was greater. Because of the "attenuation effect" in relation to the cable size, it is evident that the three-quarter inch cable is more sensitive to reflections than that of the half inch or .412 inch cable, thereby making this a more critical product.

Effects of Intentional Fault

Length and attenuation have been shown to limit reflections resulting from periodicity. Reflections resulting from large single impedance changes—usually due to dents in the outer conductor—are also limited by cable length and attenuation.

Evidence of this effect was observed in a 1030-foot length of cable deliberately dented with a pair of pliers. This dent, about two inches long, was placed about 100 feet from the end of the cable.

Before noting the effect of this dent, look at Figure 2 again. Notice that the SRL of the cable is greater than 30 db. Figure 6 shows that the dent has caused a considerable change in the SRL pattern. At 220 megacycles, the SRL of this cable has been reduced from greater than 30 db to less than 26 db. The decrease in SRL at the upper frequencies is much greater than that at the lower frequencies. This is because the two-inch dent more nearly approaches a quarter wavelength at the higher frequencies. When a single discontinuity reaches one-quarter wavelength, the reflection is at a maximum.

Additional proof of the effect of attenuation on SRL can be shown by testing the far end of this cable. In this case (Figure 7), the dent is 930 feet away from the bridge. The previous test showed the SRL due to the dent to be less than 26 db. In this case, the attenuation of the 930 feet of cable has attenuated the reflection so that the cable is still better than 20 db.

Improving Picture Quality

These tests demonstrate the importance of sweep testing both ends and rating the cable based on the lower reading. However, they wish also to point out the possibility of using attenuation to improve picture transmission.

For example, assume that there are two 1000-foot lengths of cable to be placed between amplifiers. One cable has an SRL of greater than 30 db, whereas the other cable is somewhat less than 20 db. Previously discussed test data suggests that the cable of higher SRL be placed at the output of the first amplifier. The second cable is then placed between the end of the first cable and the input of the second amplifier, therefore, the attenuation of the better cable shields the VSWR of the second cable. In this way, the first amplifier sees only a cable which has an SRL of greater than 30 db. □

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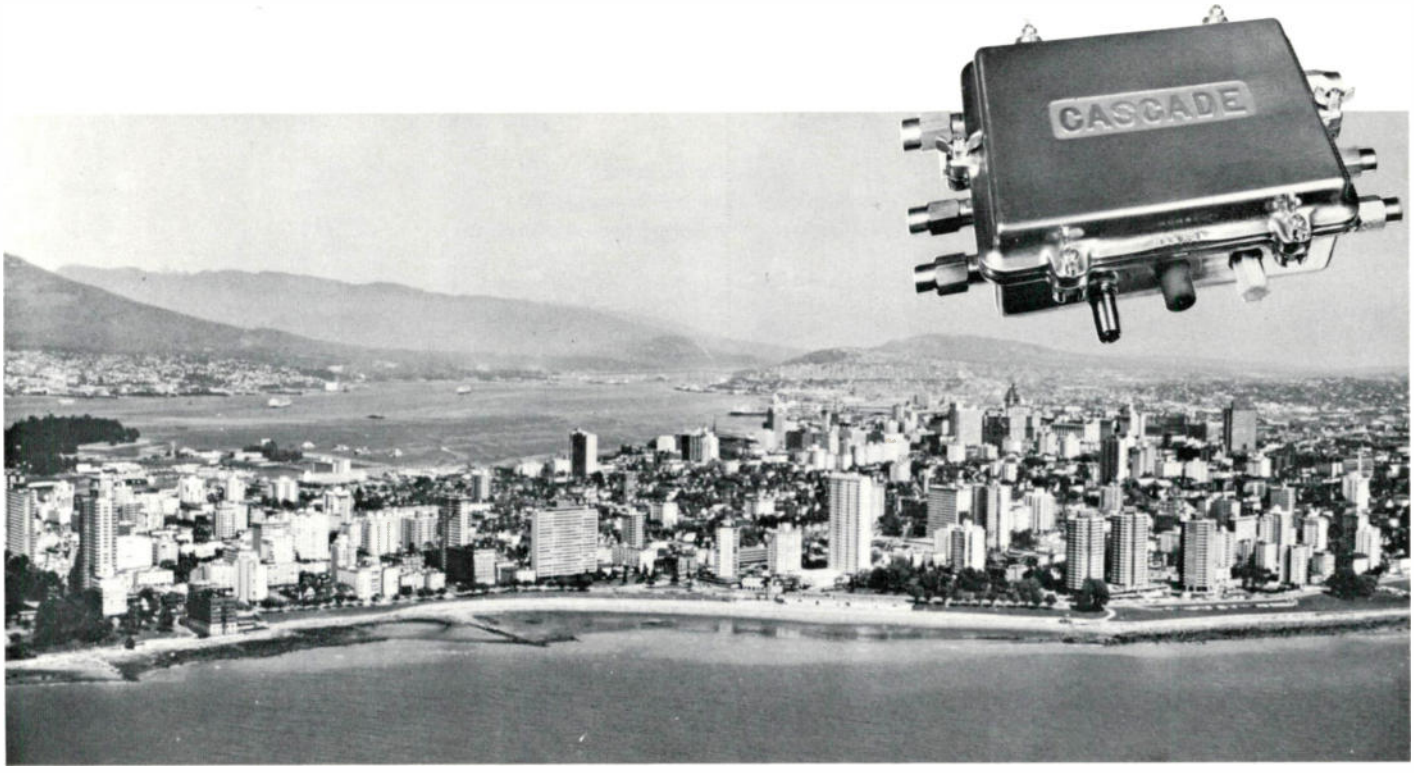

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The NCTA Position on CATV-Telco Relations

By Bruce E. Lovett
Assistant General Counsel
National Community Television Association

Telephone companies do not have a right to control CATV by offering it restrictively on a leased basis or through restrictive pole attachment agreements solely because they own or control the utility poles in the towns. Serious questions are now being raised before various forums in this nation regarding telephone company attempts to gain control over all uses of communications cable. Telephone companies are obviously concerned over future possibilities of offering all kinds of services over cable such as originations of many types, stocks quotations, data processing, facsimile reproduction, in-home shopping service and services yet to be conceived. Telephone companies through ownership of telephone poles do not have the right to control such services and prevent competition for the offering of such services.

Whether or not, and I repeat, *whether or not*, a CATV operator might at any time, presently or in the future, desire to engage in various types of originations or other communication services, the question now coming to issue is whether the telephone companies can prohibit such services. Most tariff and pole attachment agreements prohibit the CATV operator from doing things that even the FCC does not prohibit. We do not intend to be *regulated* by the telephone companies. Of course, the key to the problem is the utility poles.

Most communities, for esthetic and other reason, desire but a single set of utility poles, and many of them so stipulate in granting CATV permits or franchises. Telephone companies usually own the poles or effectively control their use through joint ownership agreements with power utilities. The right of utilities to erect such poles on public rights of way or to use condemnation proceedings to erect them on private property is a privilege granted by state and local governments—a privilege if you will, derived from the public on the basis that the general availability of telephone service is in the public interest. Utilities, generally also have monopolies in their service areas—another publicly granted privilege. These publicly granted privileges also impose a duty—a duty not to abuse those privileges. The power of utilities over poles is, then, in the form of a public trust. This is true because their value is not the intrinsic value of the poles as pieces of lumber. Instead, the value is in their location and *their location derives from privileges granted by the public.*

It is interesting that telephone and power utilities have apparently gotten along very well together on joint poles both in agreeing on use for attachment and on price for use. One might speculate on the reasons for these amiable relationships. I would like to note in passing that neither offers service which the other might offer directly or under tariffs.

I would like to comment briefly on CATV practices of telephone companies —practices with which you are all, to varying degrees, familiar. But first, I would like to begin by commending telephone companies for their good works.

The Bell System operating companies have entered into hundreds of pole attachment agreements with CATV operators throughout the United States. NCTA and the Bell System have cooperatively established liaison contacts for CATV problems in every state. General Telephone operating subsidiaries have also entered into many pole attachment agreements—as have other independent telephone companies. In many areas, CATV operators and telephone company personnel get along very well and work together to solve CATV problems. This is commendable and the public benefits from such cooperation.

I want to make the record clear on this point, but I want the record also to be clear that this is what the public has a right to expect from utility companies who occupy in many ways a preferred status in our free enterprise system.

Some of the most grevious CATV telephone practices are followed by independent telephone companies. Many of them use their monopoly over telephone poles—which are on public rights-of-ways by virtue of public grants—in an attempt to capture ownership of CATV cable through direct operation of the CATV system or by offering only a lease-back service.

Let's now examine some Bell System policies. One pole attachment agreement will be granted in any given area but if there are conflicting applications, the Bell System will not choose between them. I would like to note that NCTA approves of Bell System policy of granting at least one pole attachment in any area, but we have not agreed on the rest of their policy.

Their policy *sounds* reasonable and *is* so long as there is no tariff covering CATV leased facilities—but where such lease-backs are offered the lease is not sold on its merits—instead it is a means for market entry.

A situation occurred in one community in the East where two CATV operators with CATV permits from a community were so called "competing applicants" to the Bell Telephone Company. During the impasse based on Bell System policy of not choosing between applicants, an individual quietly signed a lease-back contract, got a permit from the town and had CATV cable over a substantial portion of the town while the pole attachment applicants were still trying to negotiate. This lease-back operator is convinced that economically and operationally a pole attachment CATV system is superior to the lease-back—but the lease was a means to break into the market and by having the lease-back fully constructed before anyone else got on the poles to effectively foreclose other entry into that market.

It is not that the Bell System will not choose between "competing" applicants that makes this policy suspect—it is the lease-back lurking in the wings, a means to close out the pole attachment

ABOUT THE AUTHOR

Bruce E. Lovett has served as Assistant General Counsel of the National Community Television Association since November, 1965. Prior to that, he served as an attorney for Western Electric Co., Inc., in the office of the General Solicitor, New York City. He had previously been engaged in private practice in Falls Church, Virginia, in the law offices of Judge William Finley; and was employed by the Federal Trade Commission, Bureau of Restraint of Trade for several years as a trial attorney.

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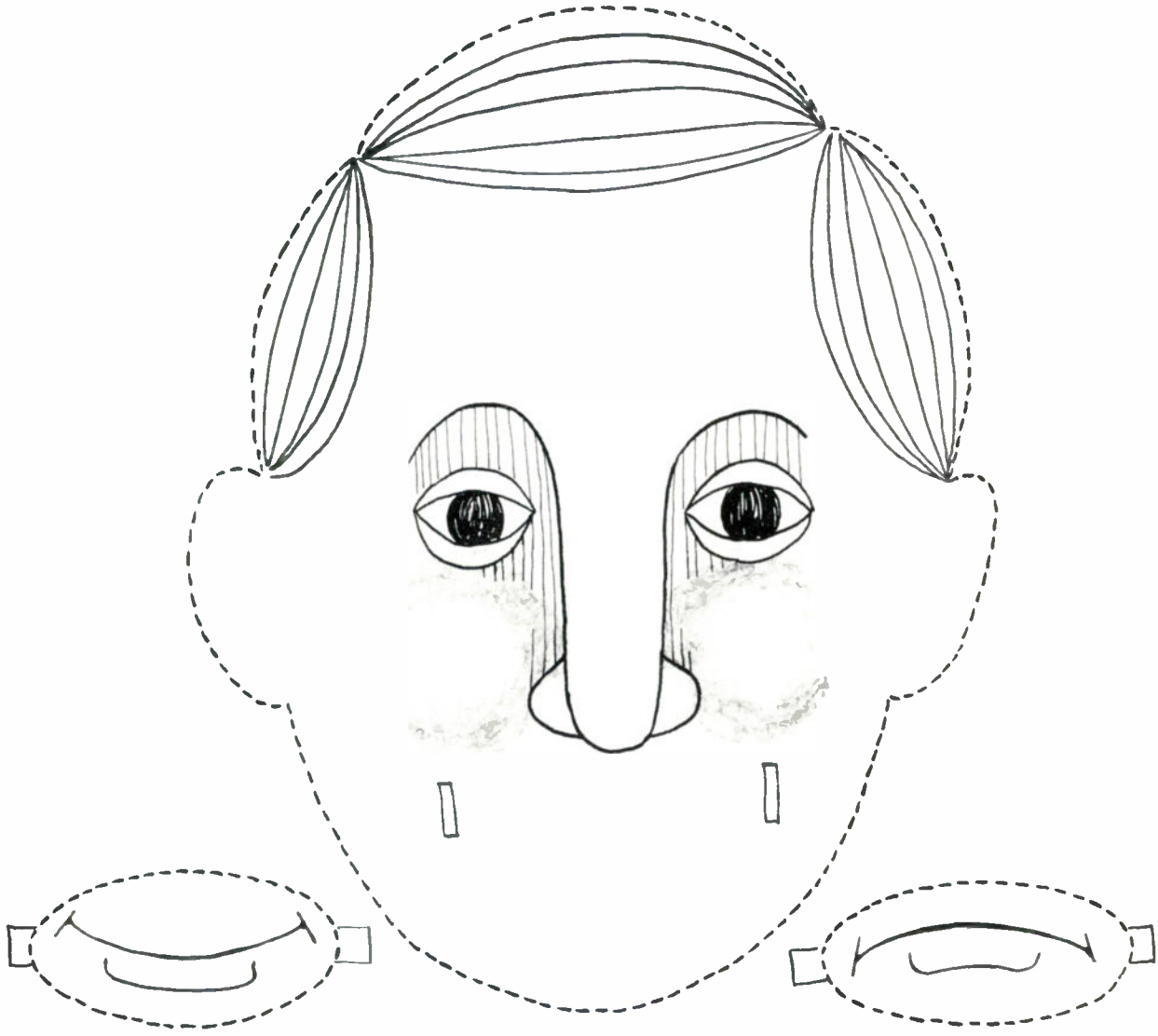

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applicant from that market. So—what appears at first to be a reasonable policy of not choosing between competing applicants, when implemented by a lease offering—is now subject to challenge as being a "device"—for control over market entry.

I would like to comment on a situation which has developed in California. One with which you are all probably quite familiar. The PUC in that state has ordered Pacific Telephone and Telegraph Company to cease and desist from further construction of a lease system in the Altadena area. The order was based on a complaint from a pole attachment applicant for the same area to the effect that the telephone company was using tactics which would insure that the lease-back operator would have his system constructed before the pole attachment operator could get pole clearances.

This case has not yet been resolved so I won't comment on the merits. But I will say that for any telephone company to use its position in order to favor a lease operation would be a dangerous practice. This sort of thing does not involve just the question of whether a telephone company will or will not grant pole attachment privileges. It involves telephone company use of its monopoly position to control who gets into the market and how they will operate.

I have read several reports that the New England Telephone and Telegraph Company has entered into a contract to provide CATV lease-back service to a CATV operator in Waterville, Winslow, Fairfield, Rockland, Camden and Rockport, Maine—this it is going to do even though the CATV operator has no permits or franchises from these communities. The article reports that there are seven CATV operator applications previously submitted in Waterville. The telephone company justifies this offering on grounds that it is offering a telephone company private line tariff service under state and municipal rights it has received in connection with offering regular telephone service. This same thing has already occurred in Maine, in Michigan, Georgia and Alabama. While on the basis of technical interpretation of local statutes, the Bell System may believe it can get away with this, NCTA believes that it constitutes an abuse of the publicly conferred utility privileges which the Bell System enjoys—and constitutes an abuse of monopoly power:

1. By employing restrictive tariffs the CATV lease operator subsidizes cable capacity which can be converted to Bell System use and;

2. By the same restrictions prospective competition for broadband coaxial cable uses may be controlled and eliminated.

A passing comment on pole rates. NCTA—does not of course, have any comment on the amount of pole attachment rates as such, but we believe that they must be reasonable— that they must be justified by economic data. The value is not in the poles as such but in their location and, as I have said, the location of poles derives from publicly granted monopoly privileges which should not be abused by extraction of unreasonable and exorbitant pole rates.

In conclusion, if lease-back CATV facilities were offered as simply a competitive choice as against pole attachment systems, I do not believe that CATV operators would have a quarrel with telephone companies. If it was simply a question of an operator choosing one method or the other based on the merits of each, I believe that our problems could be solved simply through continuing liaison with the telephone companies. However, I would like to re-emphasize the fact that many lease-back systems are being offered as a means for controlling market entry. So long as telephone companies use their monopoly position with respect to the location of telephone poles in communities to prefer lease-back service through denial of pole attachment with a simultaneous offering of lease service; or through claims that franchises are not necessary in certain states for a lease service; or by delaying pole attachments while a lease system is being constructed; or through extraction of unreasonably high pole rental rates in order to make lease service look more attractive—so long as these conditions exist, then the best relationship that can be hoped for between CATV operators and telephone companies generally is one of co-existence rather than real co-operation. I for one do not believe it should be necessary to litigate all of the problems such as I have alluded to. It would be far better if the telephone companies would recognize their obligations and would in so doing treat CATV operators and the CATV industry always on a fair and equitable basis.

1. The FCC on October 21, 1966, in Docket 16942 ordered a hearing on the lawfulness of CATV tariffs filed with the FCC by 18 Bell System companies covering 44 states. This is a beginning.

2. NCTA and State and Regional Associations by their filings before the FCC, and other actions, are not throwing down the gauntlet—the telephone companies by their actions have done this—we are picking up the challenge not because we want to but because we *must*.

We must discover at this point in time whether telephone companies are going to control the future of CATV technology and equipment and, through tariffs and pole attachment restrictions, the use of that technology and equipment.

Are they going to have a *carte blanche* to cross over the regulated utility boundry and by using their resources (including poles)derived from their preferred utility status—to limit and control the future of our industry?

We are firmly committed to preventing this from coming to pass. □

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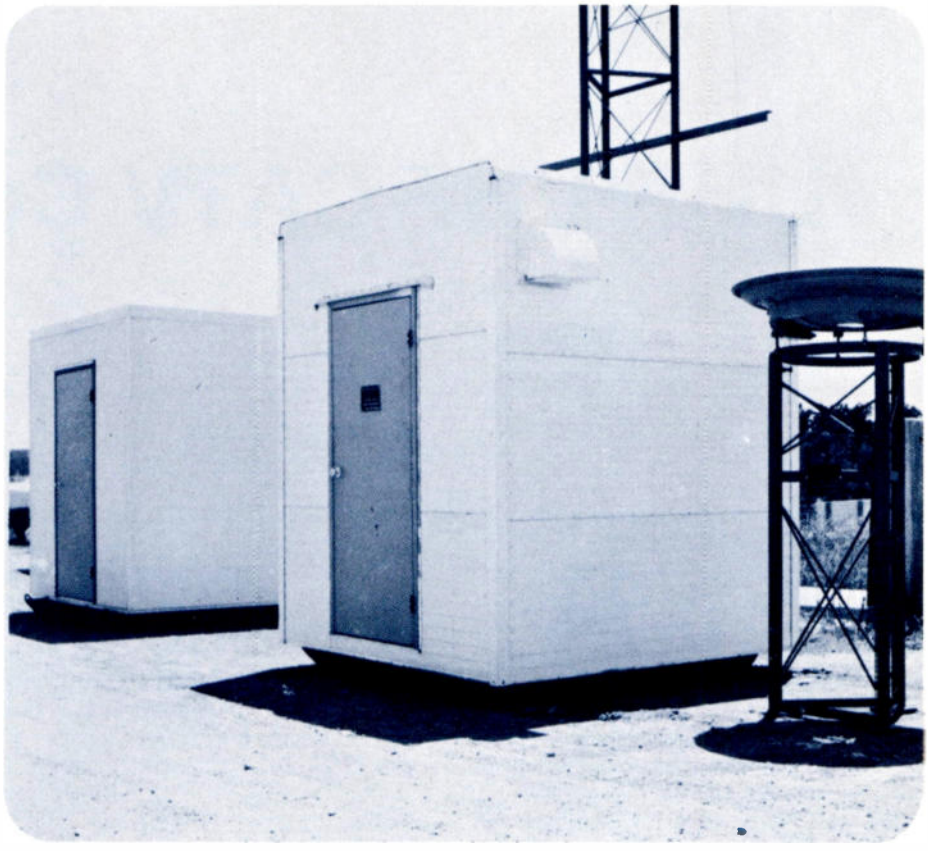

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UHF-VHF CATV Converters

By Edward Wuermser
Project Engineer, Entron Inc.

The general public is showing increased interest in Ultra High Frequency (UHF) TV programs and therefore this service must be added to CATV Systems. UHF as transmitted, is at too high a frequency to be compatable with present CATV systems because of the high cable losses (figure 1) and difficulty in constructing distribution system amplifiers for UHF frequencies. In addition, all present CATV systems would be obsolete, since by present system standards for amplifier spacing, the number of amplifiers required would be increased two and one-half times. Also, the viewing audience would be limited since a majority of existing TV sets do not have all channel capability i.e., channel 2 through channel 83. Therefore, conversion to the present VHF frequency band is required.

There are many UHF to VHF converters available for home TVs, but these are unacceptable for CATV head-end use because of high noise figures and frequency drift. Breaking a typical converter into functional blocks (figure 2), one finds at the input, a tunable filter which, in turn, feeds a diode mixer. The converting local oscillator or (LO) is tunable so that the unit will tune over the entire UHF spectrum. The output of the mixer is fed to a filter to reject the unwanted signals. In some cases VHF amplification is provided. There are variations using a transistor mixer or using one transistor as a mixer-oscillator.

Considering the noise figure of this type of converter, most of the diodes used for mixing have published noise figures of 14 db to 16 db with conversion losses in excess of 6 db. Using a 7 db noise figure for the amplifier following the converter gives an overall noise figure at the head-end of 16.1 db. See Table I.

ABOUT THE AUTHOR

Edward Wuermser has been associated with Entron as Electronic Design Engineer since 1964. Ed's experience with CATV equipment dates back to 1959 when he first joined Entron to participate in the modulator development program. Since 1964, Ed has been responsible for the design of UHF converters, amplifiers, and filters. In addition, he has worked on other specialized head-end equipment. Ed holds a BSEE degree from the University of Maryland, Class of 1960. In addition, he studied transistor circuits and the fundamentals of radar at Westinghouse, where he worked on IF and RF equipment for frequencies up to 500 MHz. He is a member of IEEE.

The signal to noise ratio at the antenna with 1 mV of signal available across 75 ohms and a noise bandwidth of 4 MHz is 59.2 db. This is the maximum signal to noise ratio possible since it contains only the noise generated by the antenna source impedance. Any active device, amplifier or converter, after the antenna adds noise; thereby, decreases the signal to noise ratio. Referring to the example with a 16.1 db noise figure, the S/N = 43 db; which is below the recommended 50 db for head-end equipment.

The previous example did not take into consideration the UHF cable loss from antenna to converter. Applying a typical case, we will use channel 36, 602 MHz, and a 300 ft. run of ½" cable having 8.4 db attenuation. The added cable loss causes an increase in noise figure to 24.5 db and a decrease in signal to noise ratio to 35.7 db. This is below the design goal of a 40 db signal to noise ratio at the end of the system.

Consider now the above mixer preceded by a UHF amplifier and mixer mounted at the antenna, thereby deleting the 8.4 db cable loss. This produces an overall noise figure of 8.1 db and a signal to noise ratio of 51.1 db, which is better than the 50 db minimum for optimum system design. This gives a positive indication of the benefits of UHF amplification before conversion.

Next, consider the frequency drift of the inexpensive converters. Most tunable oscillators have long term stability of no better than ±.1%. When a conversion from channel 83 to channel 2 is made, the LO frequency required is 830 MHz. Therefore, the variation could be ±830 KHz and this variation in LO frequency is transferred to the VHF signal. To receive the picture properly, the individual TV set local oscillator would have to be changed in frequency with the fine tuning control. Interference is caused by the converted adjacent channels now being displaced from their normal IF frequencies and the traps for the picture and sound of the adjacent channels are no longer at the right frequency thus allowing these signals to pass through the IF and cause a low frequency beat with the video signal.The variation in frequency is acceptable for an individual set for which the converter was designed since all VHF signals are blocked out by the converter when in use and therefore there would be no adjacent channel to cause interference.

By using a crystal controlled oscillator and multiplying the crystal frequency up to the required LO, one can achieve a stability of ±.005%. Using the same LO frequency as in the previous example, ±.005% of

830 MHz is ±41 KHz. This slight variation is not great enough to move the adjacent channel carrier out of the traps and cause interference.

Now that the inadequencies of TV set converters and some of the remedies have been described, let us investigate the requirements of a converter for CATV use and discuss each block in the diagram (figure 3). The portion within the dotted line will be discussed first.

The UHF amplifier can be designed using either tubes or transistors. Present day tubes, ceramic planar triodes, can produce 16 db to 20 db gain with noise figures of 7 db to 9 db across the UHF band. The main disadvantages are high power consumption, the need for 2 to 3 separate supply voltages and the limited life due to the decrease in cathode emission.

Transistors, on the other hand, have lower gain, 6 db to 10 db, but also lower noise figures, 3 db to 6 db. The benefits are that only one supply voltage is required and there is no deterioration in performance with aging of the device. The short comings are temperature sensitivity, very little isolation between the input and output, and emitter peaking is required to obtain usable gain.

The next block is the mixer. Just as non-linearities in amplifiers cause the generation of frequency components other than those injected at the input, so will any active device, when operated non-linearly, generate frequencies other than those supplied to it. If two frequencies are injected at the input, the output will contain the two original frequencies; the sum and difference frequencies; harmonics of the frequencies, and all combinations of the sum and difference of the harmonics. A CATV converter uses the difference frequency f_1-f_2, where f_1 is the UHF signal and f_2 is the LO.

Conversion of the signal frequency with the lowest possible noise figure is the primary function of the mixer with the least loss possible. The LO, in many cases, is close in frequency to the UHF signal, therefore, care must be taken to avoid absorption of signal power by the LO source since this will decrease the

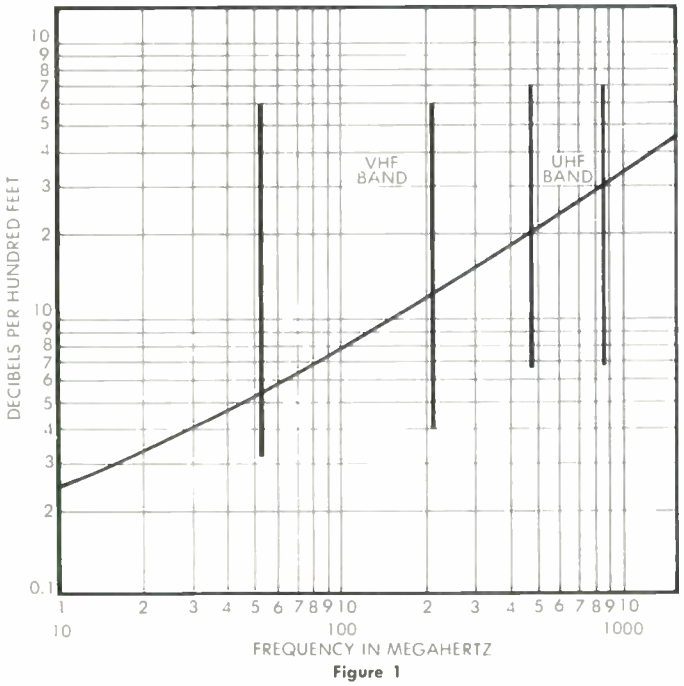

Figure 1

available input power. Consequently, loose coupling of the LO source to the mixer is necessary, causing a loss of LO power.

The LO power delivered to the mixer diode should be greater than the signal power so that the conversion loss is determined by the LO level and not

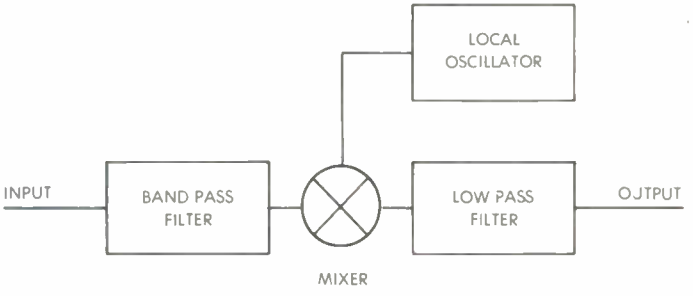

Figure 2

the signal level. There is a maximum limit for the LO power level delivered to the diode since as LO power is increased, the noise generated in the diode increases (figure 4). Therefore, a trade off between high LO power for minimum conversion loss and low LO power for minimum noise generated is necessary. One other

CONFIGURATION	MIXER	MIXER + UHF CABLE LOSS	10 db UHF AMP + MIXER
F (db)	16.1	24.5	8.1
$\frac{S}{N}$ (db)	43	35.7	51.1
SEE APPENDIX FOR CALCULATIONS	IV	V	VI

Table 1
Noise Figure Improvement Due to UHF Preamplifier

factor to consider is the change in conversion loss versus a change in LO power. As shown in figure 4, the conversion loss decreases with increasing LO power until it reaches saturation and then levels off. Operating above the knee of the curve has the advantage in that small variation in LO power level will not appreciably affect the conversion loss.

Next, we will consider the local oscillator block. As was described earlier, an oscillator operating at the LO frequency has one serious drawback. It does not have the stability required for a CATV converter, therefore a crystal oscillator-multiplier must be used. Owing to the high level required for Class C multiplication and the poor isolation of transistors, the final output of the multiplier string will contain spurious outputs which are multiples of the crystal frequency. Extensive filtering and use of overtone oscillators will decrease the level and the number of these spurious. One point to emphasize is the fact that the LO level at some points in the oscillator-multiplier may be 1 volt while at the mixer the signal level is only 1 mV. This is a 60 db difference and adding to this the requirement that spurious responses in the band be down at least 50 db from signal gives a required 110 db rejection between various points in the circuit. This virtually predicates the need for the crystal frequency to be chosen such that no multiples of the crystal frequency will fall in the output band. Since

crystal activity and consequently oscillator output power decreases with increasing order of overtone, overtone crystals greater than the 7th overtone are not generally used. The choice of crystal frequency is therefore a compromise between the closeness of spurious frequencies and the activity of overtone crystals.

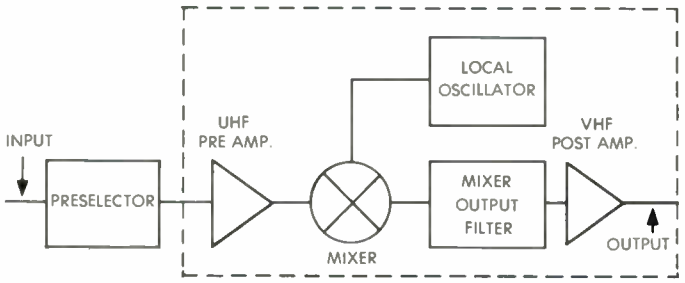

Figure 3

The benefits of locating the UHF preamplifier and mixer at the antenna have already been shown. Next for consideration is the location of the oscillator-multiplier. Locating it in the head-end has benefits in that the design is less rigorous and less expensive parts may be used since the temperature variations in the building are not as severe as at the antenna. In addition, should maintenance be required, it would be much easier. There are several undesirable features, these being, the need for two cables interconnecting the LO and mixer, or for the single cable operation,the need of diplexers to separate signal and LO at each end of the cable. For low VHF band conversion this is no great problem since the LO frequency is well removed from the signal frequency, i.e., for channel 14 to channel 6 conversion, the LO is 388 MHz while the signal is at 88 MHz. Isolation of these two frequencies would not be too difficult. But when one considers a conversion of channel 14 to channel 13 with the need for a 260 MHz LO and signal frequency of 216 MHz, it is quite evident that the diplexer will necessarily be complex or impossible to realize.

Another factor is the cable loss from head end to antenna. To maintain the proper LO power level at the mixer, the LO power at the head-end would have to be increased to compensate for this loss. Increasing the power at the head-end compounds the problem of radiating the multiples of the crystal frequency into other head-end equipment and causing interference on other channels.

An alternative is to generate one-half or one-third of the LO frequency at the head-end and complete the multiplication at the mixer to decrease cable loss. This is beset with the problem of amplifying the sub LO frequency at the antenna to compensate for cable loss before multiplying. Rather than have a separate multiplier one could use the mixer diode for the necessary multiplication. With this method the conversion loss increases and correspondingly the noise figure. Also the spurious and image problems are increased since the signal has several high level frequencies to mix with.

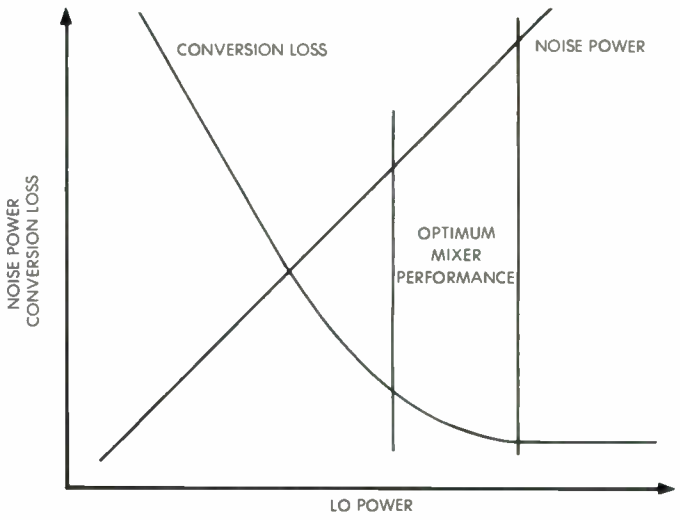

Figure 4

An alternative is to locate the oscillator-multiplier with the UHF preamplifier and mixer. The benefits are the need of only one cable between the head-end and converter, no radiation problems and no complex diplexer. Since the oscillator-multiplier will be exposed to greater variations in temperature, more care in design and choice of components will be required. Frequency stability will still be ±.005% since the crystal determines the frequency.

The next block in figure 4 is the mixer output filter, which must reject the UHF signal, the LO frequency and all spurious-signals in the VHF output band while passing the required VHF signal with minimum loss. In addition, its input impedance must be matched to the mixer at the VHF frequency and its output impedance matched to the line or input impedance of the post amplifier. The filter input should also exhibit a low impedance to the UHF

signal and LO if a series mixer is used and a high impedance if a shunt mixer is used. Generally, the frequencies generated in the mixer are sufficiently removed from the desired signal and simple filtering will prove adequate, except when the second harmonic of the LO minus the signal falls in the desired band, 2f LO-f UHF = f VHF. This is impossible to prevent and therefore, these conversions must be avoided, see Table 2.

	UN-DESIRED 1	IM-POSSIBLE 2	UN-DESIRED 1	
FROM CH.	22	23, 24	25	TO CH. 7
FROM CH.	25	26, 27	28	TO CH. 8
FROM CH.	28	29, 30	31	TO CH. 9
FROM CH.	31	32, 37	34	TO CH. 10
FROM CH.	34	35, 36	37	TO CH. 11
FROM CH.	37	38, 39	40	TO CH. 12
FROM CH.	40	41, 42	43	TO CH. 13

1 UNDESIRED BECAUSE OF IMAGE FREQUENCY ON ADJACENT CHANNEL
2 IMPOSSIBLE BECAUSE OF IMAGE FREQUENCY ON SAME CHANNEL

Table 2
List of Impossible and Undesired UHF Conversions

Continuing through the block diagram, we come to the last block which is the VHF Post amplifier. The need for this is based on maintaining the established noise figure of the converter. Since some antenna towers are quite high, consideration of cable loss at VHF must still be taken into consideration. If a VHF post amplifier were not used, the mixer would

CONFIG-URATION	10 DB UHF AMP + MIXER	UHF AMP + MIXER + VHF CABLE LOSS	UHF AMP + MIXER + POST AMP + CABLE LOSS
F (db)	8.1	12.3	8.9
$\frac{S}{N}$ (db)	51.1	46.9	50.3
SEE APPENDIX FOR CALCULATIONS	VI	VII	VIII

Table 3
Noise Figure Improvement Due to Post Amplifier

drive the cable and the cable loss would be added directly to the conversion loss. Citing the example used previously, UHF amplifier gain 10 db with a noise figure of 4 db, mixer gain −6 db with a noise figure of 14 db, and a 600 ft. cable run; we have an overall noise figure of 12.3 db and a signal to noise ratio of 46.9 db, see Table 3. This is an increase in noise figure of 4.2 db over the 8.1 db found previously when the VHF cable loss was not included. Addition of a 10 db gain, 7 db noise figure post amplifier results in an overall noise figure of 8.9 db which is only a 0.8 db increase and a signal to noise ratio of 50.3 db. Further improvement in noise figure could be obtained by either increasing the UHF preamplifier gain or decreasing the post amp noise figure.

In many areas there are UHF stations separated by only two to four channels. Closely spaced channels can produce interference when they mix with multiples of the crystal frequency. Also, the received power level of undesired channels may be great enough to

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overdrive the UHF pre-amplifier. To alleviate this condition, a highly selective filter is necessary. The requirements for such a device are, first of all, a low insertion loss, since the loss can be considered as adding directly to the noise figure. The bandpass should be wide enough to pass the desired channel but with approximately 20 db rejection 6 MHz to either side of the bandpass. The extremely narrow bandwidth and high close-in rejection predicates a high insertion loss. Consequently, a compromise must be made between low insertion loss and selectivity.

There are many basic types of filters, some of these being lumped constant, helical resomator, tuned line, cavity and strip line. Lumped constants can not be used since the frequency is too high for effective use. The helical resonator degenerates to the equivalence of a tuned line due to the high Q required. Strip line techniques can not be used to full advantage since the frequency involved is too low. This leaves the tuned line and cavity as the most likely candidates for filter construction at VHF. □

Appendix

I. NOISE FIGURE by definition

$$F = \frac{Sa/Na}{S/N}$$

Where

F = noise figure

$\frac{Sa}{Na}$ = Ideal signal to noise ratio

S/N = Actual signal to noise ratio

Rearranging terms to solve for system noise figure

$$S/N = \frac{Sa/Na}{F}$$

II. NOISE FIGURE when noise figure and gain of individual stages are known.

$$F_T = F_1 + \frac{F_2-1}{G_1} + \frac{F_3-1}{G_1G_2} + \cdots\cdots\cdots\cdots + \frac{Fn-1}{G_1G_2\ldots Gn-1}$$

Where

F_T = total noise figure
F_1 = noise figure of 1st stage
F_2 = noise figure of 2nd stage
F_3 = noise figure of 3rd stage
Fn = noise figure of nth stage where n is an interger
G_1 = gain of 1st stage
G_2 = gain of 2nd stage
Gn-1 = gain of next to last stage

III. SIGNAL TO NOISE RATIO at antenna with 1mV signal available.

$$Sa = \frac{V^2}{R} = \frac{(.001)^2}{75} = 133\times10^{-9} \text{ Watt}$$

$$Na = KTB = 4\times10^{-21}\times4\times10^{6} = 16\times10^{-15} \text{ Watt}$$

$$\frac{Sa}{Na} = \frac{133\times10^{-10}}{16\times10^{-15}} = 8.3\times10^{5} = 59.2 \text{ db}$$

IV

MIXER
$F_1 = 14$ db $= 25$
$G_1 = -6$ db $= .25$

AMPLIFIER
$F_2 = 7$ db $= 5$

$$F_T = 25 + \frac{5-1}{.25}$$
$$= 41 = 16.1 \text{ db}$$

$$S/N = \frac{83\times10^{4}}{41} = 2\times10^{4} = 43 \text{ db}$$

V

CABLE
$F_1 = 0$ db $= 1$
$G_1 = -8.4$ db $= .14$

MIXER
$F_2 = 14$ db $= 25$
$G_2 = -6$ db $= .25$

AMPLIFIER
$F_3 = 7$ db $= 5$

$$F_T = 1 + \frac{25-1}{.14} + \frac{5-1}{.14\times.25}$$
$$= 283 = 24.5 \text{ db}$$

$$S/N = \frac{83\times10^{4}}{283} = 2.93\times10^{3} = 35.7 \text{ db}$$

VI

UHF PREAMPLIFIER
$F_1 = 4$ db $= 2.5$

MIXER
$F_2 = 14$ db $= 25$
$G_2 = -6 = .25$

AMPLIFIER
$F_3 = 7$ db $= 5$

$$F_T = 2.5 + \frac{25-1}{10} + \frac{5-1}{10\times2.5}$$
$$= 2.5 + 2.4 + 1.6$$
$$= 6.5 = 8.1 \text{ db}$$

$$\frac{S}{N} \quad \frac{83\times10^{4}}{6.5} = 1.27\times10^{5} = 51.1 \text{ db}$$

VII

UHF AMPLIFIER
$F_1 = 4$ db $= 2.5$
$G_1 = 10$ db $= 10$

MIXER
$F_2 = 14$ db $= 25$
$G_2 = -6$ db $= .25$

$$F_T = 2.5 + \frac{25-1}{10} + \frac{1-1}{10\times.25} + \frac{5-1}{10\times.25\times.132}$$
$$= 2.5 + 2.4 + 0 + 12.1 = 17.0$$
$$= 12.3 \text{ db}$$

$$\frac{S}{N} = \frac{83\times10^{4}}{17} = 4.9\times10^{4} = 46.9 \text{ db}$$

CABLE
$F_1 = 0$ db $= 1$
$G_1 = -8.7$ db $= .132$

AMPLIFIER
$F_4 = 7$ db $= 5$

VIII

UHF PREAMPLIFIER
$F_1 = 4$ db $= 2.5$
$G_1 = 10$ db $= 10$

MIXER
$F_2 = 14$ db $= 25$
$G_2 = -6$ db $= .25$

POST AMPLIFIER
$F_3 = 7$ db $= 5$
$G_1 = 10$ db $= 10$

CABLE
$F_4 = 0$ db $= 1$
$G_4 = 8.7$ db $= .132$

AMPLIFIER
$F_5 = 7$ db $= 5$

$$F_T = 2.5 + \frac{25-1}{10} + \frac{5-1}{10\times.25} + \frac{1-1}{10\times.25\times10} + \frac{5-1}{10\times.25\times10\times.132}$$

$$= 2.5 + 2.4 + 1.6 + 0 + 1.2 = 7.7$$
$$= 8.9 \text{ db}$$

$$\frac{S}{N} = \frac{83\times10^{4}}{7.7} = 1.08\times10^{5}$$

$$= 50.3 \text{ db}$$

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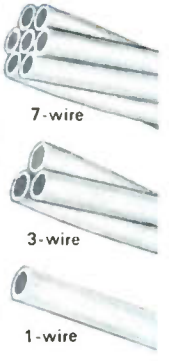

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Using A Fault Locator

For Buried and Aerial CATV Plant Maintenance

By Edward M. Allen, Manager,
Cable-Vision Lafayette, California

In many instances, use of a fault locator can greatly reduce the time required to locate damage to underground plant. We have found that in opening underground distribution facilities in new housing developments, use of a fault locator reduces the day-long task of finding damage caused by other construction crews to a 15 or 20 minute job. At our present growth rate of 30 plant miles per year, we consider this labor-saving technique quite significant. As much as 100 crew hours can be saved in opening buried plant for a single 200-home tract.

The portable, battery-operated instrument in daily use at Cable-Vision traces the course of buried cable, accurately measures its depth before excavation, and pinpoints the location of ground-to-earth type faults common to uniduct plant. Consisting of a self-contained transmitting unit to generate a pulsed 990-cps signal through the cable and highly sensitive hand-held probes to detect these electrical signals through earth or asphalt or concrete pavement, the device is known as a Delcon 4900 series Buried Cable Fault locator.

Under the supervision of our chief engineer, Ron Cotten, the solid-state device is employed whenever discontinuities are noted in trunk or feeder cables between amplifiers and/or service pedestals.

The technician assigned to shoot the trouble, connects the transmitter leads to center conductor or shield and makes ground contact. An automatic control establishes the proper output signal level for various factors such as soil condition, moisture, section length, size of the fault, etc. A flashing light informs the technician of the proper setting.

Cable-Vision plant foreman Chuck Christiansen adjusts output signal level on fault locator transmitter. Leads to left are connected with center conductor or shield. Ground lead can be to the unit's ground rod or to pedestal case or anchor bolt on utility pole.

Concrete driveways or streets present no obstacle to tracing cable path. Here, Chuck Christiansen listens to pulsed tone and observes dB intensity meter which provides numerical reference for changes in signal level.

With the circuit established, the technician is ready to locate the precise underground course and also the depth of the cable at any point. His tools consists of a lightweight three-foot long probe, and a camera-sized receiver unit which reproduces the pulsed signal through a loud-speaker. Operating in much the same manner as a radio direction finder, the receiver unit produces a null signal when pointing directly to the energized cable. Moving the probe to either side of the precise course of the underground cable produces an audible signal. Thus, our technician can describe the entire course as fast as he can walk across open lawns, driveways, or streets.

Since the inductive probe senses a null when pointed directly at the cable, the cable depth can easily be determined by moving the probe at a 45 degree angle away from the cable path. When a null is reached with the probe at this angle, the technician need only measure the surface distance between the two points, which equals the cable's depth.

Since most CATV plant is at this point relatively new, its faults are generally of a pronounced

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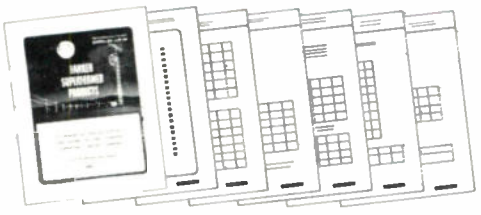

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Cable-Vision of Lafayette, California operates in a 75-square mile franchise area of Contra Costa County in the San Francisco Bay area. The firm provides that community with nine video channels and FM music, and uses SKL equipment. The four-year old system is said to be the largest in that area with 5000 subscribers and over 100 miles of plant with more planned. The firm has a nine-man engineering and maintenance crew.

nature, e.g., a severe physical damage, such as a partial or total cut by outside workman. As a consequence, there is a sharp discontinuity in signal, which permits pinpointing the cut or severed end to within a shovel-width with only the search wand.

However, the locator unit is supplied with a second compatible conductive probe for use on minute faults. This "contact frame" is used to pinpoint such faults within a fraction of an inch by isolating the epicenter among equal voltage points in the conductive field. A recent example of the use of the contact frame was the location of a coax cable buried adjacent to a power cable. The latter picked up the tracing tone, of course, and transmitted it beyond the end of the severed coax. The contact frame quickly determined the exact point of signal dimunition.

In this particular geographical area, the advent of seasonal winter rains slows down residential construction. As a result, extending service via buried plant to new subdivisions is correspondingly reduced.

We anticipate that during the winter rainy season, trouble will crop up in aerial plant, such as Splice opens which will permit moisture entry, grounds between splitters or connectors, and moisture problems between conductor and shield. With the addition of an extendable exploring coil, our fault locator will be used to pinpoint these aerial faults. The connection and signal level setting procedures are the same—only the exploring coil is substituted for the search wand or contact frame.

Depth of cable equals the distance between the precise path (as determined during tracing) and the null point obtained with the search wand at 45 degrees. Although Cable-Vision customarily buries cable to a uniform 24-inch depth, other contractors with backhoes and loaders can alter this depth considerably, besides wreaking havoc to the cables.

The fault locators are designed to operate for approximately 50 hours on a standard six-volt lantern battery, with output automatically regulated for changes in battery voltage.

The Fault Locator is made by the Delcon Division of Hewlett-Packard Company, Palo Alto, California. The 4900A costs $595, and their new model 4901A with built-in ohmmeter costs $695; both come complete with probes and instructions. □

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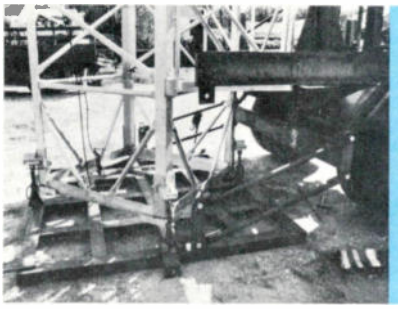

Trailer carries its own base plate. Earth type expansion anchors are used for guys. No concrete is necessary. Reduces erection time to a minimum.

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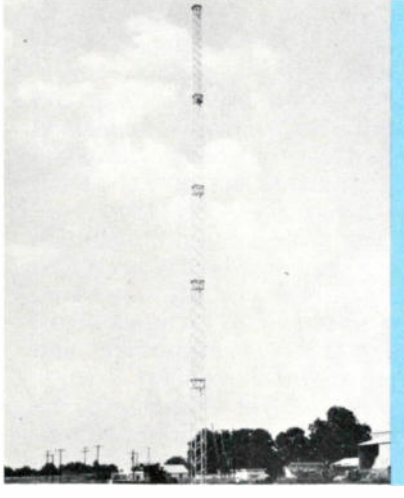

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Proposed NCTA Standard: Amplifier Output Capability

The following proposed technical standard was prepared by committees of the National Community Television Association for presentation to its membership. This is the first such standard put forward by the NCTA, and TV & Communications is pleased to cooperate in publicizing it within the CATV industry. To assure clarity, the complete text of the proposal is reprinted below.

I. General

The following standard is the result of intensive work on the part of the NCTA Standards Committee and its Engineering Subcommittee in multiple sessions at the 1966 National Convention as well as the preparatory work, drafts, mailings and comments solicited by the Engineering Subcommittee Chairman prior to that convention.

At the June 20th meeting of the NCTA Board of Directors, the Standards Committee recommended adoption of this specification as an NCTA Standard. The Board unanimously approved the recommendation and directed the following procedure:

1. Publication of the specification in the NCTA Bulletin, and by other means, for circulation to the NCTA membership and associate membership as a "Proposed Standard."

2. Evaluation of membership and associate membership comments by the Chairman of the Standards Committee and such other members of that Committee as he may appoint. (Comments should be sent to Standards Committee, NCTA, 535 Transportation Bldg., Washington, D.C. 20036.)

3. In the event that no substantive changes are recommended by the Standards Committee Chairman as a result of these comments, the specification shall become a formal NCTA Standard six months from the date of the first publication in the Bulletin.

This Standard does not limit a manufacturer in the design of a CATV amplifier nor does it prescribe how a user must select or employ a manufactured product. The Standard defines the NCTA meaning of the term "output capability of CATV amplifiers" and it describes in detail how this measurement is to be made. The Standard specifies a level of multiple carrier interference for the purpose of providing a common ground of comparative reference point for the evaluation of amplifier performance by the industry. Any manufacturer, if he chooses, may supply additional output data for different values of multiple carrier interferences than that prescribed in the Standard. Indeed, it is recognized that in certain cascaded systems equipment must be operated with lower values of multiple carrier interference so that an overall objective in system performance can be realized.

II. Standard

The NCTA Standards Committee recommends that all manufacturers of amplifiers for CATV applications specify the "Output Capability" of that amplifier in the form outlined in this Standard. A specification of Output Capability may be designated as an "NCTA Standard" only provided all of the conditions set forth in this Standard are fulfilled.

The Standard wording and form of the specification shall be:

"Output Capability (NCTA Standard) ..... dBmV output level:

a. For ... TV channels.
b. With.....dB output tilt.
c. At.....dB gain.
d. And .....dB slope."

III. Definitions:

1. dBmV Output level shall be measured in dBmV, the value in decibels with respect to the standard level of one millivolt across 75 ohms.

$$dBmV = 20 \log_{10}$$

output voltage (across 75 Ω) in millivolts
standard level of one millivolt

2. TV Channels

(i) The Total number of TV Channels (condition a) used in the test shall be specified explicitly. Amplifiers designed for all band VHF (channels 2 through 13) shall be tested with all 12 channels. Other amplifiers shall specify the total number of standard TV channels used in the test and in addition identify the highest frequency channel included.

(ii) If the amplifier is designed for non-standard channels, it shall be tested with appropriate visual carrier frequencies representing those channels, and frequency of each such carrier will be clearly identified in the specification.

3. Output Tilt

The output tilt (condition b) is the difference in amplifier output level, in dB, between the highest and lowest frequency of visual carrier. The test shall be conducted in accord with a tilt corresponding to the manufacturer's recommended operating conditions for the amplifier. If the tilt is not linear (in dB) the oper-

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ating condition shall be described in detail (preferably by a plot of dB vs. frequency) in the specifications.

4. Gain

The gain of the amplifier being measured (condition c) shall be the manufacturer's recommended operating gain in dB for the highest frequency visual carrier.

5. Slope

The slope of the amplifier being measured (condition d) shall be the difference in gain in dB between the visual carriers having the highest and lowest frequencies, as measured at the output level indicated.

IV. Method of Measurement:

1. Source and/or impedance

All measurements shall be made with test equipment presenting a source and/or load impedance of 75 ohms, with a return loss of 20 dB minimum.

2. Carrier frequencies

(a) The frequency of visual carriers used in the test shall be within 50 k Hz (kilocycles) of the values assigned by the FCC[1] for all standard channel carriers.

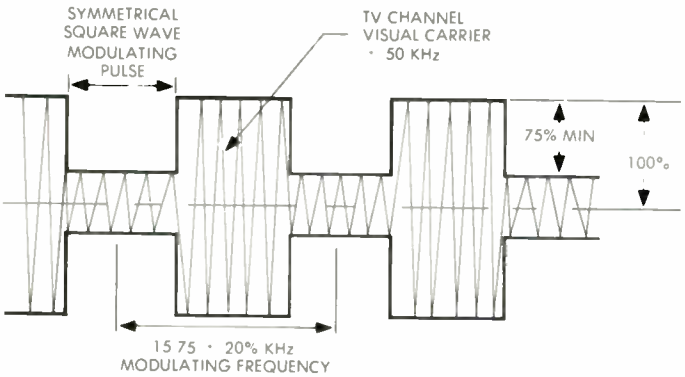

Figure 1. Modulation

(b) If non-standard channels are employed in the test of the frequencies of their visual carriers shall be within 50 k Hz of the values specified by the manufacturer (see paragraph III, 2(ii) above).

(c) Any pilot signals which are necessary for the operation of the amplifier as installed in the manufacturer's recommended system shall be provided during the test with a level and modulation (if any) as specified by that manufacturer.

(d) Aural and other FM carriers and the chromanance subcarrier frequency may be omitted during the test.

3. Modulation

All visual carriers shall be synchronously modulated, in the normal TV modulation manner (negative transmission) by a symmetrical square wave of 15.750 k Hz ± 20% to a depth of at least 75%. (Fig. 1) The term synchronously modulated means that all carriers shall be modulated by the same square wave and in the same phase relationship.

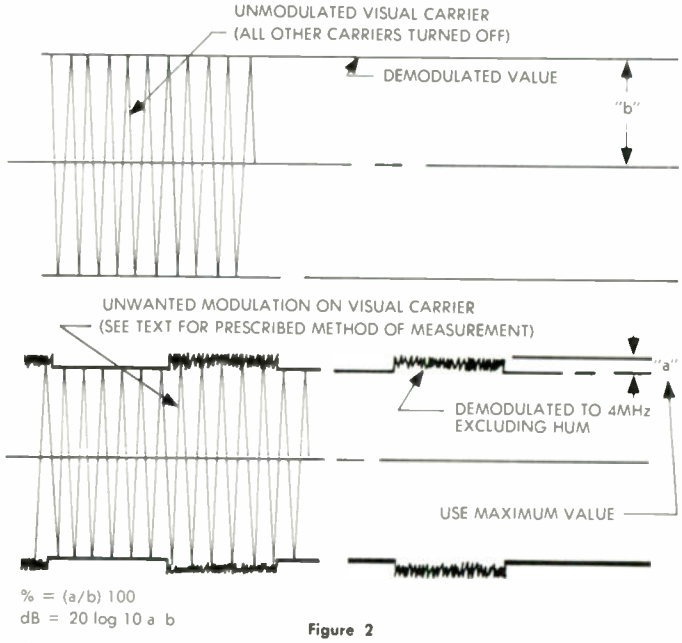

Figure 2

Output of Amplifier Under Test. (make measurements on each carrier in turn.)

4. Measurement

(a) Modulation shall be removed at the source from each visual carrier in turn.

(b) The ration a/b as defined in Figure 2 for this carrier (the carrier from which modulation was removed) shall be measured at the output of the amplifier under test.

(c) The band width of the envelope detector shall be 4 MHz wide to include various non-linearity products (multiple carrier interferences other than cross modulation). Hum, if present, shall be removed with a filter. Corrections must be applied to the measuring devices, if necessary, so that the true value of the signal amplitudes identified in Fig. 2 are determined.

(d) The output levels of all carriers shall be adjusted, maintaining the specified tilt and gain (as defined above) until the ration of a/b does not exceed 0.14% (−57dB) for any visual carrier.

V. Output Capability

The Output Capability of the amplifier may be specified as the output level in dBmV of the highest frequency visual carrier when all of the conditions presented above have been met.[2] □

[1]Pgf. 73.603 of Part 73, SubPart E of the FCC Rules and Regulations specify the frequency band allocations of standard TV Channels. Pgf. 73.682 (a) 2. specifies the visual carrier frequency shall be nominally 1.25MHz above the lower boundary of the channel. Pgf. 73.668 specifies a broadcast frequency tolerance for the visual carrier of within ±1000 cycles of the authorized carrier frequency.

[2]If the condition set in paragraph 4(d) can be met at more than one value of output level ALL such levels must be identified in the specification preferably by a plot ration a/b expressed in dB, made in accord with this standard vs. output level of the highest visual carrier in dBmV.

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Voltage scale	one	Input	75 ohm F type connector
Db scales	four	Accuracy	±1.5 db All TV channels
Measurement Method	True peak of sync pulse	Voltage Range	10 microvolts to 1 volt
Weight, including carrying case	5-⅛ lbs.	Db Range	—30 to +60 dbmv
Size without case	4¼" x 5" x 5¾"	Frequency Coverage	Ch 2 to Ch 13 One Range
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CATV Legal View

(Continued from page 14)

ness, the established "ins" are often able to relate the preservation and promotion of their own economic welfare directly to the Federal regulator's obligation to govern in the "public interest." At the same time, the potential competitor, seeking to institute a new station or service for public consumption, can often be painted as constituting a threat to the welfare of the community and even, in some situations, to our very American way of life. The specter of additional program services coming into a market produces literally a "call to arms" among those noble licensees trusted with the responsibility of keeping the Commission on its toes as to its obligations to protect the "public interest." It is not inaccurate to say that the FCC in the exercise of regulatory jurisdiction over this affluent segment of our "free enterprise" economy is largely preoccupied with competitive problems and considerations.

Without any doubt, the royalty, true elite and landed gentry of the "in" Power Establishment are those holders of VHF television licenses. With good reason, these licensees are charter members of the don't-rock-the-boat crowd; undeniably they have a "good thing" going for them. And I, for one, cannot blame them for making every reasonable effort to preserve their golden egg —or even more descriptively, the chicken that lays it. It does seem, however, that the Federal regulator could be somewhat disabused of his naiveity and apparent willingness to accept with little question the economic philosophy that "what's good for General Motors is good for the country." Perhaps neither Mr. Wilson nor General Motors can be blamed for espousing such a philosophy; but it does seem that a more enlightened evaluation might reasonably be expected from the detached regulator.

Television stations, to understate the proposition, have never been known to encourage the establishment of competitive station operations. Yet, one of the patent anomalies of the new FCC CATV policies is that the majority of oppositions generated to petitions by CATV interests to expand their operations into new market areas have come from the established, most wealthy VHF television operators. Some objecting stations have been so candid as to acknowledge that while the introduction of CATV would do them no serious financial harm, it just might impair the environment in the area to the extent of impeding the full development of future television stations—stations which, when established, will furnish direct and substantial competition to the existing stations. This demonstration of solicitude for competitors represents indeed a new phenomenon in the attitudes of TV broadcasters. Being by nature somewhat skeptical, we are not wholly convinced that this new solicitude is prompted only by a genuine desire to be protective of less fortunate UHF operations in the fond hope that they might some day be able to function as a fully equal competitive force within the television market.

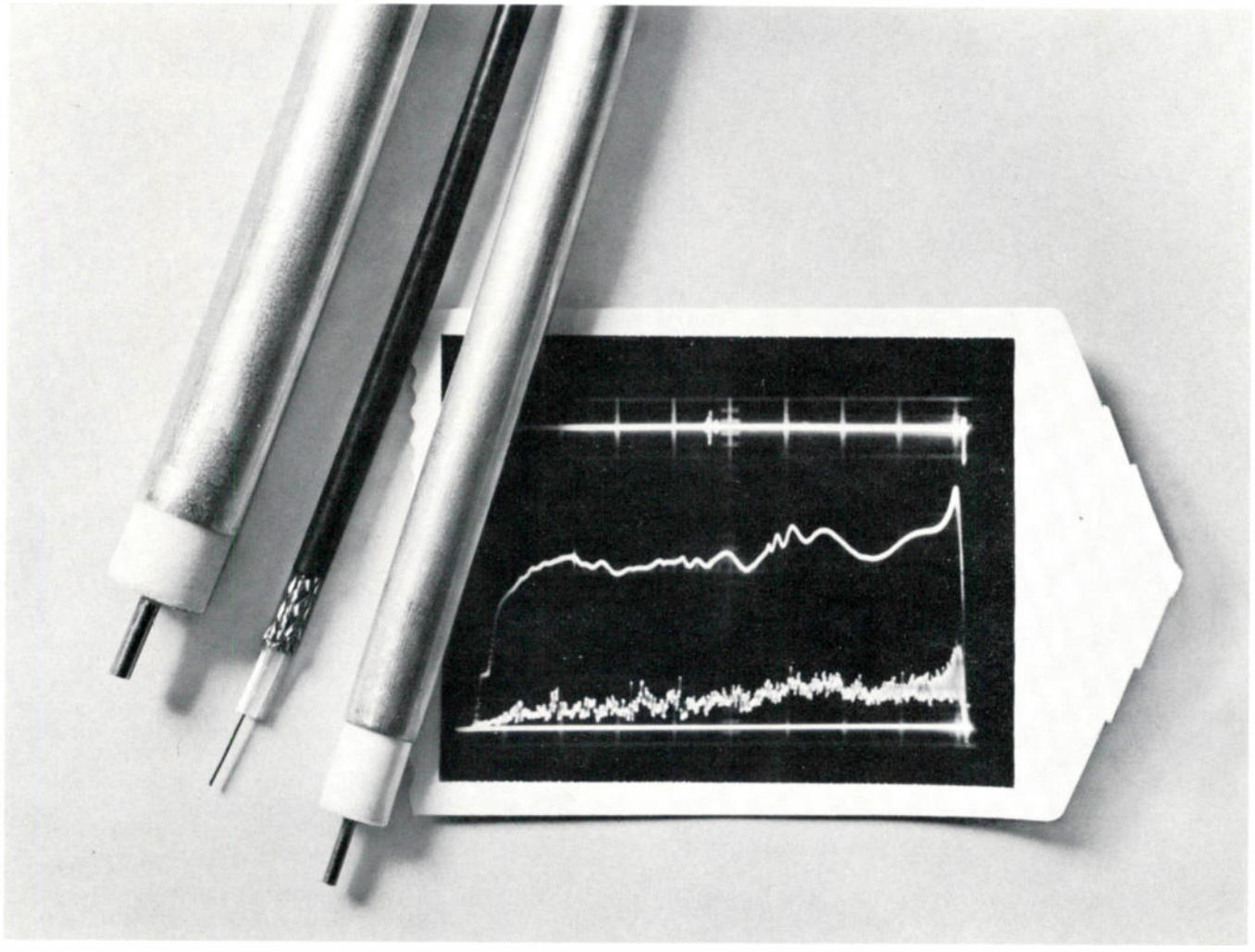
For to our trained eye, there appear to be indications, however slight or misleading they may be, that some TV stations just might be taking advantage of these new policies to further, as well as feather, their own immediate economic ends. For example, we know of a situation where a substantial television station interest has petitioned the Commission to permit it to install a CATV system within the town it serves while, at the same time, it has actively opposed the establishment of a CATV system in another much smaller town located some 40 miles distant. Parenthetically, the same TV station was an unsuccessful applicant for a CATV franchise in the smaller, distant town. This particular television station has asserted in a characteristically skillful and straight-forward manner that the "public interest" would obviously be served by the establishment *by it* of a CATV system in *its* town, but that there would appear to be some rather serious public-interest questions to be resolved prior to the establishment by other interests of a CATV system in the other smaller town located on the edge of its Grade A contour. The sum and substance of the reasoning employed by the television station to reach these seemingly inconsistent conclusions is simply that each is seperately manifested in the "public interest."

We are constrained to observe that the FCC appears not yet to have lost faith with its television licensees; for we see no evidence that the agency shares our concern or suspicion that some of its more established VHF licensees just might be pulling the Commission's leg by shedding crocodile tears for their poor little, not-yet-established UHF competitors. And after all, it probably is a bit unsporting for a late-comer like CATV to question motives since the ground-rules of this "game" have been in effect for quite a period of time.

Nonetheless, the so-called "Top-100 Market" rule of the FCC has served so far only to demonstrate that the agency offers no realistic or practical resolution to whatever problems, if any, are presented by CATV operation. The hearing policy would be a farce if it had not thus far served to inflict serious and substantial financial injury upon many persons engaged in making lawful business plans and investments without awareness that a Federal agency might really undertake to promulgate such unrealistic and unworkable policies.

Even acknowledging the existence of a regulatory problem, we believe that responsible administration by the government of its affairs requires a more straight-forward, honest approach to fair and just resolution.

To date, only one thing seems certain: Humpty Dumpty and the FCC see eye to eye on the use of words and who is to be master. □



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Financial Reports

Viking Industries, Inc. reported a net income of $277,510, or 22 cents a share, for the quarter ended September 30, compared with a net income of $122,994 or 10 cents a share for the same period last year. Net income for the 9 months period was $835,093 or 65 cents a share, compared with a net income of $383,307 for the same period last year. Sales for the nine months were $11,657,583, compared with sales of $8,336,179 for the nine months period in 1965.

TelePrompTer Corp. reported record revenues of $4,803,628 and net earnings of $663,211, or 81 cents a share, for the nine months ending September 30. In the comparable period last year, the firm earned $210,430, or 28 cents a share, after imputed taxes, on receipts of $4,006,091.

H&B American Corp. reported record revenues and earnings for the fiscal year ended July 31. Revenues were $5,114,000, with a net of $636,000 or 25 cents a share, compared with revenues of $4,557,000 and a net of $110,000 or 4 cents a share for the previous year.

Amphenol Corp. president Matthew L. Devine reported a 69% increase in per share earnings on a 41% sales gain for the first nine months of 1966. Net earnings for the period were $4,224,610, or $1.45 per share, compared to $2,537,427, or 86 cents per share, for the same period of 1965.

Copperweld Steel Co. reported net sales of $94,540,840 for the first nine months of 1966, 7% less than the net sales of $101,518,259 for the corresponding period of 1965.

Storer Broadcasting Co. revealed a nine months after-tax profit of $8,556,000 for the period ending September 30, 1966, an increase of $1,738,000 over the similar period in 1965. Storer's earnings per share for the first nine months of 1966 were $2.06.

Superior Cable Corp. directors declared a dividend of $0.20 per share payable on December 1, 1966 to stockholders of record on November 15, 1966. Net sales of $7,002,992 for the quarter ended September 30 were 23% higher than the same period last year.

Cox Broadcasting Corp. reported consolidated net income of $1,150,360 for the three months ended September 30, 1966, an increase of 25% over net income of $923,310 for the comparable period a year ago. Operating revenues for the 1966 third quarter totaled $8,738,982. □

DECEMBER 1966

CATV TECHNICIAN

Shown above is Bob Wagner, technician for Coachella Valley Television in Palm Desert, California. TV&C staff photo.

- The Role of CATV Connector Design
- New CATV Products

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The Role of Connector Design In Cable System Performance

By Richard A. Bolz,
President and Technical Director
Communication Dynamics Corporation

The recently increased demand for improved CATV system performance, has resulted from several factors, foremost being the growing number of color receivers placed on present systems. Increased channel coverage, and longer trunk cable runs have also played an important part in magnifying present system shortcomings.

Most equipment manufacturers responding to increased demand have done much to improve performance in the realm of head-end, and amplifier electronics. The CATV plant area which still requires improvement in performance, is the coaxial transmission system, made up of coaxial cable and connectors. CATV cable as produced today by the leading companies, is a high performance component, which can maintain its characteristics for an indefinitely long period, provided that it is installed properly and subsequently protected from damaging environmental factors. The agent which has the most damaging and degrading effect on cable performance is water, in either liquid or vapor form. The air-dielectric CATV cable designs currently being introduced to the market, make it possible to protect cable from water damage by means of positive dry air or nitrogen pressurization of the cable itself. With these cables, gas pressure is introduced through ports in the connectors which are required to be gas tight. For some years, the use of pressurized, air-electric cables has been standard practice in most high performance commercial and military communication systems. Widespread use in CATV applications, of these lower loss, air-dielectric cables is however still some time away, and for the purpose of this discussion we will confine ourselves to the consideration of metal sheathed, foam dielectric cable and connector systems. Assuming then that the cable can deliver the performance that is required, the problem is one of preventing degradation of its inherent high quality characteristics. This brings us to consider in some detail, the effect of the connector on the performance of the coaxial signal transmission system.

The extent to which connectors can affect the performance characteristics of a system is not generally realized. From an economic point of view, the initial dollar amount budgeted for connector components in a system can be far exceeded by added installation costs which generally result from the use of inadequately designed connectors. In this regard, we consider a connector to be of inadequate design, when it is not self-sealing, i.e. when it is necessary to wrap, shrink tubing, tape or encapsulate the complete assembly after installation to prevent water entry and/or corrosion. A well designed connector should safeguard and maintain cable characteristics when properly mounted on the cable in either the mated or unmated condition. If the connectors used are not designed well mechanically, cable performance will deteriorate with time, ultimately resulting in unanticipated trouble shooting and system down-time. Conversely, the specification of high quality connectors at the outset of system planning will result in both immediate and long-term cost savings.

Exactly what functions are specifically required of the connector? Essentially there are two basic functions which the connector must perform well for an indefinitely long period; these are electrical or signal, and mechanical; sometimes difficult to analyze separately. A connector is used to join, both electrically and mechanically, two transmission system elements. These may be cable-cable, or cable-equipment junctions usually required to be permanent or semi-permanent connections. Ideally the system designer requires that the installed connector introduce the least possible discontinuity or non-uniformity into the coaxial transmission system. How then does the connector best perform these required functions? In the discussion which follows we will try to isolate the electrical signal, and mechanical requirements. It must be borne in mind that the two are, none the less interrelated. This is illustrated in the area of moisture or waterproofing, a mechanical aspect of connector design which vitally affects electrical or signal performance.

Consider first the electrical or signal attributes of the connector. From a signal transmission point of view, the ideal connector is electrically invisible over a wide range of operating frequencies. Since transmission line discontinuities are vector additives, depending on their phase spacing in the line at certain frequencies, each single connector should have a return loss which is substantially less than that of the cable. It follows that the connector must be at least as good a section of matched transmission line over its own length as the cable itself. It must also be designed to maintain these qualities when it is used to perform a line size transition, such as splicing two different cable diameters, or terminating cable with a connector interface line size much different from the cable.

Connectors used in line powered systems must be designed for carrying the powering energy, without any arcing, heating or possible degradation of signal transfer quality.

A factor rarely considered in connectors designed for CATV applications, is the effect of current surges associated with lightning strokes—particularly in the case of splices which join long cable runs. Very little is really understood concerning some of the phenomena associated with lightning. It is known that the aluminum sheathed cables in use today, when properly protected can withstand and or carry very high peak surge currents before failure occurs. Current surges can reach peak values between 10,000 and 100,000 amperes. In a relatively large percentage of the lightning failures encountered in aluminum sheath coaxial cable installations, the point of failure has been in the connector. The designer should know beforehand, whether or not the connectors he intends to use in his system are capa-

ABOUT THE AUTHOR

Richard A. Bolz is President and Technical Director of Communication Dynamics Corporation. Before joining CDC in 1964, Mr. Bolz served as Director of Research for Phelps Dodge Electronic Products Corp. He was granted a B.S. in Physics from Manhattan College in 1950, and has done post-graduate work at New York University. His technical background includes work in UHF and microwave communications, electronics, infra-red and ultra-violet optical instrumentation, upper altitude control instrumentation and telemetry, and special purpose coaxial lines and devices. Since 1959 he has served as a consultant to the Cosmic Ray Research Group, Department of Physics, New York University.

ble of withstanding high magnitude peak sheath current surges. Elsewhere in this article, engineering design features are discussed which describe a connector designed to meet the requirements developed above.

A connector must be designed so as to maintain the mechanical ratings of the cable and/or the electronic equipment to which it is connected. At the same time the signal transmission properties of the system must not be degraded. The connector should be capable of installation on the cable in the shortest time at the least cost. The method of installation required should be simple, foolproof and require no special tools. Special, unwieldy and expensive installation tooling is not desirable and should not be required for a well engineer connector. It is hard to see why hydraulic presses, portable threading lathes, flaring tools, two foot crimping tools, soldering irons, torches together with bagged loose connector parts are necessary in the field, atop towers or telephone poles.

The leading manufacturers of cable are very aware of the field conditions under which their products are used, and the installation problems often encountered. They usually are also informed as to the relationship of connectors to the performance of their cable product. These companies are frequently called upon to send engineering representatives into the field to look into difficulties customers encounter with the use of their cables in finished systems. Such defects as return loss spikes in certain parts of the band, or out of specification attenuation figures arise more often than they should. Usually, high return loss spikes are caused by cable damage incurred during installation and/or the use of poorly matched and compensated connectors. In cases where cable attenuation has gradually increased with time to levels above specified limits, the effect is most often the result of water absorbtion by the cable dielectric. Unless the cable is found to have leaks in the sheath which have admitted water, this fault can be attributed to the use of connectors which were not waterproof. There can be no argument against the desirability of designing a connector to be completely waterproof, and the closer the design can approach a hermetic seal the better. A standard technique for measuring the seal integrity of connectors is currently in use in pressurized, air-dielectric, aerospace cable systems. The connector is mounted on a suitably adapted, one foot length of cable, or on a test fixture which simulates a one foot length of cable. An accurate gauge and valve assembly form part of the test set-up, which is filled to 30 psi with dry air or nitrogen. The gauge must not show any evidence of pressure drop for a period of twenty-four hours. The total volume of gas contained in the measuring apparatus is relatively small, and over a period of twenty-four hours, even a very minor leak in the connector will be detected by the resultant large pressure drop. If CATV connectors which pass the above test are used in a system, the user can be certain of maintaining dry cable and uniform attenuation characteristics over an indefinitely long period of time.

The selection of the connector interface, (Type N, F, UHF, etc.) to be used in a system should be the subject of more attention in system planning than is usual. Some interface series are much superior to others, either electrically or mechanically, or both. Some are not matched electrically at all, and are holdovers from narrowband RF or audio designs of the nineteen-forties. Others cannot be constructed in a waterproof version. till others were designed for high production rates at low cost, with no consideration given to high frequency signal performance. The engineering aspects of some of the more widely used interface designs are discussed in another paragraph. The mated, male-female section of the connector pair must also be waterproof if the return loss of the pair is not to be a function of weather conditions.

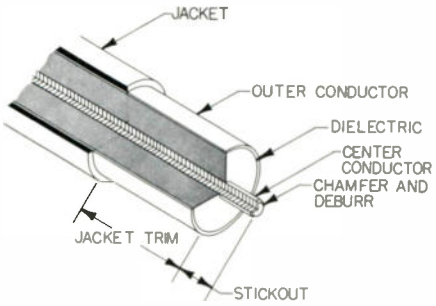


FIGURE 1

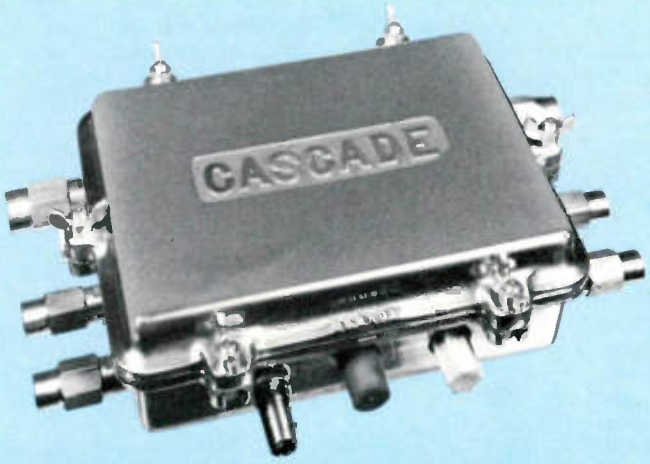
Too many users are inclined to regard connectors in terms of hardware requirement, much as screws and washers, etc. Only when problems arise do they begin to take a close look at this very important passive component. One system designer for a fairly large company actually requested drain holes in the connectors to be supplied—to let water out! Imagine the prior experience which led to this request. The independent operator may soon be competing with the communication industry giants and if he is not to fall by the wayside, he must take a long hard look at his system building blocks in terms of quality, engineering and reliability. Components designed, sold, and purchased on the basis of price alone, can no longer be used in today's CATV systems. These building blocks must be upgraded if the industry is to continue to grow, remain healthy and build its image in the public mind.

When examined closely, the use of connectors selected on the basis of price alone, without regard to performance, can be quite expensive in the long run. Surprisingly, high quality, well engineered connectors can often cost less initially than their opposite numbers. The hypothetical example below compares labor costs for installation and maintenance in the system, of connectors selected on the basis of price alone, versus the use of high quality, performance specified types.

NON-SPEC CONNECTOR—(REQUIRES WATERPROOFING)		
Purchase Price—		1.00
Waterproofing Materials—Shrinkable tubing, tape, etc.		.15
Assembly on Cable—		
Direct Labor, 5 Minutes @ $3.60 per hour	.50	
Waterproofing—Direct Labor, 8 Minutes @ $3.60 per hour	.80	
TOTAL DIRECT LABOR		1.30
Overhead—90 percent of Direct Labor		1.17
TOTAL COST		$3.62
POTENTIAL TROUBLE-SHOOTING OR CALL BACK COSTS		
Direct Labor—Includes Travel Time, 1 Hour @ $3.60 per hour		3.60
Overhead—90 percent of Direct Labor		3.24
TOTAL		$6.84
Plus customer dissatisfaction, down-time, etc.		
PERFORMANCE SPECIFIED CONNECTOR		
Purchase Price—		1.85
Assembly on Cable—Direct Labor, 5 Minutes @ $3.60 per hour	.50	
TOTAL DIRECT LABOR		.50
Overhead—90 percent of Direct Labor		.45
TOTAL COST		$2.80

The illustration given may possibly be criticized for over-simplication, however the point made is sound. The actual cost of time spent in waterproofing a connector installation and/or potential subsequent troubleshooting can be substantial. It is harder to evaluate the potential loss in terms of customer dissatisfaction. The use of well engineered, performance specified connectors quite often costs less initially, but if not, will certainly cost less in the last analysis. Perhaps the old adage can be repeated, that "The bitterness of low quality remains long after the sweetness of low price is forgotten."

How is a high quality, well-engineered connector designed? The prime design objective must be the maintenance of the signal transmission and mechanical properties of the cable. The design should be such that the installation of the connector is rapid, foolproof and requires no special tools. No matter what connector design is considered, the cable on which it is to be mounted requires some preparation. If the cable has a protective polyethylene jacket, the first several inches are removed without nicking or scoring the aluminum outer conductor. Approximately one inch back from the cut cable end, the aluminum is scored deeply with a tubing cutter. The cable is flexed at the score mark until the aluminum parts. The short section of aluminum outer conductor is removed, leaving the outer conductor cut square to the cable axis. Using a sharp blade, the foam dielectric is cut flush with the outer conductor, down to the copper center conductor. Depending on the cable size, the project-



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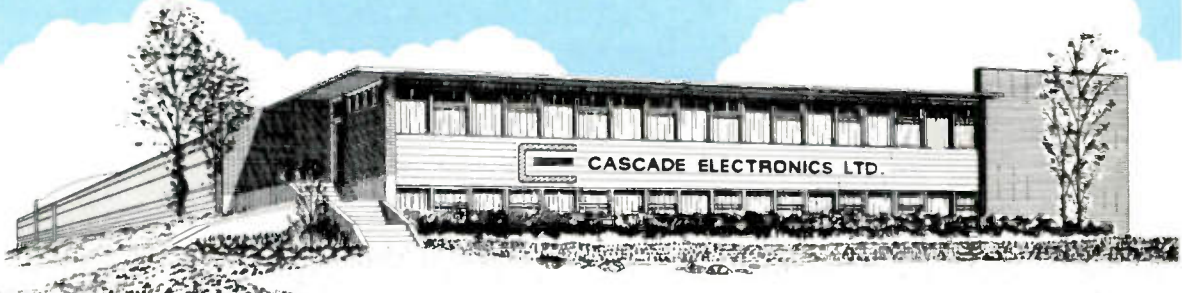

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ing center conductor is cut off ⅜ to ½ inch from the prepared cable end. This cut is deburred, and the end of the conductor is filed round or chamfered to provide easy entry into the connector contact. The dielectric adhering to the copper conductor is removed to insure good contact. A cutaway view of the prepared cable, ready for connector mounting is shown in Figure 1.

The connector as supplied to the man in the field should have as few loose parts as possible. To keep the installation simple and prevent loss of parts, it is preferable for the connector to consist of only one or two subassemblies. Basically, all connectors can be said to consist of cable grip and connector body. The prime function of the cable grip assembly is to hold the connector on the cable. The grip should hold the connector such that after installation, the completed assembly has a tensile rating at least equal to the

TABLE 1

Cable Size Versus Maximum Recommended Pulling Tension.

Cable Size (Inches)	Max. Tension (Lbs.)
.412	150
½	200
¾	450

maximum recommended pulling tension for the cable size. Typical values for several cable sizes are summarized in Table 1. The values given are averaged from several manufacturers data, and in all probability include a margin of safety. The composite cable/connector tensile rating must be obtained without deformation of the cable outer conductor, which if present will cause degradation of the signal transmission. Most connector cable grips in use today em-

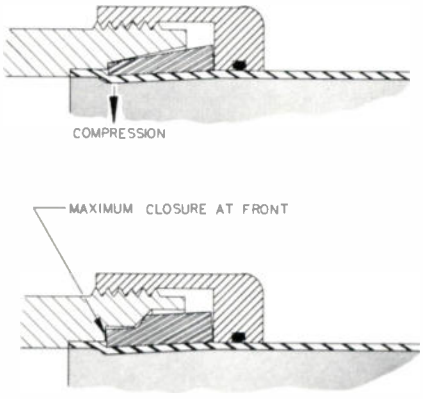


FIGURE 2a

ploy either crimp, embedded or spring coil, or collet grip techniques. Internal or external crimp designs are characterized by the relatively expensive tooling required. Crimp connectors for smooth aluminum sheath cables were developed primarily for splice applications in conduit or cable ducts, with minimal radial size as the prime design objective. Those presently available are somewhat restricted in the variety of interface types offered. Connectors employing embedded or spring wire coils do not have the inherent tensile characteristics of the collet type and often require a more involved assembly of loose parts. The most widely used grip is the collet type. Care must be taken in the design of the collet grip in order to provide uniform axial closing of the collet around the aluminum outer conductor. This is desireable for two reasons: first it results in the least possible cable deformation for a given tensile strength, and second the maximum transfer of sheath surge currents through the connector outer conductor structure. With uniform radial closure over the length of the collet, a given amount of radial compressive force is distributed over the largest cable surface area, while the deforming force per unit cable area is a minimum. Most collet grips are designed in such a way that the collet tends

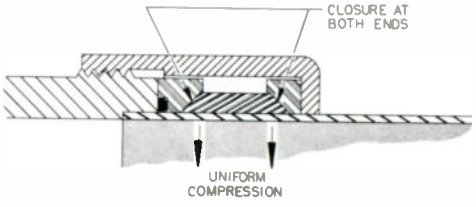


FIGURE 2b

to close only at one end. Figure 2a illustrates this fault in single-ended collet design, and shows why this type tends to assume a conical shape on the cable, which results in similar deformation of the cable sheath. To insure that the

grip collet closes parallel to the cable, the collet must be double-ended as shown in Figure 2b. In this design the collet closure is uniform over the cable contact area. Sufficient tensile retention force is obtained without any measureable deformation of the cable. Simultaneously, the electrical contact resistance between cable and connector is a minimum. Consequently the magnitude of sheath current transfer capability is a maximum. An equally important function of the connector cable grip assembly is the completion of the cable outer conductor signal current path. In this regard, it must be remembered that in RF transmission, signal propagation is in the conductor surface layer. The depth, only several thousandths of an inch thick at television frequencies, is directly proportional to wavelength. For all practical purposes in the case of coaxial lines, the signal energy path is the inside diameter surface of the outer conductor, and the outside surface of the center conductor. In order to keep the return loss or VSWR of the connector to a minimum, the connector should be designed so that there are no "folded" or reentrant signal paths. The contact between the prepared end face of the cable outer conductor and the connector body should be a high compression, but joint. The joint should be held under compression over the entire circumference of the cable outer conductor end face, and the connector body cable seat. Figure 3a illustrates how the outer conductor signal surface path integrity is maintained in this type of butt joint. Confining our attention for the moment to the inter-relationship of the outer conductor signal path and the cable grip assembly, we can establish the following design requirements on the grip assembly in terms of signal transmission. The connector cable grip assembly must be designed to mechan-

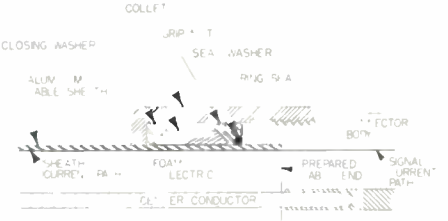


FIGURE 3a

ically insure the necessary high compression butt joint described above. Some single-ended collet arrangements are designed such that they fail to establish this type of joint. With reference to the double-ended collet construction shown in Figure 3a, the method of achieving the two fold function of the grip assembly may be seen. The first requirement of high sheath current transfer capacity from cable sheath through connector is assured by the current path indicated. The resistance of each junction or link in the current path, i.e. sheath-collet, collet-seal washer, and seal washer-connector body is kept to the minimum by maintaining extremely high mechanical pressure between these members. The signal path along the inside surface of the outer conductor is also indicated in Figure 3a. The path indicated, rather than any other—say the sheath current path for example, is assured by the fact that when the connector is properly installed, the prepared cable end-face (Plane A-A') is under a compression of approximately 4,500 pounds per square inch with respect to the connector body cable seat.

Further analysis of the signal transmission path through the connector brings us to consider the contact between the cable center conductor and the connector center conductor. A properly designed solder connection between these two members is probably the ideal method of joining, from the point of view of both mechanical strength and signal transfer. The solder method is excluded from our design approach, since we consider field soldering to be in the category of special tooling. The best design approach, within the limitation of no special tooling, is a spring finger contact arrangement. With the proper choice of material, finish and mechanical design, we can obtain electrical and/or signal performance equal to a soldered joint. Earlier remarks pertaining to the undesirability of folded or reentrant signal paths apply with equal validity to the center conductor signal path. Basket type or indented

connector center contacts are to be avoided because of the folded signal path in these designs (Figure 3b). The contact arrangement shown in Figure 3c provides the uninterrupted surface signal path which we require. By fabricating the contact as shown in the figure, from beryllium copper, and heat treating it to the proper spring temper, the designer can obtain a total contact pressure in a direction normal to the copper center conductor, on the order of 2,000 pounds per square inch. (Typical value—center contact designed for ½ inch, 75 ohm cable). By burnishing and then silver plating, the contact resistance between the cable center conductor and the connector contact is reduced to less than 0.1 milliohm.

The spring finger contact design may be criticized because it does not provide for capture of the cable center conductor. A soldered contact will capture the conductor if it is held fixed relative to the connector body by means of the insulator support structure. If this mechanical feature is incorporated in a connector design which is electrically acceptable, a retention force of approximately 200 pounds maximum can be obtained. (½ inch, 75 ohm cable). To do this however, requires that the simplicity of connector installation must be sacrificed in so far as a group of loose parts must then be installed in the field. Well designed cable is manufactured with a strong mechanical bond between the copper center conductor and the foam dielectric, with the foam under diametric compression by the aluminum sheath. When cable of this type is installed properly, any tendency for the coaxial conductors to displace relative to each other, will be practically eliminated. This results from a distribution of forces and the transfer of any center conductor withdrawal force to the aluminum sheath. Any remaining tendency to small relative displacements of the center conductor at the ends of the cable can be accommodated by allowing the center conductor to engage the connector spring contact by a length equal to approximately five times the center conductor diameter.

To achieve a connector design having a low return loss value, particular care must be exercised in the electrical design. If we remember that the characteristic impedance (Z_o) of a coaxial structure is defined by the following,

$$Z_o = \frac{138}{\sqrt{E}} \log_{10} \frac{D}{d}$$

where E = dielectric constant
D = electrical diameter of outer conductor
d = electrical diameter of center conductor,

we can calculate the ratio of conductor diameters for any desired characteristic impedance, in any dielectric medium. In a typical connector there are abrupt changes in line size and also the dielectric medium. For example, in the case of a type F connector designed for use on ¾ inch cable, the cable line size of approximately .700 inch must terminate in the type F line size which ranges between .100 and .150 inch. The center contact will have diameters which range from .190 to .025 inch. Abrupt changes in the dielectric medium occur at the insulating support beads which hold the center contact in position relative to the connector body. If the connector designer were to use only the above formula for calculating diameters when the line size changed, or for the insulating support beads, he would design a so-called "constant impedance" connector. Electrical testing of such a design would reveal an excessively high VSWR or return loss, the reason being that the design would not be compensated. Every point at which the line changes size, or the medium changes in a coaxial structure, fringe field effects and capacitive

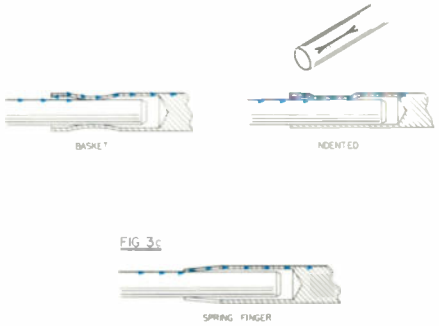


FIGURE 3b

discontinuities are introduced. These give rise to high VSWR values unless broadband compensation is introduced in the electrical design. Compensation techniques available to the designer include the use of inductive steps, biconical tapers and combinations of both, depending on the particular transition problem and the frequency range of operation. To qualify as well-designed, a connector then must provide an integrated solution to many simultaneous and coexisting problems. These include mechanical constraint and sealing, sheath and signal current transfer, and finally design compensation of electrical discontinuities and fringe effects resulting from dielectric medium and line size changes.

Our evaluation of connector design includes the following brief examination of currently available terminations or interfaces which have a present wide CATV usage.

"UHF" SERIES—Basically not a high frequency interface. Originally designed for low frequency applications, (audio and RF below 20 megacycles). Characteristic impedance is indeterminate due to lack of standardization and originally intended end-use. Dielectric material used includes teflon and mica filled phenolic. Female and male originally designated as SO-239 and PL-259 respectively on military drawings. Due to the design, a mated pair in this series cannot be self-weathersealing, and if a seal is required, external sealing techniques must be employed.

"MODIFIED UHF" SERIES—This is essentially the same interface as the

UHF above. The center contact diameter, however has been reduced in an effort to provide a characteristic impedance of 75 ohms. Suffers from the same inability to seal the mated pair as the UHF. No government or industry standardization on mating interface dimensions, specifically center conductor.

"F" SERIES—A very small interface having a nominal line size of .150 inch. Originally designed as low production cost item for use with RG-59/U braided cable. Small line size does not lend itself to good electrical transition from aluminum sheath cable sizes. No standardization of mechanical or electrical characteristics other than thread size, male and female. Most currently available versions make no attempt to provide 75 ohm impedance, or specify materials (center contact and dielectric). Study of various samples purchased on the open market, revealed center contacts fabricated from flat strip or round stock, ranging from half-hard, unplated brass to soft copper. Dielectric materials ranged from machined teflon to moulded and split polystyrene beads. With the exception of CDC dash FM and dash FF types, no provision was found for weathersealing of the mated interface pair. Assuming good grip of these connectors on an aluminum cable, the mated pairs of some versions have very low tensile resistance, or connector outer conductor butt pressure, because of very small snap ring cross section (height = .032 inch) which holds the male coupling nut on the connector body.

"N" (70 OHM) SERIES—A well engineered interface, the design of which is fully covered by military specifications and drawings. Designed for use up to frequencies in excess of 5,000 megacycles. The mated pair interface is weatherproof and withstands environmental conditions called out by the governing military specification. Beryllium copper spring finger inner and outer conductor contacts are specified. There must be heat treated and silver and/or gold flashed. Good coupling nut retention on the male is assured by the specification which calls for 100 pounds minimum test. Measurements indicate it will take tensile forces in excess of those which limit the aluminum cable. The only disadvantage of this series, is the characteristic impedance of 70 ohms. Since CATV transmission lines are 75 ohms, there is a theoretical VSWR of 1.07 or a return loss of 29.5 db builtin. This relatively small disadvantage, which is known constant, is far offset by the total superiority of the type N design. It is by far the best interface available for CATV use. In most cases, type N connectors should not and do not cost more than any of the other series. reviewed. The interface end of type N connectors for use on aluminum sheath cables should be built according to the military specification however.

SPLICES—While splices are not properly designated as terminations or interfaces, they are widely used and merit some comment. A good splice is electrically invisible. It provides for the junction of two lengths of equal or dissimilar size cables. Mechanically a splice must maintain the pressure seal between the cables, and also the mechanical tensile rating of the smaller cable. Previous general comments pertaining to signal transfer, current, return loss, etc., apply to the splice as well. Splices are generally exposed environmentally and therefore subject to corrosion. They must be designed for exposed use, without the necessity of potting, taping or shrinking tubing after installation.

In this discussion, we have attempted to bring home the fact that just as with other equipment in CATV systems, such as antenna, tower, cable, amplifiers, taps, couplers and bridges to name a few, connector characteristics must be specified. The system designer, engineer or operator is not only entitled to know, but must know beforehand exactly what performance can be expected from each component or part of his system. Connectors do not have to be expensive to be good. It costs no more to machine a connector body to the correct electrical dimension, than it does to machine one that has been called out incorrectly. Engineering design together with the manufacturing quality control that goes into the connector determines its overall quality. The connector design must be kept as simple as possible and require no special tools for installation. In this way the installation of the connector on cable can be made next to foolproof, at the least cost in labor.

Where the industry has been reluctant for one reason or another to furnish performance and/or manufacturing specifications, or develop components with characteristics that were needed, the knowledgeable users have taken the initiative and prepared their own specifications. These become the purchasing guides. One example of this can be found in Bell specification No. KS-19925 designed to cover CATV amplifiers.

Communication Dynamic Corporation has taken what it believes to be a forward step by publishing a full technical specification to which its CATV connector product line is designed and manufactured. □

REFERENCE—

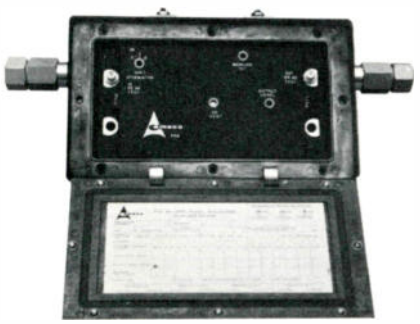
1. Robert, W. L., "Impedance Discontinuities In CATV Cables," TV & COMMUNICATIONS, Nov. 1965.
2. Sunde, E. D., "Earth Conduction Effects," Van Nostrand.
3. Bewley, L. V., "Travelling Waves on Transmission Systems," 2nd Ed., John Wiley.
4. Jickling, R. M., "Meeting on High Precision Connectors, N.B.S., Boulder Labs, June, 1961," N.B.S. Report No. 7277.
5. Griemsmann, J. W. E., "Design and Performance of Cable Connectors for Microwave Use," Report No. R-520-56, PIB-450 Contract No. NObsr-52078, Index No. NE-110718.

PRODUCT REVIEW

NEW COMPONENTS FOR CABLE TELEVISION SYSTEMS

NEW AMECO LINE

Ameco has announced the availability of a new series of mainline amplifiers for CATV. Called the Pacesetter series, solid-state equipment is said to employ a new concept in cable TV amplifiers. The amplifiers are designed with a unitized circuit assembly that incorpo-



rates all amplifying. AGC and bridging circuitry; built-in power supply, plus surge protection devices. Pacesetter amplifier units include the PSM mainline, PSMB mainline-bridger combination, PSA mainline with automatic gain control, PSB bridger and PSE extender.

Electrical characteristics of the mainline amplifier, PSM, are listed at an output of 48 db at channel 2; 48.5 db at channel 13. The Pacesetter line extender output capability is listed at channel 2 as 42 db and at 13 as 40 db.

For more information, contact Ameco, Inc., Sales Department, 2949 W. Osborn Rd., Phoenix, Arizona 85017.

NEW "DIAMOND 4" ANTENNAS

A new series of special-purpose array antennas designated "Color Captain" has been announced by Jerrold Electronics Corporation. These "Diamond 4" arrays are said to eliminate interference problems inherent to complex, multi-channel CATV systems through co-channel rejection.

The Color Captain log-periodic arrays are available in three basic models to cover all of the VHF TV channels. Model CC-234 for channels 2, 3, and 4; Model CC-456 for channels 4, 5, and 6; and Model CC-713 for channels 7 through 13. Each is a complete array ready for installation.

Complete data is available from Jerrold Electronics Corp., Government and Industrial Division, 401 Walnut Street, Philadelphia, Pa. 19105.

NEW DIRECTIONAL COUPLER

Craftsman Electronics has announced the development of a new indoor directional coupler for CATV applications. The 600A Directional Coupler is available in tap attenuations of 10, 14, 18, 22, 26, and 30 db and is said to feature high return loss on the input, output and tap terminals. The surface mounted tapoff features MF-61A fittings for the through coaxial line and tapoff line. It may be combined with Craftsman's two-way and four way splitters, models 2WDWSF and 4WDW-F. Dimensions are 15/16" x

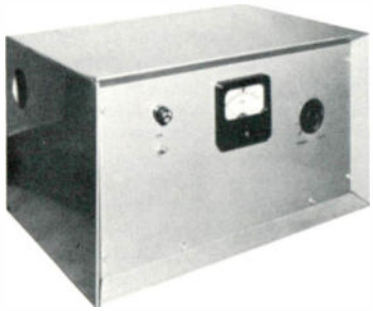
2-1/16" x 3". Shipping weight ¼ pound. Installers net price is $7.95 including MF-59A cable connectors. For additional information contact Craftsman Electronic Products, Inc., 133 West Seneca Street, Manlius, N. Y. 13104.

CABLE SEALING RESIN

3M Company has introduced a new, two-part resin specially designed for capping and sealing communications cables. Known as "Scotchcast" brand Electrical Insulating Resin No. X3598, it is a fast curing, flexible polyurethane material for use in communications applications where low voltage systems are in use. No. X3598 cures within 2 to 5 minutes at 75°F. The low cure temperature will not harm sensitive plastic wire insulation.

HI-POWER AMPLIFIER FOR CATV

Jacobsen Electronics, Rapid City, S. D. has introduced a new high powered amplifier for CATV, that when centrally located, is said to serve cities up to 6,000 people with no other amplifiers of any type in the system. Jacobsen Electronic's lowband model HP6 includes channels 2 to 6 and lower portion



of the FM band. Up to 4 watts per channel is said to drive enough signal on aluminum cables to furnish adequate signal levels for several miles. Modulator or regular head-end equipment supply normal levels to the new device which amplifies each channel individually, using one tube per channel. Application of the amplifier in small towns is said to make an absentee operated system a practicality. Contact Jacobsen Electronics, 415 6th Street, Rapid City, S.D.

JERROLD CARS EQUIPMENT

The Communications Systems Division of Jerrold Electronics has announced the availability of its solid-state 440 series microwave equipment in the recently authorized Community Antenna Relay Service (CARS) band (12.7-12.95 GHz). The CARS band 440 model is of the same solid-state, modular

design as the 6-8 GHz 440 equipment previously offered for other applications. For details, contact Jerrold Electronics Corp., 401 Walnut Street, Philadelphia, Pa. 19105.

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CATV System with cash flow. Will offer stock of public corporation for good system. Write Dept. T122, TV & COMMUNICATIONS.

CATV NATIONAL ACCOUNTS MANAGER

BSEE or equivalent. Strong communications / CATV equipment background including RF solid-state circuitry. New business development specialist to market full line services, products to independent 'multiple system owners telephone companies, U.S.A. and abroad. Knowledgable in contracts, turnkey procedures, CATV system planning. Negotiable 5-figure salary, performance incentive, travel expense. Relocation paid. Send resume, salary history in confidence to R. N. Malonek, Ameco, Inc., P.O. Box 13741, Phoenix, Arizona.

WANTED

Technician — CATV experience — permanent position — no traveling — 220 mile system — $525-$575 a month — Liberal vacation, insurance, hospital benefits. Send resume: Cablevision, 716 Francis, St. Joseph, Missouri.

CHIEF TECHNICIAN

Largest CATV operator in New York State desires Chief Technician for one of its systems. An excellent opportunity. Experience is necessary. Send resume and requirements to Dept. 123, TV & Communications.

ATTENTION

CATV FIELD ENGINEERS AND SYSTEM ENGINEERS

ARE YOU:

1. Feeling insecure because of recent slow-downs and days off in CATV manufacturing. **2.** Fed up with traveling to different communities by the dozens? **3.** Disgusted with never having more than a superficial knowledge of the system on which you are working, because of "hit and run" assignments? **4.** Weary of "grinning and bearing it" while customers scream about equipment shortcomings, delayed shipments, incorrect billing, etc., etc., etc., and threaten to buy elsewhere?

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Five years direct personal experience with CATV system design, construction, trouble shooting, maintenance, head-end and antenna work. Radio-telephone first or second-class tickets. Some microwave experience.

This offer open to any qualified CATV technician. Send resume or call: **MR. ROGER WILSON.**

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2 FIELD ENGINEERS WANTED

Young expanding communications construction organization needs two field engineers for projects throughout U.S.A. Graduate engineers or equivalent in service. Telephone/CATV system design experience required. Jobs involve travel. Good pay for right men. Write James Nishmura, Communication Systems Corporation, 140 East Main Street, Huntington, New York 11743.

ENGINEERING POSITION WANTED

Top man looking for chief engineer position. Eleven years experience, FCC license. Microwave experience plus three years in system construction work. Reply to Dept. T128, TV & Communications.

EXPERIENCED CATV TECHNICIAN

. . . looking for position with growing systems group. Nine years in Industry. Fully experienced in management and operating techniques. Resume on request. Reply Dept. T126, TV & Communications.

CATV MANAGERS

Several Openings Available — Single system and multiple system responsibility. Some CATV or related field experience necessary. Applicants should demonstrate ability to supervise, promote, and accomplish results. Company is one of the larger, newest, fastest expanding in the field. Top fringe benefits—security. Salary commensurate with ability and experience. Send resume to Dept. T127, TV and Communications.

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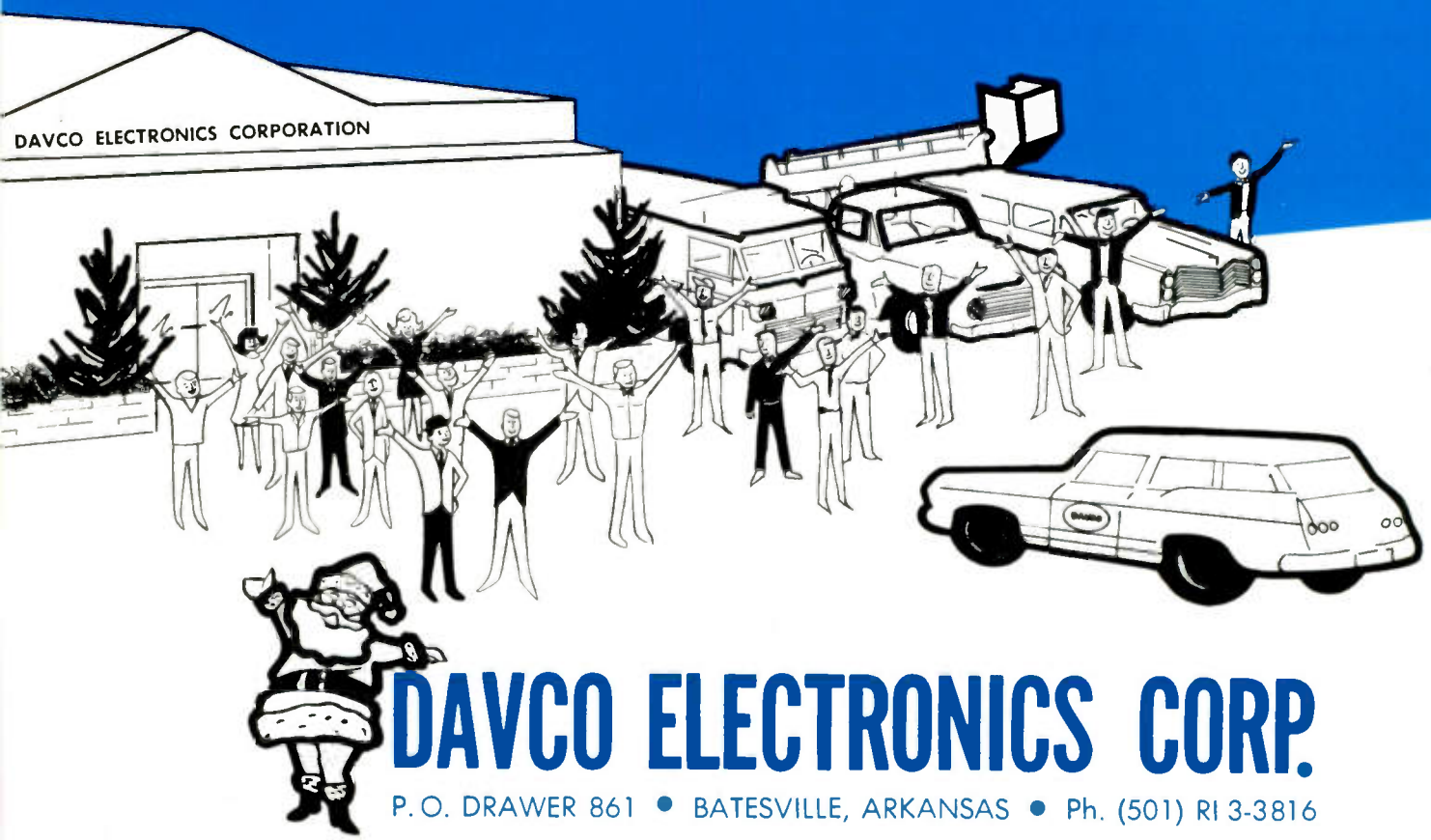

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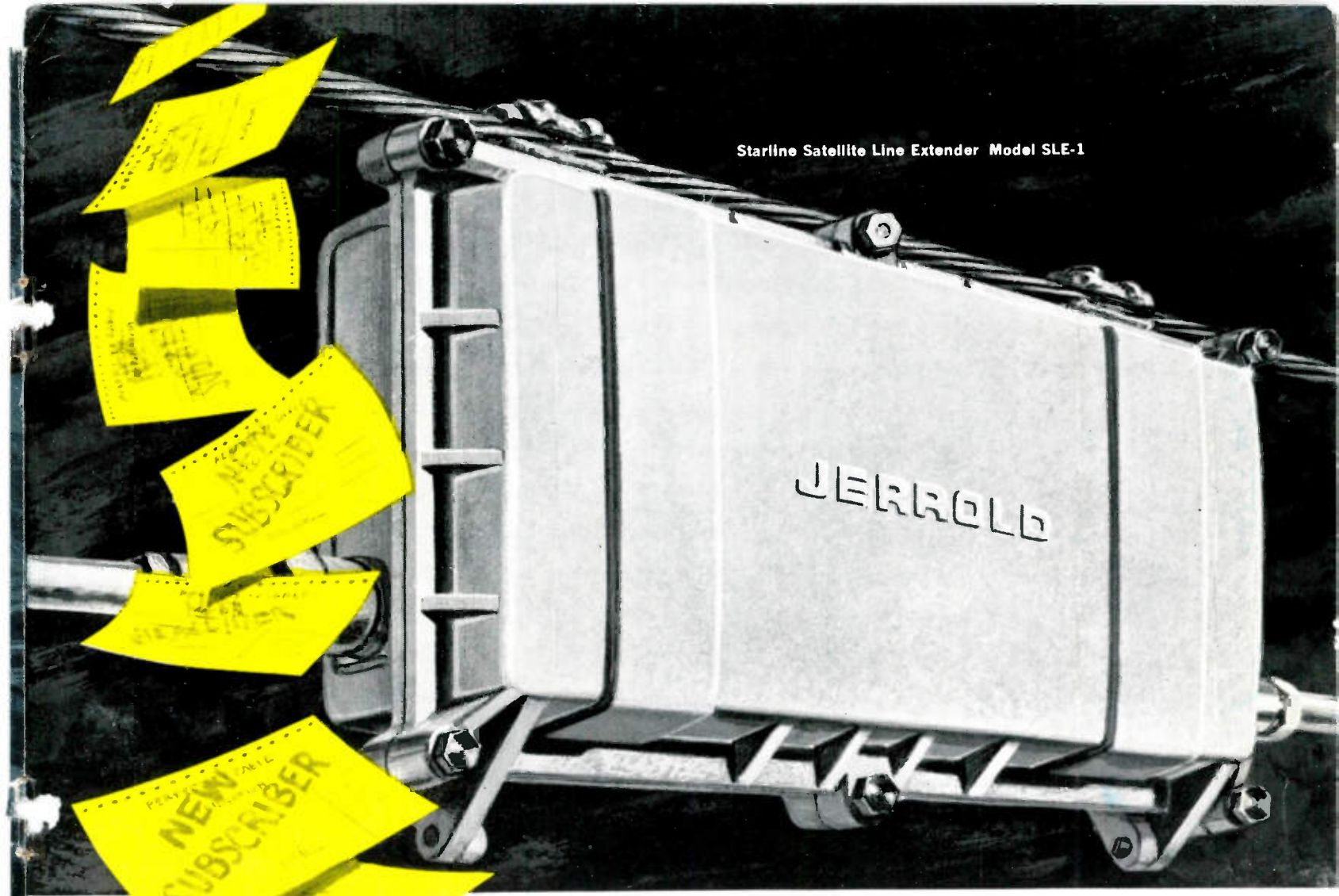

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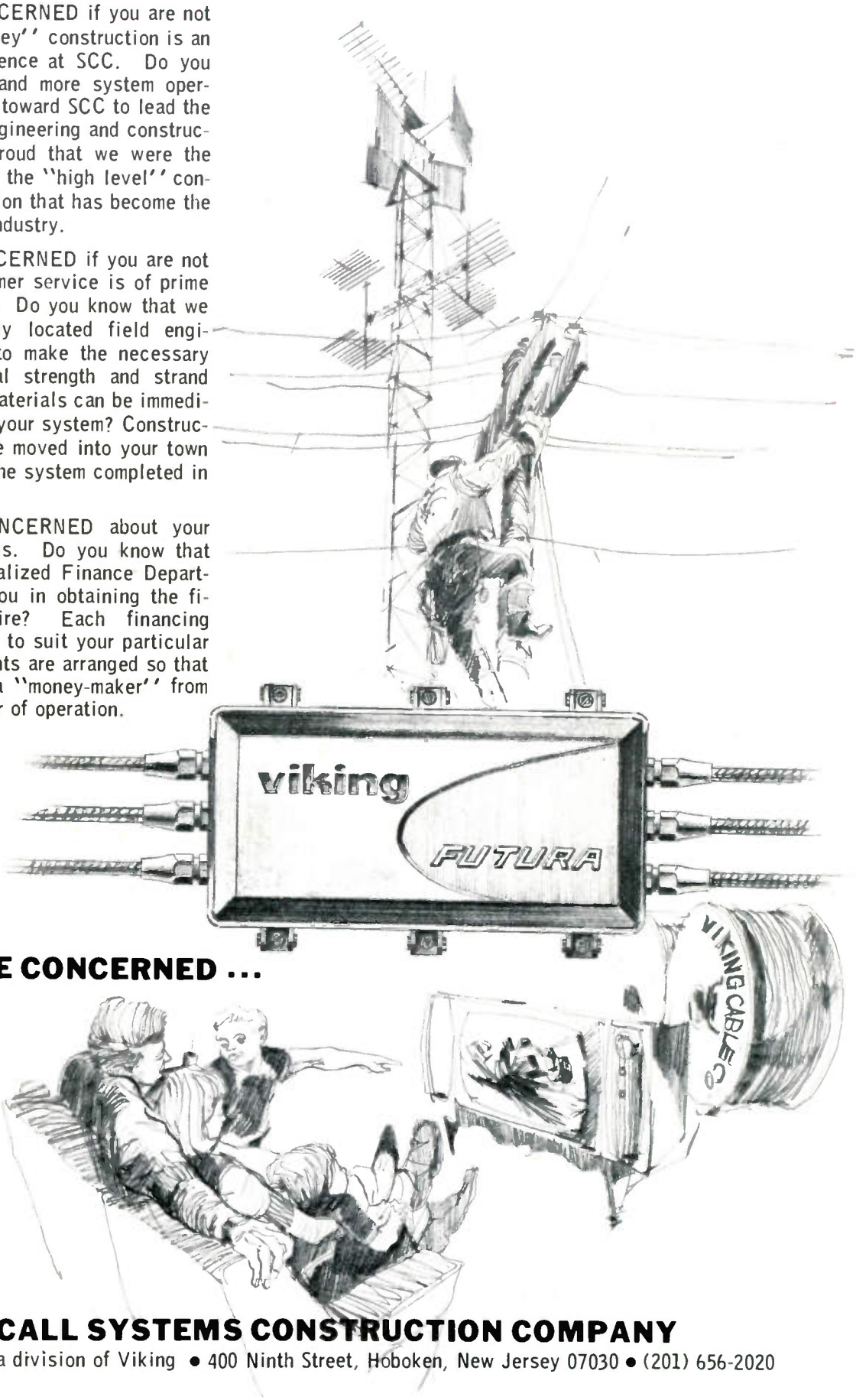

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