Inside this issue...

UHF - VHF Conversions
Using Two-Way Radio
Connector Concepts
Jerrold’s new four-outlet directional-coupler taps minimize ghosts caused by mis-match in the feeder line beyond the tap location. They’re available in eight different isolation values (10 to 40 db). Four outlets are ideal for densely-populated areas. The DCM series taps feature high isolation between outputs, low feed-through loss, seized center conductor facilities, new F-61B chassis fittings for better weather proofing of drop-cable connections, plus weather and radiation-proof housings. For complete details on these reliable, economical, perfect-for-color multi-taps phone 215-925-9870, or write

CATV Systems Division
JERROLD ELECTRONICS CORPORATION
401 Walnut Street
Philadelphia, Pa. 19105
Viking Futura series represent the ultimate in CATV amplification. The Futura features modular, solid state plug in components enclosed in a universal die cast housing. An electrically superior amplifier, the Futura has an extremely linear phase shift through the entire VHF band. Integrated AGC units with silicon type, solid state components produce higher outputs with lower noise figures. Designed for years of reliability and ease of operation, Futura amplifiers offer unparalleled performance.

Now and in the future the Viking Futura series deliver “Full Spectrum CATV.” Call collect today for all your CATV requirements.
TeleMation

where program origination begins!

TeleMation live local origination

TeleMation has a package to fit your live origination requirements, be they large or small. Our offerings run the gamut from a Basic System (viewfinder camera, videotape recorder and accessories) to an elaborate studio. And you can be sure TeleMation has the know-how and the hardware—selected from over 150 broadcast equipment manufacturers—to deliver professional cablecasting systems.

Watch for our new CABLECASTER® VIDEO CONTROL CENTER coming soon. It embodies the advantages of EIA (broadcast) standards, as well as the portability and economy required for CATV. It will be fully compatible with all TeleMation-furnished weather, news and live camera equipment, old or new. Specifying a TeleMation package today, assures you of the long term benefits of TeleMation’s continuing developments in the Cablecasting field.

AMPEX VR-6000

WEATHER CHANNEL ™ ‘97

Beautifully styled successor to the famous TMW-2B — All new with these all new and exclusive features:

- No meter shadows
- Pan and tilt for live local origination
- Built-in slide programmer
- Adjustable L & R dwell
- Binary sync generator
- Long scale (250°) Texas Electronic dials

Greater value for less money.

$5495.00 complete
The TeleMation/AP NEWS CHANNEL is YEARS AHEAD with smooth, readable presentation of top stories from the AP news wire; “Electronic Brain” controls operation to provide viewers with most interesting, most recent news. Field proven in scores of installations.

**WEATHER CHANNEL™ ‘75’**

New low-cost companion to the ‘97’. Designed for smaller systems needing a less expensive unit but at no sacrifice in quality — same shadowless Texas Electronics instrument — same G.E. camera — same decorator styling — same pan and tilt feature.

New low cost

**$3995.00 complete**

**NON-DUPLICATION SWITCHER™**

Newly developed to provide increased capacity with simplified programming — exclusive elapsed-time programming (every switcher event can be used regardless of time) makes this compact programmer equivalent to a 96” x 96” pinboard. Twelve channel capacity and one minute resolution to handle the most difficult schedules.

If you don’t know switchers know your supplier — TeleMation has manufactured more non-duplication switchers than all others combined.

**TELEMATION**

2275 South West Temple
Salt Lake City, Utah 84115
Telephone (801) 486-7564

Buy integrity . . . 

Buy Telemation!

**IN THIS ISSUE**

Finding Faults

Maintenance crews for underground systems find one of their more troublesome and time-consuming duties to be the location of damage within the plant. In such a system, utilization of a fault locator can prove profitable to the extent of reducing a day-long search for damage to less than half an hour. Read how Cablevision of Lafayette (Calif.) applies this labor-saving technique to advantage, on page 60.

Two-Way For CATV

Two-way radio has for many years been the communication industry’s boon to efficient, organized business. Most endeavors require a certain amount of communication between personnel and maintaining a cable system is no exception. An efficient method of communication has unlimited value in keeping the operation running smoothly. Vumore’s John Monroe points out the requirements and advantages of two-way radio for CATV systems, on page 34.

Converting UHF Signals

Keeping pace with public demands will soon necessitate the addition of UHF to many more CATV systems, says Entron project engineer Edward Wuerms. Wuerms points out that UHF is not compatible with present CATV systems, and although many converters are available for home receivers, high noise figures and frequency drift make them unacceptable for CATV head-end use. Read Wuerms’ consideration of UHF to VHF conversion, on page 52.

Operator With A System

When Clear-Vision Television of Nogales, Arizona, began operation in 1953, owner Jesse Allen hooked up a total of one household and three TV shops. Today, subscribers number over 1,800. Author Sam Street recounts the story of the man behind the Nogales system, on page 39.

**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.

Stanley M. Searle, Patrick T. Pogue PUBLISHERS

**Staff**

Stanley M. Searle • Editor
Robert A. Searle • Managing Editor
Charlene Williams • Associate Editor
John Paul Johnson • News Editor
I. Switzer • Technical Associate
John P. Cole, Jr. • Legal Editor
Lon Conner • Contributing Editor
David F. Teer • Contributing Editor
Charles Wigo • Contributing Editor
Patrick T. Pogue • Business Manager
R. Wayne Wilson • Advertising Manager
Jock Jungroth • Advertising Sales
Robert Hunt • Production Manager
Lee Spaulding • Artist
Frank M. Benedict • Artist
Frances Poe • Circulation
we’re looking for the oldest AMECO solid-state amplifier in operation

You can win a sunderful, wonderful vacation for two in Phoenix, Arizona absolutely free! Plus! A free new Ameco PACESETTER amplifier.

Anyone can enter. Entry blanks were mailed to all CATV systems in late November. If you did not receive one and think you may have the oldest solid-state Ameco amplifier in operation, call 602-262-5500. We’ll rush your entry blank to you.


AMECO, INC., 2949 West Osborn Road
P.O. Box 13741, Phoenix, Arizona 85002
(602) 262-5500

Two-Way Radio; A Tool For CATV Operators
A means to better service and lower costs, by John Monroe

Selecting Two-Way For Your Cable System
Efficiently meeting your communications needs, by Peter S. Carr

Profile Of A Successful System
A visit with Cable-Vision TV of Nogales, by S. S. Street

Using Cable Attenuation To Improve Transmission
Structural return loss of coax examined, by Clay Marohnic

Telephone Industry Relations With CATV
The position of the NCTA, by Bruce E. Lovett

UHF To VHF Converters For CATV
A comprehensive discussion, by Edward Wuermser

Using A Fault Locator For System Maintenance
Trouble shooting buried or aerial plant, by Edward M. Allen

Amplifier Output Capability: Proposed NCTA Standard
Uniform technical specification proposed to industry

CATV TECHNICIAN SECTION

Connector Design And Cable System Performance
The vital role of connector quality, by Richard A. Bolz

DEPARTMENTS

Editorial
Industry Perspective
Letters to the Editor
CATV Legal View
Management Corner
News Spectrum
Focus on Progress
Subscription Information
Financial Report
New CATV Products
Classified Advertising
Index to Advertisers

CIRCULATION: TV & Communications is circulated through United States and foreign mails on the first day of each month. In individuals and firms dealing in products and services for community antenna television (CATV), CCTV, and microwave. A detailed circulation breakdown is available upon request. TV & Communications is published 12 times per year. ADVERTISING. Commercial display advertising is accepted from manufacturers and suppliers of electronics equipment and allied services, at the discretion of TV & Communications management. Advertising rate cards and circulation breakdown are available upon request. COPYRIGHT: Contents of this publication are copyrighted by Communications Publishing Corporation. No material, either written or graphic, may be reproduced without the written permission of the Publishers. TV & COMMUNICATIONS is published at Oklahoma City, Okla. Subscribers should allow six weeks for change of address. PUBLISHERS: Patrick T. Pogue and Stanley M. Seaier.

TV & COMMUNICATIONS • 207 N.E. 38th St. • OKLAHOMA CITY, OKLA.
look to PACESETTER for TRUE interchangeability

45 seconds! That's all it takes to change-out the entire circuitry in the PACESETTERS! They're designed with a Unitized Circuit Assembly that plugs into a universal housing. You can pre-install the housings in a new system or cut down-time to a minimum with the PACESETTERS.

This new generation of mainline amplifiers features built-in reliability plus highest quality performance in any system location. Weather-protected housing, optional seized center conductors, matched input/output, tapped primary power transformer, built-in surge protection are but a few of the cost-saving innovations in the PACESETTERS!

You can try the 45-second test yourself! Call 602-262-5500 today. An Ameco representative will bring you the PACESETTERS for demonstration.

ameco
P.O.Box 13741, Phoenix, Arizona 85002.

WE DESIGN, BUILD, EQUIP AND SERVICE CATV SYSTEMS ANYWHERE IN THE WORLD.
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 CATV’s 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 unpublished 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.
Superior "Alumagard" Coaxial Cable for CATV

Designed for aerial applications, Superior Alumagard Coaxial Cable features a solid aluminum sheath over Cell-O-Air® expanded polyethylene dielectric. In addition to providing the essential desirable physical characteristics, "Alumagard" Coaxial Cable gives you the "electricals" that assure long-term transmission stability.

You can use all the frequencies available to you because there are no attenuation discontinuities over the continuous range through 219 MCS and beyond.

Dependable Member of Superior's Quality Line!

75 ohm Cell-O-Air® expanded polyethylene dielectric—with extra high strength solid aluminum sheath. Every reel sweep tested over its full length. Guaranteed 5 years.

For detailed information and prices, write

SUPERIOR CABLE
SUPERIOR CABLE CORPORATION / HICKORY, NORTH CAROLINA 28601
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 origination 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 volley 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 origination--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.
The Model R-3T Trunkline Amplifier by ENTRON embodies the latest proven concepts in solid-state design coupled with packaging ingenuity.

The R-3T features automatic gain control and covers the entire bandwidth of 50 to 230 MHZ. Accurate slope control is insured by ENTRON's G-1 (73.5 MHz) Pilot Carrier Generator. Regulated 2.5 A and 5 A supplies are available for remote power.

The amplifier module is 100% plug-in, for simple installation and removal without having to disconnect the cable.

The R-3T is available with all popular connectors (0.412, ½, and ¾-inch cable sizes) including ENTRON's new ER 800 flare types, which prohibit cable pullouts in cold weather.

One of ENTRON's completely solid-state system components—write for R-3T specifications!
from
COMMUNICATION DYNAMICS
the New Standard
of quality in CATV

CDC offers a new high standard in its CATV connector series. Introducing the quality and reliability of missile specifications to the CATV industry for the first time at a competitive price, the complete line includes types N, F, UHF, Splices and amplifier entry fittings. Cable sizes .412", .5" and .6".

PERFORMANCE SPECIFIED
• TRULY WEATHERPROOF — SEALED TO 30 PSI
• SILVERPLATED, BERYLUM COPPER CONTACTS
• VIRGIN TEFLOM DIELECTRIC
• UNITIZED GRIP ASSEMBLY — INSTALLED IN SECONDS
• LOWEST VSWR

Catalog and Technical Performance Specification C-12627-V, Issue 2 available on letterhead request.

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. Incidentally, 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.
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.

Here is the first multi-channel solid-state microwave system designed specifically for use in the C.A.R.S. band (12.7-12.95 GHz). Using the same proven solid-state circuitry as the 6-8 GHz common-carrier 440, the new Jerrold CARS 440 provides sharp, true color and black-and-white pictures over even the longest hops. Transmitters and receivers are designed for stacking to a single antenna without auxiliary equipment. With CARS 440 you're assured maximum stability, high output, minimum maintenance—at a surprisingly low price.

It's not too early to plan your CARS system. Start by talking with Jerrold, the people who know CATV best. Write today for complete information.
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 top 100 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 within the 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 within 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.

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 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 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.)
With Times' CATV cable send him up once... then forget it.

Timatch perfect match connectors
This trip won't be necessary again for at least five years when the cable you install is Times JT1000 seamless aluminum tube sheath coaxial cable. You can forget about the cable later if you remember this now: Times JT1000 lasts longer up on the poles — without costly repairs or continuing maintenance. Instead of degrading from the day you install it, your cable will have the same high-performance quality five years or more from now. Because it's seamless, it's water and vapor proof. Self-sealing when tapped. Gives a 30db return loss guarantee, and radiation protection when high power level amplifiers are used. 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.
If Experience is the Best Teacher

We've been supplying equipment to the Western CATV industry for over 11 years. And—we're system operators. We'll recommend and supply all your specific system needs, based on extensive experience—and at reasonable prices.

We stock a wide variety of equipment for every system need. CATV Equipment Company is the “one-stop” CATV supply center of the Far West. And—we specialize in getting orders to you fast!

For any system need, call CATV Equipment Company—the experienced CATV supplier of the West.

CATV EQUIPMENT COMPANY
1422 - 34th AVENUE • SEATTLE, WASHINGTON
PHONE (206) 325-6838

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.
WHAT'S BEHIND THE GREAT NEW COLORVUE CATV TRUNK-LINE AMPLIFIERS?

HERE'S WHAT:

It didn't take **all** of AEL's 234 engineers, 7 plants, 13 operating divisions and 1125 employees to come up with the fabulous new COLORVUE line of solid-state trunk-line amplifiers!

But . . . the availability of top engineering talent and unmatched research and design facilities made possible COLORVUE's high output, high gain, flat response, true modular design, and a great many more state-of-the art characteristics.

Now, the payoff . . . economy! AEL's manufacturing expertise and complete production facilities add up to fast and easy maintenance—down-to-earth prices—for you.

Want to know more about AEL and/or COLORVUE? Just drop us a line. Better yet, call us at 215/822-2929.
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 distribution 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 “constitute (sic) a part of a plan or scheme to benefit the Bell System in two essential ways; namely, it provides a method whereby CATV undertakes the construction of coaxial cable capacity which can be converted to Bell System use 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 action 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.

December, 1966
Viking has developed a new inexpensive Installation Signal Strength Meter with the technician in mind. For the first time, you can now obtain a lightweight utility meter, completely transistorized to check approximate levels for tap installations, drop wires and customer installations on the RF level. Two frequency measurement ranges are available, 54 - 88 mc. or 174-216 mc. and are selectable by switch. Special features include a pull on power switch that shuts off automatically when the cover is closed, eliminating any possibility of battery discharge. In normal use, you can expect to receive more than 75 hours of battery life from two 4.2 volt mercury batteries. The compact size allows complete flexibility and convenience when working at the tap or other typical system requirements. Cable TV technicians now have a rugged, durable, easy to handle Installation Signal Strength Meter. self-contained in a leather padded carrying case with adjustable shoulder strap.

NOTE: Batteries NOT Included.

**SPECIFICATIONS**

- **Frequency range:** Two broadband ranges; 54-88 mc. or 174-216 mc. separately selectable by switch.
- **Input:** 75 ohms with D.C. block.
- **V.S.W.R.:** 1.3:1 Max.
- **Full scale sensitivity:** +6 dbmV to +36 dbmV.
- **Meter calibration:** -4 dbmV to +6 dbmV on meter face; range extended to +36 dbmV with 10 and 20 db attenuators at input. The meter is calibrated for r.m.s. reading.
- **Accuracy:** Max. ±1.5 db for single frequency.
  Max. ±2.5 db for equal levels of multi-carriers.
- **Power requirements:** Battery powered by two 4.2 volts mercury batteries. Switch provided for battery check.
- **Connector:** Type "F" female.
- **Dimensions:** 6¾" x 4½" x 3½".
- **Weight:** 2 lbs.

**only $150.00**

**model 5907**
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 step much of the problem of stringing cable underground. The re-broadcast 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 seen by 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 propagation 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 subject 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.

**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 WRPL-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: Cableview 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."

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

December, 1966
Pruzan Same-Day Service
means more
than speed alone...

...like large inventories. Inventories that are large in both scope and quantity are basic to Pruzan "Same-Day Service." If you don't have the material in stock you can't ship an order the same day it is received. And we are now making same-day shipment on 85% of our orders and looking for improvement.

Pruzan maintains large quantity stocks of more than 7,500 different products. You'll find all your regularly-needed materials plus a great many highly specialized and "hard-to-find" items. At Pruzan you can get more of your supply needs, with faster shipments, than from any other single source.

Call or write today for catalogs, quotations or immediate shipment of your needs.

Communication, CATV & Power Line Supplies

Pruzan Company

Phone 206 + 624-6505 / 1963 FIRST AVENUE SO., SEATTLE, WASHINGTON 98134
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."

---

**No matter how you look at it:**

You just can't beat the Model C-1 Field Strength Meter Calibrator.

A battery powered, highly portable solid state laboratory instrument engineered for CATV, use the Model C-1 Calibrator in checking and calibrating the accuracy of Field Strength Meters.

**SPECIFICATIONS**

- Frequency coverage: 54 Mc — 216 Mc
- Output level: 26, 20, 6 ODB
- Output accuracy: Within 1 DB
- Output impedance: 75 Ohms, F Type Connector
- V.S.W.R.: Better than 1.05:1
- Size: Approximately 4½ x 5 x 7 inches
- Power Supply: Regulated using 2-9 volt 2nd 6
- Warranty: 90 Days

The accuracy of Model C-1 is assured by the use of a stabilized passive power detector, read out on an internal microamperemeter at one point for all frequencies, thus eliminating even the inaccuracies due to microamperemeter nonlinearity. All R.F. circuits are double shielded to prevent "strays" and to allow measurement at low levels.

**MODEL C-1**

TV CABLE SUPPLY CO.
BOX 38, CARLISLE, PA.
PHONE: 717-243-4918

December, 1966
Craftsman makes electronic products for men who make DECISIONS!

Mr. Bill Bresnan, Executive Vice President of Jack Kent Cooke, Inc. is a man who makes decisions. His company uses the Craftsman Modular Directional Tap. So should you.

MODULAR DIRECTIONAL TAP

During a recent tour of the Craftsman Facilities with Dan Mezzalingua, Mr. Bresnan discovered why he not only saves money on in-line taps but also why the Craftsman Modular Directional Tap is the best on the market. Superior engineering, high quality standards and a never-ending strive for excellence makes the Modular Directional Tap worthy of the name Craftsman. You too can find out what Bill Bresnan learned...there's no substitute for any of the Craftsman products.

For more information on the new Craftsman Modular Directional Tap ask for Data Sheet 1050.
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 they 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.

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.

"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.
CATV
Construction and Engineering

Consider the requirements of your CATV system. Henkels & McCoy, Inc. provides you with skilled personnel, the latest equipment and valuable experience in:

- Outside Plant Engineering
- Transmission Engineering
- Installation of Head End Equipment
- Aerial Line Construction
- Pole Line Construction
- Aerial Line Engineering
- Underground Construction
- Clearing Make-Ready
- Pole Line Balancing
- Placing Electronic Components
- Placing House Drops

Eighteen years in CATV systems construction, and over 40 years in utility construction and practices have taught us what is needed—well versed in installation of all types of cable and electronic components.

This experience and capability as the nation’s largest independent telephone and CATV contractor is available to you. Discuss your needs with your Henkels & McCoy, Inc. district office, or send for a brochure describing H & M services.

**East Coast**
Jolly Road
Blue Bell, Pa. 19422
Tel. (215) Mitchell 6-8006

**Central States**
1800 Johnson Street
Elkhart, Indiana 46514
Tel. (219) 264-1121

**West Coast**
14531 E. Garvey Street
Baldwin Park, Calif. 91706
Tel. (213) 962-3271

**Southeast**
2710 Varsity Place
Tampa, Florida 33612
Tel. (813) 932-0020

---

**Announces a New CATV Library Service**

These helpful and timely publications may now be conveniently ordered through TV & Communications. Each is designed to boost your knowledge of CATV with state-of-the-art coverage of theoretical and practical aspects. Collectively or individually, they make an important addition to any library. Just fill out the coupon below and send with your check or money order. Your volumes will be mailed immediately, postage paid.

- **PRINCIPLES OF TRANSISTOR CIRCUITS**—S. W. Amos 1965. 293 pages, 5/2 x 8/3. Illus. Clothbound $7.95
  
Keep in step with the rapid advance in transistor technology, contains new material on dc stabilization of amplifiers by direct-coupled feedback, phase shift and Wien bridge oscillators blocking oscillators and sawtooth generators. Appendices on transistor parameters and manufacture of transistors.

- **BASIC MICROWAVES**—Bernard Berkowitz 1966. 169 pages 6 x 9. Illus. Clothbound $5.95
  
This comprehensive text develops a clear understanding of the principles underlying modern microwave technology. Although complete in its survey of the field, book is non-rigorous; knowledge of calculus is not required. Mathematical aids are introduced and explained where needed.

  
Written to teach the language of semiconductors for their use in all kinds of circuits. Comprehensive review of principles underlying all semiconductor devices. Covers diodes beginning with a presentation of the fundamental properties of point contact and PN junction diodes. Detailed presentation and analysis of all the parameters of transistors that could possibly interest engineers. Gives methods of designing circuits with transistors.

- **HOW TO READ SCHEMATIC DIAGRAMS**—David Mark 1957. 160 pages, 5/2 x 8/3. Illus. Paper $3.50
  
Covering the symbols and abbreviations used in schematic diagrams related to the electronics field, this book starts with individual components and carries through to complete receivers and similar equipment.

  
A complete course in radio theory from electricity and electromagnetism to antennas and receivers, including sections on radio mathematics and troubleshooting instruments and techniques.

- **INTRODUCTION TO PRINTED CIRCUITS**—Robert L. Swigart 1956. 112 pages, 5/2 x 8/3. Illus. Paper $2.70
  
A clear, comprehensive treatment of the development that has revolutionized the electronics industry. The author fully discusses various manufacturing processes used, maintenance techniques peculiar to printed circuitry, and a wide variety of practical applications.

  
Anyone with a knowledge of electricity can master the fundamentals of electronics by studying this step-by-step course. More than 800 simple, easy-to-understand “teaching” pictures make up more than half of the course. The text is carefully written so that ambiguity is eliminated. There is a complete index on every page—accompanied by at least one illustration. Review pages highlight the important topics covered.

---

**Gentlemen:**

Please send me the following publications from the CATV LIBRARY.

- [ ] A
- [ ] B
- [ ] C
- [ ] D
- [ ] E
- [ ] F
- [ ] G

**Total amount enclosed** $________

**NAME** ____________________________
**ADDRESS** ____________________________
**CITY** ____________________________ **STATE** _______________________ **ZIP** ______________________

**TV & COMMUNICATIONS**
P.O. Box 63992 • Oklahoma City, Oklahoma • (528) 528-3523
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 Pittsburgh, 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-
CUSTOM ORDER THE FEATURES OF YOUR
TIME/WEATHER SYSTEM WITH

WEATHER-SCAN II

Now from the manufacturer of the famous WEATHER-SCAN time/weather system... a new unit designed specifically for CATV systems desiring an economy package. The all-new WEATHER-SCAN II is your answer to a limited budget. Instruments and special features may be custom-ordered to fulfill your exact needs. These new, compact systems may be specified with all the famous Texas Electronics instruments contained in the standard WEATHER-SCAN, or any combination thereof. A premium quality AFCO camera gives flawless, undistorted instrument scanning. Compact size—32 inches wide x 30 inches deep x 16 inches high—takes up minimum floor space, permits easy moving.

Easily adaptable for public service and other messages. A spring release enables camera to swing around for live programming. Camera position is variable...no need to remove from mounting.

If your budget is limited, WEATHER-SCAN II is your answer to time/weather and local origination programming. Another pace-setting product of R. H. Tyler Co. . . .

Same high quality . . . Same variety of features . . . New low price!

CUSTOM ORDER THESE OPTIONS:

Any combination of time/weather instruments you desire. Your choice of electronic rain indicator, clock, temperature, barometer pressure, wind direction, or wind velocity instruments, all precision manufactured by Texas Electronics, Inc.

Any number of message positions you desire, depending on the number of instruments you select. For example, specifying any four instruments automatically gives you two message positions; specifying three gives you three message positions, etc.

Maximize your message capacity for service programming by adding an 80-slide carousel projector. Installation of this automatic unit lets you use five time/weather instruments, increases your message capacity to as many slides as you need.

Famous General Electric TE-20 camera used in the standard WEATHER-SCAN. The ultimate in precision cameras.

Combine the best of these options for your own system's needs. Specify exactly what you want in your time/weather system... and select the price range that will fit your budget.

WEATHER-SCAN II COMES EQUIPPED AS SHOWN FOR ONLY $2195

CONTACT YOUR DISTRIBUTOR—OR WRITE OR CALL

R. H. TYLER CO.

ORIGINATOR OF TIME / WEATHER EQUIPMENT FOR CATV
1405-15TH STREET • WELLINGTON, TEXAS • (806) 447-5841
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 licenses 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 de-vine 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 induce for his own special benefit the restriction of the legitimate business activities of others not so fortunate as to hold television licenses."

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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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.
Where does Kaiser-Cox fit into your CATV plans?

Everywhere!

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™ 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™ 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.
**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 Rentaviorision 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. Haller 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 assignments 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. Duang 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 Kinman 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 Tele-
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., Coshcton, 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 Finn, 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 Middle America CATV Association for the coming year. Other officers include: Raymond W. Baker, vice president; Peter Ruiz, 2nd vice president; and Kenneth Schuelen, secretary-treasurer. Fred McElroy, Ralph Weir, Jr., Harshel 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.

---

CAS variable tap gives you **guaranteed** lowest insertion loss

On a 1000 foot feeder line you can have four outlets at every tap location and still **MAINTAIN LESS INSERTION LOSS and BETTER MATCH** with a CAS variable tap than with any other in-line tap you can buy at any price!

CAS guarantees a minimum insertion loss in proportion to tap value. There's no wasted signal because CAS ILT-830 Series taps use only the signal taken off the line. You completely eliminate "hit or miss" installation. You can install exactly the right value every time.

**NO INSERTS NEEDED**

CAS taps really are **variable**. A simple screw adjustment (see illustration above) gives you a range of isolation values from 8-30 db. **NO INSERTS TO BUY**! Simply set the isolation value you want on an easy-to-read scale.

**SAVE ON INVENTORY**

Now, you can take the guesswork out of inventory control. CAS units adjust simply to all your in-line tap requirements . . . nothing else to buy . . . no more guessing about which value inserts to stock for "so-called" variable taps. You save money on inventory and get **guaranteed** performance.

---

Check these features:

1. Single, two or four customer drops
2. Weatherproof strand mounting enclosure
3. Choice of feeder terminal fittings
4. Unique "floating" feature of the CAS center conductor allows for temperature expansion or contraction with no stress on the positive internal connection
5. High reliability fiberglass printed circuit boards

Compare these **guaranteed** operating specifications:

<table>
<thead>
<tr>
<th>Tap loss (variable)</th>
<th>8 db</th>
<th>30 db</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.25</td>
<td>1.3</td>
<td>.25</td>
</tr>
<tr>
<td>2.35</td>
<td>1.35</td>
<td>1.2</td>
</tr>
<tr>
<td>8 db</td>
<td>1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>30 db</td>
<td>23</td>
<td>35</td>
</tr>
<tr>
<td>Directional isolation</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Order today! Complete specifications on request.

---

CAS MFG Co.

P. O. Box 47066 • Dallas, Texas 75207

214/BL 3-3661
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 familiar "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 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 inventorizing 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.
This is NCTA

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

Fredrick 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

For further information, write

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

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.
Here are 4 prime reasons why COMMUNICATION SYSTEMS CORP. is your best choice for CATV turnkey construction:

1. **Engineering**
CSC utilizes its own professional engineering department to serve you better. Complete integration of system design and construction assures efficiency in building, highest system performance. CSC specializes in total CATV system design and construction...understands your problems...knows how to solve them. State-of-the-art design concepts are employed to give you the most for your investment.

2. **Construction**
CSC backs every project with nationwide experience in CATV system construction, including both aerial and underground techniques. Only full-time, permanent personnel—people that know CATV—form CSC's crews. Surveyors...linemen...technicians...all are craftsmen whose only standard is to give you maximum quality. Veteran experience guides every step of construction.

3. **Independence**
Benefit from the unique services of an independent contractor. No direct ties with equipment manufacturers or suppliers assures selection of equipment based on maximum return for your investment. CSC is completely objective in this vital function. Selection is made for your system's requirements...done with your unique problems in mind. CSC works full-time with you as well as for you.

4. **Extra Service**
CSC handles the entire system design and construction project for you. Every detail is planned to remove the worry from your shoulders. This includes all liaison with telephone and power companies to determine pole line re-arrangements. Total CATV experience guarantees superior workmanship in every phase of construction, done by people who enjoy working for you.

Let CSC handle your turnkey project...we'll make your problems our problems.

COMMUNICATION SYSTEMS CORP.
140 EAST MAIN STREET  HUNTINGTON, N.Y. 11743  •  (516) 271-1262
COMPLETE SYSTEM CAPABILITY
FIELD ENGINEERS WANTED—SEE CLASSIFIED AD ON PAGE 81
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.

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.

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.

December, 1966
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.

With the cable under test connected to the bridge, a signal proportional to the cable reflection 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, 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, .500 inch, and .750 inch diameter cables.

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

TV & Communications
### BRIEF SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>TRUNK AMPLIFIERS</th>
<th>BRIDGING AMPLIFIERS</th>
<th>INTERMEDIATE BRIDGING AMPLIFIERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Band</td>
<td>50-220MHz</td>
<td>50-220MHz</td>
<td>50-220MHz</td>
</tr>
<tr>
<td>Response Flatness</td>
<td>±.25 dB</td>
<td>±.5 dB</td>
<td>±.5 dB</td>
</tr>
<tr>
<td>Min. Full Gain — Ch. 13</td>
<td>26 dB(2)</td>
<td>18 dB(2)</td>
<td>33 dB(2)</td>
</tr>
<tr>
<td>Min. Return Loss, I&amp;O</td>
<td>16 dB</td>
<td>16 dB</td>
<td>16 dB</td>
</tr>
<tr>
<td>Max. Noise Figure Ch. 2 (Full gain) Ch. 13</td>
<td>8</td>
<td>—</td>
<td>26</td>
</tr>
<tr>
<td>Min. Output Level</td>
<td>48 dBmV(4)</td>
<td>48 dBmV(4)</td>
<td>48 dBmV(4)</td>
</tr>
</tbody>
</table>

(1) 25 dB for trunk/bridging units.  
(2) Above trunk amplifier output level.  
(3) Before splitting. Splitter loss is 0 to 0.5 dB.  
(4) Output at high channels for 12 carrier cross-modulation of -57 dB. Bridging amplifier output before splitting.
THE INSIDE STORY

The Colorburst 7000 line of trunk and bridging amplifiers is the industry's new Rolls Royce, despite pricing 5-10% below direct competition. Look at these features:

- Quality transmission of color signals.
- 5 color-coded plug-in amplifier modules.
- Color-coded plug-in splitters for 1, 2, 3, or 4 lines.
- CATV's first linear AGC — integrated circuits.
- Connectorless cable fittings.
- Cascadability of 50 or more amplifiers.
- Radiation-proof housings with pressure fittings.
- Aerial and underground housings.
- Modules interchange with other makes.
- Prompt delivery.
- Full 2 year warranty.

Consider these other important new SKL products for your distribution system, too.

- SKL/7300 Line Extension Amplifier. 24 dB gain.
- SKL/262 High-Level Distribution Amplifier. +58 dBm output, −57 dB cross-modulation.
- SKL/7500 Directional COLORTAP.

Call collect to SKL's Telephone Service Bureau in Boston, 617/254-5400 or Phoenix, 602/264-2775 for data.
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 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 1000 feet 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.

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. Theoretically, 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.

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...
A Total CATV Concept: design, engineering, package

cast aluminum housings

Now . . . A New Housing To Match Quality Performance

- Cast aluminum housing guarantees maximum weather and RF seal, reliability and performance.
- 10 db more output than other CATV amplifiers
- Systems-proven
- Modular in design
- New exclusive circuitry
- Direct feed and directional coupler feed

BEFORE YOU BUILD OR REBUILD . . . CALL OR WRITE C-COR!

C-COR Electronics, Inc.
60 Decibel Road • State College, Penna. 16801 • Phone 814-238-2461
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 VS/WR 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 1080-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 VS/WR of the second cable. In this way, the first amplifier sees only a cable which has an SRL of greater than 30 db.

---

**IF CATV IS YOUR BUSINESS... THESE ARE YOUR PUBLICATIONS**

TV & COMMUNICATIONS Magazine and the weekly CABLE TELEVISION REVIEW news bulletin give you comprehensive thorough coverage of the CATV industry. Every month TV&C is packed with informative management and technical articles, in-depth commentary on industry developments, plus a report on the latest industry equipment. The REVIEW complements this vital coverage with timely reports of the latest CATV news—including FCC and legislative action, system construction, franchises granted, names in the news, and financial notes.

---

Gentlemen:
Please begin my subscriptions to these vital publications.

TV & COMMUNICATIONS

□ Three years $19; □ Two years $14; □ One year $8

CABLE TELEVISION REVIEW

□ Two years $95; □ One year $50

NAME ________________________________
FIRM ________________________________
ADDRESS ________________________________
CITY/STATE ________________________________

COMMUNICATIONS PUBLISHING CORPORATION
P.O. Box 63992 • Oklahoma City, Okla. • (405) 528-3523

December, 1966
CASCADE AMPLIFIERS Are Now Being Used EXCLUSIVELY By The WORLD'S LARGEST CATV SYSTEM

VANCOUVER CABLEVISION, The World’s Largest CATV System Serving 58,000 Subscribers... Now Uses CASCADE AMPLIFIERS EXCLUSIVELY. Find Out How Your System Can Use This Cascade Big System Capability.

Contact Cascade Today:

CANADIAN DISTRIBUTOR:
FRED WELSH ANTENNA SYSTEMS
VANCOUVER MONTREAL
5594 Cambie St., Vancouver 15, B.C. 90 Beaubien St. W.
Telephone (604) 321-2621 Montreal B, P.Q.

CASCADE ELECTRONICS LTD.
ELECTRONIC AVENUE, PORT MOODY, BRITISH COLUMBIA
TELEPHONE (604) 939-1191

CASCADE ELECTRONICS
P. O. Box 866
Cape Canaveral, Florida
Telephone (305) 723-0700

CASCADE ELECTRONICS
2128 Third Avenue,
Seattle, Washington
Telephone (206) MA 3-1230
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 in 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 origination 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 origination 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 utility companies to set pole heights on way of use 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 public 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 previous CATV telephone practices are by the 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 the lease 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 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.
Can a CATV operator be happy with Plastoid aluminum sheathed cable?

Cut out the doubt.

Call (212) ST 6-6200 and find out.

We know hundreds of CATV operators who are happy with Plastoid aluminum sheathed cable. In fact we know so many that we can give you the name of one near you, someone who has faced geographic or climatic conditions similar to yours, someone who probably started with Plastoid cable and is now extending his system with more of the same.

Plastoid's specs are equal to—or better than any other cables ever made. As cable making pioneers, we helped to establish industry standards. And we continue to set them with our half-inch and .412-inch feeders plus our ¾ths-inch trunks. We build, as we always have, for lower attenuation, longer life. And we run constant tests to see that we meet our own high standards.

The best tests, however, are in the field, in working CATV systems. That's where we've helped to create hundreds of happy success stories. At least one of them is taking place right now near you.

Call us whether you want special technical, pricing or delivery information. Or call us to learn about a CATV operator who is happy with Plastoid cable. The next one could be you.
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 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 offering; or by denying 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 cooperation. 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 boundary 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.
Protect your head-end equipment the way manufacturers recommend... with Fort Worth

FACTORY-FABRICATED BUILDINGS

Designed expressly to house CATV and microwave electronic equipment, Fort Worth FACTORY-FABS withstand any climate or location problem... house electronic equipment according to the most rigid standards. FACTORY-FABS are available in popular sizes or custom-built to your design... yet they are surprisingly inexpensive.

- INSTALLED IN MINUTES
Your FACTORY-FAB can be ready to work for you in minutes. You have no rig-up delays on arrival because your building comes with supporting I-beams. Simply drop on your site, connect the service inlet, and you're in business.

- REDUCED COST AND WAITING TIME
FACTORY-FABS save you time and money because complete wiring is installed at the factory. Unlike conventional buildings, equipment can be delivered with it rather than installed on location.

- QUALITY CONSTRUCTION
FACTORY-FABS are designed expressly to house electronic equipment. Result? Problems like inadequate tightness, poor ventilation and improper sealing of doors are non-existent. And... an absolute minimum of maintenance is required.

- FAST DELIVERY
No matter what the weather conditions, site or local labor situations, FACTORY-FABS offer fast delivery and uniformity. We promise delivery on time.

Many options are available in size, outside finish, wiring and ventilation. You owe it to yourself to write for full specifications on these rugged, versatile head-end buildings. You'll find one exactly suited to your needs... at an economical price.

Write or call today...

FORT WORTH TOWER CO.

P. O. Box 8597  Pho. (817) JE 6-5676  Ft. Worth, Tex.
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 compatible 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.

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 1/2" 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 ±0.005%. Using the same LO frequency as in the previous example, ±0.005% 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 inadequacies 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 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 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 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.

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 fre-
quency of 216 MHz, it is quite evident that the diplex
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 interfer-
ence 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 neces-
sary 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.

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
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 fea-
tures, these being, the need for two cables intercon-
necting the LO and mixer, or for the single cable oper-
ation, the need of diplexers to separate signal and LO
at each end of the cable. For low VHF band conver-
sion this is no great problem since the LO frequency
is well removed from the signal frequency, i.e., for

---

New Name...New Look!
THE CATV
CLASSIFIEDS

This vital monthly section of TV & Communications has been completely redesigned to give you maximum benefit. New emphasis...new easy-to-read format makes the CLASSIFIEDS your direct pipeline to the national CATV industry.

- Are looking for employment
- Need to hire a good man
- Want to buy, sell or trade equipment
- Have professional services to offer

...You can reach the entire industry in quick time through the CLASSIFIEDS. Just mail your message to us (we'll write it for you, if you wish) ...and we'll place it in the next issue of TV & Communications. Our rates are low...Confidential reply service is available.

CATV CLASSIFIEDS ARE FOR YOU

USE 'EM...Page 81
NEW YORK CITY HAS NON-FRANCHISED CATV

Firm Now Offering “Telephone Cable TV” Via Bell Leaseback

Martin Sugar, president of Com-Tel, Inc., a subsidiary of Bell Television Inc.--a New York City MATV firm--told the Review last week that his firm is currently operating a “pilot run” cable television system serving 18 square blocks of Manhattan. The area served, Central Park South, stretches from 53rd to 59th Streets and from 5th to Broadway. Sugar reported that the cable television service is being provided in Manhattan under an exclusive leaseback arrangement with New York Telephone Co., a wholly owned AT&T subsidiary, Empire City Subway Co., and New England Telephone Co.

MAINE MUNICIPAL ASSOCIATION TO OPPOSE BARTELL VENTURE

The Maine Regional Association, meeting in Augusta, has designated Rockland city managers to present to the forthcoming legislature. This action by the Municipal Association is to provide Bartell with CATV distribution facilities. Several of the communities

CALIFORNIA PUC ACTS ON ALTADENA

In a decision which both staggered and amazed California CATV operators, the California Public Utilities Commission last Thursday, November 10, finally issued a decision on the complaint of International Cable, lodged against the Pacific Telephone and Telegraph Company and All-Metal Fabricators, Inc. By three to two vote the Commission in essence took a laissez-faire posture on the conflict in Altadena. It sidestepped what was felt around the nation to be a landmark situation by ruling that it could not rule on the merits of the complaint. It ruled that a different nature from CATV distribution facilities.

LEASEBACK WITHOUT FRANCHISE IN AMENIA, NEW YORK

A situation which appears to be roughly analogous to the New England Telephone/Bartell arrangement in the state of Maine is shaping up in New York. This time the principals are New York Telephone Co., a subsidiary of AT&T, and Pawling Telephone Co., an owned.

All the important CATV news
Reported by insiders. Weekly.
Read it first in

CABLE TELEVISION REVIEW

To subscribe, fill out the coupon on page 46
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.

<table>
<thead>
<tr>
<th>CONFIGURATION</th>
<th>10 DB UHF AMP + MIXER</th>
<th>UHF AMP + MIXER + VHF CABLE LOSS</th>
<th>UHF AMP + MIXER + POST AMP + CABLE LOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>F (db)</td>
<td>8.1</td>
<td>12.3</td>
<td>8.9</td>
</tr>
<tr>
<td>S (db)</td>
<td>51.1</td>
<td>46.9</td>
<td>50.3</td>
</tr>
</tbody>
</table>

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
Clete Nelson is as American as apple pie.

... So?

So just 17 years ago last summer Clete founded Utility Tower Company in the grand tradition of free enterprise. His aim was to manufacture the finest communications towers in the industry. And to make a living (a star-spangled virtue in itself).

Under Clete's guidance Utility has built and erected hundreds of towers across the U.S. and around the world (including scores of CATV towers). Ready industry acceptance of Utility towers is apparent—the company just keeps growing.

The tangible reason for Utility's continued success is the product, of course. Utility towers are engineered, built and erected by experts who know CATV. Top quality materials and professional skills are combined to give you the best tower you can buy—anywhere.

Moral? Look to Clete and Utility for your CATV tower needs. Enjoy the all-American benefits of wide experience ... highest quality ... individualized service. And remember that more than nine out of ten customers select Utility automatically for their future tower needs.

Write or call for further information.
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 resonator, 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 equivalent 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

\[ F = \frac{S_a}{S_n} \]

Where

- \( F \) = noise figure
- \( S_a \) = Ideal signal to noise ratio
- \( S_n \) = Actual signal to noise ratio

Rearranging terms to solve for system noise figure

\[ S/N = \frac{S_a}{S_n} F \]

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

\[ F_T = F + \frac{F_1}{G_1} + \frac{F_2}{G_2} + \cdots + \frac{F_n}{G_n G_{n-1}} \]

Where

- \( F_T \) = total noise figure
- \( F \) = noise figure of 1st stage
- \( F_i \) = noise figure of i-th stage
- \( F_n \) = noise figure of nth stage where \( n \) is an integer
- \( G_i \) = gain of i-th stage
- \( G_{n-1} \) = gain of next to last stage

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

\[ S_a = \frac{V^2}{R} = \frac{(0.001)^2}{75} = 133 \times 10^{-6} \text{ Watt} \]

\[ N_a = KTB = 4 \times 10^{-5} \times 4 \times 10^6 = 16 \times 10^{-5} \text{ Watt} \]

\[ S_a = 133 \times 10^{-6} \]

\[ N_a = 16 \times 10^{-5} \]

\[ S/N = \frac{83 \times 10^4}{41} = 2 \times 10^4 = 43 \text{ db} \]

IV. MIXER

- \( F_T = 14 \text{ db} + 25 \text{ db} + 5.1 \text{ dB} \) = 25.1 db
- \( G_1 = 6 \text{ db} = 0.25 \)

\[ F_T = 25 + \frac{5.1}{25} = 41 \text{ db} \]

\[ S/N = \frac{83 \times 10^4}{41} = 2 \times 10^4 = 43 \text{ db} \]

V. CABLE

- \( F_T = 4 \text{ db} = 1 \)
- \( G_1 = 8 \text{ db} = 0.14 \)

\[ F_T = 4 + \frac{25}{14} + \frac{5.1}{14} \times 25 \]

\[ = 283 = 24.5 \text{ db} \]

\[ S/N = \frac{83 \times 10^4}{283} = 2.93 \times 10^4 = 35.7 \text{ db} \]

VI. UHF PREAMPLIFIER

- \( F_T = 4 \text{ db} = 2.5 \)
- \( G_1 = 10 \text{ db} = 10 \)

\[ F_T = 2.5 + \frac{25}{10} + 5.1 \times 10 \times 25 \times 1.32 \]

\[ = 7.5 + 2 + 12.1 = 17 \text{ db} \]

\[ = 12.3 \text{ db} \]

\[ S = \frac{83 \times 10^4}{17} = 4.9 \times 10^4 = 46.9 \text{ db} \]

VII. UHF AMPLIFIER

- \( F_T = 4 \text{ db} = 2.5 \)
- \( G_1 = 10 \text{ db} = 10 \)

\[ F_T = 2.5 + \frac{25}{10} + \frac{5.1}{10 \times 25} + \frac{1.1}{10 \times 25 \times 1.32} \]

\[ = 7.5 + 2 + 0.0121 = 7.5 \text{ db} \]

\[ S = \frac{83 \times 10^4}{17} = 4.9 \times 10^4 = 46.9 \text{ db} \]

VIII. UHF PREAMPLIFIER

- \( F_T = 7 \text{ db} = 5 \)
- \( G_1 = 8.7 \text{ db} = 0.13 \)

\[ F_T = 7 + \frac{25}{10} + \frac{5.1}{10 \times 25} + \frac{1.1}{10 \times 25 \times 10} \]

\[ = 7.5 + 2.4 + 0.121 = 10.02 \text{ db} \]

\[ = 9.02 \text{ db} \]

\[ S = \frac{83 \times 10^4}{7.7} = 1.08 \times 10^5 \]

\[ = 50.3 \text{ db} \]
relax!

Your CATV cable is safe when it is supported

with ALUMOWELD®—the long-life messenger

Relax, settle back and enjoy the comfort of knowing that with Alumoweld® messenger on the job your CATV cable will remain in service year after year. It lets you say goodbye to those revenue-robbing, customer-upsetting outages caused by weather damage and corrosion.

Alumoweld has the highest strength-to-weight ratio of any messenger. It is as strong as steel, weighs less, lasts longer and is easier to handle. The thick aluminum cladding of each wire, never less than 10% of the radius, is permanently welded to the steel core to give greater corrosion resistance. And Alumoweld is completely compatible with your CATV cable, so there's no danger of electrolytic corrosion.

Specify Alumoweld messenger... you can’t buy better, more economical protection for your CATV system.

World Leader In Bimetallic Wire

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION, Glassport, Pa.
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

ALUMOWELD CATV MESSENGER

FAST SHIPMENTS from our warehouse stocks in New York, Chicago, Pittsburgh, Memphis, Reno—and from warehouses of leading distributors.
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 underground 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.

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

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.

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 underground 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.

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

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.
We could help you build communication systems on the moon...

meanwhile... we supply the finest products on earth for Communications Construction

FANNER SUPERFORMED® PRODUCTS

for messenger, guy, open-wire and cable
DEAD-ENDING / SPLICING / GUARDING / SUPPORTING / LASHING / DAMPING

Clip coupon... send for your FREE COMMUNICATIONS PRODUCT CATALOG today!

Please send me Fanner's COMMUNICATIONS PRODUCT CATALOG CP-10.

Name
Title
Company
Address
City__ State__ Zip__

THE FANNER MANUFACTURING COMPANY
Electrical Products Division
Brookside Park, Cleveland, Ohio 44109
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.

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 diminution.

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 re-
duced.

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 mois-
ture problems between conductor and shield. With the addition of
an extendable exploring coil, our fault locator will be used to pin-
point 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.

The fault locators are designed
to operate for approximately 50
hours on a standard six-volt lan-
tern battery, with output auto-
matically 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.
Another Andrews Tower
CATV First:

ANDREWS
QUICK-ERECT
TOWERS

Andrews introduces a completely new concept to CATV with this rugged, revolutionary QUICK-ERECT TOWER! Completely mobile . . . trailer or ground mounted . . . may be erected by five men in four hours. Designed for short term or long term, permanent installation. Fully selectable height.

CHECK THESE OUTSTANDING FEATURES:

■ Microwave towers up to 300', CATV towers up to 410'; ideal for extreme height path surveys. ■ Erected in sections for safety and efficiency; sections are held permanently in place by special safety locks. ■ Erected by its own guy lines; remaining guys are pulled into place by rising sections. Tower may be raised, locked into place, tensioned and lowered from ground level; no climbing necessary. ■ Trailer has its own power unit; trailer-tower is completely self-contained. Room is provided on the trailer to carry transmission lines, reflectors, parabolic disks or antennas. ■ Rugged aluminum, all-welded construction.

ANDREWS QUICK-ERECT TOWERS are your answer to difficult microwave, CATV head-end or path survey problems. Pace-setting quality . . . Time-saving economy. It's another ANDREWS first in CATV! Inquire today for full specifications on these outstanding towers.

CALL OR WRITE

ANDREWS TOWERS, INC.
1420 LAYTON AVENUE • FORT WORTH, TEXAS • 817 TE 1-1222
DESIGNER-MANUFACTURER OF SUPERIOR CATV TOWERS
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 ...

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-

December, 1966
Now that you know all about aluminum sheathed cable, how about an aluminum sheathed, air dielectric type?

Attenuation is about 25% less than the equivalent size of foam cable, for one thing. For another, return loss is guaranteed not less than 26 db from 20 to 225 MC. And, average VSWR on all channels won't exceed 1.03:1. If you need further convincing, an air dielectric coax allows you to run from antenna to head-end equipment into town, over greater distances, with far fewer amplifiers. Imagine what this means to your original installation cost as well as service requirements. And, if the town you want to serve isn't particularly well located and it looks like microwave is the only way out, remember Helical Membrane can handle the job without a special FCC permit.

Helical Membrane coaxial cable is competitively priced with cables covering only the low band frequencies. Quality is the keynote. Adverse atmospheric conditions, heavy snow, hail or rain have no effect. Construction consists of a copper inner conductor supported coaxially by a polyethylene helix. A continuous aluminum outer conductor provides a permanent moisture vapor barrier. You can buy Helical Membrane in 3/4", 7/8" and 1" diameters, 75 ohm impedance, in 1000 foot reels. And, special Habirlene jacketing is available if you're interested in direct burial.

While on the subject, why not look into our Foamflex aluminum sheathed foam dielectric coaxial cable for bridging off Helical Membrane in town? Helical Membrane and Foamflex, a high-performance pair for your next installation.

For a complete listing of Sales-Service-Stocking Centers, plus up-to-the-minute technical data, write, wire, TWX or telephone: Phelps Dodge Copper Products Corporation, 300 Park Avenue, New York, N.Y. 10022. 212 751-3200, (TWX) 212 867-7455.

[Image of Helical Membrane coaxial cable]
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 kHz (kilocycles) of the values assigned by the FCC for all standard channel carriers.

(b) If non-standard channels are employed in the test of the frequencies of their visual carriers shall be within 50 kHz 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 chrominance subcarrier frequency may be omitted during the test.

(b) All visual carriers shall be synchronously modulated, in the normal TV modulation manner (negative transmission) by a symmetrical square wave of 15.750 kHz ± 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.

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.1

1Pgf. 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.

2If the condition set in paragraph (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.
"C" cell batteries. Video detector output is provided for oscilloscope monitoring of video. Bandwidth is limited only by the .5mc I.F. carrier. (Earphones not supplied.) Image rejection is quite good, and error due to side channel overload is minimal because of the use of a double tuned bandpass filter that tracks with the oscillator across the dial. The carrying case is constructed of genuine leather, the same thickness as the ¾" shoulder strap and is lined with velvet covered board for added strength and rigidity. A snap holds the cover completely open in either horizontal or vertical position.

<table>
<thead>
<tr>
<th>Voltage scale</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Db scales</td>
<td>4</td>
</tr>
<tr>
<td>Measurement Method</td>
<td>True peak of sync pulse</td>
</tr>
<tr>
<td>Weight, including carrying case</td>
<td>5-½ lbs.</td>
</tr>
<tr>
<td>Size without case</td>
<td>4½&quot; x 5&quot; x 5½&quot;</td>
</tr>
<tr>
<td>Size with carrying case</td>
<td>3½&quot; x 6½&quot; x 7&quot;</td>
</tr>
<tr>
<td>Carrying case</td>
<td>Genuine leather</td>
</tr>
</tbody>
</table>

Input: 75 ohm F type connector
Accuracy: ±1.5 db All TV channels
Voltage Range: 10 microvolts to 1 volt
Db Range: —30 to +60 dbmV
Frequency Coverage: Ch 2 to Ch 13 One Range
Batteries: (2) 9 volt to 2mn6 (meter)
(2) "C" cells (pilot lamps)

Complete with carrying case and batteries $295.00

AVAILABLE FROM:
TV CABLE SUPPLY CO.  TVC
BOX 38 • CARLISLE, PA. • PHONE 717-243-4918
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 naivete 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 understand 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 markets 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 CATV 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 this seemingly inconsistent conclusions is simply that each is separately 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 unseemly for a late-comer like CATV to question motives since the ground-rules of the 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, 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 might be that some CATV operators are too often rising 20 years ago, that a Federal agency might really undertake to promulgate such unrealistic and unworkable policies.
Three proven Amphenol CATV cables offer you 
low loss, low attenuation, uniform VSWR

The proof is in the picture! Every inch of Amphenol CATV cable is tested for structural return loss. It must pass these quality standards: 26 db structural return loss for minimum ghosting (30 db available on all TV channels), consistently low attenuation and uniform 75 ohm impedance. Based on this performance, CATV contractors have installed over 7.5 million feet of Amphenol cable.

1. HEAD-END CABLE. Seamless, lightweight aluminum cable, .750" in diameter, gives you moisture and radiation protection. Attenuation variance is minimal from the smooth curve: 0.25 db/100' at channel 2, 1.03 db at channel 13. Easy to install in 1000' minimum lengths. Available with all-weather black poly jacket.

2. FEEDER CABLE. Amphenol .500" aluminum cable is a star performer from deep South to Seattle. Attenuation is low for its size: 0.65 db/100' at channel 2, 1.40 db at channel 13. This CATV cable also comes in .412" diameter with attenuation figures of 0.85 db/100' at channel 2, 1.65 db at channel 13. Both available with black poly jacket.

3. HOUSE-DROP CABLE. Performance proved, Century 59/U drop-line cable features Amphenol quality polyethylene dielectric and copper braid shielding for best signal transmission. Attenuation is uniformly low: 2.4 db/100' at channel 2, 4.9 db at channel 13. Polyfoam® version available to satisfy lower attenuation needs.

For more information, see your Amphenol Sales Engineer. Or write to Amphenol Cable Division, 6235 S. Harlem Ave., Chicago, Illinois 60638.
Gabriel Electronics, for many years — and still — the nation's leading designer and producer of microwave communications antennas for Heavy Duty Common Carrier Systems, now offers a complete line of parabolic antennas and passive reflectors to the CATV industry. Designed for CATV . . . economically priced for CATV!

Gabriel antennas have been engineered specifically for CATV where the basic requirement is for economy with reliability and performance. Electrical performance meets all applicable 6, 11 and 12 GHz requirements . . . and mechanical performance meets or exceeds all applicable E.I.A. standards.

Whether you are just 'thinking' about CATV; are starting construction, or plan future expansion to your existing system you'd better write for information on Gabriel antennas. Gabriel offers the best value for CATV microwave systems . . . it's just as simple as that.

**Designed for CATV**

**Priced for CATV**

---

**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 $835,993 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 $5114,000, 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. reported a nine months after-tax profit of $8,536,000 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.
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
DECEMBER’S CATV PROBLEM SOLVERS from PRUZAN

In December, as in every month of the year, Pruzan will provide the answers to supply problems for more and more CATV systems. The reasons are plain. The combination of knowledgeable people and an almost fanatical intent to ship every order on the day it is received means tops in service. Add big Pruzan inventories, covering the widest range of materials in the industry, and you have the key to keeping costs down and construction on schedule... while providing uninterrupted service. Like the idea? Find out for yourself. Call Pruzan today.

Equip your crews for the safest possible working conditions during the winter months.

WARNING SIGNS, FLAGS

Heavy-duty galvanized “A” frame construction, designed so it will not fall over in the wind. Flag holder welded to the side; 18” sq. panel can also be furnished to read “ABEL CABLE WORKING.”

GMP #7358 $16.00 each
16” Red Fluorescent plastic flags w/staff & stay: $1.50 each

HARD HATS

Buy the best for your men. MSA “Shockguard” Hard Hats will give the necessary impact and electrical protection to prevent injuries, and meet all safety requirements. Specify whether you want cap style (pictured) or full brim hat style, yellow or white. $4.50 each ($4.95 each equipped with chin strap)

FIRST AID KITS

WINTER LINERS

MSA “Zero Hood” Winter Liners are for use with all MSA hats and other types of suspensions. Gives complete head, neck & ear protection. MSA - DX-86092 $2.00 each. Specify medium or large size.

PLASTIMAYD RAINWEAR

Here is the heavy duty plastic rain jacket and parka designed for use by linemen and electrical construction workers. Heavy duty rain pants also available. Specify size (S/M/L/XL) and color (Olive Green, Blaze Orange). Ask for your complete Plastimayd catalog. #9540 Heavy Duty Parka: $4.50 each. #9542 Heavy Duty Pants: $4.50 each.

For additional information on any of these products, phone or write: PRUZAN COMPANY, Attn: Bill Keilwitz.

Communication, CATV & Power Line Supplies
PRUZAN COMPANY
PHONE 206-624-6505
1963 FIRST AVENUE SOUTH, SEATTLE, WASHINGTON 98134
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 indefinite 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. Wide-spread 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 against 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. 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 arc, none the less interrelated. Thus it 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 inviolable 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 atmosphere 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.

TV & Communications
ble of withstanding high magnitude peak sheath current surges. Elsewhere in this article, engineering design features are discussed which describe a connector design 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 engineered 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 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 absorption 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, utilizing a hydrostatic, air-dielectric, aerospace cable system. 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 either 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-fifties. 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 water proof if the return loss of the pair is not to be a function of weather conditions.

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, with low 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 $1.80
- **TOTAL DIRECT LABOR** .90
- **Overhead**—90 percent of Direct Labor 810
- **TOTAL** $2.60

**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** Plus customer dissatisfaction, down-time, etc. $6.64

The illustration given may possibly be criticized for over-simplification, 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-
Cascade Electronics introduces the start of a great new, full and complete CATV service for the industry.

Right now one new United States warehouse and sales headquarters is operating in the Northwest. Another is soon to follow in the Harrisburg, Pennsylvania area.

Cable television system owners, operators and technicians will be able to rely on one source for complete service. Each regional headquarters will offer a full line of Cascade "big system capability" CATV gear—from amplifiers, head-end, splitters, taps and cable to technical and engineering service, and system design.

When you need a tap or a complete system, you'll be ahead by calling Cascade.

For further information . . . write or call your nearest sales center.
Cable Size (Inches) Max. Tension (Lbs.)

<table>
<thead>
<tr>
<th>Cable Size (Inches)</th>
<th>Max. Tension (Lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/12</td>
<td>150</td>
</tr>
<tr>
<td>1/2</td>
<td>200</td>
</tr>
<tr>
<td>3/8</td>
<td>450</td>
</tr>
</tbody>
</table>

The cable grip assembly is to hold the connector rating at least equal to the maximum recommended pull rating 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 employ 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 desirable for two reasons: first it results in the least possible cable deformation for a given tensile strength, and second the maximum transfer of shear 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 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 collet}

No spiral migration.
Positive grip. Fast installation
with Diamond Aluminum Support Clamps

Where you're running Figure 8 distribution wire, Diamond Support Clamps with their positive action and unique metal to metal contact provide the greatest gripping strength! The clamping jaws have grooves for .109" messenger on one side, .134" on the other, plainly marked to insure proper installation. Two types are available — pole mounted and cross-arm mounted, as shown. For further information, contact:

DIAMOND EXPANSION BOLT COMPANY, INC.
Garwood, New Jersey
A Division of General Cable Corporation

December, 1966
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, butt 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 mechanically 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

---

**What Makes ROHN CATV Towers Different?**

Here Are Just A Few Reasons Why So Many CATV Owners Are Specifying ROHN Towers:

**EXPERIENCE —** ROHN engineers have more experience and are among the pioneers in tower construction and design.

**DESIGN —** ROHN towers are carefully and fully engineered to DO MORE THAN the job for which they are intended. They're proved by thousands of installations for every conceivable type job.

**COMPLETENESS —** The line is complete for every need. All accessories, lighting, and microwave reflectors are available from ONE reliable source. Entire job can be "turn-key" production if desired.

Write — Phone — Wire for Prompt Service

**ROHN Manufacturing Co.**

Box 2000, Peoria, Illinois
Phone 309-637-8416 — TWX 309-697-1488

"World's Largest EXCLUSIVE Manufacturer of Towers; designers, engineers and installers of complete communication tower systems."

---

**TOP SECRET INFORMATION**

You've got it, and we want it (for the rest of our readers).

Know some short-cuts to CATV technical problems? Getting more good out of your test gear than newcomers in the cable TV industry? Got your truck rigged to make life easier and service better? As an experienced CATV Technician, you can let hundreds of newcomers in on what you have learned and get paid for it. Tech tips, long or short, earn standard editorial payments when used in TV & Communications. Send materials, or write for more information, to:

Bob Searle, Managing Editor, TV & Communications, P. O. Box 63992, Oklahoma City, Oklahoma
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 contacts 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 7,000 pounds per square inch. (Typical value—center contact designed for 1/2 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. (1/2 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 displacement 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 \( Z_0 \) of a coaxial structure is defined by the following:

\[
Z_0 = \frac{138}{\sqrt{\varepsilon}} \log_{10} \left( \frac{D}{d} \right)
\]

where \( \varepsilon \) = 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 3/8 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 discontinuities are introduced. These give rise to high VSWR values unless broadband compensation is introduced in the electrical design. Compensating 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 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 or center conductor character.

"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 braid 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 silvered 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 built-in. 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. 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 tub 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—


MAKE YOUR SYSTEM MAINTENANCE MORE EFFICIENT WITH ALL-METAL DOUGLASS BODIES

CUSTOM INTERIORS are built to fit your specific needs. Every inch of space is used. Fully enclosed and locked cabinets save tools and equipment, cut storage costs. Keeps needed equipment with you at all times.

LOW PROFILE gives unobstructed visibility, easy access to inner bed from all sides, better stability. Increases over-all hugging capacity, enables you to conduct maintenance with these sturdy units.

Write or call today...
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 incorporates 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 2WDWF and 4WD-F. Dimensions are 15/16'' x 2-1/16'' x 3''. Shipping weight 1/4 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

Jerrold 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. Jerrold 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.
TO  THE  CATV  CLASSIFIEDS

Reply to Dept., TV & Communications, P.O. Box 63992, Oklahoma City, Okla.

Rate for classifieds is 25 cents per word for advertising obviously of a non-commercial nature. Add $1.00 for Box Number and reply service. Advance payment is required; minimum order is $4.00. Classified rate to commercial advertisers is $3.00 per column inch (2½ col.). Deadline for all classifieds is 1st of preceding month.

FINANCING FOR THE CATV INDUSTRY

Inwood National Bank of Dallas
P.O. Box 7206 • Ph. (214) 51 7-9111
Dallas, Texas • Clark Bass, President

PROJECT ENGINEERS

All levels, for challenging assignments in the design of audio, video and control facilities for cable TV studios, and in TV allocations; and FCC licensing activities. BSEE and minimum of 2 years experience required.

Location: CBS Headquarters Building, midtown Manhattan

COLUMBIA BROADCASTING SYSTEM, INC.
51 W. 52 Street, New York, N.Y. 10019

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?

CHANGE SIDES!
Become a customer yourself by joining one of the largest and certainly the most dynamic multiple system owner. We're bursting at the seams with new projects, and growing by leaps and bounds. Several positions are open which will relieve the above disadvantages.

HOSPITALIZATION AND LIFE INSURANCE • COMPANY STOCK PLAN

MINIMUM REQUIREMENTS:
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, TELEPROMPTER CORPORATION
50 West 44th Street • New York, New York • 212 JU 2-8800

ADVERTISER INDEX

Aberdeen Company ............................................. 56
Ameco, Inc. ................................................... 6, 7
American Electronic Laboratories, Inc. .......... 17
Amphenol Cable ................................................ 69
Anaconda Astrodota Co ................................ 30, 31
Andrew Tower Co ............................................ 63
Armadiello Manufacturing Co. ....................... 50
Benco Television Associates ............................ 56
CBS Televsion Review ...................................... 55
Cascade Electronics, Ltd. .............................. 47, 75
Cascade Line Constructors ............................. 44
CAS Manufacturing Co. .................................. 33
CATV Equipment Co ........................................ 16
C-Cor Electronics Inc .................................... 45
Communication Dynamics ............................. 12
Communication Systems Corp ....................... 38
Copperwell Steel ............................................. 59
Craftsman Electronic Products Inc ................. 23
Davo Electronics Corp .................................... 62
Diamond Expansion Bolt ................................. 76
C. C. Douglass Mfg. & Sales ............................ 79
Entron, Inc .................................................. 11
Fanner Manufacturing Co. .............................. 61
Ft. Worth Tower Co ........................................ 51
Gabriel Electronics ......................................... 70
Gilbert Engineering Co., Inc. ......................... 26
Hendel & McCoy ............................................. 25
Jerrold Electronics Corp. ............................... C.2, 13, C
Kaiser System Corp ........................................ 39
Microflect Company, Inc ................................ 68
National Community Television Association 36
Noram Cable Construction Ltd. ...................... 62
Phepls-Dodge Copper Products Corp ................ 65
Plastoid Corp ............................................... 49
Pruzzin Company ............................................ 21, 72
Rohn Manufacturing Co ................................ 77
Sitco Antennas .............................................. 78
Spencer Kennedy Laboratories Inc ................ 42, 43
Stan Socia Corp ............................................. 40
Superior Cable Corp ........................................ 9
TeleMation, Inc .............................................. 45
Times Wire & Cable Co .................................... 15
Tucker Sno Cat Corp ....................................... 62
TV Cable Supply Co ....................................... 22, 67
R. H. Tyler Co .............................................. 27
Utility Tower Co ............................................ 57
Viking Industries, Inc .................................... 3, 19, C4

2 FIELD ENGINEERS WANTED

Young expanding communications construction organization needs two field engineers for projects throughout U.S. Must have CATV experience or equivalent in service. Telephone/CATV system design experience required. Jobs involve travel. Good pay for right men. Write James Nishnura, 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 & Communications.
Season's Greetings

DAVCO ELECTRONICS CORPORATION
P.O. DRAWER 861 • BATESVILLE, ARKANSAS • Ph. (501) RI 3-3816
SERVING CATV SINCE 1949
Reach more subscribers with new Starline Satellite™

Jerrold’s new solid-state, cable-powered Starline Satellite line extender is the economical way to deliver quality color pictures to more subscribers. It features a regulated power supply, plug-in amplifier module with variable tilt and gain controls plus plug-in pad facilities, external rf test points, and the Starline air-tight, radiation-proof, multi-mount housing.

The Satellite is a valuable adjunct to the total solid-state capability of a complete Starline system. It’s compatible with any system providing 20 to 30 volts ac via the feeder cable. For complete details on the Satellite or other Starline system equipment phone 215-925-9870, or write

MVO CATV Systems Division
JERROLD ELECTRONICS CORPORATION
401 Walnut Street, Philadelphia, Pa. 19105

FIRST IN CATV The nation’s largest and most experienced manufacturer/supplier of CATV equipment and services.
WE ARE CONCERNED...  

WE ARE CONCERNED if you are not aware that "turnkey" construction is an every day occurrence at SCC. Do you know that more and more system operators are looking toward SCC to lead the way in system engineering and construction? We are proud that we were the first to introduce the "high level" concept of construction that has become the standard of the industry.

WE ARE CONCERNED if you are not aware that customer service is of prime importance to us. Do you know that we have strategically located field engineers available to make the necessary preliminary signal strength and strand surveys so that materials can be immediately ordered for your system? Construction crews can be moved into your town within days and the system completed in record time.

WE ARE CONCERNED about your financial problems. Do you know that we have a specialized Finance Department to assist you in obtaining the finance you require? Each financing policy is tailored to suit your particular needs and payments are arranged so that your system is a "money-maker" from the very first year of operation.

IF YOU ARE CONCERNED...

CALL SYSTEMS CONSTRUCTION COMPANY
a division of Viking • 400 Ninth Street, Hoboken, New Jersey 07030 • (201) 656-2020