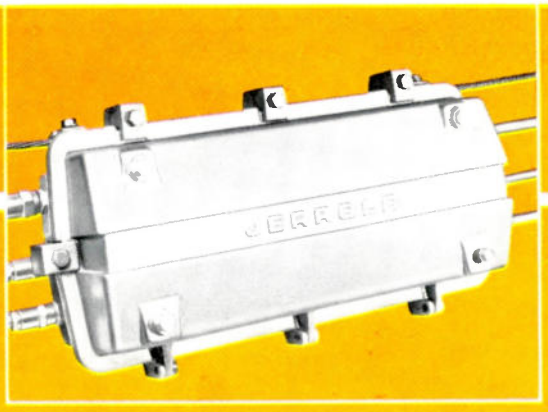
September 1967

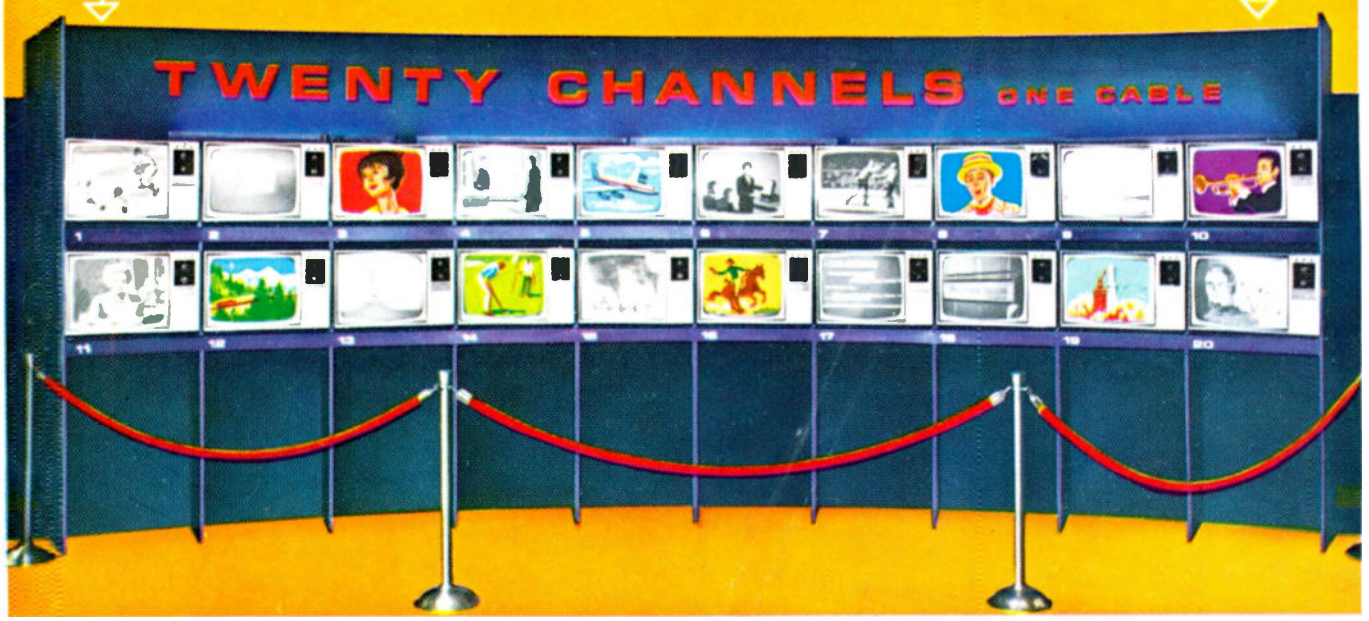
TV Communications

The Professional Journal of Cable Television

SPECIAL CONSTRUCTION EDITION



New Jerrold Starline Twenty delivers all this...



...or superb 12-channel operation

Set up for 20-channel operation or 12, the Starline Twenty distribution system will be tough to beat. It's not just solid state. It's *reliable* solid state. And the proof will show up at the subscriber's set—not just for months—but year after year.

Jerrold electronic and mechanical innovations assure superb distribution by the Starline Twenty right down to the last subscriber on the line. Cascade-ability is unequaled (71 amplifiers for 12-channel operation). And the rugged construction assures low-cost operation. What's more, Starline Twenty offers greater flexibility in system layout.

Assure every subscriber of crystal-clear black-and-white or true living color pictures, and the potential for 20-channel program variety with Jerrold Starline Twenty—the unbeatable solid-state CATV distribution system. For more information on Starline Twenty, write CATV Systems Division, Jerrold Electronics, 401 Walnut Street, Philadelphia, Pa. 19105, or phone: (215) 925-9870. TWX 710-670-0263.

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Solid Seamless Aluminum Sheathing - keeps out all moisture and contaminants.

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IN THIS ISSUE

Emphasis on Construction

Building a 235-mile plant is a big job — a $1 million job in the case of Community Cablevision's Lakeland, Florida system now under construction. Beginning on page 38, Joy Diegel tells of the accellerated turnkey project which will bring modern, multi-channel television to Lakeland viewers.

The continuing growth and sophistication of the CATV industry is continually reflected by the increasing number of firms engaged in supplying the system operator's needs. This is particularly true of the construction contractors now offering system installation services. An up-to-date, quick reference listing of these firms will be found on page 40 of this issue.

It is generally conceded that cable system operators, like the public utilities, are faced with the prospect of going underground, eventually, in most every community. This month, the various aspects of buried system installation and maintenance are discussed in detail by a construction contractor (see page 42); a system operator (see page 50); and a trenching equipment manufacturer (see page 66).

Construction of Vumore's Ponca City, Oklahoma system utilized new system design methods which promise substantial savings in plant installation. Using high level distribution techniques, the 85-mile plant realized a trunk to feederline ratio of 1 to 6. Savings in labor and materials were also reported, as a result of the design techniques used. Read the full report, beginning on page 46.

Mid-Band Techniques

Starting on page 54, Gay Kleykamp presents a report and analysis of 19-channel CATV operation using mid-band transmission on a standard 12-channel system. Both laboratory tests and field operations at the Merced/Atwater system are discussed in detail.

SEPTEMBER 1967 Vol. 4, Number 9

TV Communications

The Professional Journal of Cable Television

CATV TECHNICIAN SECTION

DEPARTMENTS

BPA

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Includes 6 position rotating sign holder for Advertising, Local News and Public Service.

The "Cadillac" of Weather-Time News channel originators. Eight viewing positions: rotating sign holder, clock, barometer, thermometer, wind direction indicator, wind velocity indicator, rainfall indicator and humidity indicator.

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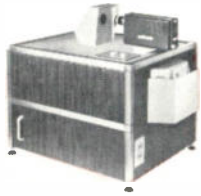
Compact, table model—Time - Weather - News - Advertising channel originator. Six viewing positions: Six sided rotating card holder, clock, thermometer, humidity indicator, barometer and date indicator. Complete with outdoor sensors and ST 1000 camera. **Only $2195.**



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24 Transistor, 17 diodes

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Including F1.4 and F1.9, wide angle (12.5mm), standard (25mm) and Telephoto (50mm and 75mm) lenses. Also, manual zoom and remote controlled zoom lenses. Ask for our complete specification sheet and prices.

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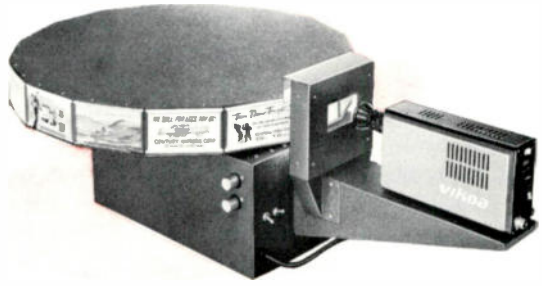

holder accepts 3" x 5" cards which can be prepared on an ordinary typewriter. Complete with ST 1000 camera **only $1100.**

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EDITORIAL

By Stanley M. Searle

Franchise Fee Escalation

A couple of years ago we used this column to strongly criticize a former CATV equipment manufacturing executive for what we considered to be an outrageous franchise bid. In soliciting a cable television permit for Ashville, North Carolina, he had offered the city something like a 16% "piece of the action" with ownership of the cable plant eventually reverting to the city.

Ashville voters eventually cancelled the permit of the original franchise holder and have recently granted a 35 year exclusive permit to Thoms Broadcasting Company. The August 22 edition of the *NCTA Bulletin* includes a special report on the publicity campaign which won the franchise, noting that "*a tax of only 6%*" will be paid to the city.

Apparently, someone on the NCTA staff feels that 6% is an attractive figure. *We don't.*

In fact, this statement by NCTA, coupled with the recent Colorado Springs bidding has us wondering just when the responsible leadership of the cable television industry is going to make itself heard.

Are we alone in decrying franchise taxes that devour a major chunk of system profits?

Are we in error in thinking that a 6% hidden tax on cable service is exorbitant — and could actually impair the cable system's ability to serve its customers?

No two communities are precisely the same and no set amount is universally "right" as a franchise tax. But it is safe to say that 2-3% is about the industry standard. Certainly 5% or more is substantially out of line with the usual fee and, as such, should be viewed with skepticism by responsible operators and their various assoications.

To say "*only 6%*" implies that cable operators are working on an extremely high profit margin and can afford to "share the wealth" with city government in a big way. We believe that this is a false image and one that can be extremely damaging for cable television. Such a false image is an open invitation, we believe, to unbearable franchise taxes and eventual rate regulation.

I would appreciate hearing from the readers of TVC on this subject. Are we wrong in our stand on franchise tax escalation?

Can FCC Handle the Job

While diverse communications industries — including commercial broadcasting, cable television, telephone, ETV, two-way radio and the networks — move forward on collision course, the Federal government still fails to provide the essential guideposts or planning to avert chaotic confusion and dissipation of radio spectrum resources.

Congress refuses to grant funds to the FCC to equip it for vital functions and, more important, Congress and the Commission are both procrastinating; unable or unwilling to face the realities of modern technologies and public demand. Cable television, for example, is treated as though, by ignoring its problems and promises, it can be caused to disappear.

Voicing the urgent concern of thousands of interested businessmen, and perhaps millions of citizens, we beseech our nation's elected and appointed servants to act decisively to avert a crisis. The communications services of America must be planned, developed and equitably administered. We're fifteen years late already; further delay is a luxury none of us can afford.

If the FCC is improperly structured to deal with the job it has apparently been given, or if it is too shackled by outside influences, then it should be replaced now with a more capable agency or department. Congress will be dealing a cruel blow to untold thousands of businesses and *all* of the taxpayers if it neglects to show some initiative in implementing timely reforms.

The traditional sluggishness of the FCC in handling important matters (such as hearings that consume five or six years) is, in itself, a conspicuous flaw. Then there is the lack of adequate and balanced staffing (only a dozen and a half in the CATV Task Force). And consider the problem of Commissioners passing judgment on vitally important matters with only scant surface knowledge of the issues involved (at least a couple of the present Commissioners have admitted that most of the technical terminology is over their heads).

Congress must give the FCC the mandate and the means to do a respectable job — or else replace the Commission with a new department that is clearly geared for action.

Stan Searle

Superior E-X-T-E-N-D-E-D Spectrum Coaxials go all the way to 300 MHz...and beyond!

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Controlled impedance uniformity over the extended range provides sufficient band width for up to 14 additional 6 MHz TV channels. You get 26 db minimum return loss (measured at a fixed 75 OHM termination) at any frequency. Both Coppergard and Alumagard feature Cell-O-Air® expanded polyethylene dielectric in aerial types. Coppergard features solid polyethylene dielectric in direct burial construction.

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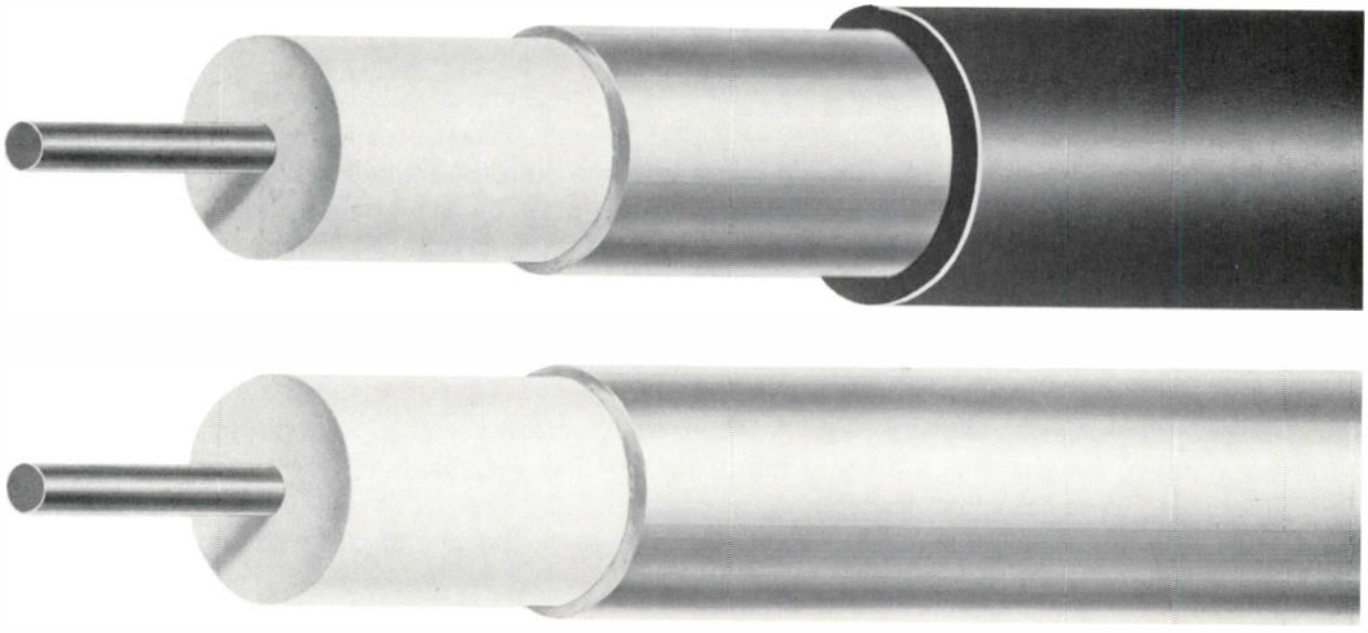
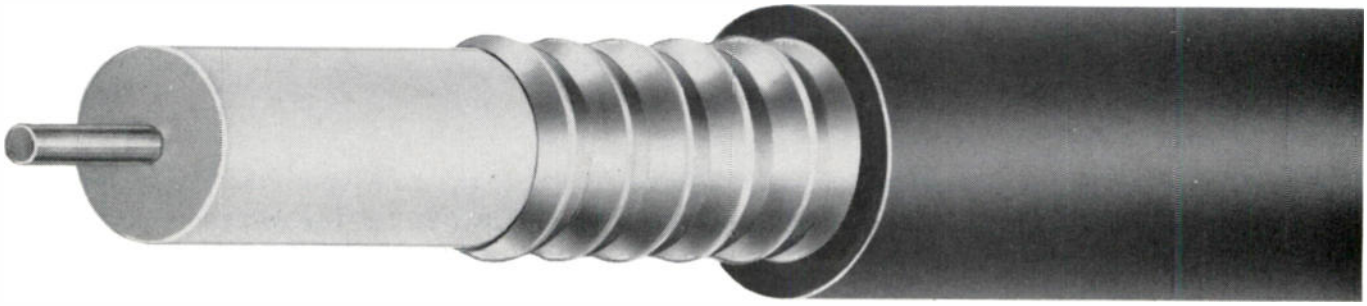


Alumagard (seamless aluminum sheath)



Coppergard (corrugated copper shield)

Superior's Full Spectrum Coaxials — through 219 MHz — are also available in both aerial and direct burial types.

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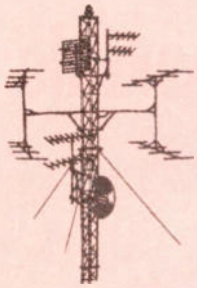


CATV Industry
PERSPECTIVE

Copyright liability for cable operators is now a certainty--barring unlikely reversal of lower court decisions by U.S. Supreme Court. Negotiations involving copyright owners, cable operators and broadcasters are being fostered by Register of Copyrights; result will probably be an approximate meeting of minds which will guide Congress in fixing a flat fee. Cable systems will, in all likelihood, be stuck with a copyright bill of one or two percent of gross. Opponents of CATV will try to push for much higher amount but won't succeed, mainly because of relatively low figure paid by television broadcasters.

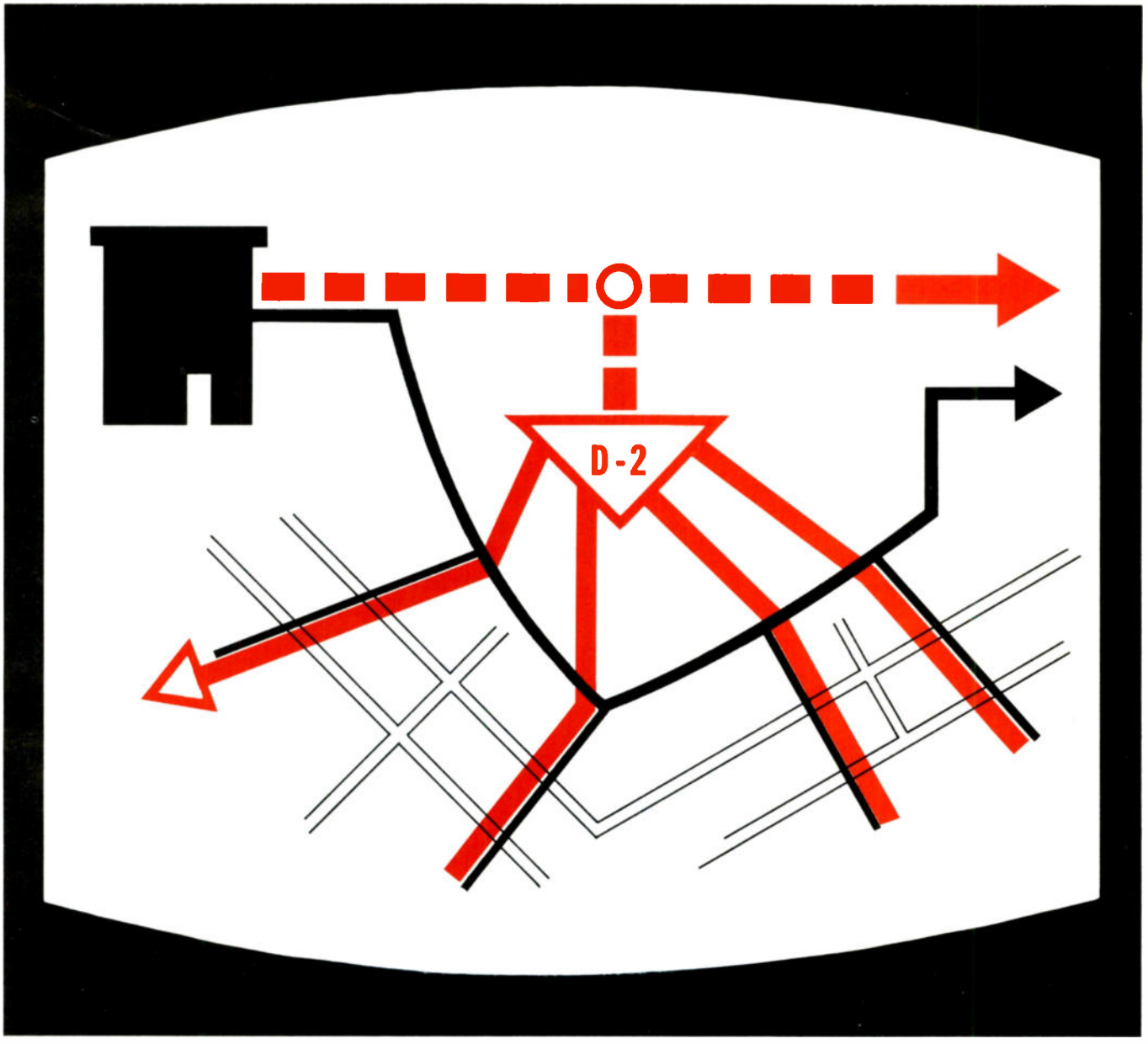
Look for increases in monthly charges to cable television subscribers. It's the inevitable result of inflation and higher costs. By 1970 franchise taxes will, on the average, be double what they were in 1960. . .due to competition within the industry. Also, city officials are becoming much more adept as auctioneers where a CATV permit is up for grabs. New sophisticated hardware, while providing viewers with more and better pictures, also costs more than last year's equipment. And most operators are already girding for a copyright fee which could go as high as 3%. All factors considered, typical monthly charge will go from $5.00 to $7.00 by mid-1970.

Merger trend is evident in cable television. GenCoE, a multiple system operating company formed two years ago by several pioneer operators, has announced a merger with Livingston Oil. And Jerrold Electronics, already the giant in CATV equipment sales, is combining with General Instruments, Inc. Jerrold, as a division of GI, will account for about 20% of that firm's total sales.

Local origination of programs continues as fastest growing, most controversial facet of cable television. Survey conducted nationally by TVC indicates high degree of sophistication in many cablecasting studios. Number of manufacturers actively marketing equipment and software for local cable programming reflects interest; is nearly double the number involved a year ago. All this despite premonition of many operators that local origination plans invite heavy broadcaster opposition.

Manpower need in cable television will soon be critical. New equipment to be delivered within next eighteen months will increase requisite knowledge and experience of chief technicians. Twenty channel systems will be subject to a brand new set of problems--at a time when the majority of operators have only recently learned to live with twelve channel solid-state equipment. Qualified estimate is that industry requires 1,000 new technicians per year just to maintain newly constructed plant. . .in addition to necessary up-grading of technical manpower already in CATV.

Attitude of broadcasters, at least NAB, should show some moderation toward CATV during next several months. Kansan, Grover Cobb, new NAB chairman, is optimistic, constructive and remarkably open-minded about cable TV. New high in NCTA-NAB relations can safely be predicted.



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SAVE ON COSTS...*with ENTRON'S D-2 DISTRIBUTION AMPLIFIER*

The tested D-2 Distribution Amplifier simplifies the system layout . . . means you can shorten trunkline routing . . . and reduce system cost.

It combines the functions of a trunkline terminator/distributor and a distribution amplifier/line splitter . . . which means you can SHORTEN YOUR TRUNKLINE by cascading in the distribution network.

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Completely modular, the solid-state D-2 has the greatest degree of flexibility available today. It is the only distribution amplifier that can handle (any or all) one, two, three or four outputs without marked loss of output capability . . . just plug in the appropriate splitter module.

Other D-2 assets: environment-proof housing, plug-in amplifier module, and full-wave power supply.

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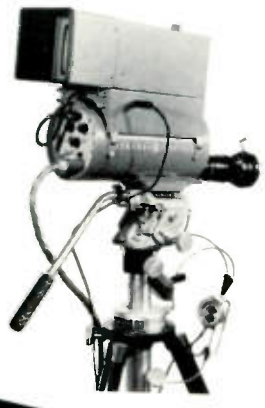
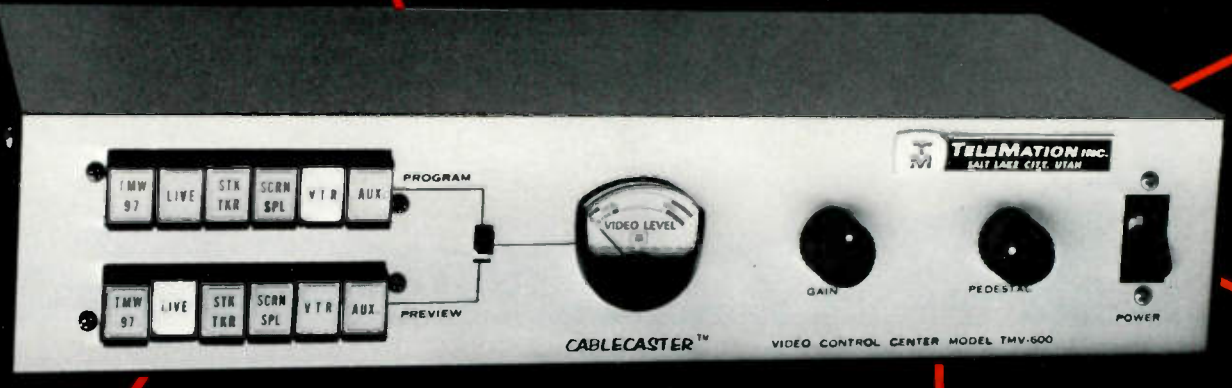


In CABLECASTER* systems inexpensive industrial cameras with TeleMation modifications are converted to full broadcast specifications. Yet they will instantly revert to self-contained 2:1 interlace operation if fitted with TeleMation's industrial sync generator. All cameras are automatically synchronized for smooth professional switching. A single cable carries all signals and power, adding greatly to the appearance and convenience of operation.

CABLECASTER™ *Video Control Center*

Heart of the CABLECASTER* system, the TMV-600 can be operated in three modes: synchronous industrial, external EIA, or with optional internal EIA sync generator. Smooth switching and accurate control are provided in all modes. The video level meter and video gain control, plus the smooth vertical interval switching of the TMV-600, will let you project a truly professional image on your local origination channel.



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CATV operators can now take full advantage of the many plus features of the TMW-97 WEATHER CHANNEL* . . . remote mirror positioning, remote slide change, 16 mm film accessory, and split screen presentations are all easily accomplished. Your WEATHER CHANNEL* old or new is converted to broadcast specs when operated with a TMV-600 video control center using EIA sync.

Video Tape Recorders

The "VTR" output of the TMV-600 can be switched to either preview or program switcher buss, permitting recording sessions without disturbing "on-air" operation. Video outputs of each VTR connect to separate switcher inputs.

VISIT OUR DISPLAY
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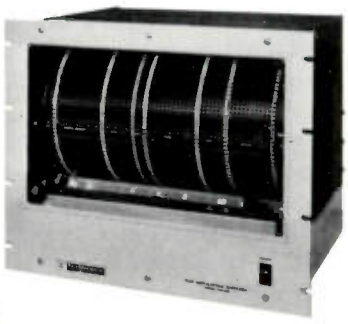
The most significant development ever for CATV program origination.



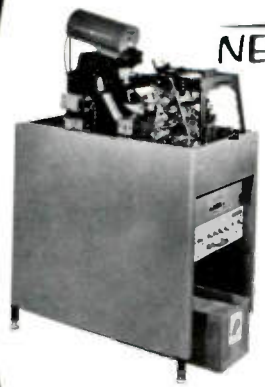
Non-Duplication Switcher

The split-minute switching capability of the TMP-205 provides automatic transient free switching when remotely controlling the TMV-600 video control center.

Here's Why:

Representing an entirely new approach in the design of TV synchronizing and control apparatus, the CABLECASTER* concept provides the advantages of professional broadcast equipment but at a cost only slightly higher than the crude industrial systems it replaces. TeleMation furnished cameras, whether old or new, are easily converted to full broadcast specifications. Control and metering of video level, essential to multiple source programming, is provided along with perfect vertical interval switching.

Call us collect to learn how this professional equipment can be integrated into your CATV local origination system.



NEWS/CHANNEL™

NEWS CHANNEL*, the exciting 24-hour-a-day AP news service may be CABLECASTER* modified for integration with other local origination equipment or for split screen presentation with stock ticker service. Also facilitates automatic presentation of locally produced news.

U.S. Patent No. 3,320,363 / Canadian Patent Pending

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CATV MANAGEMENT CORNER

Do You Have a Blind Spot?

Do you have a blind spot that keeps you from doing your best job? Some people do, but many successful system managers have learned how to recognize these stumbling blocks to progress.

A blind spot is something that interferes with a manager's ability to see issues clearly or fully. It may be a lack of open-mindedness, an overdose of egoism or an unwillingness to face up to a situation. Sometimes it's accompanied by rigidity and unwillingness to change. In other cases, it may be an attempt to escape from a tough job, like preparing a budget or handling a customer grievance.

Probably the most damaging blind spot in the area of ideas and values is the one that impels a manager to hold to the *status quo*, no matter what. He opposes everything new, whether it's changes in the trends of the industry, replacement of out-dated and worn out equipment, an experiment with a new direct sales approach or some other venture. A new, dynamic changing industry such as ours must have men who have a hunger for growth and change. The operator who insists on the status quo will be outgrown by the industry and outstripped by the first dynamic-minded competitor who comes along. A rigid mind which chokes the flow of changing values and innovating ideas is the most costly liability a man in a growth industry can have. Other blind spots include: bias toward your employees because they are lower on the totem pole; unwillingness to give credit where it is due; unwarranted toughness (based on the notion that that's the way to keep people on their toes); and inability to take criticism.

A classic blind spot is a manager's unwillingness to use and develop the special abilities of his employees. This is evident in the one-man show, when the manager gives only limited delegation or when he second-guesses his subordinates.

One probable result: The employee with a flair for creativity and original thinking will be uncomfortable in his position and will try to find another job where his ideas will meet with less resistance.

Other blind spots in handling problems include: failure to set up alternatives in making a decision; acting only on precedent; inability to see the real issues and concocting dummy ones instead; carelessness in getting the facts; and reluctance to clamp down when it's necessary.

Facing up to realities is another problem area. The most damaging blind spot in this area is unwillingness to delegate and its basic cause is a fear of relinquishing power and authority, but realistic managers know the penalty for not delegating; an over-burdened manager trapped in details, a corps of subordinates whose abilities are untapped, poor communication and high quit rates.

only two bolts

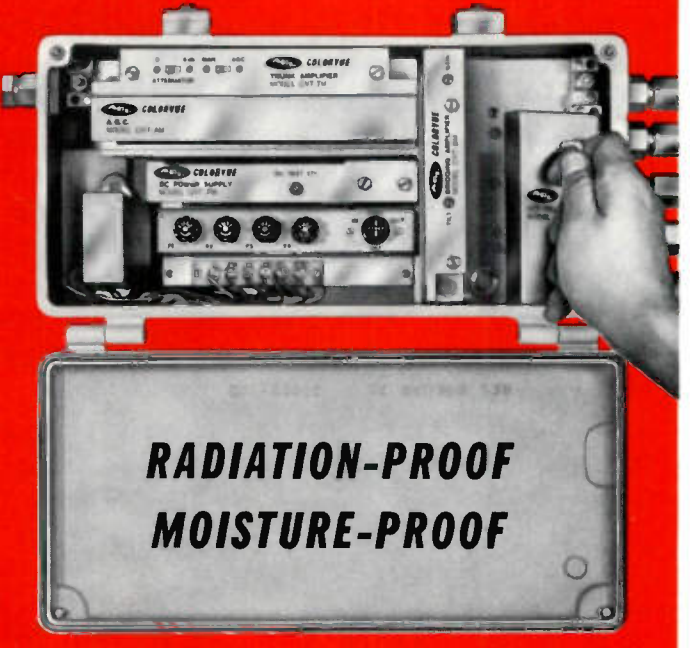
. . . to open / close the housing cover

Is field maintenance a problem with *your* CATV system? Then see **COLORVUE**'s advanced-design line of solid-state CATV trunkline amplifiers. Just two bolts open or close the housing cover. RF leakage is negligible and the closure meets rigid utility company requirements for atmospheric pressure.

And **COLORVUE** is the first truly modular amplifier. One basic housing and five individual plug-in units make maintenance, replacement and expansion quick, easy and economical. Trunk Amp, AGC, Bridging Amp, Off-Trunk Splitter and DC Power Supply plug-in in seconds—in the field—without shutting down the system or turning off the power.

Perhaps high-grade color distribution is your problem! Then **COLORVUE**'s the answer—with true studio color signals delivered to every subscriber on the line.

How come? Simple! It's the amplifier with the high output capability, high operating gain, flat response and extended bandwidth that delivers full color fidelity across all channels.



Want complete details on **COLORVUE** or AEL? Then drop us a line. Better yet, give us a call at 215/822-2929.

AEL

CATV DIVISION

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Correspondence: Post Office Box 552, Lansdale, Pennsylvania 19446

Calendar

SEPTEMBER 11-13. The Pacific Northwest Community TV Association Inc. will hold its Fall meeting at the Portland Hilton in Portland, Oregon.

SEPTEMBER 12. An organizational meeting to form the Tennessee CATV Association will be held. Contact Alvin Wood, Tro-Cable Inc., P.O. Box 888, Dyersburg, Tenn. 38024.

SEPTEMBER 17-20. The annual Fall meeting of the West Virginia and Mid-Atlantic CATV Association will be held at the Greenbrier in White Sulphur Springs, West Virginia.

SEPTEMBER 18. The New York State Community Television Association will hold its Fall meeting on Monday, September 18, at the Otesaga Hotel, Cooperstown, New York. For additional information contact William S. Jackson, 814 238-5051.

SEPTEMBER 26-27. The NCTA Executive Committee will meet in Washington, D.C.

OCTOBER 5-6. The Kentucky CATV association will hold its annual fall meeting at the Continental Inn in Lexington, Kentucky.

OCTOBER 9-10. NCTA Regional Meeting at Philadelphia, Pennsylvania in the Warwick Hotel.

OCTOBER 11. The Pennsylvania Community Antenna Television Association will hold its annual meeting in Philadelphia, Pennsylvania at the Warwick Hotel. For further information contact William S. Jackson 814 238-5051.

OCTOBER 16-17. NCTA Regional Meeting at Atlanta, Georgia in the Regency Hotel.

OCTOBER 19-20. NCTA Regional Meeting in Cincinnati, Ohio at the Netherland Hilton.

OCTOBER 23-24. NCTA Regional Meeting in Minneapolis, Minnesota at the Raddison Hotel.

OCTOBER 26-27. NCTA Regional Meeting in Kansas City, Missouri at the Prom Sheraton.

NOVEMBER 5-8. The National Association of Educational Broadcasters will hold its 43rd annual convention at the Denver Hilton in Denver, Colorado.

NOVEMBER 9-10. NCTA Regional Meeting in Dallas, Texas at the Marriot Hotel.

NOVEMBER 13-14. NCTA Regional Meeting in San Diego, California at Vacation Villiage.

NOVEMBER 16-17. NCTA Regional Meeting in Portland, Oregon at the Portland Hilton.

NOVEMBER 28-29. The NCTA Executive Committee will meet in Washington, D.C.

JANUARY 12-13. The Rocky Mountain Cable Television Association will hold its annual meeting at the Holiday Inn in Albuquerque, New Mexico.

JANUARY 22-23. The NCTA Executive Committee will meet in Washington, D.C.

MARCH 24-26. The Southern CATV Association will hold its spring meeting in Atlanta, Georgia at the Callaway Gardens.

MAY 7-8. The NCTA Executive Committee will meet in Washington, D.C.

JUNE 3-5. The NCTA Board of Directors will meet.

JUNE 30- JULY 3. The 17th Annual NCTA Convention will be held in Boston, Massachusetts. □

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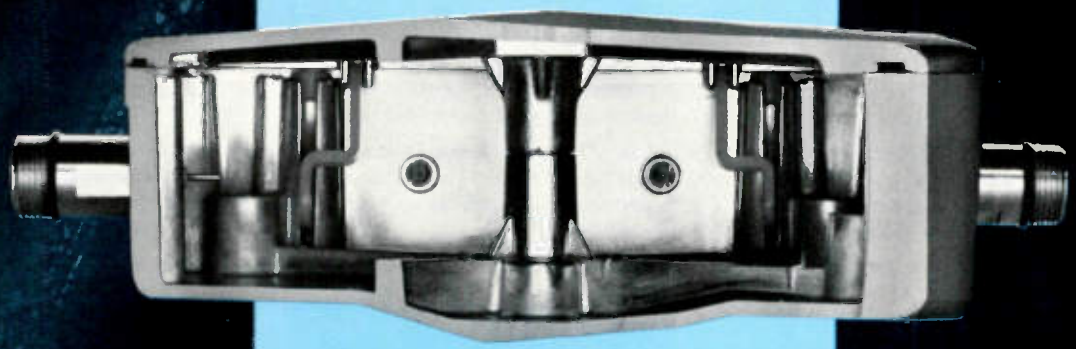

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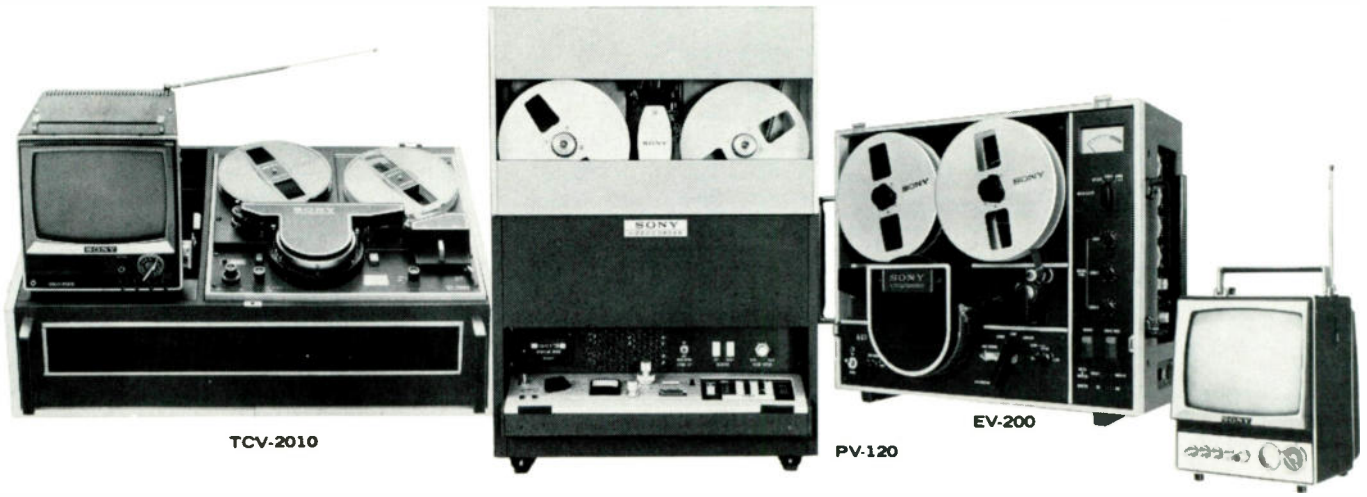

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Late News

JERROLD/GENERAL INSTRUMENT MERGER PLANNED

A proposed merger between Jerrold Corp., and General Instrument Corp. of Wilmington, Delaware is scheduled to take place pending stockholder approval by both companies and IRS tax exemption in the move for Jerrold. General Instrument, manufacturer of electronic components and equipment, will issue 7/10ths of a share of its common stock for each of Jerrold's shares. General is the nation's leading producer of VHF and UHF tuners for TV receivers and has considerable background in integrated circuitry, a technology which may replace solid state in CATV engineering.

FRANCHISE BIDDING SETS NEW HIGH

The franchise for what has been labeled as "the finest cable television market in the country today under present FCC rules" was let August 15 to Vumore-Video Corp. The newly-formed corporation which is owned by Vumore, Daniels and Associates, and a group of Colorado Springs business men, has agreed to pay the city on a sliding scale up to 35% of all yearly gross receipts. This will amount to an average of 13½% according to Bill Daniels, president of the Corporation. The 300-mile, $2 million system will be completely underground and construction is to begin immediately. The revenue to the city offered is said to be more than has ever been offered to any city in the history of CATV.

BROADCAST GROUPS REAFFIRM COPYRIGHT POSITION

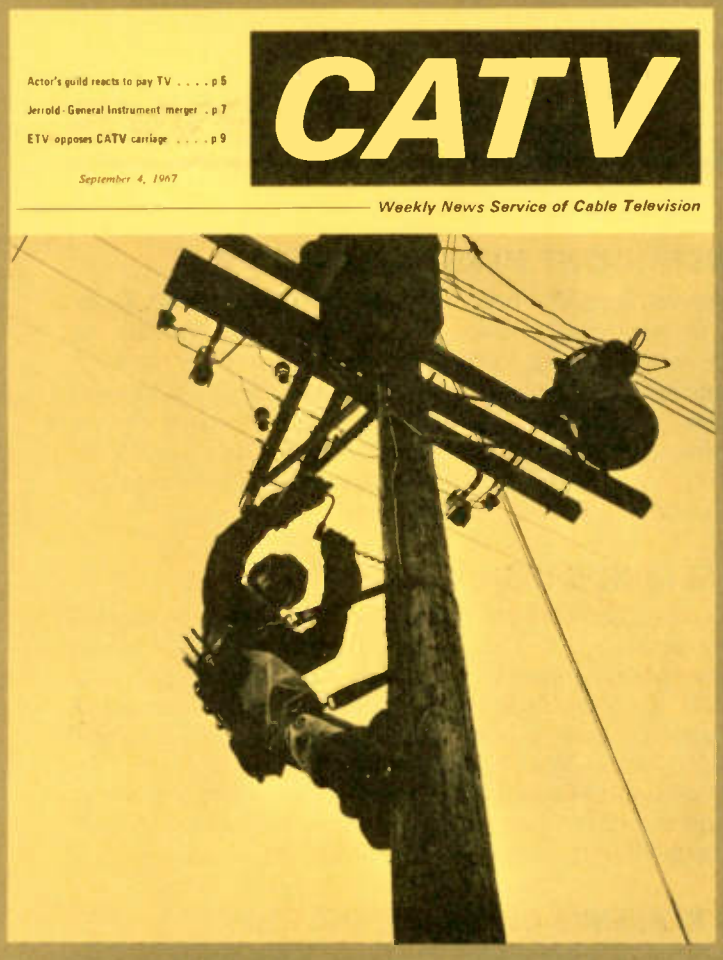
In recent letters to register of copyrights, Abraham Kaminstein, and at his request, NAB and AMST have summarized their respective positions on the question of CATV copyright legislation. NAB confirmed its continued support of Section 111, which was deleted from the omnibus copyright bill on the House floor last session. The group also stated their opposition to a moratorium on infringement suits, and spoke out against a compulsory licensing fee stating, "Broadcasters must bargain for program rights in the open market, and we would expect that competing CATV systems would do likewise," AMST concurred with NAB's position, and added its view that operation of satellites and translators should be given consideration in determining what areas are "underserved" under the compulsory licensing arrangement spelled out in Section 111.

FCC WITHDRAWS WAIVER AFTER CONSTRUCTION START

In a gesture that shook the Cleveland area operators, the FCC has reversed a former decision to allow Lorain Cable TV to bring in Toledo signals. Having received the waiver, the firm had already begun construction of the Lorain plant and now is left holding the bag with only one distant signal. At the same time, the Commission included reconsideration on a waiver granted to Telerama, Inc., but has apparently decided to let Telerama keep the signals — at least for now. The Commission was prompted to both considerations by United Artists Broadcasting, Inc., owner of WUAB Television in Lorain.

UNITED NETWORK SCHEDULED TO RETURN

With a new emphasis on news programming the United Network intends to make a comeback this season, under the guidance of Robert R. Pauley, immediate past president of the ABC radio network. Service may begin as early as mid-October with the network offering news and public affairs programming. Phase two of the comeback, will consist of sports offerings, with the final phase to make entertainment programming available. The exact program content of the latter phases is yet to be revealed.



CATV News

CATV Legal Views

CATV Finance

CATV Editorials

CATV Franchises

CATV System Sales

CATV Promotion Tips

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News SPECTRUM

Ex Parte Charges Dismissed

The charges of *ex parte* contacts at the FCC by the Association of Maximum Service Telecasters boiled to a head last month, and, as a result, the situation may likely be resolved in court. In a Memorandum Opinion and Order written by the General Counsel's staff, the Federal Communications Commission found that a majority of its members — Chairman Rosel H. Hyde and Commissioners Kenneth A. Cox, Robert E. Lee and Nicholas Johnson (FCC General Counsel Henry Geller was also present) — were not guilty of improper *ex parte* contacts with the five AMST officials who visited them on May 9 of this year. AMST defends its visit as a general presentation of industry problems that did not touch on individual CATV cases.

But almost before the dismissal became public knowledge, an announcement came from the Washington law office of Robert D. L'Heureux (who was at that time on vacation), indicating that the Commission decision would be appealed promptly in the U.S. District Court of Appeals for the Fifth Circuit in New Orleans, Louisiana. The Fifth Circuit will get the case because the firm L'Heureux represents, Multivision Northwest, is based in Georgia, and the New Orleans court serves this area.

The Commission actually had to issue four separate orders dismissing the charges, and only after a long process of collecting the signatures of the Commissioners. The initial order dismissing the *ex parte* charges was drawn up by General Counsel Geller; however, at that time, only three signatures could be gleaned. Commissioners Robert T. Bartley and Lee Loevinger, who had not met with AMST, abstained from voting. In addition, Commissioners Robert E. Lee and James J. Wadsworth asked not to be shown as participating. But when the final dismissal was announced, both Bartley and Wadsworth issued statements that in essence said they concurred in the orders, although, like Loevinger, they were not present at the AMST meetings. Wadsworth said, specifically, that, "Based upon the written record in this proceeding and the statements contained in the attached opinion, I concur in the result reached by the Commission." Bartley generally noted that, "I believe that industry discussion of general policy matters with Commissioners is in line with our responsibility to be well informed on all matters which are subject to our regulation, and I concur in the result of the order."

CATV Industry Protests

The action brought a flood of protests from members of the CATV industry, including: GenCoE, Inc.; Mission Cable TV, Inc.; Southwestern Cable Company; Pacific Video Cable, Inc.; Trans Video Corp.; Rancho Bernardo Antenna Systems, Inc.; Escondido Community Cable, Inc.; American Television Relay, Inc.; Tele-Vue Systems, Inc.; and Back Mountain Telecable, Inc. Although the complaints of all were dismissed, the Commission did feel constrained to grant special disposition to Tele-Vue's new systems.

Tele-Vue noted in its filing that it has asked to extend CATV service to Conroe, Texas, which is opposed by KHOU-TV, WKY-TV, KPRK-TV, KPRC-TV, all in Houston. Jack Harris, head of AMST, is also president of KPRC-TV. KHOU-TV also has strong ties to AMST. The Commission noted that "the distinction between what is proper and improper under the circumstances is perhaps the most complex and difficult question involved in the formulation and re-publication of rules governing *ex parte* communications."

The Commission said "we recognize that the officials of Gulf (KHOU-TV) and KPRC were proceeding in good faith, as representatives of AMST, in carrying out the wishes of its board of directors. They scrupulously avoided the discussion of particular cases and requested that members of the Commission interrupt the discussion as they approached improper areas." In a footnote however, the FCC noted that "they did not advise the Commissioners that they were parties for particular waiver proceedings."

The Commission said "in short, it was a lack of awareness on the part of the parties to this proceeding as to the full import of the rules and policies regulating *ex parte* communications in this area. But it also appears that the parties acted in good faith. To us, the release requested here — that their oppositions be dismissed and that they be disqualified — is inappropriate. Such a harsh course is unwarranted in the circumstances of which certainly deprive the Commission of the assistance of these views of persons vitally interested in this particular proceeding. On the other hand, Tele-Vue is certainly entitled for redress."

In dismissing the *ex parte* charges, the Commission said Tele-Vue could have fifteen days to apply to the AMST arguments, with the TV stations having another ten days to file replies, and all comments will be made a part of the Tele-Vue case. All other charges were simply dismissed outright.

ATR Case Still Pending

Still another case involving the AMST visit has not been acted upon by the Commission. American Television Relay, which has a multitude of microwave applications pending at the FCC, has charged that the AMST addressed the specific problem of microwave relay systems at the meeting. Some of the ACT applications have been pending for well over a year.

(News continued on next page)

214 Issue Goes To Court

With the ambiguous "Section 214" issue still pending under the conspicuously slow but watchful eye of the Federal Communications Commission, a Pennsylvania CATV firm has decided that the time has come for action — on its own terms. Radio Hanover, a firm which has leveled anti-trust charges against United Telephone et al in Pennsylvania, has raised the 214 issue before Judge Nealon of the United States District Court in Pennsylvania, the court to enjoin United Telephone of Pennsylvania from extending its lines in Hanover without obtaining a certificate of public convenience and necessity from the FCC. And, obviously, the question in point is the very core of the Section 214 issue — the nature of the telco leaseback service. It is, essentially, the issue of whether the leaseback is just another facet of telephone communications service, or a new service of interstate nature.

Section 214 of the Communications Act requires a common carrier to obtain from the FCC a certificate of convenience and necessity when constructing a new line for the transmission of interstate signals. If it is eventually determined that the distribution of television signals by telco's is a non-telephone interstate service rendered on new lines, the telco's who are offering leaseback service will be doing so in direct conflict with the requirements of Sec. 214.

The action by Radio Hanover is just one facet of that firm's involuted legal skirmishing with United. But it now appears that it will provide the basis for a possible slowdown of telco activity. CATV attorneys have warned that the actions of AT&T, General Telephone and United constitute a foreclosure of the cable market and could, if not stopped, result in a de facto control of the industry.

In raising the 214 issue in Federal court, Radio Hanover followed the provisions of subsection c of Section 214 which states that "any construction . . . of service contrary to the provision of this section may be enjoined by any court of competent jurisdiction at the suit of the United States, the Commission, and State affected, or any party in interest.

Thus Radio Hanover has done as a party in interest what many communications attorneys — both in and out of the FCC — have felt the Commission should have done a long time ago. It has been argued that the wording of Section 214 is such that the courts would have to decide the issue anyway, and the Commission should have acted to speed up a legal determination of the question.

The initial decision in the Commission's "expedited" hearing on Section 214's applicability to telco leasebacks is expected to be forthcoming sometime late this year. In that particular hearing (Docket 17333), testimony has already been taken on the 214 issue. But an earlier ruling by the courts will tend to relegate the Commission's deliberations to the role of a rear guard action.

Ad Hoc Copyright Committee Formed

With Congressional resolution of the complex copyright issues still obviously quite a distance away, several prominent members of the CATV and broadcast industries have decided to do their own bit toward finding a common ground of understanding. The group, consisting of eighteen imminent CATV industry leaders and broadcasters who also have CATV interests, is working under the assumption that the complexities of copyright protection as it touches on CATV and broadcasters will not be resolved by Congress until the two industries themselves can reach some mutual understanding.

Under the informal co-chairmanship of George Hatch, president of KUTV Inc., Salt Lake City, Utah, and past national NCTA Chairman Alfred R. Stern, president of Television Communications Corp., the group's first Washington meeting was termed not only "productive," but "remarkably progressive" toward finding a field of compatibility. Both Hatch and Stern stressed that the present impetus must be maintained and that an ever-widening circle of broadcast and CATV interests must be brought into the mainstream of the ad hoc committee's program.

Essentially, the group agreed that there are four basic policy questions crucial to any understanding: "1. Exclusivity of broadcaster rights. 2. Origination of programs by CATV systems. 3. CATV systems importing signals from distant markets into the areas of their service. 4. Additional program carriage problems involving various proposals by government and other matters relating to copyright." If a common ground can be found, a presentation can then be made to copyright holders and Congress, hopefully for legislative action next year. Even the most recalcitrant current foes of CATV will not fail to be impressed if the committee's plan is successful, and a genuine understanding among wide segments of the two industries will hopefully sway Congress.

The committee planned to appoint subcommittees to study each area, and "it was agreed also that a subcommittee would study a proposal for a market test to measure the effect of television-CATV practices in the area of public response and acceptance and economic impact." Stern and Hatch said that discussion of whether the market test should be held was inconclusive, with virtually 18 different proposals.

Copyright Analysis Available

Efforts of the CATV/broadcaster ad hoc committee received no mention in *Congressional Quarterly's* recent report on the current copyright situation as it affects CATV in Congress. The highly respected independent research service —

which bills itself as "the authoritative reference on Congress and politics" — did, however, reason that copyright legislation is unlikely to pass this year, and noted the possibility of interim legislation and the help that Senator John McClellan (D-Ark.), Chairman of the Senate Judiciary Committee, might give CATV.

"The CATV question was undoubtedly the most important of the tie-ups killing the revision bill for 1967," *Congressional Quarterly* reported. "According to sources on the Senate subcommittee and in the copyright office of Library of Congress, the other obstacles could have been overcome had it not been for CATV . . . the CATV lobby, headed by the National Community Television Association, has become increasingly powerful as CATV has become big business. Having never paid royalties in the past, they have had the hope that Congress would enact legislation permitting them broad exemptions from copyright liability."

UHF Aid Proposal Is Questioned

The rulemaking proposal to allow CATV systems more flexibility in aiding the development of UHF television has brought the expected barrage of comments into the Commission — from broadcasters opposing greater freedom for CATVs, and from members of the CATV industry, which is naturally in agreement with the new proposal. Among the exceptions were broadcasters with strong CATV holdings, such as Cox Broadcasting Corp., which filed along with its subsidiary, Cox Cablevision Corp., and Newhouse Broadcasting Corp.

The proposal would modify the present rule, which states that a CATV system must carry all television signals that put a predicted Grade B contour over the community where the CATV system is located. The change would allow a CATV system, at its own discretion, if it is within the Grade B contour of one station to carry the signals of any other television stations within that first station's community, even if the more distant station does not put a Grade B signal into the CATV system's community. The idea of the rule change specifically would be to aid UHF development, since many UHF stations don't have strong enough signals to reach CATV areas although their VHF counterparts easily quality. The change would mean that a CATV system could carry the UHF as well as the VHF.

The CATV industry filings, exemplified by the arguments of the National Cable Television Association, stressed support of the amendment, but only if its present voluntary form is maintained. Some of the broadcasters wanted not only to change the form of the amendment, but also to make it mandatory. Besides Cox, Newhouse and the NCTA, supporters of the amendment included Midwest Video Corporation, Little Rock, Arkansas; radio stations WHJB and WOKU-FM in Greensburg, Pennsylvania, which hold CATV franchises; Milton J. Shapp, former head of Jerrold who filed as an individual; Cosmos Cablevision

(Continued on next news page)

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Broadcasters in general filed with a variety of suggestions, but the basic idea expressed was opposition to latitude for the CATV systems. The Massachusetts Broadcaster Group of Springfield Television Broadcasting Corp., for example, called the changes a "simplistic, expedient solution to an extremely complicated problem." Perhaps the most typical of the comments came from the National Association of Broadcasters, which complained that "not only would the choice of signals be left to the CATV system, but most importantly, that choice would be made among many signals from an area so broad that it would have no relationship to any competitive situation. On the other hand, if carriage of all these signals were to be made mandatory, CATV systems would have to provide carriage far in excess of their channel capacity." The NAB argued that "the only meaningful approach is on a case-by-case basis, limiting the consideration solely to that of equalizing the treatment of UHF and VHF stations serving the same communities." Among other prestigious broadcast groups filing in opposition to the changes were American Broadcasting Companies, Storer Broadcasting Corp., Westinghouse Broadcasting Co., and the Association of Maximum Service Telecasters.

The National Cable Television Association, rebutting broadcaster arguments, said that the change would not frustrate the Commission's distant signal policy but instead would indeed, as broadcasters charge, equalize signal quality and thus "assist UHF to compete effectively with the more powerful, technologically superior VHF. Competition should lead to improvement. Surely this is a desirable result." The NCTA also said that viewing habits would not be changed solely as a result of CATV carriage and that new, local, and independent stations would not be injured through the new rule.

PBA Goes To House Floor

The Public Broadcasting Act of 1967 cleared the House Commerce Committee by a vote of 15—6 last month, and after a brief respite in the Rules Committee, was targeted to reach the floor of the House around the first week of September. A strong Republican effort to disembowel the legislation is expected on the House floor, and if the drive attracts enough conservative Democrats, the bill is dead at least until next year. The six who voted against the bill were all Republicans and a number of other GOP committee members abstained from voting, although one, Rep. Donald Brotzman (R-Colo.) voted for the measure.

As the hearing neared conclusion, the committee members' quandries about the legislation appeared to be centered around two worries: long-range financing and the possibility of political abuse of public broadcasting. As a result, amendments were pushed that would forbid ETV stations from editorially backing political candidates and would stipulate that both political parties be well represented on the corporation for public broadcasting. Rep. Jake Pickle, (D-Texas) offered an amendment that stipulates that no public broadcasting programming is to be "primarily" for amusement and entertainment. The Committee also defeated a move to prohibit the proposed corporation for public broadcasting from directly dealing with network facilities.

The act, which has already received Senate approval, would establish the corporation for public broadcasting and give it an initial $9,000,000 authorization for aiding programs and ETV network operations. The Committee approved the $9,000,000 figure, but cut out the part of the bill that said after the first year it would have "such sums as may be necessary." The panel evidently wants to hold President Johnson to his word to send up a long-range financing bill next year, and wants no vague authorization until a specific bill is approved.

Earlier, the Committee divided eighteen to thirteen on strictly party lines to defeat a Republican motion to kill the corporation for public broadcasting altogether. It did adopt, however, GOP proposals, of the panel, to say that only eight of the fifteen-man corporation for public broadcasting can be from one party and another amendment forbidding ETV stations from editorializing. It was expected that the group would forbid editorial endorsement of a political candidate by ETV stations, but the amendment to the Communications Act — which is the form the amendment took — would forbid any editorializing or taking of official stands on controversial subjects, although balanced documentary presentations would still be allowed.

Another section of the bill would extend the past construction aid to ETV stations that has been administered by the Department of Health, Education and Welfare. The bill would authorize HEW to draw $10,500,000 the first year and originally looked forward to $25,000,000 the second year and to $30,000,000 the third year and would have authorized two more years of the program. The House Committee, however, put it back to three years and halved the sums authorized for the second and third years.

Anaconda Buys Astrodata CATV Interest

Ed Regan, vice-president and general manager of Anaconda Astrodata, has announced the purchase by Anaconda Wire and Cable of Astrodata's 51% in the CATV equipment company. The manufacturing complex, based at Anaheim, California, will continue to function as a wholly-owned subsidiary, retaining the present name, and Astrodata will continue to furnish technical information and data for the development of new equipment.

NAB Wants Importation Rule Extended

The Secondary Market Television Committee of the National Association of Broadcasters has voted to continue the NAB's efforts to get the Federal Communications Commission to extend its rules against the importation of distant television signals by CATV systems to all television markets. Currently the rule against distant signal importation applies only to the top 100 markets. The committee is headed by Hamilton Shea, executive vice president of Gilmore Broadcasting Group of Harrisonburg, Virginia. Gilmore Broadcasting is one of the active participants in a fight for a CATV franchise in Tucson, Arizona, where the company, in conjunction with two other local broadcasters, proposes to import the four Los Angeles, California independents into the Tucson market.

Asheville, N. C. Franchise Granted

After years of controversy, the city of Asheville, North Carolina has finally awarded a CATV franchise. The exclusive, 35-year grant went to Thoms Broadcasting Company, which submitted its initial petition to the city in February of 1964. Under the terms of the franchise, the city will receive a tax of 6%.

Over the past three years that CATV has been under discussion, the city has seen requests that offered a return of as high as 16%, with the system being returned to the city after 20 years. At one point, in August of 1964, the city council announced their own decision to go into the CATV business. However, this proposal was never acted upon.

Livingston/GenCoE Sign Agreement

Livingston Oil Company took a major step last month in completing its acquisition of GenCoE, Inc., Austin, Texas-based owner of cable television and microwave systems. The acquisition is subject to approval of Livingston Oil shareholders at the annual meeting to be held this month. Proposed terms call for Livingston to issue 1,099,864 shares of a new cumulative convertible preferred stock. The preferred would have an annual dividend of 30 cents a share and would be convertible into Livingston common on a share-for-share basis, according to Livingston officials.

Livingston Oil, a crude oil and gas producer, announced last April that it had reached agreement in principle to acquire GenCoE and TeleSystems Corporation of Philadelphia, Pennsylvania. The latest announcement, however stated that negotiations with TeleSystems had been "suspended" because the acquisition was not in the mutual interest of the two companies.

Lerner To Enter CATV

Plans to enter the field of electronic communications have been announced by Lerner Communications, Inc., an affiliate of Lerner Home Newspapers, publishers of 33 community newspapers in the metropolitan Chicago area. The plans of the newly-formed affiliate include CATV, the development of methods to reproduce facsimile newspapers and the use of other audio and visual techniques to supplement the newspapers' present newsgathering, publishing and distribution services.

The Lerner organization's entry into electronic communications, according to a news release, follows a comprehensive research project by S. I. Neiman, specialist in electronic industry public relations. Neiman revealed that engineers and CATV technicians have made surveys of more than sixty trade areas served by various publications ranging from New England to Iowa. Lerner expects to file letters of intent or to make application for CATV franchises in the near future in a number of these cities. The firm's first step, according to Louis A. Lerner, executive vice president of Lerner Communications, will be to establish CATV systems in the metropolitan Chicago area, particularly in the northwest area where interference in the reception of Chicago TV stations is prevelant; and to provide viewers with the local neighborhood news and other community services.

Lee Releases N. Y. Hearing Results

FCC Commissioner Robert E. Lee has released his "Personal Informal Views" on the results of the hearing he chaired in New York City on the interference to television reception that will be caused for an interim period by the construction of the proposed New York Port Authority World Trade Center building in Manhattan. The transmitters of the New York Stations will be moved there from the Empire State Building, but only after construction causes interference for a time.

Lee said that the service disruption will last about one year and noted that "During, and after, construction, it is assumed that CATV will be available (at a price) for those who wish it." He also noted that Irving B. Kahn, president and chairman of TelePrompTer Corporation, testified at the hearing "to show that television service in the New York City area is spotty and poor at best; that the basic problems are not likely significantly to change if service is transferred to the World Trade Center; and that his organization is available to afford relief now and in the future." The FCC is sending the results of the hearing to the Commerce Committees of the House and Senate, which expressed concern with the situation in the first place.

Model CATV Ordinance Drafted

The National Institute of Municipal Law Officers has issued a model ordinance for municipal regulation of CATV. The 94-page monograph, which is designed to aid municipal attorneys, contains a lengthy discussion of Federal, state and municipal regulation of CATV, including several pages of comparative license fees around the country. According to the author of the study, Robert L. Winters, the model ordinance is "a model to be used as a point of departure." Winters noted that the NIMLO looked at numerous municipal CATV ordinances and drew what it felt were the best features in them. The study by Winters led

(Continued on next news page)

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5

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Our diagram skips many of the numbers in Plastoid's large testing repertory. Our engineers don't approve. They point out tests that would take pages and pages to describe. And they're forever dreaming up new ones. But we're less thorough here because we know the best test of cable is in use. There you'll find our aluminum sheath is unique in its moisture resistance and in its longer lasting electrical properties.

Test us—by the numbers if you please. Call Plastoid collect. The numbers are (212) ST 6-6200 for full details and special pricing information.

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CORPORATION

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him to conclude that the municipality, in most cases, holds the right to grant a CATV license.

Winters stated that while "few, if any, questions have arisen with regard to a municipality's power to franchise the complete-plant type of CATV operation, this is not so in the situation where the CATV company hires a telephone company to carry and distribute its TV signals to its subscribers." With an obvious reference to the activities of AT&T in New York City, Maine, Rhode Island, and Michigan, Winters concluded that the distribution of television signals is a non-telephone service (a question which the FCC will weigh in its Section 214 hearing) and argued for municipal licensing of an operator who goes the leaseback route: "It would seem that this channel lease type of CATV operation within a municipality would not be covered by a telephone franchise so as to obviate the necessity for a municipal CATV franchise." Copies of Report No. 151 can be obtained from the National Institute of Municipal Law Officers, 839-17th Street, N.W., Washington, D. C. 20006. The price is $5.

NAB Battles NY-Penn Microwave

The National Association of Broadcasters has fired a verbal retaliation to New York-Penn Microwave Corporation's opposition to NAB's objections regarding the firm's application to construct a microwave system to provide CATV systems in West Virginia with signals from three New York City television stations. NAB's filing said the microwave company's opposition was erroneously based on the association's supposed failure to meet the requirements of Section 21.27 (c) of the Commission's rules. According to the NAB, the objections were not filed under that section but under Section 21.26 (c).

The NAB contended that the organization was "solely concerned with the potential economic effect of the proposal upon broadcast stations located along the route of the microwave systems. . . There is no better time than the present for recognizing the need for an overall decision on the merits of a nationwide interconnected microwave system and no better forum than a hearing on the pending microwave applications that, if granted, will form the foundation of such a system.

Entron Announces Budget Increase

Entron, Inc., of Silver Spring, Maryland has announced an immediate increase of 40% in its research and development budget in order to develop new products looking toward expansion of transmission of intelligence over coaxial cable. In making the announcement Edward P. Whitney, president, noted that the company's board of directors authorized the additional funds last week in "recognition of the fast growth of the state of the art of CATV system equipment development."

New Manufacturing Firm Formed

A new CATV equipment manufacturer, HTV Systems, Inc., has filed a registration statement at the Securities and Exchange Commission in Washington, D. C., seeking to register 350,000 shares of common stock, which are to be sold to the public at $2 per share. There will be a 15 cents per share commission to National Association of Securities Dealers members who help in the public sales. The SEC noted that "the company proposes to engage in the design, production and sale of community antenna television equipment and other specialized electronic equipment and devices." The new company was organized under New York law on May 15 of this year; its business address is 210 Boxart Street in Rochester, New York.

TelePrompTer To Offer Stock

TelePrompTer Corporation, New York City-based multiple system operator, has made a filing with the Securities and Exchange Commission, seeking registration of 40,000 shares of common stock. The registration amounts to a selling out of stock by Joseph Silverman, Harry Morris, Jr. and Herbert M. Ardston. Silverman holds 20,000 shares and Morris and Ardston each own 10,000 shares, which were issued to them when TelePrompTer acquired a CATV firm that they had owned.

The shares, TelePrompTer said, will be offered occasionally on the American Stock Exchange or over-the-counter, either directly or through brokers or to dealers, or in private sales or otherwise, at prices current at the time of sale. The prices per share will be supplied to the SEC later, but the initial filing puts a $35 top on the share prices. The SEC noted that in addition to indebtedness, TelePrompTer has outstanding 991,824 shares, of which Hughes Aircraft Company owns twenty per cent and management officials nineteen per cent.

TelePrompTer Corporation reported a few weeks ago that it had revenues of $3,445,555 and net earnings of $677,061 for the six months period ending June 30. The 1967 results compared with revenues of $3,349,677 and earnings of $672,967 during the similar period last year. On a per share basis, earnings were 80 cents for the 1967 period, compared to 82 cents in 1966. Included in the results were $557,633 of non-operating income, primarily from sale of stock in the subsidiary TelePrompTer Manhattan CATV Corporation to Hughes Aircraft Company. Results of operations of the subsidiary, which is developing CATV service in Upper Manhattan, were not included in the report.

Fanner Announces Acquisition

Tom E. Butz, president of The Fanner Manufacturing Company, has announced the acquisition of American Crossarm and Conduit Co., Chehalis, Washington-based producer of wood products. Operational since 1862, American Crossarm and Conduit Co. is noted for its production of crossarms, braces, transmission structures, molding and other related products for overhead support of electrical transmission and distribution lines and communication systems. □

here's why...

we designed a true coaxial connector for your coaxial system.

Somebody had to make a strong, completely weather-resistant, trouble-free, dependable unit with quick and easy installation that exceeds your cable return loss. Craftsman did it!

Write or call collect, for free literature on our Sure-Grip coaxial connectors today!

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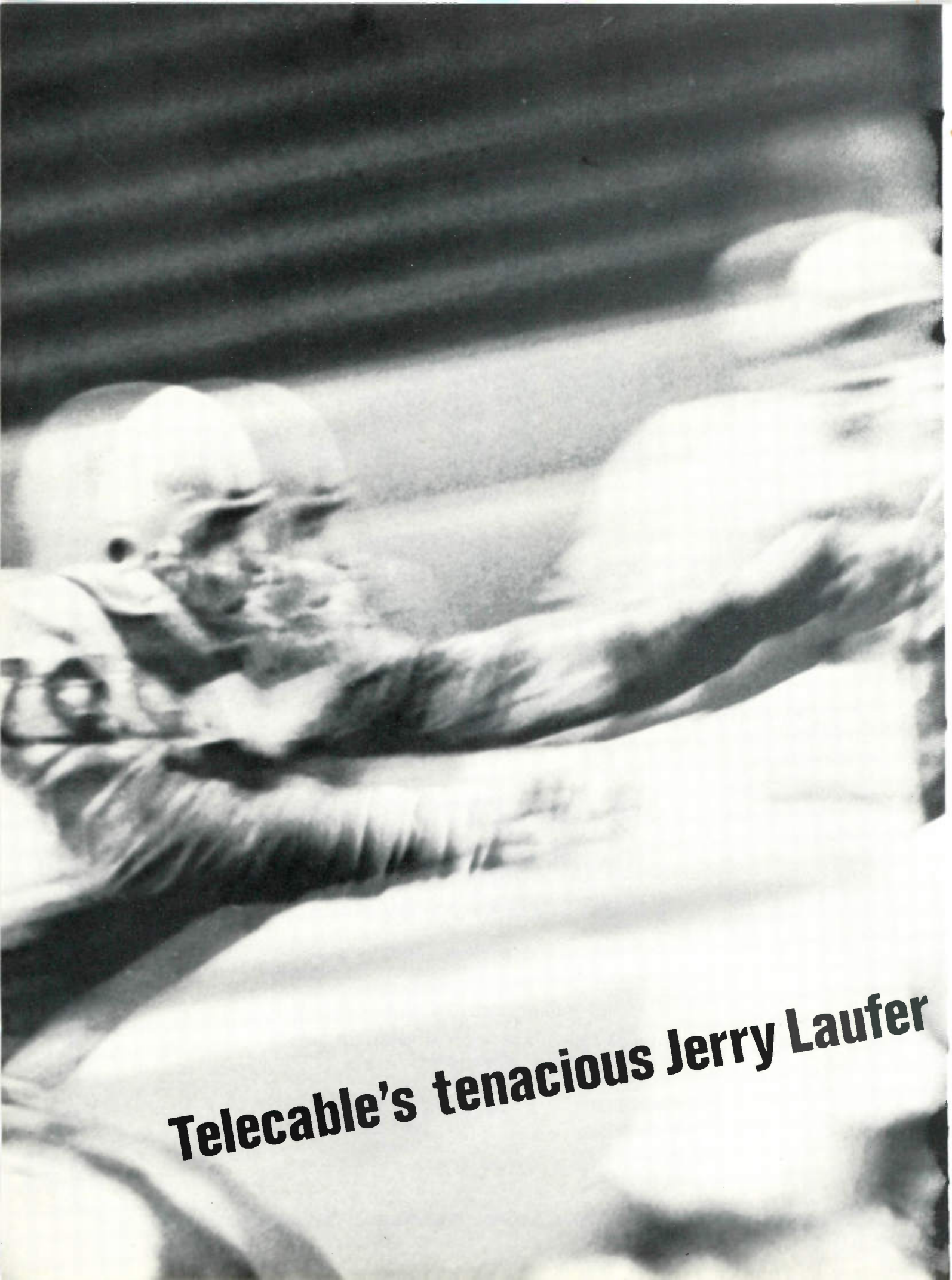

Telecable's tenacious Jerry Laufer

Seattle CATV is no longer haunted

Last year, there were 12 men in the Notre Dame backfield, and 21 more on the line.

Or at least that's how it looked on too many CATV sets in Seattle.

The ghosts were due to strong signal interference picked up from local channels 4, 5, 7, and 9.

Telecable's Vice President of Engineering, Jerry Laufer, studied every means and tested every piece of equipment available in a new, $30,000 test laboratory.

The device that put an immediate end to the haunting images on Telecable's channels was International Telemeter Corporation's Focus 12.

The ITC Focus 12 is a 12 channel V to V converter. Its heavy shielding completely eliminates interference caused by direct pick-up in TV receivers.

In other words, the Focus 12 unit takes ghosts out of the CATV world, at down to earth prices.

The results: 12 crystal clear channels, perfect color reception, and outstanding frequency stability. Even in the shadow of powerful local transmitters.

But why stop with 12 channels.

When you're ready to expand, check the ITC Plus 13, a channel expander that adds up to 13 new channels to your system.

The Plus 13 is a fully transistorized unit (like Focus 12), and it provides extra heavy shielding to prevent interference on all 13 new channels.

Then check the ITC Gamut 25.

A 25 channel converter that completely cleans up the ghosts on your 12 existing channels, and adds 13 new, interference-free channels to your system, right off the bat.

has the FOCUS 12 by ITC

Focus 12, Plus 13, Gamut 25.

Three beautifully designed, fully transistorized units for perfect CATV reception.

Easy to buy, easy to install, impossible to beat.

For full specifications on each, write or call us at (213) 478-7751. We'll give you price and delivery information at the same time.

ITC eliminated Telecable's ghosts forever.

And that's clearly good business.

FOCUS 12 PLUS 13 GAMUT 25

THE GHOST BREAKING CHANNEL EXPANDERS FROM ITC

International Telemeter Corporation
2000 Stoner Ave., Los Angeles, Calif. 90025

A Subsidiary of Gulf+Western Industries, Inc.

G+W

FOCUS
. . . On People

Systems

James Yager has been appointed general manager of Cosmos Cablevision Corporation. Yager, who is also a vice-president and a member of the board of directors for the Cosmos Broadcasting Corp. entity, has been manager of the company's planning and development department for the past five years.

Hy Triller has been named manager of the Eau Claire, Wisconsin system, where he previously served as manager in 1959. Before joining the Daniels Management Company, operators of the Eau Claire system, Triller was general manager of Cleveland (Ohio) Area Television. He also served as general manager of the SKL system in Lafayette, California.

Mr. Triller

Mr. Yager

Johnny Cline has been named manager of the Centralia, Washington, KELA-TV Cablevision system. Cline was formerly with Okanogan Valley Cable of Omak, Washington.

John Morris has been named manager of Hartselle (Ala.) Cable TV. Morris, who was formerly manager of the Boaz, Alabama division of TV Cable of Alabama, replaces Billy P. Roberts, who recently resigned as Hartselle manager.

William H. (Bill) Young has been named chief technician for Southwestern CATV Co. of Brownsville, Texas. Young served as chief technician for Bannock (Idaho) TV for the last 12 years. His position there has been filled by **Delmar Cammack**, who has been with the firm since September, 1965.

Tom J. Edwards has been named public relations manager of the CATV division of Cosmos Broadcasting Company, Columbia, South Carolina. Edwards was previously employed by the Monroe, Louisiana, system.

George J. Dastyck, director of employee relations of the Gannett Company, Inc. has been named a vice president of Ontario (N.Y.) Cable Television, Inc.

Robert Morse has been named Manager of Trenton (Mo.) Cable, Inc. He replaces **Marion Patton**, who has been transferred.

Jerry S. Mitchel has been appointed sales customer service manager for Buckeye Cablevision Corp. of Toledo, Ohio. Mitchel was formerly general manager of the Manistee, Michigan system.

Phillip C. Lothrop has resigned as vice president and manager of Green Mountain Television Corp. and Montpelier Television, Inc. to accept the position of assistant to the president of Vermont Television of Barre, Vermont. A pioneer in cable television, he organized Montpelier (Vt.) Television in 1953 and has been manager since the system started in that year. **Robert M. Martineau** has assumed Lothrop's former positions with the two CATV firms which serve the communities of Burlington and Montpelier, Vermont.

Richard H. Weindel has joined American Cable Television as director of finance. Weindel has been a free lance consultant and was controller for an electronics firm.

Sonny Myers has been named manager of Fuqua Communications, Inc.'s system in Elberton, Georgia. Myers moves up from chief technician for the company.

Douglas Fuller has joined St. Joseph (Missouri) Cablevision as chief technician. He was formerly field technician for United Video.

Lowell S. Robertson has been named manager of Telesis Corp.'s Bloomington, Indiana system.

Charles C. Shank has been named manager of the DeKalb, Illinois system for Allied Video Transmission. Shank was formerly with Streator TV Cable Company.

Louis Adelman has been appointed to the position of district sales manager for Video Communications, Inc. of Desert Hot Springs, California.

Suppliers

Bruce Walters has been appointed to the newly-created position of director of manufacturing for Anaconda Astrodata Co. Prior to joining the company, Walters was vice president, products, of Ameco, Inc.

Mr. Walters

Mr. Einsidler

William L. Davenport, Jr. has been elected executive vice president of Scientific-Atlanta, Inc. Davenport also remains as treasurer, a position he has filled since joining the company in 1959. **Glen P. Robinson, Jr.**, president, remains as chief executive officer of the company.

Stanley A. Viens has been promoted to assistant marketing manager of the Brand-Rex Division of American Enka Corporation.

Joseph B. Einsidler has been named instruments sales manager of the government and industrial division of Jerrold Electronics.

Robert E. McCann has been appointed general manager of a

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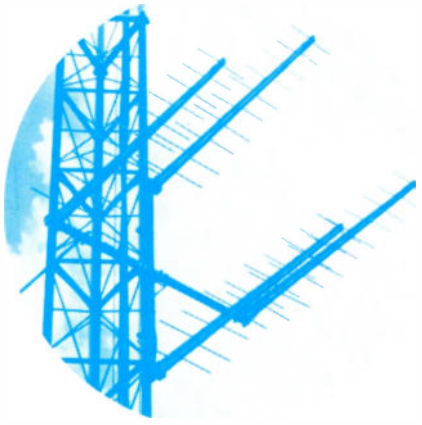


TOP

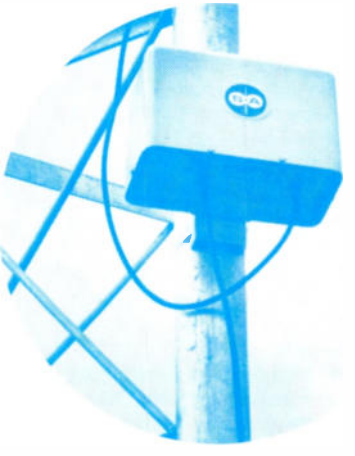
QUADRATE CHANNELER ANTENNAS

-eliminate co-channel interference with high gain, wide band, narrow beamwidth design. Standard configurations available for VHF, UHF, and long distance applications.

TO

PREAMPLIFIERS

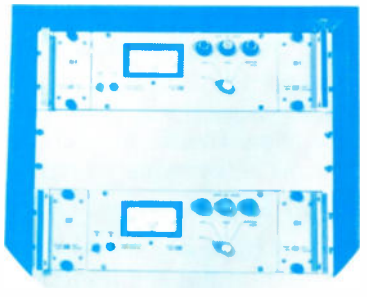
-minimize adjacent channel interference with reliable solid state construction. Field-effect-transistor front ends can accept 10 to 20 dB higher unwanted signal levels than ordinary bi-polar transistor preamplifiers.



BOTTOM

RECEIVERS

-optimize head-end performance with low-noise modular units. Separate AGC systems eliminate the effects of selective fading. Field-effect-transistor RF amplifiers minimize spurious responses and cross modulation. Compatible with existing commercial equipment.



For further information, contact Tom Smith, Marketing Manager, CATV

SCIENTIFIC-ATLANTA, INC.

Box 13654, Atlanta, Ga. 30324

Tel. 404-938-2930, TWX 810-766-4912.

newly-formed organization, Television Distribution, Inc. of Harrisburg, Pennsylvania. McCann was in charge of Ameco's warehouse in Harrisburg prior to joining Television Distribution in June of this year.

Mr. Court

Mr. Calhoun

Wayne E. Calhoun has been appointed personnel director at Ameco, Inc. Calhoun has been assistant manager of the personnel department since April, 1965. **Frank B. Court** has rejoined Ameco as one of the firm's sales representatives in the Midwest.

Norman C. Hanson and **Charles A. Smith** have been appointed West Coast sales representatives for the Wire and Cable Division of International Telephone and Telegraph Corp.

Dennis W. Burns has been named sales engineer for Georgia and Florida for Jerrold's CATV Systems Division. Burns was previously associated in sales capacities with Fischer & Porter and American Locker Company. He will serve his area from an Atlanta, Ga. office.

Mr. Burns

Mr. Snider

Charles D. Snider has been appointed vice president and general manager of Great West Construction Company, Inc. of Mexia, Texas. Snider was formerly with Ameco, Inc. as construction manager.

D. "Mike" Ganley has been named sales representative for the northeastern region for Times Wire and Cable Co. Ganley, who has had management experience in CATV and manufacturing for the past two years, will make his offices at the company's headquarters in Wallingford, Connecticut. **M. "Don" Atchison** will serve the midwestern region of the country, with offices in Kansas City, Missouri. **W. "Bill" McNair** has been named sales representative for the southwestern region.

A. A. Sroka has been appointed video national sales manager for Ampex Corporation. **Donald Kleffman** has been named manager of video product management for the company.

Professional

John Druckenbrod has been named to the new position of director of public relations for the National Cable Television Association. He has served for the past year as director of information services for the American Podiatry Association and previously spent 11 years with the National Forest Products Association.

Mr. Druckenbrod

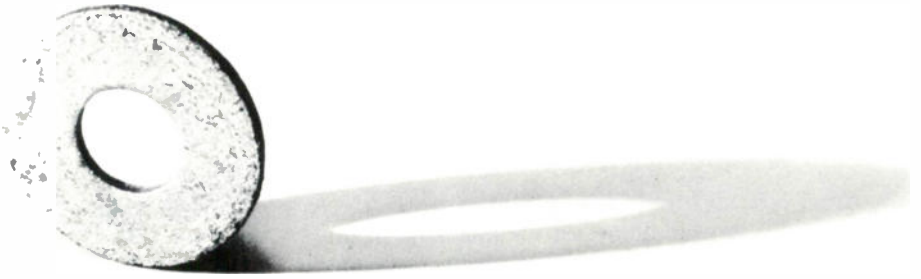
Mr. Jackson

Sol Hirschorn, general credit manager for Vikoa, Inc. has been elected secretary of the Community Television Credit Association, an association of cable television suppliers.

Steve Riley has joined the art and production department of Communications Publishing Corp. He is a graduate of Oklahoma State University — School of Technical Training. Riley will assist in the production of *TV Communications* magazine and the *CATV Directories*.

William S. Jackson has joined Barash Advertising of State College, Pennsylvania, as an account executive. □

When you need round washers and some straight talk...



...you need the Pruzan Company.

Sure, our washers are round, square or curved. We also have spring, centering and lock washers. And they're all hot galvanized. Other companies have washers, too. But, at Pruzan Company you get washers, the nuts and bolts to use with them, and 7,500 other items of all types in stock *for immediate shipment.*

Most important, the ones which we ship will be the right ones for the job you have to do. That's where the straight talk comes in.

The people you talk to at Pruzan know the problems you face. They will coordinate the supplies you need for the job that needs to be done. You won't get well-rounded phrases that mean nothing. Just straight talk from people who understand exactly what you want and how fast you must have it. *85% of all orders shipped the same day received—and freight is no problem.* Pruzan offers the most liberal prepaid freight policy in the industry; your order is fully prepaid if it's 150 lbs. or more. You are assured of the lowest cost possible and no delays in construction for the lack of one small part.

That's the nuts and bolts—and washers—of the Pruzan Company story. You'll find more of the supply items you want—and more of each of them in stock—and you'll get them quicker if you phone or write the Pruzan Company for some straight talk on catalogs, quotations or immediate shipments.

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235-Mile system installation in central Florida gets underway fast with the signing of . . .

Lakeland's $1 Million Turnkey

By Joy Diegel
Publicity Manager, Ameco Inc.

Construction activity on Lakeland, Florida's 235-mile CATV system was well underway within a week after Community Cablevision, Inc. signed a $1 million contract with Ameco, Inc.

The fast start was made possible by much pre-planning on the part of principal owners Duane F. McConnell, John W. Gilman and Dan Sanborn. McConnell is president-general manager of radio station WONN in Lakeland, Gilman is vice president-commercial manager and Sanborn operations manager-news director.

Within the week, carpenters were busy remodeling the radio station's ground floor into a head-end room, cable casting studio, control booth and offices. Joseph "Buster" Keeton, Ameco field engineer, was supervising stranding operations and organizing a warehouse for receipt of a steady flow of equipment. Chet Buttorff, chief technician, already was walking the poles in the second quadrant of the new system — and interviewing for a good assistant technician.

WONN is in the downtown area of Lakeland, lending

In front of WONN studios, Buster Keeton, Duane McConnell and John Gilman discuss grounding, bonding and AC voltage on line extenders to eliminate lightning problems.

Buster Keeton and Lakeland's chief technician, Chet Buttorff, both 13-year CATV veterans, discuss progress on construction of cablecasting studio for Lakeland operation.

the system layout to a hub design; tower and head-end site at the radio station with legs spreading in four directions. Thus a metropolitan area population of 75,000 can be served with 1/2" instead of 3/4" cable, and with no leg using more than 24 amplifiers in cascade throughout the entire 235 miles of plant.

Lakeland is the largest city in the geographic center of Florida. Adding the 300-foot radio tower height to Lakeland's altitude of 200 feet provides good line-of-sight paths to Tampa, St. Petersburg and Orlando, from which eight television signals will be received, processed and distributed to subscribers' TV sets.

The radio tower is a grounded unipole type, with the signal fed through six wires around the structure and transmitted from about two-thirds of the way up. The CATV antennas, then, will be 100 feet above the transmitting level, attached to a tower and not requiring insulation from broadcast signals.

Test signals are termed "adequate and clean" by Duane McConnell, Community Cablevision head, who has hooked a color TV set in the radio station to a simple antenna attached to the tower.

Head-end equipment, shipped from Phoenix after the contract signing, is Ameco's "Channeleer" solid-stat heterodyne signal processor. Amplifiers and directional taps will be solid-state Ameco Pacesetters. CATV cable will be aluminum-sheathed Amecoax and

City-owned utility poles are used in the Lakeland plant — stranding crews kept cables 12 inches below telephone lines, 52 inches below power lines.

Ameco Cable drops. A nine-ton stock of pole line hardware in Buster Keeton's temporary warehouse was moving out quickly as crews acted to meet an October fire-up date for the first 60 miles of system into the southwest quadrant of Lakeland.

Though McConnell claims "we're novices at this CATV business," the operation of WONN by McConnell, Gilman and Sanborn is evidence of successful experience in communications and administration. Then too, among other stockholders in Community Cablevision are Florida CATV entrepreneurs William F. Hemminger and Harry Harkins.

Keynotes at WONN are planning, public service, public relations, local programming and promotion. The five P's are applied to the cable operation as well.

McConnell says CATV caught his attention a couple of years ago when a first franchise application was made to the Lakeland City Commission. Community Cablevision's application was among nine others to follow, and McConnell began his public relations/information campaign while the commission studied all the applications. When it came time for a franchise grant last October, only two applicants chose to stay in the running — and Community Cablevision made an eight-minute video tape presentation, backed with a well-produced proposal booklet, that snared the franchise.

The public information program has continued, averaging a news release via newspapers and radio every 10 days. Lakeland residents not only have a general idea of what CATV is, but what it will mean to them in terms of picture clarity and program selection.

Pre-promotion via video-audio presentations to local service clubs started in July. McConnell, Gilman and Sanborn, long-time members in most of the service organizations, take turns presenting these 20-minute programs. A Community Cablevision logo was designed in advance for use on a site sign and all C.C.I. vehicles. A list of early subscriber inquiries was set 'up and maintained for future follow-up.

A spot radio and newspaper advertising campaign on a count-down theme started 60 days prior to turn-on in the first quadrant, and direct mail, house-to-house canvass, demonstration block parties, a formal ceremony at Lakeland Civic Center and a three-day open house at the studio are planned. The same procedure will coincide with the turn-on of each of the other three sections except the grand opening.

Sanborn, a newsman of 30 years experience, has been developing a photo file of nearly everything and everybody in Lakeland. When the system is fired up, there will be instant visuals available for every Lakeland news story even before arrival of the local origination van on the scene.

Break-ins of Lakeland news (WONN audio) on the teletype news channel is another of many progressive cablecasting features planned by Community Cablevision. A time/weather channel will include local forecasts for a region subject to hurricanes from July to September. In addition to a program schedule channel, bulletin board and stock market quotation channels, a spot on the dial reserved for community public service will cablecast Lakeland cultural and civic programs. High school and Florida Southern College students involved in ETV will be hired as part time help in local origination programming.

With this Planning/Public Service/Public Relations/Programming/Promotion approach, McConnell is aiming for 30% saturation on the initial campaign.

Novices at CATV? Maybe the trio running the show at Community Cablevision are in this business for the first time, but their sound approach and progressive thinking ought to make the Lakeland installation a model CATV system by any standards. □

Stranding operations on a humid July morning in Lakeland. Watchword was: "hard hats, sharp gaffs, and watch those cypress trees."

CONSTRUCTION CONTRACTORS

The firms listed here are actively engaged in cable system construction in North America, and may be contacted for details of construction capabilities and specialties omitted from this quick-reference listing.

David B. Adams Construction Company; Uniontown, Pennsylvania 15401. (412) 438-7560. Complete CATV construction services, including cable plowing. Serving Ohio, Pennsylvania, Maryland, and West Virginia.

Anaconda Astrodata Company, 1430 South Anaheim Blvd., Box 3772, Anaheim, California, ph. (714) 635-0150: Complete system planning and turnkey construction service.

B.C. Antenna Contractors Ltd.; 1947 Kingsway, Vancouver, B. C., Canada; ph. (604) 879-2631. CATV engineering and construction.

Broadway Maintenance Corp.; Long Island City, New York 11101, ph. (212) 286-3700; CATV design, installation, and maintenance.

Burnup & Sims; P.O. Box 2431, West Palm Beach, Florida, ph. (305) 683-8311. Services include power and telephone plant re-arrangement and tree trimming. Complete construction.

Cable Construction Company; 514-1/2 River Road, P.O. Box 190, Puyallup, Washington 98371, ph. (206) 845-7541. Furnishing all types of system construction.

Cal-Tel Construction Company, Inc; 1698 East 25th Street, Signal Hill, California, ph. (213) 426-7041; Handles all phases of CATV construction.

Cascade Electronics, Ltd.; Electronic Avenue, Port Moody, British Columbia, Canada, ph. (604) 939-1191; Full CATV system design and engineering services, with complete turnkey construction aid available.

Cascade Line Constructors, Inc.; P.O. Box 604, Wenatchee, Washington 98801, ph. (509) TU 4-7161, Specializes in telephone line construction and CATV systems.

CAS Manufacturing Co.; P. O. Box 47066, Dallas, Texas 75207, ph. (214) BL 3-3661; Experienced design, engineering and construction.

CATV Equipment Co.; 1422-34th Avenue, Seattle, Washington 98122, ph. (206) 325-6838; Specialists in all-band systems, providing complete construction services, layout, equipment and installation.

CATV Services Co.; P. O. Box 574, Worland, Wyoming 82401, ph. (307) 347-3085; All kinds of cable system engineering and construction.

C-COR Electronics, Inc.; 60 Decibel Road, State College, Pennsylvania, ph. (814) 238-2461; CATV engineering and construction services.

Co-Ax Construction Co.; 2949 West Osborn Road, Phoenix 17, Arizona, ph. (602) 252-6041; Specializing in complete turnkey construction. Construction representatives provided on all turnkey jobs. (Subsidiary of Ameco, Inc.)

Communication Systems Corp.; 140 East Main Street, Huntington, New York, ph. (516) 271-1262; Complete turnkey and construction capabilities for CATV systems.

Communications Constructors, Inc.; 1852 East Pacific Coast Hiway, Wilmington, California 90744, ph. (213) 835-0137. Complete CATV construction services.

Comm/Scope; (a division of Superior Cable Corp.) Hickory, North Carolina 28601; Turnkey construction for CATV systems including planning and engineering.

Com-Tel Construction, Inc.; 1721 West Monroe Street, Decatur, Indiana 46733, ph. (219) 724-2581 or 2690. Aerial and underground system construction, including cable plowing, and system engineering services.

DAVCO Electronics Corp.; P. O. Box 861, Batesville, Arkansas 72501, ph. (501) RI 3-3816; Complete services include layout, equipment and installation. New system construction or modifying existing systems.

Entron, Inc.; 2141 Industrial Parkway, Silver Spring, Maryland, ph. (301) 622-2000; Utility pole make-ready studies, system layout. Specializes in turnkey construction.

Great West Construction, Inc.; Box 468, Mexia, Texas 76667, ph. (817) 496-4662. Complete services include field engineering, signal surveys, layout engineering, installation of all electronic components, and testing both aerial and underground systems. Also provides rebuild service.

Gregory Electric Company, CATV Division; P. O Box 76, Columbia, South Carolina 29202, ph. (803) 256-9926. Complete system design, engineering, and turnkey construction capabilities.

Henkels & McCoy, Inc.; 1800 Johnson Street, Elkhart, Indiana, ph. (219) 264-1121; CATV engineering and construction.

Jerrold Electronics Corp.; 401 Walnut Street, Philadelphia, ph. (215) OS 2-0800; Turnkey construction, engineering and surveys.

J. H. B. Construction; Box 132, Alexandria, Minn; tower erection, painting and complete CATV construction.

Kaiser-Cox Corp.; 2216 West Peoria Ave., Box 9728, Phoenix, Arizona 85020, ph. (602) 944-4411; Construction of partial or complete systems, including complete turnkey.

Killoren Company; 925 N. Bluemound Drive, Appleton, Wisconsin, ph. (414) 734-9278. Engineering construction and maintenance services for CATV systems.

Artie M. Loftis Construction; Box 656, Malakoff, Texas, ph. (214) HU 9-4666. Complete CATV construction services.

Matador Construction Co.; 5471 San Fernando Road, West Glendale, California 91203, ph. (213) 243-9593; Comprehensive services include both pole and underground construction.

Noram Cable Construction Ltd.; 1111 Albion Road, Rexdale, Ontario, ph. (416) 741-0566; Complete CATV construction services.

Robert G. Owens, Inc.; 150 Washington Blvd., Laurel, Maryland, ph. (301) 498-0555; Total Turnkey capability.

Spencer-Kennedy Laboratories; 1360 Soldiers Field Road, Boston, Massachusetts 02135, ph. (617) 254-5400; System layout and design plus installation supervision for plant construction. Turnkey construction and installation contracts let.

Stan Socia Corp.; 734 Petroleum Building, Tyler, Texas, ph. (214) LY 3-0911; Complete CATV system construction and engineering services.

System Construction Company; 830 Monroe Street, Hoboken, New Jersey, ph. (201) 656-2020. Construction of cable systems anywhere on the continent. New turnkey or rebuild or expansion of existing systems. (Subsidiary of Viking Industries, Inc.)

Systems, Inc.; 235 Bear Hill Blvd., Waltham, Massachusetts, ph. (617) 891-5480, Engineering and construction of all types of CATV systems, including turnkey projects. (Subsidiary of National Teline.)

Telectric Construction Corp.; Kirkwood, Missouri; Complete coaxial plant construction, electric equipment installation, tower erection and maintenance of system.

TeleSystem Services Corp.; 113 South Easton Road, Glenside, Pennsylvania, ph. (215) 884-6635. Offers design, engineering and complete construction services for CATV systems. (Subsidiary of TeleSystems Corp.)

Utilities Contracting Company; 1422 East Michigan, Lansing, Michigan 48915; ph. (517) 482-5248.

Village Cablevision Corp.; (Subsidiary of Advance Communication), 236 East Washington Street, Lisbon, Ohio 44432, ph. (216) 424-7273. Specializing in CATV plant construction. Buried or aerial installations and rebuilds.

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A Contractor's Analysis of Buried CATV Construction

By J. D. Burge
Chief Engineer, Robert G. Owens, Inc.

Start of direct burial run, with vibratory plow in ground, is shown here. The method eliminates trenching, hand laying of cable, and backfiling.

A look into the future regarding the disposition of utilities also holds an indication as to the future of the CATV operator. Regardless of whether he may like it or not, or for that matter, whether he can afford it, he must face the reality of replacing his present aerial plant with underground construction. With this rather awesome reality at hand, let us explore the advantages and disadvantages as well as the economics of such a move.

While disadvantages are quite well publicized, much of the fear of operating an underground plant is unfounded. The biggest problem from an operational standpoint stems from the moisture contamination possible in such a plant. Moisture can be eliminated with the proper selection and installation of watertight enclosures; and these units are available today. The cost of these units varies, depending upon whether or not you are required to maintain a flush grade or if you can place pedestals above ground. If given the choice, always insist upon pedestals above ground. Not only are these units less expensive, but also much easier to service.

Many different methods for installing underground plant are used today. The most expensive of these methods from a labor standpoint, is boring in existing areas. The least expensive is plowing in rural or open areas. The range of cost can span from about $.16 per foot for areas suitable for plowing to as much as $6.00 or $7.00 per foot in high density metropolitan areas. The requirements of the various city and county right-of-way departments can also effect the total cost to an operator.

In some areas, the city will require replacement of a complete sidewalk if you cut any portion of it. Or perhaps their requirements for street crossings will not allow you to open up a cut all the way from curb to curb, but will only allow half of the street to be opened at any one time. They often will allow only a small portion of any trench to remain open at any one time. All of these items will effect greatly the cost of an installation. The operator should be absolutely certain of the local requirements before he starts to budget his dollars.

Many times, the overly cautious attitude of public administrators is due to a lack of knowledge as to your requirements. A few hours of education with these persons can reward you with tremendous savings.

In new subdivision areas, the most economical method of installation is to come to a joint use trench arrangement with the utility companies or the developer. The problem of coordination becomes very prominent, but can be tolerated if close working arrangements are initiated from the start with the job foreman. The average cost for this type of installation normally runs about $.30 per foot for labor. Add to this your share of the trench cost plus necessary equipment and engineering, and you can arrive at your cost per mile. Of course, many factors influence the labor cost and this is only an average figure.

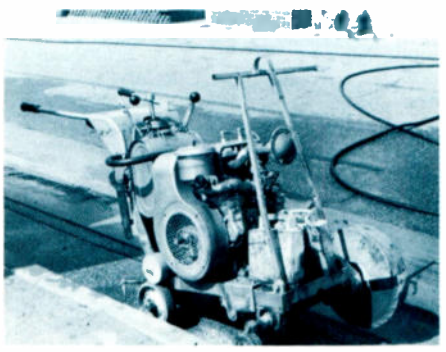
If the utilities are already underground and you are contemplating servicing that area, investigate the possibilities of trenching or plowing the rear property lines. Using this approach, you will find yourself using about half the cable and electronics as you would if you were to travel either side of the street on front property lines.

If, however, you find rear property lines unfeasible because of landscape, easements or other reasons, try to design your system on the streets feeding at least four homes from each tapping location. You

will still be using more cable than if you were to use the rear property lines, but you will have fewer tapping devices and pedestals. In designing hour underground plant in these areas, try to foresee future developments and make allowance in your design to accommodate them.

Many customers have asked for our opinion on direct buried cable for CATV. This seems to be a point which many people are puzzled about. Our feeling is this: We are convinced that there are cables manufactured today which will operate for long periods of time without any problems when direct buried. However, as I reflect on the past few years of progress in this field, I wonder if perhaps new developments in technology are going to require some drastic changes in present CATV system design and operation. In view of this factor, as an operator, I would shudder to think that to keep pace with the industry, I might have to go back in a few years and dig up everything again. No one knows exactly what the scope of the CATV system of the future will be, so perhaps that small initial investment in conduit is a good one. The duct system will allow you to change your plant in the future with the least amount of re-work.

In selecting equipment for use in an underground system, care should be taken to consider, aside from the electrical capabilities of the equipment, the adaptability of its mechanical configuration to an underground envirionment. To date, the manufacturers have had their hands full just keeping up with the needs of aerial plant. Consequently, only recently has much design effort gone into underground configuration. More and more effort is being directed to this potential and inevitable market today. A few manufacturers have brought out product specifically designed for use in pedestals. A few have made minor changes in their overhead versions to make them more adept in the situation of underground. What will be needed in the very near future, however, is a complete line of equipment specifically designed for underground use.



Shown above is the cutting unit used for cutting asphalt streets for buried installations.

Underground plant, however, is not without some very profound advantages. The equipment no longer requires AGC for thermal compensation. The plant is very easy to service. Expensive ladder trucks and climbing equipment are no longer required. And, if properly installed, your maintenance problems will decrease a great deal. Of course, the key to that statement lies in the "properly installed" phrase. As is true with any job, the better it is done in the initial phase, the better it will serve you in the future. Proper care and sealing practices, along with competent engineering and design, are the most important factors in construction. Shortcuts and poor craftsmanship in this phase will cost three fold in maintenance and customer complaints in the future.

One more point is worthy of consideration when contemplating underground construction in an area which is already developed. That is the problem of landscape protection and replacement. People seem to develop a very strong attachment to their floral possessions when the possibility of damage arises. Even though they may have their flowers or lawn in an easement, which you are allowed by the city to use. If you make them unhappy, you run the risk of sacrificing a potential subscriber. Establishing the proper attitude and desire prior to the time construction begins is a very important step. The people you plan to serve must be convinced that you are going to leave the area just as near to the way you found it as you can. Most people are pretty reasonable and if problems arise, prompt action on the part of the cable company or the construction company can usually satisfy them — right then and there. In cases where people just refuse to allow you to trench across their property, consideration should be give to boring under it rather than enforcing your right to trench in the easement.

Shown above is boring operation for street crossing.

Each operator will have to evaluate his own situation in regard to the methods most desirable for him. The cost for underground is high, but it's a reality that must be faced. In some cases, the cost can exceed three or four times the cost per mile of comparable aerial plant. However, a good pre-construction plan can save many dollars.

A few hours with the city officials can sometimes change their requirements considerable. Good on-the-job coordination of experienced people can also save time and money. Proper engineering design and specification can make an immense difference in the cost as well as the performance of the system. A good job the first time will give you a system that is both reliable and proficient, but the operator must also prepare himself for a somewhat new ball game.

With the future of CATV as bright as it is today, soon everyone will be receiving service. With this in mind, the increased revenue will more than offset the additional cost of installation. There is no question that aerial construction is still the most economical and with the equipment available today, the most practical. But the fact remains that in many cases, it is *not* the inevitable. More and more plant goes underground every day — and one day, it will all be underground. □

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Vumore Pioneers New System Layout and Construction Methods

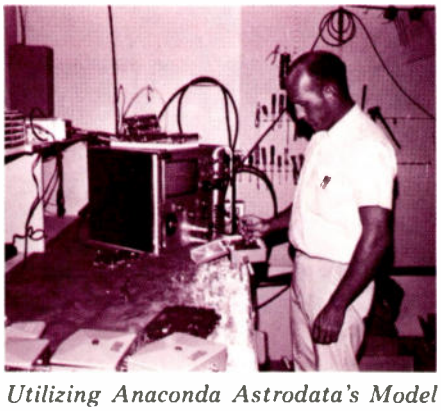
By Ronald Mandell, Anaconda Astrodata and B. Milton Bryan, TVC Staff

The new Ponca City, Oklahoma cable system has provided an opportunity to employ some new concepts in system design and construction using a new-generation of distribution amplifiers and coaxial cable. Vumore Company reports substantial savings in system cost while achieving improved plant appearance. Key to these cost savings is a system design layout which incorporates a significantly lower ratio of trunk to distribution cable.

In March, 1967, Vumore began serving subscribers in Ponca City. Their own crews did the construction of the plant, which was engineered by the Systems Division of Anaconda Astrodata. Including trunk and distribution line, 568,925 feet of cable are incorporated in 85.4 strand miles of system. Within this network, the ratio of distribution to trunk line is better than 6 to 1.

Improved techniques in system design and construction have resulted in a ratio of trunk to feeder line that is better than one to six. Checking an amplifier along the 85-mile system is Bob Hieronymus, chief engineer.

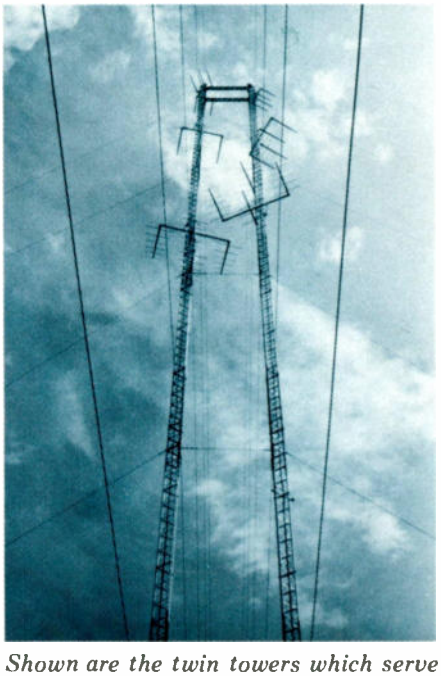
The ratio of trunk to feeder line called for becomes increasingly meaningful when the comparative costs of erecting the two types of plant are totalled. For the Ponca City system, the layout method was aimed at increasing this ratio by taking advantage of new solid-state circuit design which is an improvement over older design techniques that might require a feeder to trunk ratio of 3 to 1.



Utilizing Anaconda Astrodata's Model 990 system analyzer is Marion Patten, manager for the Ponca City system serving the 28,500 member community.

Distribution line length has been limited by the capabilities of line-extender amplifiers. Recognizing this, Vumore elected to use high level distribution implemented by distribution amplifiers rather than the shorter-range line extenders. Since this enabled longer cascades in the feeder lines, the length of trunkline routed through distribution areas could be substantially reduced.

A typical distribution line in the Ponca City installation extends 3,815 feet beyond the bridging amplifier. At the recommended spacing for the amplifiers used, runs of more than a mile, with cascades of up to six amplifiers were feasible. Four distribution lines can be run from each trunk-line bridger.



Shown are the twin towers which serve the Ponca City system. Quadrate Channelers pick up signals from Oklahoma City, Tulsa, and the Wichita-Hutchison market.

George Milner, vice president and chief engineer of Vumore, states that he is especially enthusiastic about the handling characteristics of the Sealmetic cable chosen by design engineers. An advantage cited was the flexibility, which was responsible for the neat appearance of the drip loops and the sections lashed to messenger strand. The jacketed, plastic-sealed coaxial line is easily shaped using hand pressure. More important, from a practical standpoint, it can be straightened and reformed if the original bend doesn't satisfy the installer.

George Milner, vice president and chief engineer of Vumore, goes over the Ponca City strand map with Ron Mandell of Anaconda Astrodata.

The adjustment range of the trunk and bridger amplifiers selected gave an added advantage to the cable installers. The spacing tolerance permissible allowed the amplifier locations to coincide with the lengths of standard cable sections, and no splices were needed in the main trunk. Linemen said that the cable formed up well to the strand as it was lashed, and that it pulled through rollers easily. The latter feature was a major factor in saving installation time, since longer pulls could be made.

While on-site technical assistance was available as needed from manufacturer's engineers, the bulk of the installation was performed by the operating company with the aid of detailed drawings and specifications drafted by the system vendor's personnel. Despite the strict specifications, which matched those of the systems installed by the design group and exceeded the requirements of larger utility companies, Vumore crews advised that few problems were encountered. The equipment manufacturer furnished units contained within a single housing, with optional mounting provisions. This eliminated the need for jumpers at amplifier sites and allowed easy maintenance of safe clearance where the cable neared other pole-attached lines. All units of the system (except power supplies) were strand mounted, obviating the headaches sometimes associated with crossarm mounting.

Low-maintenance operation is anticipated by system manager Marion Patton as a result of the company's experience in the installation of the system. Line up and initial adjustment was facilitated by the fact that only one bolt must be loosened for access to the amplifier controls.

Ponca City, located in the north-central section of Oklahoma, near the Kansas border, should provide a rigorous testing ground for the new system concept. Temperature and humidity variations approach those found anywhere; the winds of the region blow unimpeded across the plains, and should quickly show up the ability of the cable to withstand vibration and flexing.

Connection of the final drop is expected to be made in September. The completed 85.4 mile distribution system comprises 487,405 feet of .412 Sealmetic aerial cable as well as 1,209 feet of double-jacketed Sealmetic buried cable. Trunk cable (.500 Sealmetic) will run for a total of 80,311 feet, including the dead run from the tower site.

Because the oil-based economy of Ponca City is still expanding, greater expansion of the system is a foreseeable eventuality. Population within the city limits rose from 24,400 in 1960 to 28,500 in 1967. The unpredictable pattern of the city's growth was instrumental in Vumore's insistence on expandibility in the system design. In this area, too, the use of high level distribution can be important — a system expansion that might otherwise necessitate additional trunk line can be handled by the feeder system.

Subscribers in this former fringe area testify to the popularity of CATV, reporting excellent color pictures, as contrasted with "average to poor reception" from home antennas on tall masts previously needed. Ponca City does not lie within the grade-A contour of signals originating in the surrounding cities of Tulsa, Oklahoma City and Wichita, but now has full 12-channel service. □

The entirely modern Ponca City system utilizes Fort Worth twin towers which support almost two and a half tons of Scientific Atlanta Quadrate Channeler antennas. Signals received from Oklahoma City, Tulsa, and Wichita-Hutchison markets are processed by Channel Commander head-end gear for the twelve-channel offering. Ponca City citizens are provided with data on weather conditions and local emergencies by use of a Weather-Scan time/weather unit and an Asteroid emergency warning system.

An Operator's Experience With...

Construction and Maintenance of an Underground Distribution System

By John S. Booth
Sarasota Cablevision, Ltd.

The decision to go "underground" is usually based upon:

(1) The accessability of utility poles

(2) Restrictions of the sub-divider requiring underground construction

(3) Desire to co-operate with beautification programs

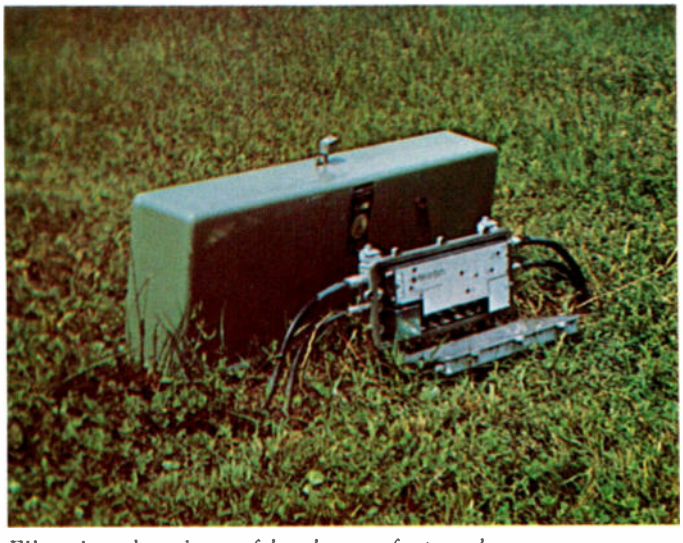
The economics of the situation are also important and will play an important part in any decision to go underground. One of the most important factors is the type of soil. In Florida—with our pre-dominately sandy soil—burial of cable is no problem. Recently, I observed an underground installation in Little Rock where a back hoe was required due to the rocky conditions. In this case the telephone and power company were using the same trench. Joint use of trenches is becoming more common, resulting in reduced construction costs.

Although a considerable amount of cable of all types has been buried, one still has to use some ingenuity and inventiveness to develop the necessary hardware to fit the needs. From a theoretical point of view, we believe underground installation to be superior to aerial. Factors leading to this conclusion are:

(1) No annual pole rent to pay

(2) The temperature of buried cable remains almost constant eliminating the problems of attenuation resulting from temperature changes

(3) Pole clearance charges are eliminated



Fiberglass housings of local manufacture have proven more than acceptable to Sarasota property owners.

(4) Good public relations (more and more communities are clamoring for all utilities to be underground, and when CATV leads the way, good PR results)

(5) Construction does not require highly skilled, unionized employees

(6) Mechanized direct ploughing of cable reduces labor costs and speeds installation

The decision to bury our system in Sarasota was greatly influenced by the fact that utility poles were not available at the time. With several other franchises outstanding, we decided to bury. Another contributing factor was that in Sarasota County, CATV enjoys the use of dedicated easements as that of utilities. Furthermore, we operate in Sarasota County, adjacent to the City, and in a newly developed area where front, rear, and side easements are available.

After investigating various methods of buring plant, we concluded that the ideal way would be to plough it into the ground without trenching. Unfortunately, all of the equipment we could find for this operation carried the reel of cable on the tractor and buried the cable behind. This was not acceptable, as it meant a splice each time we crossed a road or driveway.

Shortly after we began, we learned that manufacturers of trenchers had developed a procedure for pulling the cable through the ground. Using this method, the reel of cable remains stationery. The cable is pulled through a conduit made in the ground by a 2 inch stainless steel ball. Using this method we could disconnect the cable whenever we crossed a street or driveway, and could push the cable through a premade opening, reconnect the cable to the "vibratory" plough on the other side, and continue burying. The use of this method of ploughing-in the jacketed cable eliminated most objections — objections that were primarily based upon the open-trench method we had been using.

We originally tried sending emissaries ahead of our trenching operation to forewarn the property owners of our coming. This approach was not too successful, as the "retirees" in our area like to talk; and our advance men did not progress sufficiently to achieve the desired results. We then adopted a system of notifying the property owners — by mail — that we soon would be burying cable within public easement on their property. This proved about 98% effective in eliminating complaints.

Occasionally, we would encounter a property owner who was unaware of the existence of the rear and side

Use of a vibratory plow for direct burial of trunk and feeder lines is big improvement over trenching.

easements (which we were licensed to use) and who professed not to have received our mailed notice. In these cases, we produced evidence of our license and copies of deed restrictions attesting to the validity of our position. We went all out to retain the good will of property owners — they were our potential customers!

In addition to the problems involved in the invasion of a persons property, we were faced with providing housings for amplifiers that would not offend the owners of the property on which they would be located. Our investigations failed to produce a housing that was acceptable to us or that was designed to accommodate the amplifiers we planned to use. We were fortunate in that we were able to get a rectangular fiberglass housing fabricated locally. We have several hundred of these in use and in only two cases have the property owners insisted that they be re-located.

Much of our thinking as to hardware and problems was conditioned by the advice given us by Dick Cox and Quain Fletcher of Gulf Coast TV of Naples, Florida. They operate an underground system and were most helpful.

We decided to follow the practice of the Naples System and use pressure taps rather than in-line devices. In Naples, the taps are housed in standard water meter boxes. In Sarasota we use a concrete vault. Splitters and line extenders are housed in large concrete boxes. Both of these are production items available from local sources.

There are many problems peculiar to underground systems. We have four systems: two are underground; two aerial. While our experience in underground is not of sufficient duration to supply comparative operating costs, we do believe that the added construction costs are at least offset by pole clearance charges — and further, that the annual savings in pole rental will more than offset the additional expense in making buried house drops.

Some of the problems we have encountered that are peculiar to underground systems are:

(A) Equipment for the neat burial of RG 59 house drop cable is just becoming available, or at least we have just learned of its existence.

(B) Water or dampness is a more serious problem in underground than in aerial systems. We have resolved the waterproofing problem through the use of an adhesive material made by Raybestos-Manhattan — 84012. You may have seen the adhesive, as it was used for many years by Times Wire as a sealant on the ends of cable. Originally, we used a rubber based compound (Gayco) and two types of tape for waterproofing the pressure tap. This did not provide the desired protection. We have also used butyl rubber caulking compound. This does an acceptable job but is so long in hardening and is messy. The Raybestos adhesive comes as a solid. It is heated to liquid and hardens as soon as it comes in contact with metal. The adhesive is easily peeled from the pressure tap, splice or connector. It can be reheated and re-used if desired.

(C) In discussions with local utilities we have learned that an unresolved problem we share with them is an easy method for making a house drop underground. Equipment and techniques have been developed for burying the trunk and feeder cables, but the house drop still is a problem even for the utilities. In our area, much of the telephone distribution system is underground, but they are still going aerially to get into the house. We feel this defeats the basic advantage of underground construction — namely the cost of poles and elimination of unslightly wires.

(D) Burying under the streets and driveways is another problem for which we have been unable to find an easy solution. We have tried various methods including, hydraulic press; jetting with both water and air; auguring and a brute force operated ram. We're still looking for an easier way. In some areas, we have been permitted to make a half inch cut through the streets. A concrete saw is used in this operation. Agreement to this was secured on the basis that we would be creating expansion joints.

(E) The location of underground cable can be a problem. Despite the care with which the plans are followed, sometimes the cable just isn't where it should be. We have two pieces of equipment we use in locating the cable, both made by Hewlett-Packard. One is a Time Domain Reflectometer, which is used in working on electronic problems. Our technicians can determine the location of a discontinuity within one foot or less in a length of cable. The other device, known as a Cable Fault Locator, places a tone on the outer shield of the cable, and with a wand and indicating instrument, you can determine the path of the cable to the point where you need to know its location.

The cutting of house drops by customers is the cause of many of our service calls. One of the first we received was from an embarrassed customer who pleadingly asked that we come right out and repair their house drop before her husband came home. She didn't want him to know that his mother-in-law had cut the cable in six places while gardening.

So, although there remain many problems in practical underground system construction and maintenance, we feel that its increased use will benefit the state-of-the-art in our industry. □

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The Mid-band Technique for Multi-Channel CATV Systems

By Gay C. Kleykamp
Director of Engineering
Kaiser CATV Corporation

This is a report on a series of tests and simulated as well as actual CATV system operation with the application of additional TV channels in the 120 to 175 MHz frequency spectrum. This region is generally referred to as the "mid-band". Standard production unmodified Phoenician Series trunk line amplifiers (Kaiser Model Nos. KGAA KGMA) were used with normal 22 dB spacing.

In assigning the frequencies for the various mid-band channels, it was considered practical to use 6 MHz separation between each of the video carriers with the lowest mid-band channel (Channel "A") at 121.25 MHz. No attempt was made to use mid-band frequencies above 157.25 MHz (Channel "G") in order to avoid interference with the 166.5 MHz pilot carrier used in the Kaiser equipment. The lower frequency limitation of 121.25 MHz was selected in order to avoid any possibility of interference with aircraft navigational radio devices.

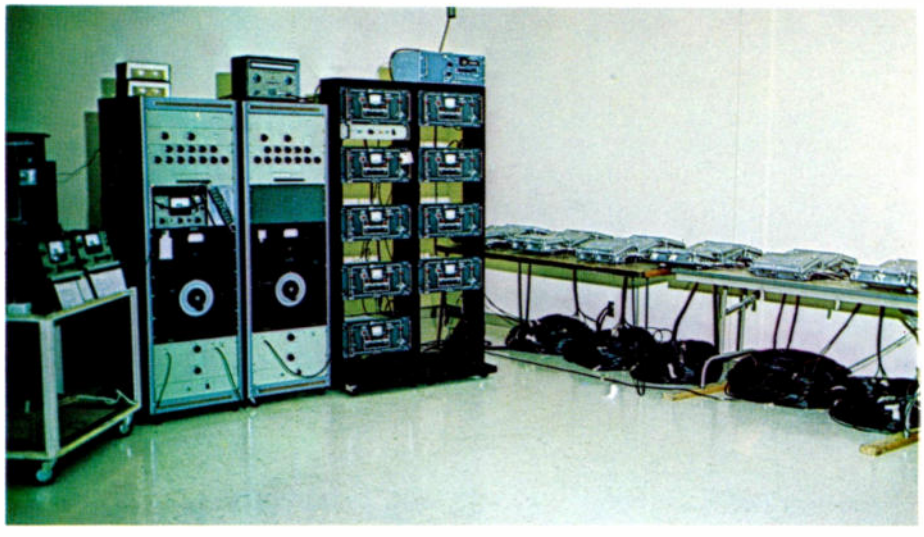
Laboratory Tests

All Kaiser Phoenician Series amplifiers are tested for a +50 dBmV, 12-channel plus pilot carrier single amplifier output level capability with a -57 dB cross-modulation indicated on all channels, minimum. The Kaiser "White Screen Tester" (see Figure 1) is used in these tests.

The "White Screen" tester delivers signals that are very similar to standard television signals. These signals consist of the various video carrier frequencies with twelve microsecond 15.750 KHz sync pulse modulation on a white screen level video modulation (85% ± 5% down from sync tip). The twelve microsecond horizontal sync pulse is synchronous in all channels. For measuring cross-modulation on a particular channel, this sync pulse is replaced with a 16.000 KHz sync pulse on only the desired channel.

The wave analyzer is tuned to the 15.750 KHz frequency and will not indicate the 16,000 KHz modulation (it has a four cycle band width). Both the desired and undesired modulation have identical rise time and pulse width characteristics, and it is therefore necessary to measure only one component of the modulation frequency spectrum in order to obtain an indication of the actual cross-modulation. The fundamental (15.750 KHz) is used inasmuch as it is of the greatest amplitude and provides the best signal-plus-noise ratio.

It is well recognized in the CATV industry that the horizontal sync pulse of undesired television signals causes a significant portion of the cross-modulation detected by the viewer of a television receiver. This has led to the term "wiping" as a description of the effect produced by cross-modulation. To maximize the condition to the worst case, the "video signal" is made to go to the white screen video level between



The "white screen" tester (above) used in Kaiser CATV's tests delivers signals very similar to broadcast television signals.

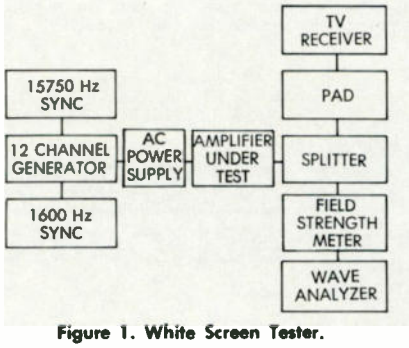


Figure 1. White Screen Tester.

horizontal sync pulses. This produces the largest excursions of undesired signal level which may be experienced in actual CATV systems. Thus, it can be seen that use of the White Screen Tester in our "White Screen" tester, which is modulated from the oscillator used for channels 2 through 13. Modified Benavac head-end control units were furnished by Benco Television Corporation for conversion of the

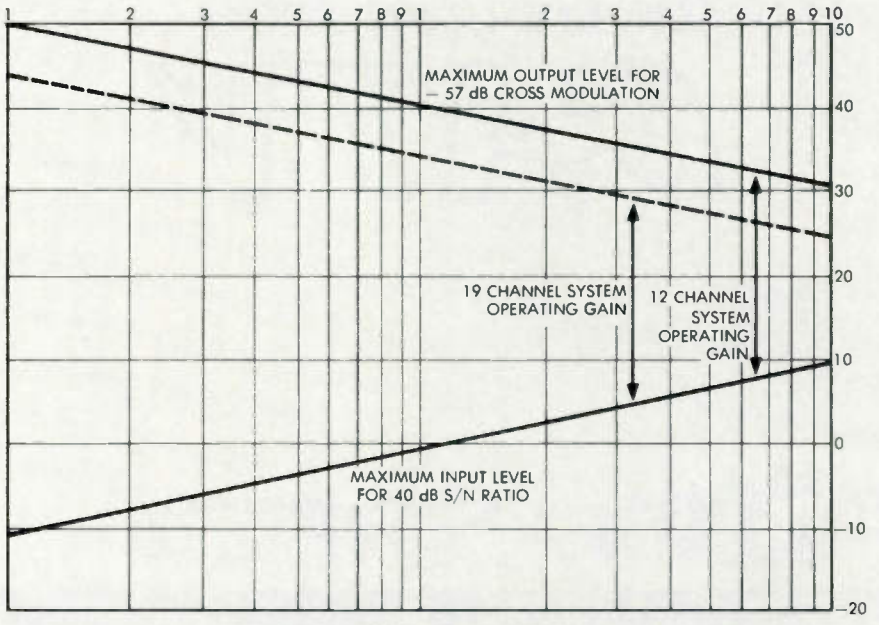


Figure 2. System Operating Levels.

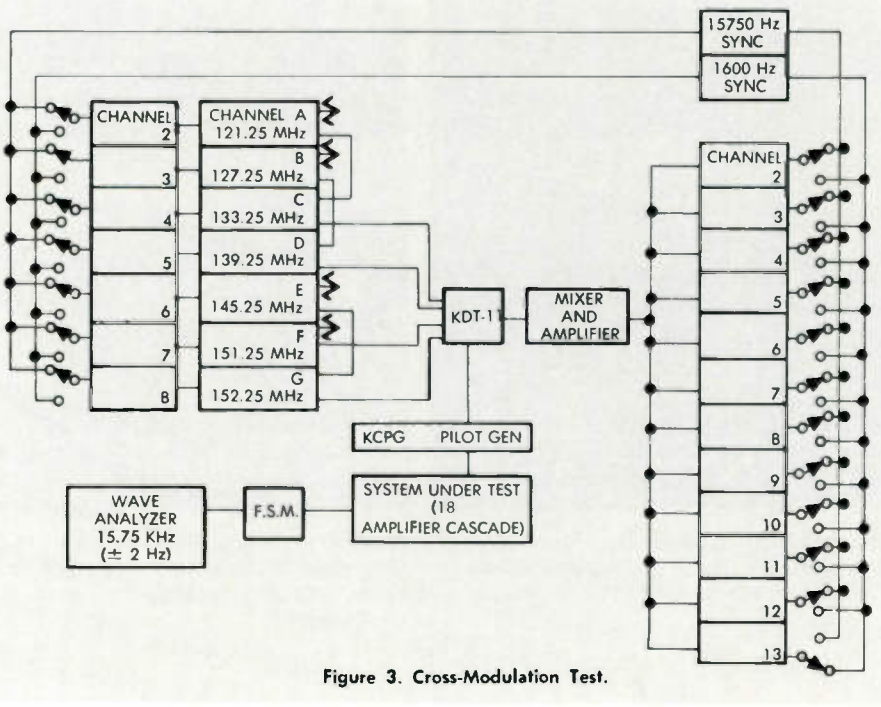


Figure 3. Cross-Modulation Test.

investigation produces a more stringent trial of the system.

The mid-band television channels (A through G) are obtained by conversion of VHF television channels 2 through 8 from an identical standard VHF television channels 2 through 8 to the mid-band channels A through G. The following mid-band frequencies used are shown in Figure 4.

Mid-band channels A through G were mixed (see Figure 3) by non-adjacent channel looping and combined with the standard channels 2 through 13, using an eleven dB directional tap (Kaiser Model KDT-11). The composite output of the nineteen television channels was then mixed with 166.5 MHz pilot carrier signal using the 10 dB directional coupler provided on the Kaiser Model KCPG — Pilot Carrier Generator. The signals were fed into the first amplifier of the system under test.

MID-BAND CHANNEL No.	OUTPUT FREQ (MHz)	INPUT FREQ (MHz)	INPUT CHANNEL
A	121.25	55.25	2
B	127.25	61.25	3
C	133.25	67.25	4
D	139.25	77.25	5
E	145.25	83.25	6
F	151.25	175.25	7
G	157.25	181.25	8

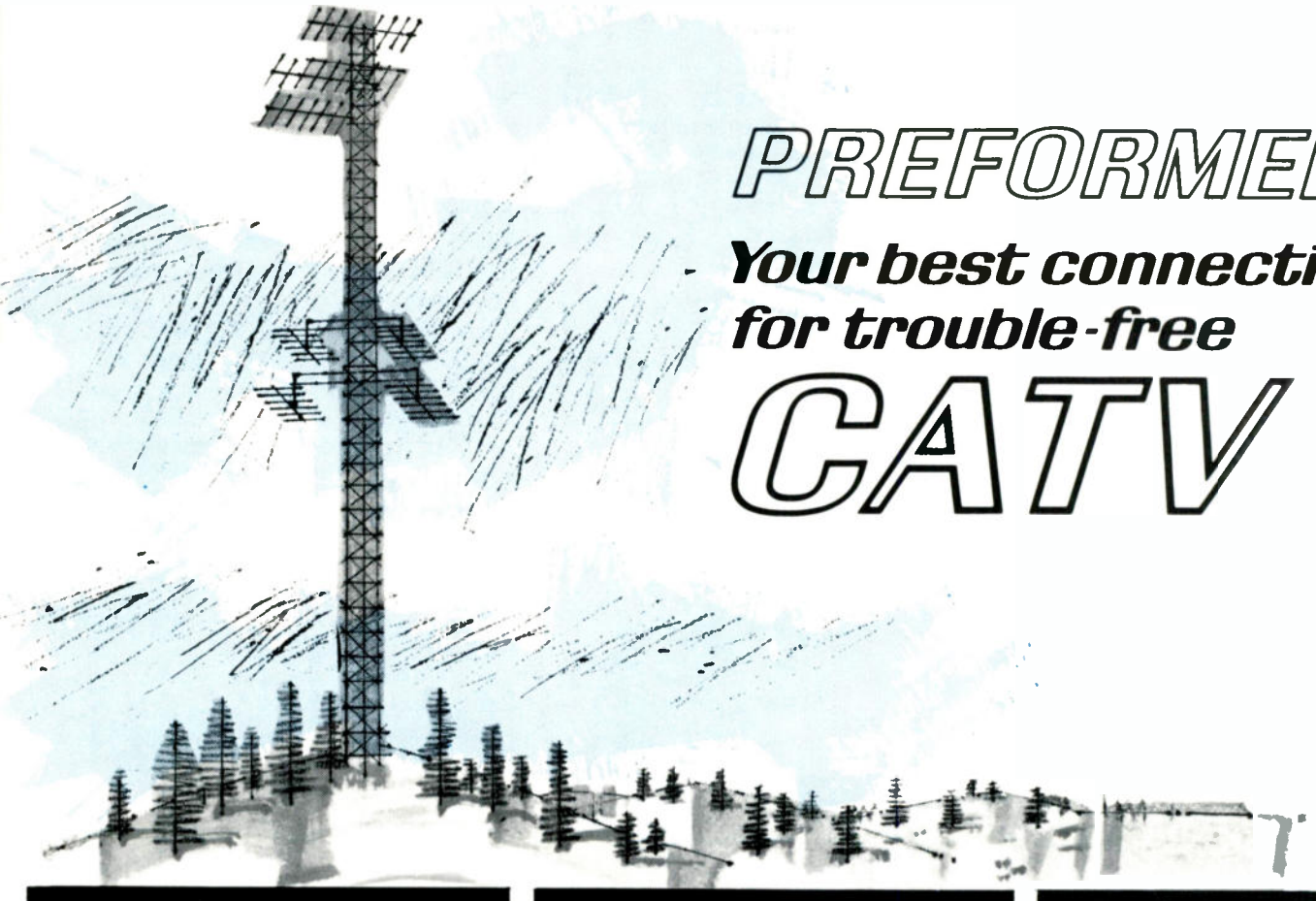
Figure 4. Mid-Band Channel Frequencies Used

The system consisted of eighteen standard Kaiser Phoenician Series trunk amplifiers with AGC at every second location. 22 dB of 75 ohm drop cable, similar to type RG-59/U, was used between amplifiers. Output levels, gain and tilt controls were adjusted for normal system operation. No "factory adjustments" for amplifier response were disturbed from the original setting as received from the stockroom.

Laboratory Test Data and Theoretical Calculations

Based upon single amplifier output capability for -57 dB cross modulation of +50 dBmV for 12 channel operation, the deration for 32 amplifiers would be 15 dB. This is based upon Figure 2 which illustrates a 10 dB per octave reduction in permissible output level. Theoretically, a 32 amplifier cascade would allow a +35 dBmV maximum output level for -57 dB cross-modulation. Using 5 dB block tilt, the output levels shown in Figure 5 apply.

2 dB "Block Tilt" was used for the mid-band channels after consideration of the effect of the cable attenuation characteristics. It will be noted that the total RF voltage existing across the output of each line amplifier is approximately the same for 19-channel operation (at



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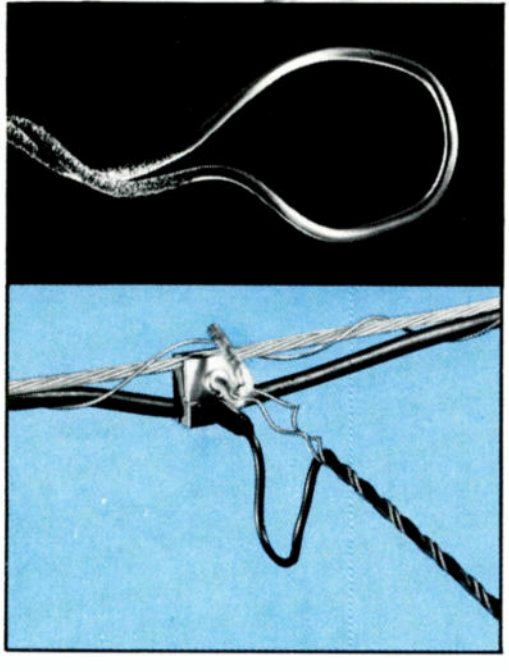

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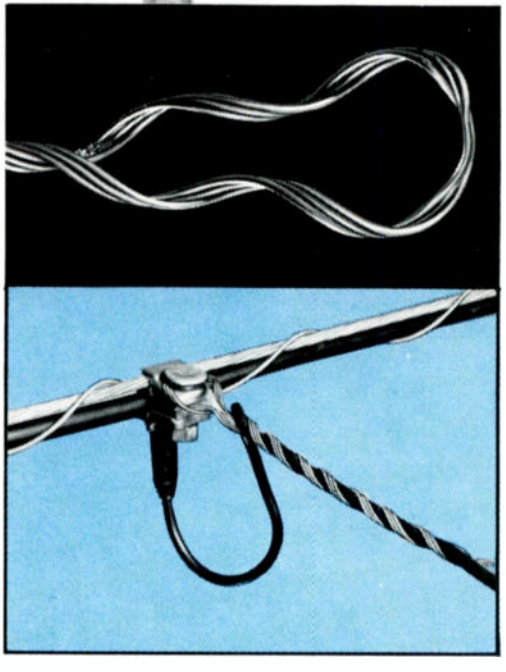

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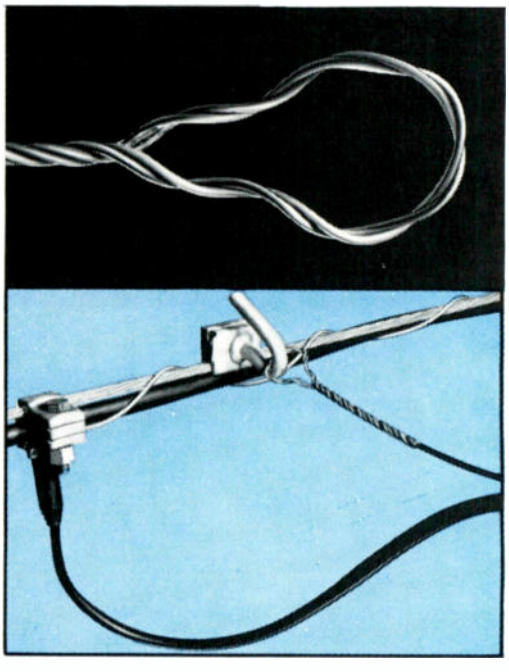

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CHANNEL NUMBER	12-CHANNEL OPERATION dBmV	12-CHANNEL OPERATION MILLIVOLTS	19-CHANNEL OPERATION dBm	19-CHANNEL OPERATION MILLIVOLTS
2	+30	31.6	+24	15.9
3	+30	31.6	+24	15.9
4	+30	31.6	+24	15.9
5	+30	31.6	+24	15.9
6	+30	31.6	+24	15.9
A	.....	.....	+27	22.4
B	.....	.....	+27	22.4
C	.....	.....	+27	22.4
D	.....	.....	+27	22.4
E	.....	.....	+27	22.4
F	.....	.....	+27	22.4
G	.....	.....	+27	22.4
P.C.	+30	31.6	+30	31.6
7	+35	56.2	+29	28.2
8	+35	56.2	+29	28.2
9	+35	56.2	+29	28.2
10	+35	56.2	+29	28.2
11	+35	56.2	+29	28.2
12	+35	56.2	+29	28.2
13	+35	56.2	+29	28.2
Total	+55.3	583.0	+53.4	465.3

Figure 5. Design Output Levels

CH. No.	TEST "A" OUTPUT LEVEL (dBm)	TEST "A" CROSS MOD. (–dB)	TEST "B" OUTPUT LEVEL (dBm)	TEST "B" CROSS MOD. (–dB)	TEST "C" OUTPUT LEVEL (dBm)	TEST "C" CROSS MOD. (–dB)	TEST "D" OUTPUT LEVEL (dBm)	TEST "D" CROSS MOD. (–dB)
2	+24	68	+23	67	+24	66	+22	74
3	+24	68	+23	67.5	+24	66	+22	74
4	+24	68	+23	68	+24	66	+22	75
5	+24	67	+23	66	+24	65	+22	72
6	+24	67	+23	67	+24	65	+22	69
A	+27	67.5	+28	68	+29	66	+27	69
B	+27	66	+28	67	+29	64.5	+27	67
C	+27	70	+28	71	+29	69	+27	71
D	+27	72	+28	72	+29	70	+27	71
E	+27	66	+28	67	+29	65	+27	68
F	+27	64	+28	64	+29	62	+27	66
G	+27	65	+28	65	+29	64	+27	69
7	+29	63.5	+28	64	+29	62	+27	70
8	+29	62	+28	61	+29	59.5	+27	66
9	+29	60	+28	60	+29	58.5	+27	65
10	+29	62	+28	62	+29	60	+27	66
11	+29	61	+28	61.5	+29	60	+27	66
12	+29	60	+28	60	+29	58	+27	64
13	+29	59.5	+28	60	+29	59	+27	64

Figure 6. Measured Cross-Modulation/System

the reduced output levels) as for the 12-channel operation (at maximum output levels.)

The cross-modulation measurements shown in Figure 6 were recorded for the 19-channel operation through the 18-amplifier cascade.

On the basis of these test results, it was determined that thirty-two amplifiers could be operated in normal cascade with nineteen television channels and pilot carrier plus wide-band FM (at +14 dBmV maximum output level) provided the levels were adjusted in accordance with Test "A". The system was then connected through a bridging amplifier (Kaiser Model KCBO-4) and two line extenders (Kaiser Model KCLE) operating at +35 dBmV (ch. 7 — 13), +33 dBmV (ch. A — G) and +30 dBmV (ch. 2 — 6). The output of this "feeder" system was connected to a television receiver converter furnished by International Telemeter Corporation which was used to convert channels A through G to channel 2, and which permits channels 2 through 13 to pass directly to the television receiver.

No effect was measured upon the cross-modulation components of channels 2 through 13 due to the insertion of the television receiver converter. The cross-modulation shown in Figure 7 was recorded for the mid-band channels before and after conversion to channel 2.

No evidence of cross-modulation, spurious beats or harmonics were evident on the output of the International Telemeter converter when viewed on a television receiver. Off-the-air television signals were substituted for the corresponding channels furnished the "White Screen" tester, and the pictures did not exhibit perceptible degradation. Channels 3, 5, 10 & 12 were available, with color on all four normal channels and channels B & D, which were converted from channels 3 & 5.

CHANNEL NUMBER	CROSS-MODULATION DIRECT	CROSS-MODULATION CONVERTED
A	–63.5 dB	–60 dB
B	–62 dB	–59 dB
C	–63 dB	–61 dB
D	–64 dB	–61 dB
E	–62 dB	–59 dB
F	–60 dB	–58.5 dB
G	–61 dB	–60 dB

Figure 7. Measured Cross-Modulation/Converter

This permitted a qualitative evaluation of the system degradation with channels 3, 5, 10, 12, B & D displaying off-the-air pictures, and all other channels were synchronously modulated by the 15.750 KHz sync pulse.

Operating System Test - Merced/Atwater, California

In order to further evaluate the feasibility of adding additional television channels in the mid-band, the "White Screen" tester and mid-band Benavacs were transported to the Merced, California CATV system, operated by General Electric Cablevision Corporation.

This system presently has twelve off-the-air television channels available at the head-end, and it is thirty-four amplifiers "deep" from the head-end to the office with a total of forty-two amplifiers in cascade from the head-end to the end of the system. General Electric constructed the system in accordance with Kaiser's layout and specifications, using the Phoenician Series line amplifiers at 22 dB spacing. Although no summation sweep has been performed, the system response was "flat" within about 3 dB and has been in operation for about a year.

After sign-off of the normal television channels carried on the system, the "White Screen" tester was connected to the input of the trunk line at the head-end. The General Radio Wave Analyzer was connected to the service drop at the office and cross-modulation measurements made. As predicted from the laboratory tests, the cross-modulation was down -51 dB at the office; this being the result of a -57 dB cross-modulation level on the last trunk line amplifier and the normal degradation of a bridging amplifier and feeder system. Although the low and high band cross-modulation was only barely within the predicted level, the mid-band cross-modulation measured two to five dB better than expected (up to -55.5 dB down).

During the measurement of the cross-modulation, a television receiver was observed for indications of spurious beats and harmonics. No problems of this nature were indicated on the white screen displayed on the television receiver. The system levels were adjusted for +29 dBmV on channels 7 through 13, +27 dBmV on channels A through G, +24 dBmV on channels 2 through 6, and the pilot carrier was left at the normal +30 dBmV. The bridging amplifier and line extenders were set for +35 dBmV on the high-band, +33 dBmV on the mid-band and +29 dBmV on the low-band.

As soon as the normally carried channels resumed their transmission (about 8:00 A.M.), the system was returned to normal operation (+32 dBmV at channel 13 and +26 dBmV at channel 2 half-tilt output levels on trunk line amplifiers, and +40 dBmV at channel 13 on bridgers and line extenders tilted for about 15 dB of feeder cable).

The color pictures above were received at the end of the 42-amplifier cascade in the Merced-Atwater mid-band tests.

Based upon the satisfactory quantitative evaluation, actual television channels in the mid-band (A through G) were added to the 12-channel head-end output with the system operating at the normally 3 dB higher trunk output levels and 5 dB higher feeder levels. The mid-band channels were added one at a time in order to check the system for any resulting degradation due to the expected over-load condition. A slight "beat" was observed on channel 5 (estimated to be 35 to 40 dB down) on the television monitor in the office. It is believed this beat was a result of the simplified mixing method employed at the head-end for adding the mid-band channels. A Kaiser Model KDT-11 directional tap was inserted into the head-end output with no additional traps, filters or other devices for isolation.

However, no noise, over-load or other types of picture degradation were observed. Therefore, in order to further evaluate the cable distribution of the nineteen channels, the pictures were observed under these abnormal conditions at the end of forty-two amplifiers. Although it was anticipated that some cross-modulation or other indication of over-load would be apparent on the system at this extreme cascade, there was no indication of degradation of any kind. It was also noted that the "beat" on channel 5 was no worse than previously observed at the office.

Conclusion

Although it was successfully demonstrated that seven mid-band channels (A through G) could be added to the Merced, California CATV system without operating at lower levels — and without noticeable degradation — it is *not* implied that this proves that the 19 channels can be carried on all 42-amplifier cascades without system level deration.

The limitation existing on the insertion of additional mid-band television channels is a function of the individual amplifier output capability, primarily. It is, of course, necessary that the head-end conversion and mixing be free of all spurious frequencies and distortion and that the line amplifiers, as well, exhibit no appreciable harmonic distortion or intermodulation characteristics.

Amplifier noise figure determines the minimum amplifier input signal level, and to operate a system of 32 amplifiers in cascade at the levels used in this test will require a 17 dB minimum low-band noise figure for a 40 dB signal-to-noise ratio.

A +35 dBmV maximum feeder level appeared to provide adequate distribution signal without notice-

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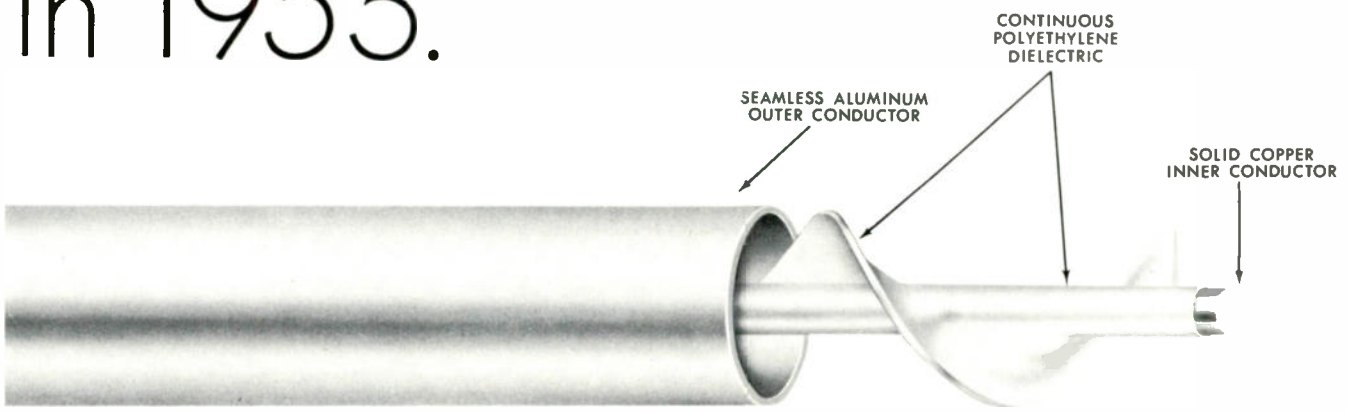

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able distortion or cross-modulation. The television receiver conversion unit furnished by International Telemeter did not appreciably contribute to the signal degradation when operating with normal (0 dBmV) input levels. The low noise figure and gain of the converter actually improved the picture definition. There was no sign of color degradation at any time.

In considering the addition of mid-band television channels to existing twelve-channel systems, the following factors should be carefully evaluated:

(1) Amplifier output capability must be sufficiently high as to permit the indicated deration. In addition, the amplifier must have linear output level vs. cross-modulation characteristics, i.e., a two-for-one reduction in cross-modulation should occur with incremental output level reduction over the maximum-to-minimum useable output level range.

Cross-modulation products increase by 6 dB each time the number of cascaded amplifiers is doubled, based upon the voltage addition factor, 20 log M. However, for each dB reduction in output level, the cross-modulation decreases by two dB. Therefore, with a simultaneous system output level reduction of 10 dB per octave with increaseing number of amplifiers in cascade, we accomplish the required 20 dB per octave reduction in cross-modulation to result in no over-all increase in the cross-modulation with cascade.

If, for example, you can operate one amplifier at +50 dBmV and maintain cross-modulation down 57 dB, then the cross-modulation would be down 63 dB, if that amplifier were operated at a +47 dBmV output level — and two of these identical amplifiers in cascade would result in 6 dB worse cross-modulation, or at the +47 dBmV output level the cross-modulation would be down 57 dB on the output of the *second* amplifier.

(2) Deration for additional television channels is assumed to be on a voltage basis (20 log N). This is in accordance with accepted theory and may be mathematically proven. The tests generally demonstrated the validity of this assumption.

(3) Conversion and mixing methods must result in clean head-end output with all spurious frequencies down at least 50 dB. The tests indicated there was no appreciable "build-up" of these beats, but no extensive investigation was conducted.

(4) Pilot carrier signals must be protected for adjacent channel interference on the system by adequate "guard band" separation.

(5) If normal amplifier spacing is retained, the amplifier noise figure must be sufficiently low as to permit the use of lower input levels without noise degradation.

(6) The television channel converter must be designed so as to provide adequate adjacent channel rejection, switching isolation, and add insignificant noise and cross-modulation products.

(7) No second order harmonic distortion problems were observed. However, it is logical to assume there are certain "forbidden" mid-band conversions. These conversions, where necessary, can be worked out I am sure by double conversation or other well known techniques.

In summary, we have demonstrated the practicability of adding seven mid-band television channels on an existing twelve channel CATV system with no modification of the Phoenician Series line amplifiers. Additional mid-band channels may be added with appropriate consideration of the seven factors mentioned above.

The author would like to express his appreciation for the cooperation of Benco Television Corporation and International Telemeter Corporation in supplying the end equipment on short notice to permit the testing of the complete system. In addition, General Electric Cablevision Corporation encouraged the tests and made available the operating system at Merced, California, used to verify the laboratory results. Interested observers at Merced, who also participated in the field testing included Mr. M. Ferguson, Vice President and Chief Engineer of the Philadelphia Community Antenna TV Company, Mr. George Henderson of the Matador Construction Co., and Messrs. G. Dail, C. Nichols, J. Gannon and technicians of the Merced CATV system. □

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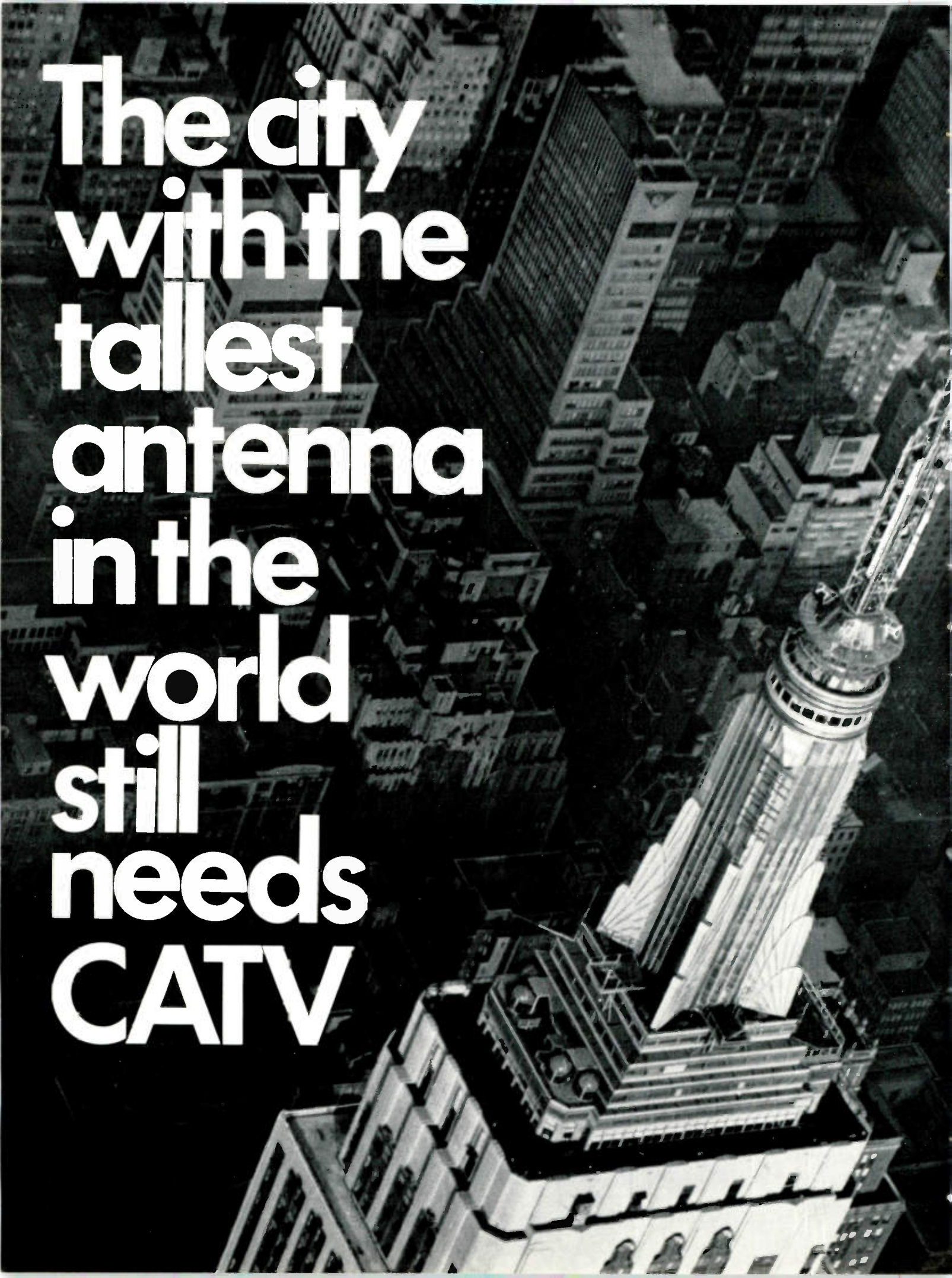
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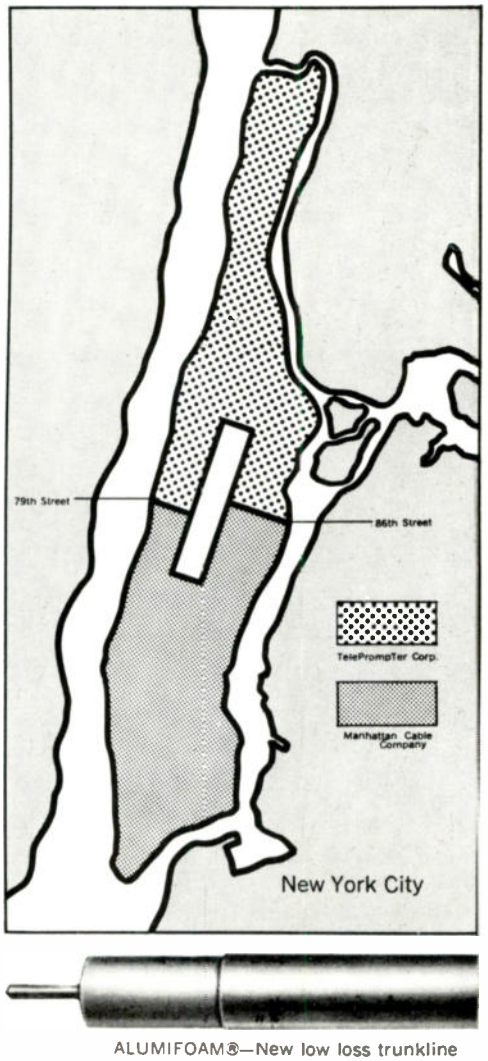

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Determining Cost Factors in Buried System Installation

By Dwaine Goldsberry
Sales Manager Ditch Witch Division
The Charles Machine Works, Inc.

Already on the horizon is the big question mark of underground installation. How practical is it? How profitable? How desirable? Is it becoming essential? Stated more succinctly, the CATV industry must learn the answer to one big question: *How much will it cost to go underground?*

It isn't a new problem, and it isn't one that is faced by CATV people alone. The electric utilities across America have already experienced the problem, and continue to face it today. And while a great deal is yet to be learned about underground installation of television cable, the experience of the power industry lends a firm, positive answer to the basic question. Underground installation *is* practical ... it *is* desirable ... it can be profitable ... and, most importantly, it is becoming more and more of an essential.

But how much does it cost? Unfortunately, that's like trying to answer "How high is up?" because there are far too many variable factors which directly influence the cost-per-foot of trenching. It all depends on where you are, what kind of labor and trenching equipment you're using and how many difficulties you encounter. Among the variables which must be considered in looking at the cost picture are these:

(1) *What are the soil conditions?* America's soil varies greatly from region to region; and trenching costs vary accordingly. From the most difficult digging conditions — solid rock — through the hard digging of heavily rockbound soil or blow sand and into the easiest digging conditions of good black loam, the cost will vary upwards or downwards with the length of time it takes to trench.

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(2) *Labor Market.* Do union requirements necessitate use of a skilled trenching operator, or may capable unskilled laborers be used? These requirements often vary with the type of equipment that is being used, with labor costs generally less when a "handlebar-type" trencher is used, as opposed to the larger, riding-type.

(3) *What type of equipment is being used?* Initial equipment costs vary upwards with machines of greater capability, and consequently have a direct bearing on the cost-per-foot of the job. In this area, also, the total installation requirements must be carefully analyzed, to give maximum capability to as many jobs as possible, thereby minimizing the initial cost of the machine.

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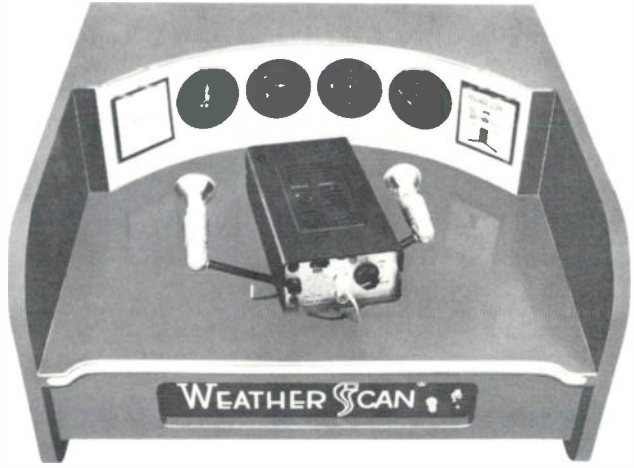

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"Handlebar-type" trenchers dig up to 12 inches wide, 5 feet deep. Model shown above is available in choice of 9 or 12½ horsepower with rubber tire mounting.

Further developments include a plow, now in the development stages, which utilizes the sonic principle. Through increased speeds and capabilities, it could well revolutionize the industry when it becomes commercially available.

(4) *What type of maintenance costs will be entailed?* To determine the cost-per-foot of either an individual job or on an annual basis, the maintenance and spare parts must be considered. Again, the type of equipment purchased will have direct bearing on the end cost, if the operator is penny-wise and pound-foolish.

(5) *In what type of area will the cable be laid?* Is the area where distribution lines are to be laid open or congested? Are there sidewalks and streets to be surmounted? Are there road crossings to be made?

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How much underground plant is already in the area?

(6) *What is your seasonal weather situation?* How many good working days could you normally expect? Will you face extreme cold weather, producing frozen soil, or extreme rainy conditions, producing mud? Costs will vary greatly on an annual basis, according to a few-months-out-of-a-year or a twelve-months-annually situation.

From contractors who are experienced in installation of all forms of underground service lines, perhaps the best example can be seen of the general cost variance. After working for years with trenching contractors, we have learned that the cost-per-foot can vary in excess of $1.00. Contractors working under extremely good conditions report an average low cost-per-foot of 10 to 15 cents, while those involved in more difficult situations report their costs can go up as high as an average of $1.00 to $1.25 per foot. These figures represent the contractor's charge for contract trenching, and consequently reflect his normal profit margin.

While the cost-per-foot for trenching done by a contractor represents one side of the picture, the costs experienced by the large utility represent another.

Most major utilities have found it more equitable to buy and maintain their own fleet of equipment for a variety of reasons: their work requires a high volume of trenching and underground installation; they have qualified laborers on the payroll and available; they are always assured of having a trencher and operator on hand when they need the work done, and, by eliminating the base profit from a contracted job, they are able to reduce the cost-per-foot for most forms of trenching and underground installation.

While the costs entailed are generally not made public, the satisfaction of many companies in their operation is a matter of record. In one northern state, for example, where frozen soil is a reality for a number of months each year and where rocky soil further slows the progress in underground installation, the results from the use of a combination trencher-vibratory plow are remarkable. One telephone utility reports that a fleet of 12 units will average 3,300 feet of buried telephone cable in a single working day.

With so many variables present, what represents the best course of action for the CATV operator interested in exploring underground installation costs in his own area?

The independent contractor would undoubtedly be the best approach for initial jobs. A great many experienced, ethical contractors are becoming specialists in the massive URD operations now taking place across the country, and are capable of performing a turnkey job for every underground requirement.

One fact should be borne in mind, however. The CATV operator should be alert to the fact that he may eventually reach the point where his underground installation requirements dictate an investment in his own equipment and operators.

If it is logical to assume that every American home will one day be wired for CATV, it seems equally logical to assume that the great percentage of those homes will be wired with underground cable. Like CATV, URD is here to stay ... and it's changing the skyline of America! □

KEEP YOUR POWER DRY

Many of the Cascade amplifiers now being shipped have a curious little fitting on top. You might wonder what a tire valve is doing on a CATV amplifier: it's your assurance that the housing is *really* watertight. A water tank and source of compressed air are a regular part of our production line. When you receive amplifiers with the fittings, you'll know that the housings didn't leak under thirty pounds of pressure.

There's a good tip for you in the success of the sealing gasket in Cascade housings. The white seal is not a separate piece, but is *poured in place* in the lid of the housing. The material is a silicon rubber compound called RTV (Room Temperature Vulcanizing). Supplied as a syrupy liquid in tubes, the substance sets up in a few hours into a non-hardening permanent seal.

You need it! RTV can solve a hundred-and-one little problems around a CATV system. You can use it (as we do) in the mounting threads of fittings, to waterproof non-waterproof connectors, as a potting agent, or anywhere that a permanent seal is needed.

We don't sell it, but your General Electric supplier does. Order a tube of RTV and beat the water-leak blues.

If you want really dry amplifiers, the use of a dessicant might be considered. A little packet of dry silica gel, dropped inside each amplifier, will absorb almost all the moisture trapped inside the housing when you close it. It *is* extra work, though. The bags are easily dried in an oven for re-use, but they must be changed each time the housing is opened.

Under normal circumstances, a dessicant shouldn't be needed. However, if you have some leaky off-brand (not Cascade) amplifiers around, silica gel might keep them working for a while. □

WHO SAYS YOU DON'T NEED AGC?

At the recent NCTA Convention in Chicago, many of the system operators we spoke with were not really familiar with the idea of temperature compensation.

In theory, it's very simple. In a modern system with a stable head-end, the only normal variation is the change in cable attenuation caused by temperature. We make amplifiers that vary their gain according to temperature variations, so output levels stay constant. A Thermistor, epoxy-sealed in a special fitting, is mounted outside each Cascade amplifier. When the outside temperature changes, the resistance of the Thermistor increases or decreases and adjusts amplifier gain to compensate for the change in cable losses (the gain compensation is *interstage*, where it can't affect noise figure). At the end of the line, the level and signal quality stay the same, regardless of temperature changes.

"Sounds great, but does it work?" We heard that question, and the answer is a resounding "YES!" It's working right now all over the continent.

By using no Automatic Gain Control, troubleshooting is a snap. If levels drop, the trouble is easy to localize. It just *has* to be a bad connection, water in the cable, or (heaven forbid) an amplifier fault. AGC might compensate for a system fault so levels would check O.K., and the only sign of trouble would be snowy pictures. Gradually, the whole system could deteriorate and AGC would mask the faults. Cascade TLC takes care of temperature variations *only*. If anything else goes wrong, it shouldn't be ignored.

Contrary to popular opinion, we *do* have an AGC unit, but we don't call it that. We call it a "Compensating Fault Indicator". In some ways, it's like conventional AGC, but in other ways it's very different. *First*, its function is to provide more (or less) gain while you find and correct a fault. If the system is in first-class shape, it just minds its business and watches for a fault to develop.

Second, it *tells you* when something goes wrong. Whenever it is called on to provide gain (or loss) of 5 db or more, it signals with an indicator light you can see from the ground (if you prefer, the light can be replaced by a pair of lines to a remote location, or even back to the head-end). As long as the light stays off, you can be sure that all is well and the system, to that point, has no serious faults. If the light comes on, you'll know there's at least 5 db worth of trouble somewhere, and attention is needed. Meanwhile, you subscribers won't know the difference.

continued

CASCADE

CASCADE ELECTRONICS Ltd PORT MOODY, B.C.

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Phone (717) 232-4111
HARRISBURG, Pa.

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Phone (206) MA 3-1230
SEATTLE, Wash.

A.G.C. *continued*

Third, we don't put our AGC at a trunk amplifier location. The Cascade unit goes in mid-span, *between* two trunk amplifiers. Here's why: let's assume that the normal input level to a trunk amp is +10 dbmv, and for some reason the level drops by 5 db. Conventional AGC would add 5 db of gain and boost the amplifier output back to the original level. However, the input to that amplifier is still at +5 dbmv, and is picking up noise and garbage along with your video signal. The level is still adequate, but subscribers start to complain about snow.

With a Cascade unit in mid-span, a 5 db loss is compensated in the same way, but *with a difference!* Signal level at mid-span is normally about +22 dbmv. A 5 db loss brings it down to +17 dbmv, and there's simply no chance of picking up noise at that level. Subscribers stay happy while you find the fault and get the indicator light to turn itself off.

A fourth difference is that we don't suggest that the compensator units be used with every third amplifier, as with conventional AGC. One unit for each five trunk amplifiers is *plenty*. Signal quality will be the very best, most faults will be self-compensating, you'll avoid gradual deterioration, and be able to locate faults readily.

The unit is identified as "CEAL-1". It is built just like other Cascade gear . . . on plug-in modules in the universal cast-aluminum housing. The complete CEAL-1 costs $350. Or, combined with a bridger amplifier in the same housing, it is CEAB-1 at $495. A third alternative is to add the circuit module to a housing you already have. The module is TMAL, at $165.

Remember, you don't *need* the Cascade "Compensating Fault Indicator", but you may *want* it. TLC will take care of any normal system variation. But when something goes wrong, the unit will save you a lot of work, and keep your subscribers happy while you fix things up. The CEAL-1 can be added to your system without even resetting levels. Initial production runs are now underway, and deliveries are expected to begin within sixty days. □

CATV-ETV Essay Contest Produces Publicity Bonus

By Ken Poindexter
Public Relations Director
Cam-Tel Co.—Prescott Video, Inc.

Being an Arkansan, it's easier for this writer to understand the reactions of Arkansas people when something new, like the Educational Television Station — KETS, Channel 2 — at Conway, comes to the state.

Within the past year two projects have come before the Arkansas people. One was an idea by cartoonist Al Capp, to construct a "Dogpatch, U. S. A." in the Ozark Mountains area of the state; and the other was the beginning of operations of the state's educational television station at Conway. So far, "Dogpatch, U. S. A." has received thumbs down from the people of Arkansas who fear that it will recreate the "Li'l Abner" image that Arkansans would rather forget, while the ETV station is being well received by the people, although it has been on the air only nine months.

Our idea of sponsoring an essay contest on the ETV station belongs to W. E. Hussman, president of the Palmer Media Group's operating CATV systems at Camden and Prescott, Ark. Mr. Hussman wondered if, in sponsoring an essay contest, we could find out what local students thought about the station and how well it was being accepted, generally, throughout our service area.

D. P. Mooney, vice-president, and this writer discussed the idea and decided to hold two contests; one at Camden High School and a similar one at Fairview High School. A similar contest was programmed at Prescott under sponsorship of Cam-Tel's sister company, Prescott Video, Inc.

We decided to award $25.00 first prize, $10.00 second prize and a $5.00 third prize, in addition to a bonus of 90 days free cable TV for first place, 60 days for second place and 30 days for third place, (with the hopes that winners would come from homes not presently on the cable thereby, adding new customers to our systems). An all expense paid tour of the ETV studio was another bonus gift to all three winners in each contest, along with their class sponsor.

Prescott Video essay contest winners learn how programs are produced from staff member at KETS, Arkansas' new ETV outlet at Conway Springs.

By March, as the station was entering its fourth month of operations, our contests had been worked out, each school had been notified, and full coverage had appeared in all local newspapers and over radio stations announcing the project. We named our contest subject, "What Educational Television Can Do For Arkansas," and requested that particular emphasis be placed on what ETV could do for the entrant's school and himself, stressing economic, political and social benefits. We asked that participants analyze the programs being offered by the station and suggest ways they though ETV could be improved or expanded.

The contest was sponsored for students in grades 10 through 12, with a deadline of April 15 for receipt of entries. We requested that any student entering the contest register with us by March 20 so that we could assign a number to use as identification on his entry. This was the only means of identification we used. Grading was done by the schools; each one grading a different school (not knowing the name of the entrants, since we were the only ones who had a list of entrants and their respective numbers).

We were pleased and excited to receive thirty registrants and anxiously awaited the arrival of the essays themselves. Channel 2 had called about the essays wanting to see copies as soon as possible, and

had received calls and letters from viewers for the first time since they had begun broadcasting.

When we did receive the essays we were amazed at the apparent depth to which the students had gone in their compositions. The effort put forth was exemplified by one winning student whose paper was very well documented, utilizing footnotes, etc. and making extensive reference to a report on ETV by the Carnegie Commission. Newspaper stories carried two-column headlines and three-column pictures of this writer presenting the winners with their checks. We were able to mention Cam-Tel (and Prescott Video) over and over along with the word "service", which we stress constantly.

The trip to Conway to tour the station was equally a success. Again, stories appeared in the local newspapers along with pictures.

Positive results due to the contest were numerous. For more than two weeks, we received top news coverage; we had made several high school students very happy; we had created a public image that we were not around to take the public's money, instead we were there to provide "service" (there's our word again!); we helped arouse interest in our state's ETV station among our youth; and we had secured some new subscribers, (some that we had tried to sell before, without success.)

We are looking foreward to next year when we plan to repeat the contest using a new subject, of course. We feel that response will be more numerous then, because the station will be older and students will be able to give better ideas and comments on its operations and mainly, because students will know that they can win cash money, an all-expense paid trip to Conway, will get their names and pictures in the newspapers, and that they will be judged impartially on their work.

We try to get our firm name before the public as often as we can, and our essay contest this year has proved that with the right subject, such a school-connected contest can provide substantial publicity while requiring a minimum of effort. □

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New IMAGICON™ eliminates double image pick-up in strong TV signal areas

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TV viewers in strong signal areas need never see double again! New Imagicon's transistorized tuner selects and converts any of 12 standard VHF channels to 40 MHz. Then a fixed frequency converter converts the 40 MHz signal to one channel, 12 or 13, through a power output connection to the TV receiver. Unwanted station signals, no matter how strong, cannot interfere with picture reception. The result is a clean, crisp picture completely clear of double image interference. New Imagicon can be placed on the TV set or up to 30 feet away. Switched output receptacle provided for TV receiver. Compact Imagicon is styled in handsome beige, blends with any decor. Installation is quick and easy. U.L. approved. For complete details about new Imagicon, write or phone.

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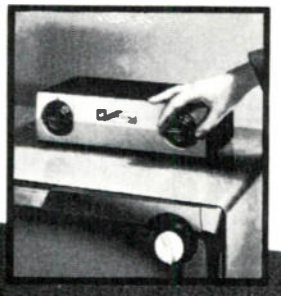
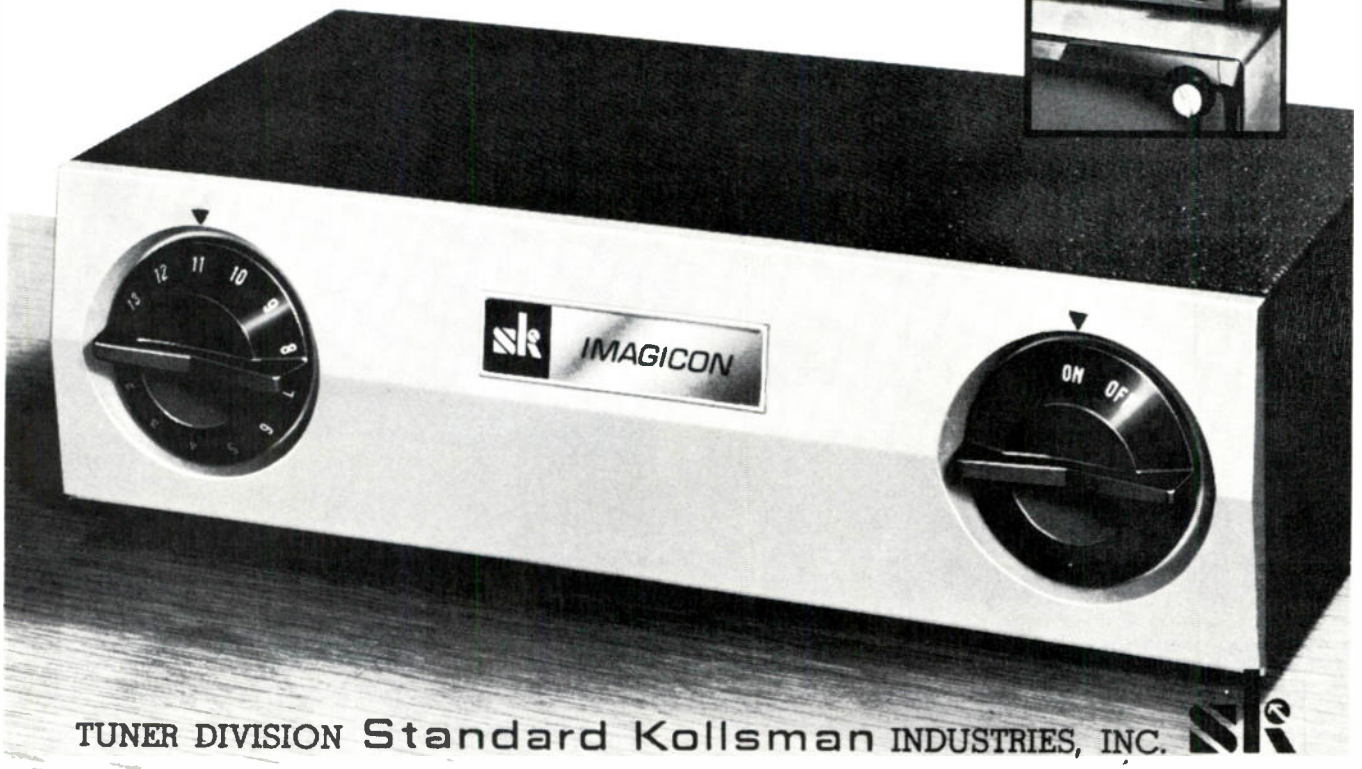
Coaxial Home Installations





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SKL/7500 Directional Taps offer high return loss, isolation and directivity to positively block reflections, ghosts and interference. And, the low insertion loss permits longer distribution lines with heavier subscriber saturation. The SKL Colortap is available in strand or pedestal mounted single-drop models with tap losses of 10 and 22 dB, built-in compensation for the attenuation slope of your drop cable, and a 5A AC bypass rating. For up to 4 multiple outputs, just insert an SKL/7500 Series Tap Adder into the Colortap. And for system flexibility — there's a choice of 12 different tap loss values, from 3.5 to 40 dB with nothing to adjust or fall out of adjustment. In addition, by using the SKL/7500-0 special 0 dB Colortap with an SKL/7504 Tap Adder at the end of a distribution line, you get 4 EXTRA drops — instead of dissipating signal power in a termination.

SKL/7300 LINE EXTENSION AMPLIFIER

When you need that extra stretch in a distribution line, you can rely on SKL/7300 Line Extension Amplifiers. Plug-in pads, wide-range gain and tilt controls, and IN or THRU cable powering assure maximum installation flexibility. The internal regulated power supply spells greater stability for your system.

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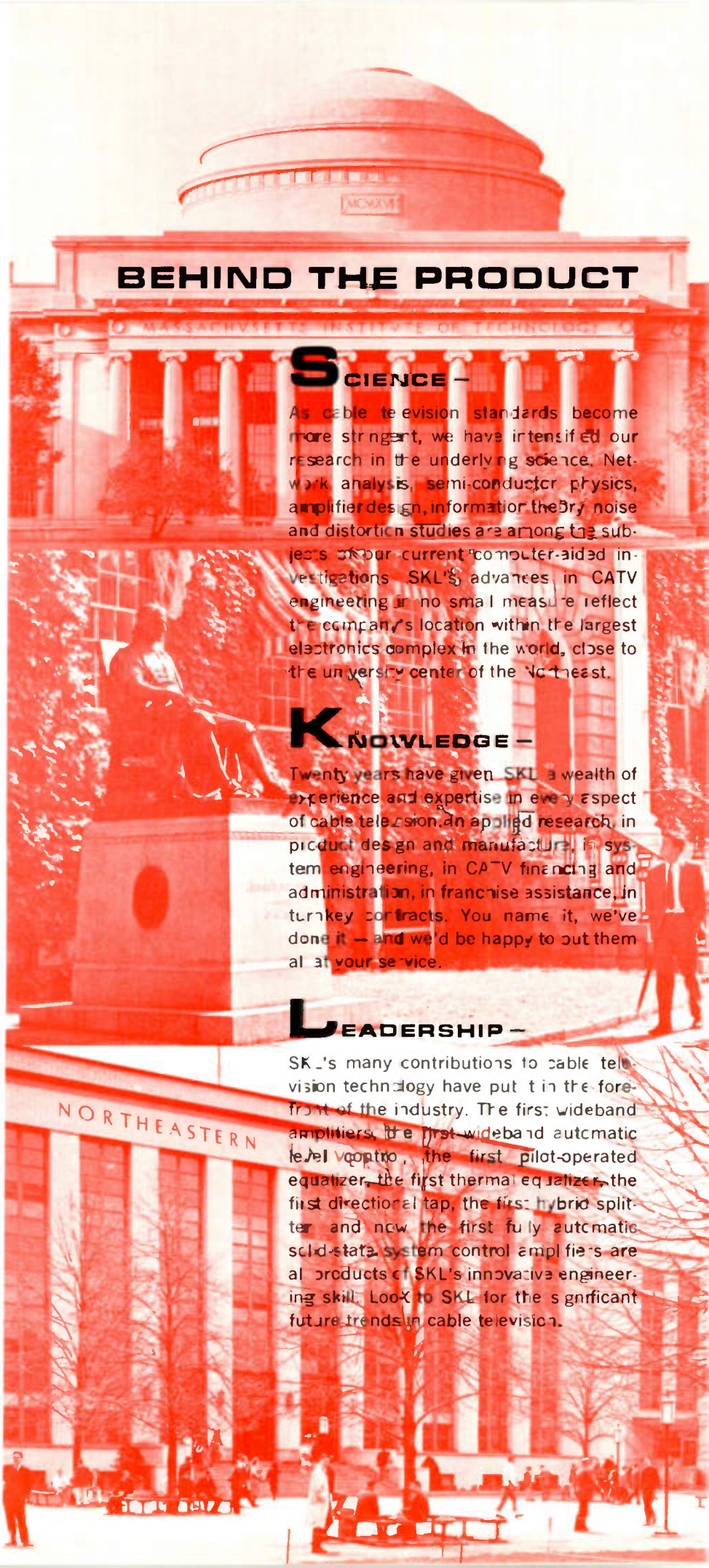
Band	50-220 MHz
Gain	24 dB
Output	+42 dBmV at high channels, for 12-channel —57 dB cross-modulation, with 5 dB block tilt
Noise Figure	12 dB
Return Loss	16 dB minimum



BEHIND THE PRODUCT

SCIENCE —

As cable television standards become more stringent, we have intensified our research in the underlying science. Network analysis, semi-conductor physics, amplifier design, information theory, noise and distortion studies are among the subjects of our current computer-aided investigations. SKL's advances in CATV engineering in no small measure reflect the company's location within the largest electronics complex in the world, close to the university center of the Northeast.

KNOWLEDGE —

Twenty years have given SKL a wealth of experience and expertise in every aspect of cable television, in applied research, in product design and manufacture, in system engineering, in CATV financing and administration, in franchise assistance, in turnkey contracts. You name it, we've done it — and we'd be happy to put them all at your service.

LEADERSHIP —

SKL's many contributions to cable television technology have put it in the forefront of the industry. The first wideband amplifiers, the first wideband automatic level control, the first pilot-operated equalizer, the first thermal equalizer, the first directional tap, the first hybrid splitter and now the first fully automatic solid-state system control amplifiers are all products of SKL's innovative engineering skill. Look to SKL for the significant future trends in cable television.

Preformed Line Products Co.

Coaxial cable can be referred to as the lifeline of CATV, and Preformed Line Products Company, Cleveland, Ohio, is continuing to direct research and manufacturing capabilities toward protection of this vital artery while mustering its marketing forces to meet demands of this expanding industry.

Following a modest entry into the CATV field in 1959, the manufacturer of pole line hardware for the communications and power

Loops of some Preformed fittings are "cabled" on this machine to make the product adaptable to a wider range of insulators, thimbles and clevises.

industries steadily increased the tempo of its activity in the field. Now, Preformed is producing a dozen items used in CATV construction.

Taking a simple basic design principle and adapting its application has been a key to Preformed's growth in the field. All of the CATV-related hardware manufactured by the company is designed to provide protection while incorporating tool-free installation, ease of handling and worker safety.

The key that opened the door into the power and communications industry for Preformed in 1947, the helix, also provided the design on which the company's CATV products are based.

Basically, the company's products are "preformed" wires. Those used for dead-ending have loops with extended legs, helically formed to accommodate various sizes of cable or strand. When the spiral legs, with an inside diameter 20 percent smaller than the outside diameter of the cable, are applied, they form a tight-fitting sleeve much like a vine that entwines itself snugly around a tree.

Thus, a gripping action is transmitted along the length of the fitting, eliminating concentrated stresses and clamping forces which can damage cables.

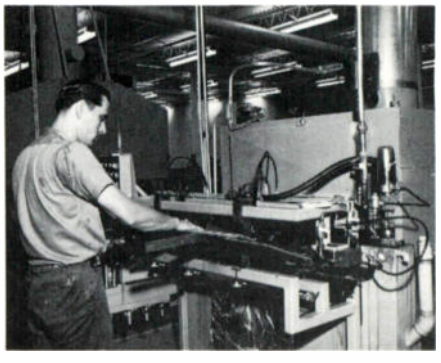
Under tension, the helix attempts to straighten out, an action which tends to increase the pitch and reduce the inside diameter of the preformed sleeve. This characteristic accounts in part for the positive grip such helically-shaped products are capable of maintaining without damaging cables.

From a single shop founded by the late Thomas F. Peterson, Preformed has grown into three manufacturing complexes located in Cleveland, Ohio; Palo Alto, California; and Tucker, Georgia. From the small shop with one wire forming machine and six employees, Cleveland operations have grown to encompass three manufacturing buildings, a research and engineering center, warehouse and office facilities manned by a total of 320 employees. Manufacturing area at the Cleveland complex includes more than 127,000 square-feet.

The Palo Alto plant, located in Stanford University Industrial Park, was expanded in 1965 to 64,000 square-feet of manufacturing and warehouse space. Plant manager there is T. F. Carter, and heading up the company's western division sales headquarters, also located at this facility, is Kenneth R. Miller.

Preformed's newest operating plant facility is the Tucker plant, located in an attractive industrial park just outside of Atlanta, Georgia. This operation, headed by George E. Steck, includes a 6,000 square-foot office building and 50,000 square-feet for manufacturing and storage. (A "knock out" wall across the rear of the building is designed to accommodate future expansion which could double the present manufacturing space.)

According to Edmund H. Brown, chairman of the board of Preformed, the Tucker plant and Palo Alto growth are logical steps in Preformed's blueprint for marketing and orderly expansion. Walking hand-in-hand with this plan for expansion is a fresh approach to marketing within the company. Headed by Chairman Brown, the company's marketing activities were realigned radically this year. Whether it is CATV, underground, fiberglass or some other rapidly growing industry, Preformed is looking hard for gaps to fill, for better ways to provide customers



Loosely assembled helical-wire subsets pass under a cascade of liquid adhesive, then enter the drying oven where they are bonded into permanent assemblies.

Preformed demonstrators prepare an outside display line adjacent to the firm's research and engineering center, Cleveland. Across the street is Preformed's main office-manufacturing building.

with products tailored to meet their needs.

A marketing department has recently been created, bringing together the functions of sales, market research, new product development, sales promotion and advertising. These functions have been grouped into a close relationship to give the company the added thrust it is seeking, according to Brown.

In addition to its domestic operations, Preformed recently completed negotiations for a joint venture manufacturing operation in Japan, the most recent in a series of moves into foreign areas by the firm.

Under W. F. Corkran, director of foreign operations, the company also has joint venture operations in England and Spain and licensee companies manufacturing its products in New Zealand, Canada, Australia, and West Germany. Additionally, the company maintains sales representation in 30 countries.

The new Japanese company, a joint venture with one of that country's leading cable manufacturing firms, will be called Nippon-PLP. This, Preformed's second manufacturing arm in that country, will be located just outside Tokyo. The 15,000 square-foot plant facility is expected to be in production by January 1, 1968 turning out a broad line of Preformed products.

As finished "sets" pass through this machine, inside surfaces of the units are sprayed with a quick-drying adhesive, then coated with a special grit to increase the holding power of the hardware.

Supporting Preformed's manufacturing plants is a modern research and engineering center located in Cleveland. Here, under the direction of James C. Poffenberger, engineers and technicians evaluate new designs, develop new products and conduct performance testing of Preformed hardware as well as materials taken on assignment from outside the company.

Preformed also operates a subsidiary, Ship Rigging & Testing Service, Inc., Brooklyn, which supplements the company's laboratory facilities for testing cable and strand. Vern L. Ripley, Jr., Ship Rigging & Testing president, said the high-capacity test equipment permits study of tensile characteristics of heavy loaded cable and strand in guyed television towers and other EHV applications.

Preformed employs 30 engineers and technicians, more than 5 percent of the company's total work force. The firm annually spends more than $500,000 for applied research and engineering.

Jon R. Ruhlman, PLP president, who considers research to be a major factor in Preformed's rapid growth, indicated that the company's aim is to obsolete its own products rather than to let its competitors do it. Backing this accelerating growth — from sales of about $250,000 during its first year of operation to more than $15 million last year — is a diverse task force of specialists. Preformed personnel hold degrees in electrical engineering, mechanical engineering, chemistry, physics, psychology, aeronautical engineering and civil engineering among others. These men are currently engaged in the design of special products and the application of existing products in many new technological ventures including space, rhombic antenna construction and oceanographic projects.

Research and engineering work in Cleveland is conducted in a physical plant that encompasses a total floor area of 27,200 feet, of which 12,200 square-feet are devoted exclusively to testing and related laboratory programs, both from within and on contract from outside the company.

Laboratory #1 is equipped primarily for vibration and tensile studies while laboratory #2 isolates impact testing from other research activity. The company also maintains X-ray facilities and was responsible for developing the first radiographic inspection of energized lines at support points to spot breaks.

Available also to Preformed engineers and scientists is a special projects workshop, a complete photographic laboratory and a small chemistry laboratory fitted for research and experimentation in adhesives and plastics. A fully-equipped electronics checkout shop is staffed to repair and calibrate laboratory instruments and field test units. The company also maintains an engineering model shop and a comprehensive technical library containing more than 7,000 reference volumes and 200 related trade magazines.

The company's manufacturing equipment must be designed by Preformed's own engineering staff in Cleveland and built to rigid specifications. Forming equipment, for example, must be capable of translating steel or aluminum wire into a spiral configuration without disturbing grain orientation of the metal or inducing unnatural stresses in the rods.

Preformed's most recent innovation related to the CATV field is a device called the Preformed Teletap Connector. Applied by hand without the use of tools, the Preformed connector has no nuts, bolts or extra fittings, and the gripping principle is said to eliminate kinks or bendings which cause "snow" or picture distortion.

This kind of programming costs you money

You're in business for one reason: to make a profit.

Anything that takes away from your profit-making is your enemy. That's why you're way ahead when you choose Lenkurt microwave transmission equipment for your CATV or ETV system.

For instance, there's our 76 TV microwave relay system that has become the standard of the industry, due to its outstanding performance, ease-of-maintenance, and economical operation. 76 TV is designed to handle monochrome or color transmission and lets you insert and drop programs with ease at intermediate locations.

There is also Lenkurt's 75A, the ideal backbone microwave relay system. Because of its non-demodulating heterodyne repeaters, 75A delivers clear, sharp monochrome and color TV pictures regardless of distance, terrain, or weather.

Lenkurt microwave systems have proved themselves in virtually every situation. From high on Freel Peak in Nevada where 76 TV brings in a sharp high-resolution picture (even when snow levels reach 20 feet), to an ETV closed-circuit system at the University of Kansas Medical Center. And our 75A has been transmitting high quality pictures for a number of CATV networks in New York and Pennsylvania.

And remember, when you buy Lenkurt equipment, you are buying more than hardware; you are purchasing Lenkurt's heritage and reputation for quality and continuity.

It all comes down to this: when you're thinking about microwave transmission equipment, for any application, think of Lenkurt. We'll show you how to improve your picture – both TV and profit. Write or call Lenkurt Electric Co., Inc., San Carlos, California. Other offices in Atlanta, Chicago, Dallas, and New York City.

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System Sales

Entron, Inc. president Edward P. Whitney and Donald Bonin, general manager of **New Iberia (Louisiana) CATV Service, Inc.** have jointly announced the purchase by Entron of the system currently under construction in New Iberia. The new system, which brings Entron's CATV operations to seven, has an estimated potential of 7,000. Daniels & Associates handled the transaction; sale price was not disclosed.

Best Associates, Inc., headed by William H. Tucker has announced the acquisition of the stock of **The Village Cable Corp.** in Harrisville, West Virginia. The newly-formed company plans to seek other acquisitions and franchises in the CATV field.

Portland, Oregon city councilmen have approved the transfer of the city's CATV franchise to **Richard and Kayla H. Evanson,** principal owners of Total Telecable, Inc., a Seattle-based company which operates 11 cable systems in the state of Washington. The franchise was previously held by Stan Terry, who serviced several areas of the city under the name of Trans-Video Company.

William W. McDonald has announced the acquisition of **Alexander City (Alabama) Cablevision Company.** Former owner was Hovey Cromer. Other CATV interests held by McDonald include systems in Alabama, North Carolina, Arkansas and Georgia.

Coaxial Cable Television Corp. president D. Richard Rothman has announced the sale of the corporation's stock to the **Times Publishing Co.** of Erie, Pennsylvania. Coaxial Cable Television operates the system which serves residents of Cambridge Springs and Edinboro, Pennsylvania.

Hightower Telesystems vice president Paul Hancock has announced his company's acquisition of the **Cornwall Co-Ax, Inc.** system which serves residents of Cornwall-on-Hudson, New York. Principal stockholder in the purchasing firm is Time-Life, Inc., which holds a 50% interest. Boston Capital Corp. holds a majority of the remaining 50% interest.

Continental Transmission Corp., CATV subsidiary of Continental Telephone Corp., has announced the acquisition of **Colorvision Engineering Co.** of Crocket, Texas.

Champlain Cablevision, Inc. principals Willard Malkan and Lee Ehrlich have announced the acquisition of the **Ticonderoga and Whitehall, New York** systems. Former owner was Northeast TV Cablevision Corp. Leeder Consultants, Inc., New York City, acted as broker in the transaction.

Larry Flin has announced the purchase of four New York State cable systems from Bruce Merrill's American Cable Television. The towns of **Endicott, Endwell, Union** and **Maine, N.Y.** are involved. □

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plans, designs and installs CATV Systems

establishes full-system compatibility of equipment and cable

maintains system efficiency through monitor maintenance program

provides full assurance of peak operational performance

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FINANCIAL REPORTS

Jerrold Corp. reported net sales of $12,217,000 for the period ending May 31, 1967, compared to $12,221,000 for the same three months of 1966. This resulted in a net income after taxes of $832,000 for this year, against last year's $1,008,000. Although the figures are slightly lower when compared to those of the preceding year, the company reported the sale of $7,000,000 in CATV equipment at the NCTA Convention, which increased the backlog of orders from $9,000,000 to $12,000,000.

Time Life Broadcast showed a drop in per share income for the quarter ending June 30, from $2.15 in 1966 to $1.74 for the recent quarter. Last year's revenues for the period were $136,986,000 against $137,388,000 this year.

Storer Broadcasting Corp. announced a 25 cents per quarterly dividend on common stock payable September 8 to stockholders of record August 25, 1967. The announcement marks the 55th consecutive quarterly dividend payment made since the company went public in 1953, as well as the 200th dividend payment since the stock was first issued in 1930.

Phelps Dodge Corp. reported a fall in gross income of over $10 million in the second quarter ending June 30, despite a substantial rise over 1966 half-year earnings. The 1967 figure of $152,522,985 compared to last year's $162,892,485 in the same quarter, while the 1967 figure for the six months period totaled $311,502,754, considerably over the $296,791,739 reported in 1966.

Plastoid Cable Corporation of America, coaxial cable manufacturer, showed a net income of $893,375 for the first six months of their fiscal year. Net income for the same period last year was $447,085. On a per share basis, the figure for this year is $.37 compared to $.19 for last year. Current sales of $7,817,238 topped the $6,879,716 reported for the first six months last year.

Cox Broadcasting Corp. reported revenues of $22,984,115 for the first six months of the year, up from $18,068,424 reported for the same period of 1966. Per share earnings of $1.46 compared to $1.02 per share last year.

Carolina Telephone Company reported operating revenues of $13,500,448 for the quarter ending June 30, compared to $11,892,024 last June 30. However, per share earnings slipped slightly from 26 cents last year to 25 cents this year.

International Silver Company, parent firm for Times Wire & Cable, pioneer manufacturer of coaxial cable for CATV, reported $149,538,000 in sales for the fiscal year ending June 30. This compares to $136,010,000 in 1966. Net income this year was $8,771,000.

Foote, Cone & Belding, Inc., new entrant into CATV, saw an increase in billings from $125,088,000 in 1966 to $133,110,000 for the same six months period in 1967. Per share earnings of $.64 compared to last year's earnings of $.63 per share.

SEPTEMBER, 1967

CATV TECHNICIAN

- Standardization for CATV Cables
- Automatic Equalization as a Factor in System Level Control
- CATV Product Review

Standardization for CATV Cables?

By Sidney A. Mills
Vice President, Production and Engineering
Ameco Cable, Inc. Phoenix, Arizona

The CATV industry has, like topsy — 'just growed'. In its first seven years of existance or by year end 1957, the industry had grown to about 580 operating systems. The average miles per system for these years has been estimated at about 38 miles. During 1966, 258 new CATV systems were built with an estimated 50.5 miles per system. As shown in Table A, the cable footage to be used by the CATV industry is expected to double in volume during the next 5 years to an overall figure in 1971 of 266,000,000 feet.

Year End	Avg. Miles/ System	Est. Cable Footage	New Systems	Net Operating Systems
1967	59	131,000,000	350	2300
1968	62	184,000,000	470	2770
1969	64	215,000,000	530	3300
1970	66	242,000,000	580	3880
1971	68	266,000,000	620	4500

Table A

We feel that figures such as these make it all the more evident that there is an immediate need for the establishment of meaningful yardsticks by which the mechanical and electrical properties of this highly important system component can be evaluated.

The validity of this premise is a matter for the CATV industry, to whom the cable manufacturer plays a supporting role, to decide. This article, therefore, is not intended to promulgate specific standards but rather to invite the industry's attention to the fact that wide variations in cable constructions for CATV use, do exist. This discussion will also review areas of design, production and testing of aluminum sheathed CATV cables to support our position that meaningful parameters by which the mechanical and electrical properties of cables are evaluated, can now be established.

RG-59/U: Deceptive Terminology

In an overall CATV system, the final umbilical link between an accumulation of many exotic and expensive pieces of equipment and your customer's TV set is a $2.50 piece of coaxial cable generally referred to in the industry as RG-59/U.

In the initial days of CATV, I am sure that the military RG-59/U coaxial cable was selected because it met the basic requirements of the system, and it was available. Over the years, in order to lower the cost of cables, there have been several changes in construction and, likewise, performance characteristics, without any change in terminology. Such use of deceptive terminology is a gross misapplication of intent.

The terminology for coaxial cables "RG-( )/U" was devised by the military initially in 1944 under their joint Army-Navy Specification JAN-C-17. Basically, their coaxial terminology is derived at as follows:

"R" - Means Radio Frequency
"G" - Means Government
"(59)" - The number assigned to the Government approval.
"/U" - Means it is a universal military specification.

If the letters A, B, C, etc. appear before "/", it means a specification modification has been made. Only cables made to the Government specification and meeting the requirements of that specification should be marked with the "RG" legend.

INNER CONDUCTOR:	0.0253" Plain 'Copperweld'
INSULATION:	Solid Type A (Polyethylene) Diameter: 0.146" ± .005"
OUTER CONDUCTOR:	Single Braid Type: Bare Copper Wire Size: 34 AWG Carriers: 16 Ends: 7 Picks/Inch: 8.2 ± 10%
JACKET:	Type I Synthetic Resin Diameter: 0.242" ± .008"
ENGINEERING DATA:	Nominal Impedance: 73 ± 3 ohms Nominal Capacitance: 22.3 pf/ft. Attenuation: 55 mc – 2.4 db/100 ft. 83 mc – 3.0 db/100 ft. 175 mc – 4.6 db/100 ft. 211 mc – 5.1 db/100 ft.

Table B

In Table B, we have outlined the basic constructional details for coaxial cable RG-59/U as initially specified under JAN-C-17.

INNER CONDUCTOR:	0.0230" Copper Covered Steel
INSULATION:	Solid Type A (Polyethylene) Diameter: 0.146" ± .004"
OUTER CONDUCTOR:	Single Braid Type: Bare Copper Wire Size: 34 AWG Carriers: 16 Ends: 7 Picks/Inch: 8.2 ± 10%
JACKET:	Type II a (Non-Contaminating PVC) Diameter: 0.242" ± .004"
ENGINEERING DATA:	Nominal Impedance: 75 ± 3 OHMS Nominal Capacitance: 21.1 pf/ft. Attenuation: 55 mc – 2.6 db/100 ft. 83 mc – 3.2 db/100 ft. 175 mc – 4.9 db/100 ft. 211 mc – 5.4 db/100 ft.

Table C

With the change from the "JAN" classification to the "MIL" classification, changes were made in the constructional and electrical requirements for this coaxial cable. The requirements for RG-59B/U coaxial cable are outlined in Table C.

The distinguishing differences between the requirements for RG-59/U and RG-59B/U cables are:

(1) Conductor size changed from 0.0253" to 0.0230".
(2) Conductor conductivity requirements changed from 30% to 40%.
(3) Recognition in the latest issue of high molecular weight polyethylene insulating material.
(4) Change from standard synthetic resin (PVC) jacket material to an improved low temperature non-contaminating Polyvinyl Chloride material.
(5) Change in dimensional tolerances.
(6) Change in electrical properties from a nominal 73 ohm impedance to a 75 ohm nominal impedance.

If there were a precise and definitive understanding that all drop cables were to be either RG-59/U per JAN-C-17 or RG-59B/U per MIL-C-17, then there would be no question in regard to the physical construction of the cable, and the physical and electrical properties would be adequately outlined and understood. However, we do not have this precise and definitive understanding. As such, we can find as many variations in CATV drop cables being used as there are manufacturers.

To illustrate the need for standards, Ameco Cable undertook a field sampling of so-called RG-59/U cables, currently being used as CATV drop cables.

	CONDUCTOR		INSULATION		OUTER CONDUCTOR						JACKET		
	MAT.	SIZE	MAT.	O.D.	MAT.	SIZE	ENDS	PICKS	% COV.	O.D.	MAT.	WALL	O.D.
RG-59/U	CS	.0253	P	.146	C	34	7	8.2	95.7	.191"	PVC	.035	.242
Brand A	CS	.0226	P	.146	C	34	7	8.0	95.6	.175	PVC	.035	.242
Brand B	CS	.0253	P	.146	C	34	5	8.0	81.3	.175	PVC	.030	.235
Brand C	CS	.0253	P	.146	C	34	7	8.0	95.6	.175	PVC	.035	.244
Brand D	CS	.0253	P	.146	C	34	5	10.1	84	.175	PVC	.030	.235
Brand E	CS	.0253	P	.146	C	36	6	8.0	78	.165	PVC	.035	.235
Brand F	CS	.0253	P	.146	C	34	7	8.0	95.6	.175	PVC	.035	.245
Brand G	CS	.0253	P	.146	C	34	7	6.0	94.0	.175	PVC	.035	.242
Brand H	CS	.0253	P	.146	C	34	5	10.8	84.0	.175	PVC	.032	.240
Brand I	CS	.0253	"	.146	C	34	7	8.0	95.6	.175	PVC	.035	.245
Brand J	CS	.032	FP	.146	C	34	7	9.0	96.3	.175	PVC	.030	.240
Brand K	CS	.0253	P	.146	C	34	5	10.8	84.0	.175	PVC	.035	.242
Brand L	CS	.0253	FP	.150	C	34	5	10.8	84.0	.176	P	.030	.240
Brand M	CS	.0253	P	.146	C	34	7	8.0	95.6	.180	PVC	.035	.245
Brand N	CS	.0253	P	.146	C	34	5	12.0	88.0	.180	PVC	.035	.245
Brand O	C	.032	FP	.146	C	34	7	8.0	95.6	.185	P	.025	.230
Brand P	CS	.0253	P	.146	C	34	7	8.0	95.6	.180	PVC	.035	.246
Brand Q	CS	.0253	P	.146	C	34	7	8.0	95.6	.180	P	.035	.242
Brand R	CS	.032	FP	.146	C	34	7	8.0	95.6	.175	P	.035	.242
Brand S	CS	.0253	FP	.146	C	34†	7	8.0	95.6	.175	P	.035	.242

C — Copper
CS — Copper Covered Steel
P — Polyethylene
FP — Foam Polyethylene
PVC — Polyvinyl Chloride
* Max. O.D. Per Spec.
† Braid plus Copper backed Polyester Tape

Table D

In Table D, we have reviewed the basic constructional details as found in some 19 different coaxial drop cables, listed or referred to as RG-59/U or Type RG-59/U cables. From this analysis, we find these variations in construction to exist:

(1) Conductors are either solid copper or copper-clad steel.
(2) Conductor sizes are 0.226", 0.0253" or 0.032".
(3) The insulating dielectric is either solid polyethylene or expanded (foamed) polyethylene.
(4) The outer conductor is generally composed of No. 34 AWG bare copper but there are cases where No. 36 AWG copper can be found. The number of copper ends per machine carrier varies along with the number of pics per inch. As such, the percent coverage of the outer conductor varies between 78% and 96.3%.
(5) The outer jacket material is either Polyvinyl Chloride (PVC) or Polyethylene.
(6) The overall cable diameters vary between 0.230" and 0.246".

In this initial analysis, we have not tried to analyze the various inherent electrical properties of each construction, nor have we tried to analyze the properties of the different grades of insulating and jacketing materials that have been used.

A detailed analysis of the various constructions reveals that material costs in the more expensive constructions can exceed the material costs in the least expensive constructions by as much as 46%. The commercial implications of this wide variation are self-evident.

We do not wish to infer that several or, for that matter, any of the constructions are unsuitable for the intended service. We have presented this review only to point-up the fact that the generic expression "RG" is a nebulous designation for a very important component of the CATV industry.

Standards to cover a CATV drop cable are relatively easy to develop, and it is probable that varying operating conditions would require more than a single standard construction. But, until such time as conditions are defined and specific constructions specified, the present conditions, which can best be described as chaotic, will prevail.

Variations In Aluminum Sheath Cables

While variations in construction of aluminum sheathed cables for trunk and distribution service are not as prevalent as in the common drop cable, constructional differences do exist and, therefore, differences exist in the physical and electrical properties.

For example, from a review of various suppliers' printed data for .412" cable, we find that the nominal inner conductor diameter can vary between 0.075" and 0.081". These figures are shown in Table E.

In the area of polyethylene jacketed aluminum sheathed

CABLE TYPE: .412" ALUMINUM SHEATH CATV	
MANUFACTURER	INNER CONDUCTOR DIAMETER (NOM.)
A	0.078"
B	0.077"
C	0.078"
D	0.0752"
E	0.075"
F	0.0752"
G	0.081"
H	0.075"
I	0.077"

Table E

POLYETHYLENE JACKET WALL THICKNESSES						
	.412"		.500"		.750"	
MANUFACTURER	WALL	O.D.	WALL	O.D.	WALL	O.D.
A	.029"	.470"	.040"	.580"	.037"	.820"
B	.035"	.482"	.040"	.580"	.050"	.845"
C	.034"	.480"	.038"	.575"	.050"	.850"
D	.050"	.512"	.050"	.600"	.050"	.850"
E	.050"	.512"	.050"	.600"	.050"	.850"
F	.034"	.480"	.040"	.580"	.050"	.850"
G	.025"	.480"	.025"	.580"	.036"	.850"
H	.040"	.495"	.050"	.605"	.050"	.855"
I	.029"	.470"	.038"	.575"	.038"	.825"

Table F

CATV cables, we again can find a wide variance in the constructional details. The indicated nominal polyethylene jacket walls and finished cable diameters as advertised by several manufacturers, are listed in Table F.

During the next few years, we will see an increasing demand for direct burial installations of aluminum sheathed CATV cables. Considerable concern has already been generated in the CATV industry over this subject and certainly the constructional variations in Table F do not help the situation.

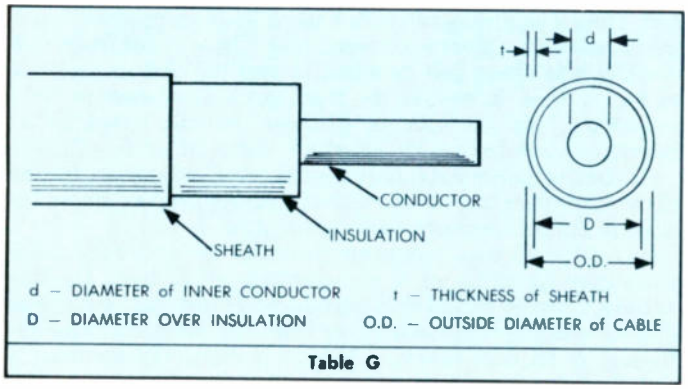


Table G

In regard to the subject matter of direct burial of cables, I would point out that in April 1964, the Institute of Electrical Engineers (IEEE) sponsored a 3 day technical conference on Underground Residential Distribution. This was followed in September, 1966 by the Second Special Technical Conference on the same subject. Copies of the technical papers presented at these sessions are available through IEEE.

Also, in E. Mark Wolf's paper "Underground Installation of CATV Cables", presented at the 14th Annual NCTA Convention, the author points out that the direct burial of aluminum sheathed coaxial cables is not to be feared and can be economically and satisfactorily accomplished provided the cables are designed, manufactured and installed in accordance with established and proven standards and procedures.

Theoretical Considerations

Let us briefly review the general theoretical considerations for CATV cable design and also review briefly a few of the various process variables which can affect cable performance.

Table G outlines the components and general configuration of aluminum sheathed CATV coaxial cables.

The electrical design characteristics of such a coaxial cable are defined by the following interrelated equations:

(1) Characteristic Impedance $(Z_o) = \frac{138.2}{\sqrt{e}} \log_{10}\frac{D}{d}$ ohms

Where e = Dielectric constant of the insulation

(2) Velocity of Propagation $(Vp) = \frac{100}{\sqrt{e}}$ percent

(3) Capacitance $(C) = 1016 \frac{\sqrt{e}}{Z_o}$ picofarads/ft.

Attenuation for these types of cables is defined by a more complex equation:

(4) $\alpha = 8.686 \left[\frac{R}{2Z_o} + \frac{GZ_o}{2}\right]$ dB/1,000 feet

Where R = effective loop resistance in ohms/1,000 ft.
Z = characteristic impedance in ohms.
G = Leakage conductance of insulation in ohms/1,000 ft.

If the appropriate expressions for R, G and Z are substituted in this equation, we can write the expression for attenuation as:

$$(5)\ \alpha = \frac{0.02387}{\text{Log}_{10}\ d_o/d_i}\left[\frac{\sqrt{P_i}\sqrt{e}\sqrt{f}}{d_i}\right] + \frac{0.02387}{\text{Log}_{10}\ d_o/d_i}\left[\frac{\sqrt{P_o}\sqrt{e}\sqrt{f}}{d_o}\right] + \frac{15.062\ \ fDe}{\text{Log}_{10}\ d_o/d_i}\ \text{dB/1,000 ft.}$$

Where: α = attenuation in dB/1,000 ft.
d_i = diameter of inner conductor (inches)
d_o = inside diameter of the outer conductor (inches)
P_o = resistivity of outer conductor (micro ohm-cm)
P_i = resistivity of inner conductor (micro ohm-cm)
e = dielectric constant of insulation (S.I.C.)
f = frequency in megacycles
D = dissipation factor of the insulation

In this expression, the first term represents the loss due to the inner conductor, the second term represents the loss due to the outer conductor and the third term represents the loss due to the insulation.

Process Variables

Basic specifications of the metal industry have established and defined resistivity values for copper and aluminum. For the purpose of this discussion, these values may be considered to be constant.

However, variations in the diameter of the inner conductor will occur during normal manufacturing operations. Wire drawing dies wear and cause diameters to increase. Also, normal handling procedures can cause "stretch" or "draw-down" of the conductor. The final electrical characteristics, particularly the cable impedance, can be quite sensitive to variations in the inner conductor diameter. Changes of 0.001" can change the impedance of .412" cable by as much as 0.6 ohms. In .500" cable such diameter variations can change the impedance by 0.5 ohms and .750" cable by 0.3 ohms. Therefore, the ability to hold close tolerances on the inner conductor dimensions, has an important bearing on the ability to maintain the cable impedance within given limits.

The diameter over the expanded polyethylene insulation is an important variable. When extruded correctly, the dielectric constant of expanded polyethylene is extremely constant. However, in the application of the aluminum sheath, the outer surface of the polyethylene tends to become compressed, thus effecting a change in the effective dielectric constant. The amount of compression is a matter of choice and will vary between manufacturers. In aluminum sheathed, foam polyethylene insulated CATV cables, the dielectric constant usually lies between 1.50 and 1.55. Variations in the dielectric constant of this extent can cause a difference of 1.0 ohm in impedance.

The thickness of the outer aluminum sheath is generally chosen to give the cable suitable mechanical properties. Variations in wall thickness and overall cable diameters can vary differently between manufacturers due to variations in the methods of application. Such variations must also be considered in establishing tolerance limits for both the mechanical and electrical characteristics.

changes in impedance along its length, each of which, by itself, is too minute to have any significant effect on the final electrical characteristics. If these structural changes occur with random spacing along the cable, they are of no special concern since they will tend to cancel out each other. If, however, these changes occur with a periodic spacing, they are of special concern. Under such conditions, there is one frequency at which the effect will be additive and the attenuation will be higher than it should be. Such a cable is said to have periodicity, and the spacing of these periodic irregularities determines the frequency at which their effect is additive.

Control of periodicity requires the meticulous study and analysis of every step of the manufacturing process where the cable or its components may be handled.

Initially, it was common practice to evaluate cable periodicity in terms of a sweep attenuation test. By this method, a sweep signal was introduced at one end of a length of cable and the signal emerging from the other end was displayed on an oscilloscope. Where periodicity occurred, a "hole" or "suck-out" would appear on the display at that frequency. By rough calibrations, the depth of the hole was determined in decibels. There were no established acceptance standards for this test although most spoke of 0.25 dB or 0.50 dB on the depth of the hole. Later, a percent deviation from the smooth curve theory was introduced. Limits of 2.5% and 5.0% were referenced, but again there were no established acceptance standards.

As cable manufacturing techniques improved, the magnitude of periodicity effects were reduced more and more until the depth of the holes became less than the resolution possible on the oscilloscope display. The best that could be said was — "no measureable deviation from the smooth curve" — certainly an imprecise statement to include in a specification.

During the past two years, manufacturers and users of CATV cables have become actively interested in "return loss" as a useful parameter for defining the quality of cable.

Return loss testing has been a valuable and highly sensitive test for evaluating electronic equipment for quite a few years. It is a rather sophisticated test, and the equipment and procedures used together with the results obtained require careful interpretation.

Return loss measurements are made by feeding a signal into one end of the cable and comparing the strength of this signal with the signal which is reflected back out of the same end. The ratio between the two, expressed in decibels, is said to be the return loss of the cable under tests.

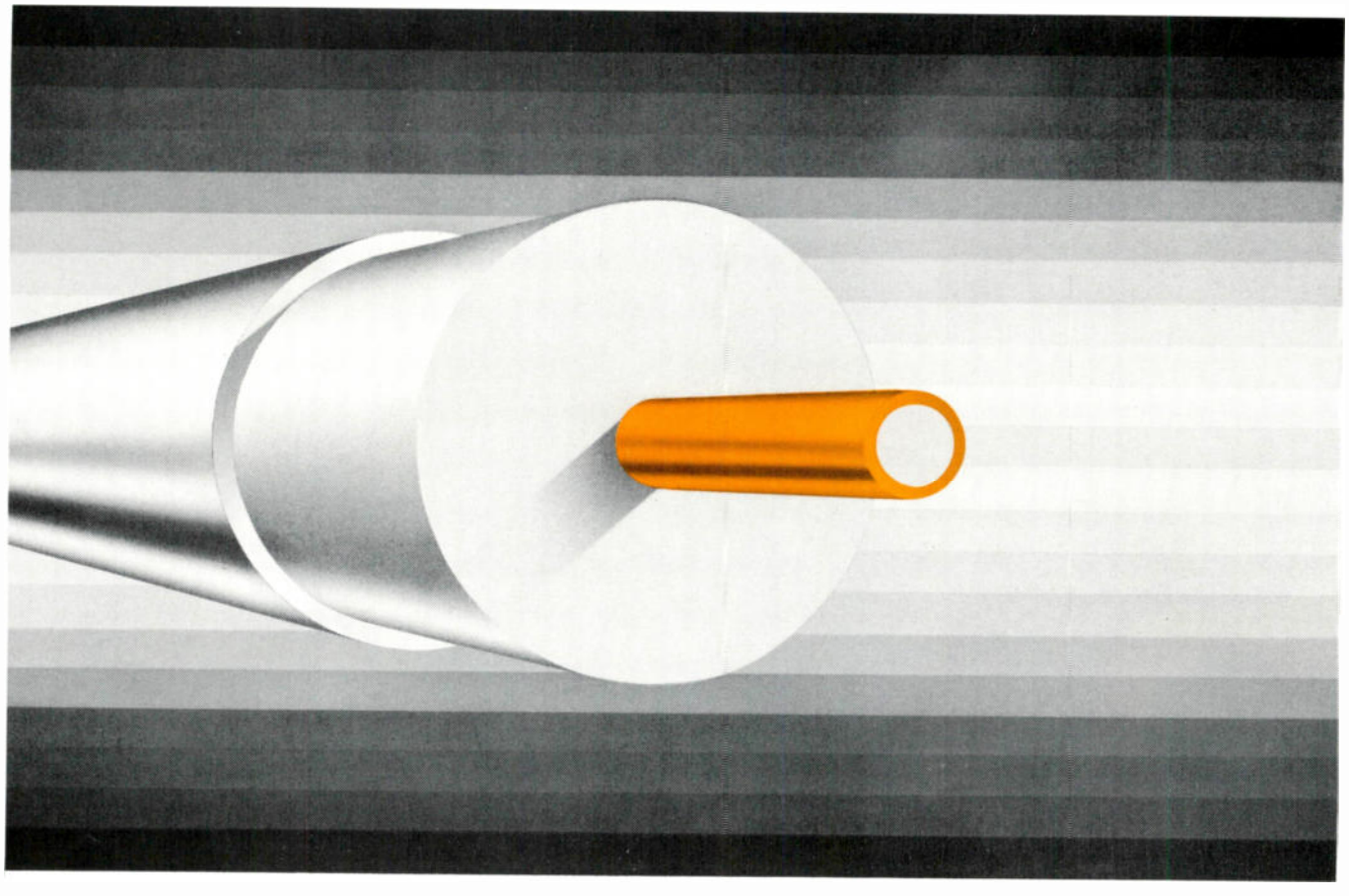
For CATV cables, the ideal condition would be zero reflection, since any signal which is reflected must reduce the strength of the transmitted signal, and it is the strength of the transmitted signal which effects the quality of the television picture carried to your subscriber's TV set. Thus, the higher the ratio between the main signal and the reflected signal, the better the cable.

The return loss test provides essentially the same information as the attentuation sweep test but with much greater sensitivity. It is this high degree of sensitivity that introduces problems in interpretation of the test method. The amplifiers used to achieve the needed sensitivity amplify not only the reflections coming from the cable but also those coming from connectors, terminations, jumpers, etc., and it is difficult to determine from the return loss measured just what part should be attributed to the cable and what part should be attributed to hardware.

When return loss measurements are made using the same equipment, hardware, and test procedures, and when the bridge adjustments and interpretation of results are always made to the same ground rules, this test can be a valuable asset for judging relative quality.

Since we do not have established standards and procedures

Maximum range, minimum copper.



Copper clad aluminum wire is the newest copper-saving TI materials system — the result of an advanced TI cladding technology which optimizes material functions.

Copper clad aluminum conductor carries the full range of signals used for CATV. It also gives these plus features:

- Matched expansion with aluminum sheath
- Lighter than solid copper
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- Long weld-free lengths
- Smooth, oxide-free surface in rod sizes
- Diameters to 7/16 inch

In addition, copper clad aluminum conductor can be processed with the same equipment now used for copper. The wire drawing can be performed with existing dies and lubricants and without change in machine speed. Resistance or oven annealing requires little or no variation from existing practices. Copper clad aluminum wire is now processed routinely to 38 AWG.

With all these superior features, copper clad aluminum wire is priced competitively with existing conductor materials.

For further information, contact your nearest Texas Instruments office. Or write TI Materials Div., Attleboro, Mass. 02703.

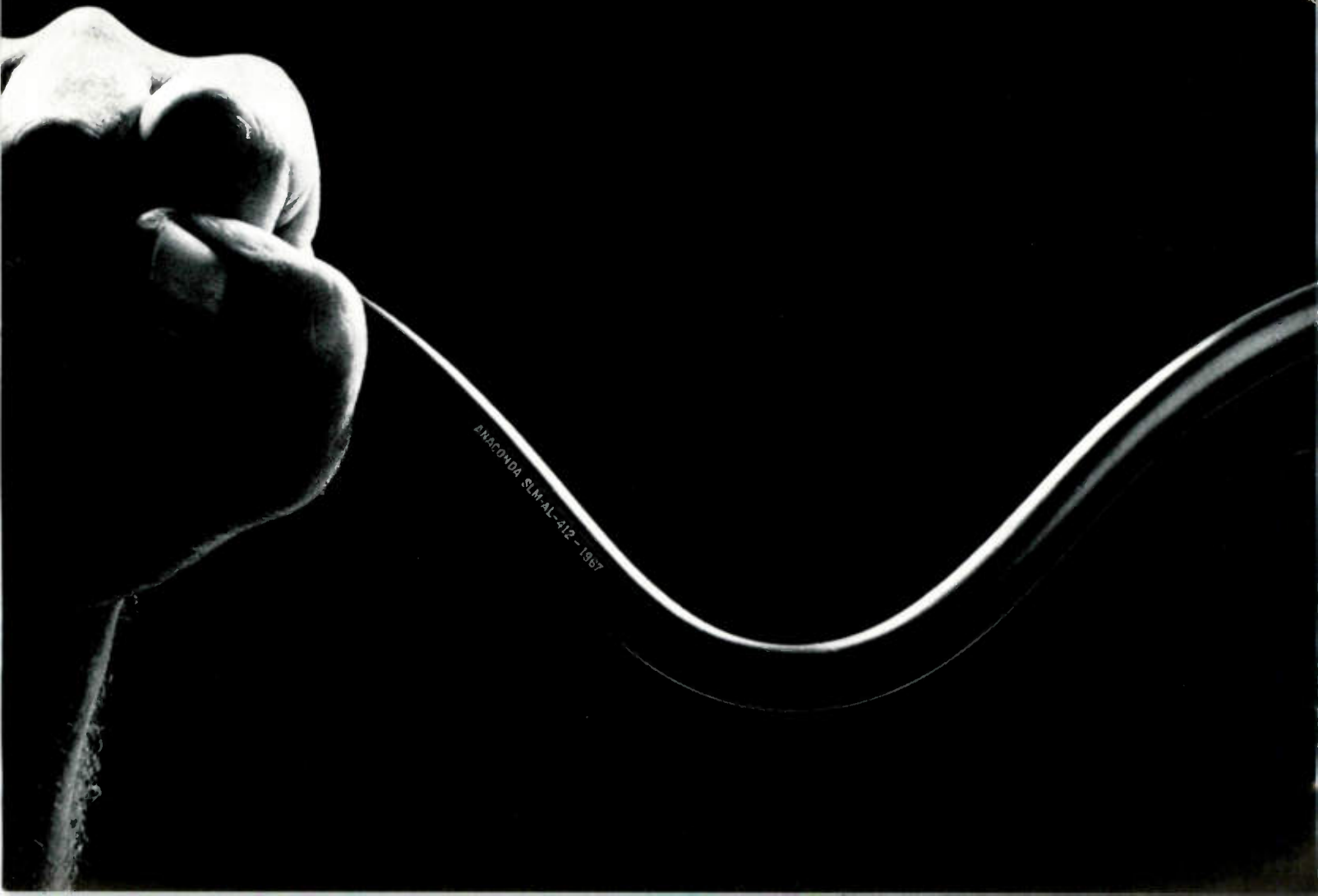
TEXAS INSTRUMENTS
INCORPORATED

Somebody had to make a coaxial cable like this.

A coaxial CATV engineers could really bend. And rebend. Form drip loops, expansion loops and spirals. All without mandrels or straighteners. All without kinking, cracking or rupturing of the sheath.

Somebody had to make a coaxial so flexible and easy to install, it's practically foolproof.

But a cable that was also moistureproof. Absolutely. And Anaconda did it, with a special design called "Sealmetic." This special Anaconda construction hermetically seals the cable sheath at the shield overlap. It also bonds the entire outer conductor and the polyethylene



jacket to form a unitized sheath. A sheath so strong the cable core is completely protected from moisture and humidity.

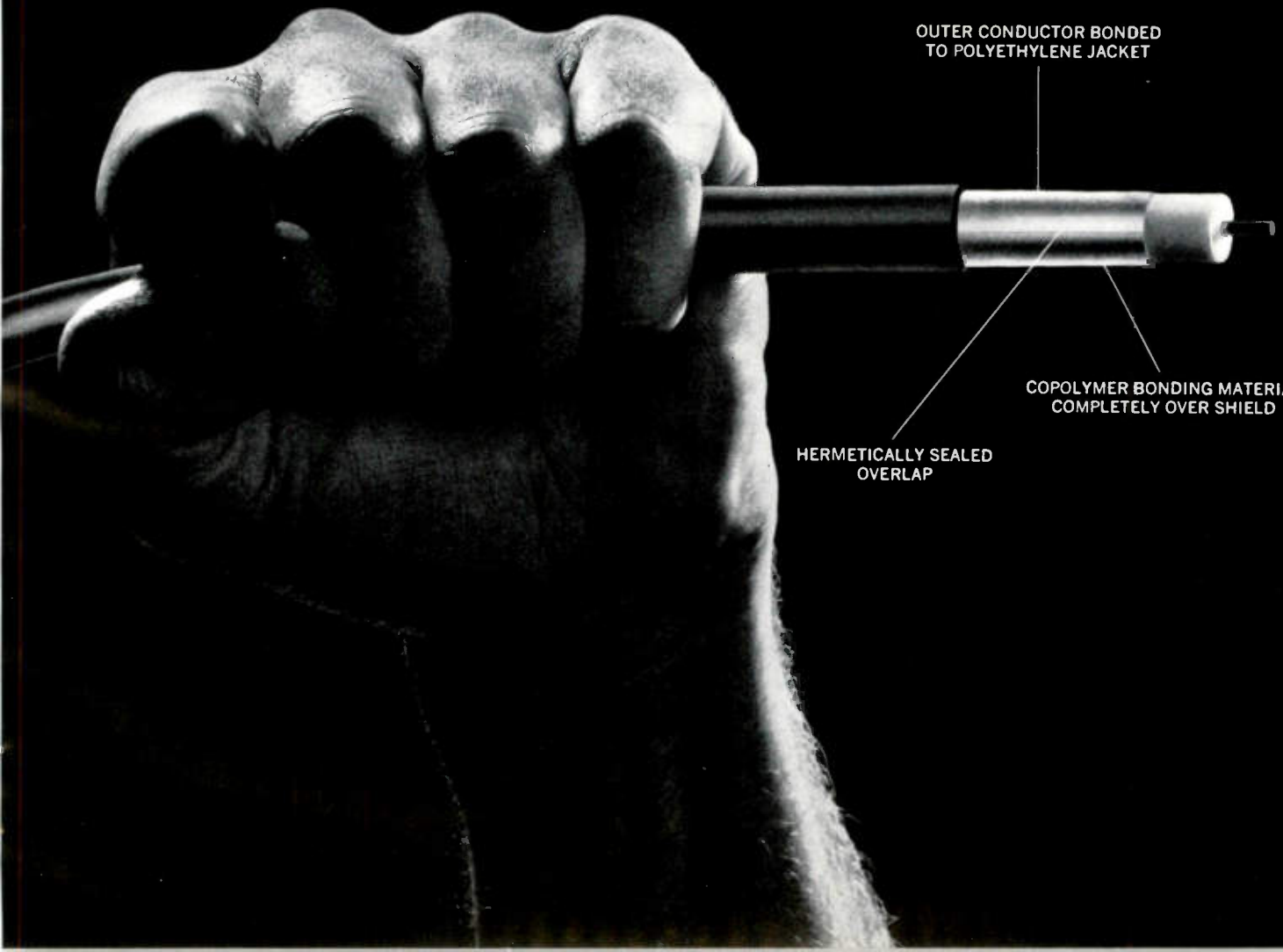
A sheath so strong it guarantees electrical excellence: signal integrity, low attenuation. And a structural return loss of 26 dB or better over the entire range of channels.

Somebody had to make a coaxial cable like this: exceptionally flexible, electrically excellent.

Anaconda did: Sealmetic Coaxial Cable.

Anaconda Wire & Cable Co., 605 Third Ave., N. Y., N. Y. 10016

ASK THE MAN FROM
ANACONDA®
ABOUT SEALMETIC COAXIAL CABLE



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for this test, it becomes difficult to make true comparative analyes between various cables on the market by simply reading the printed literature. For example, the following statements can be found in any of today's published literature:

(1) 26 dB down min. Channels 2 through 13.
(2) 26 dB min. at any frequency 20-220 mcs.
(3) Minimum 26 dB structural return loss across all Channels 2-13.
(4) 26 dB min. in any TV channel measured by sweep method from 54 to 216 mcs (compared to average characteristic impedance)
(5) 25 dB min. return loss at any frequency between 40 mcs to 230 mcs.
(6) Average USWR of 1.05 on all channels.
(7) Average minimum structural return loss at any frequency between 7 and 216 mcs is 32 dB.
(8) Return loss - 26 dB, 50-220 megahertz.
(9) 30 dB return loss (weighted) worst point Channels (2-13)
(10) 25 dB min. down at any frequency over the range 20-220 mcs, including sub channel frequencies 20-54 mcs, 88-105 mcs FM band, 105-174 mcs, as well as 12 VHF TV channels.
(11) 30 dB loss on TV and FM bands.
(12) 30 dB, 20-220 mcs as measured by the balanced bridge method.

Not having established written test procedures, and with such variations in indicated values, variations in test range, encompassed by such wordings as "minimum", "average", "average-minimum" and "weighted", it would be interesting to see how you, the user, would interpret these statements and evaluate each of the manufacturers.

This article was introduced by stating that the objective was not to solve problems but rather to expose confusion, with the hope that such open discussion would lead to development and support of industry standards. I feel free, therefore, within the latitude of my expressed objective, to point out that vague "advertising copy" is hardly a satisfactory basis for sound engineering decisions.

The CATV system design engineer, on whose judgment millions of dollars are being committed is certainly entitled to more precise data than is commonly found in the advertising pages of trade publications.

For example, average values without qualifying tolerances are misleading. It must be recognized that some variation is normal in any manufacturing process, and these variations are related directly to the principles of probability. Thus, with any normal processing, under control, as many values will be found above the average as will be found below the average. The actual range or spread of these values from the average will depend upon the degree of control capable of being effected over the process.

Nominal attenuation expressed graphically on fine paper with a broad pen is a poor basis for system design, and the expression "return loss" is just a catchy phrase unless the frequency spectrum and test procedures are precisely defined.

These are shoddy tools for an industry as sophisticated and advanced as CATV and certainly will not support improvement in the state of the art necessary for continued growth.

The wire and cable industry is capable of establishing concise and objective specifications to govern the design, production and testing of CATV cables now in general use. Past experience in other industries proves that such standards can be devised and adopted without inhibiting progress. On the contrary, they have been the very basis for advanced designs. Such a project, however, can be undertaken only with the cooperation and mutual effort of both the manufacturer and the consumer.

In CATV, as in any area of technology, there must be mutual agreement and widespread use of test methods so that the language we use to describe, and the numbers we wish to measure, are universally understandable. □

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The performance of ROHN TOWERS has built for this pioneer in tower manufacturing the top reputation in the industry. Wherever you go — **worldwide** — you find ROHN TOWERS . . . CATV, microwave, communications, broadcast, home TV and amateur towers . . . with complete accessories, lighting, microwave reflectors and equipment.

In other words, ROHN TOWERS have become an accepted standard, recognized as the tower that provides **all** the wanted characteristics of strength, durability, ruggedness, appearance, design, adaptability and prestige.

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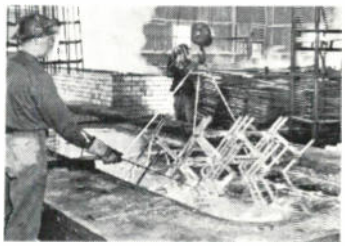

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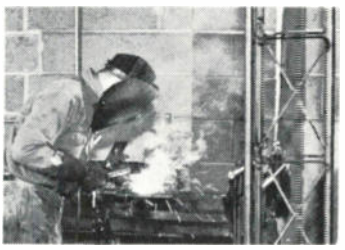

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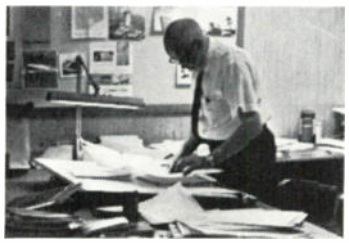

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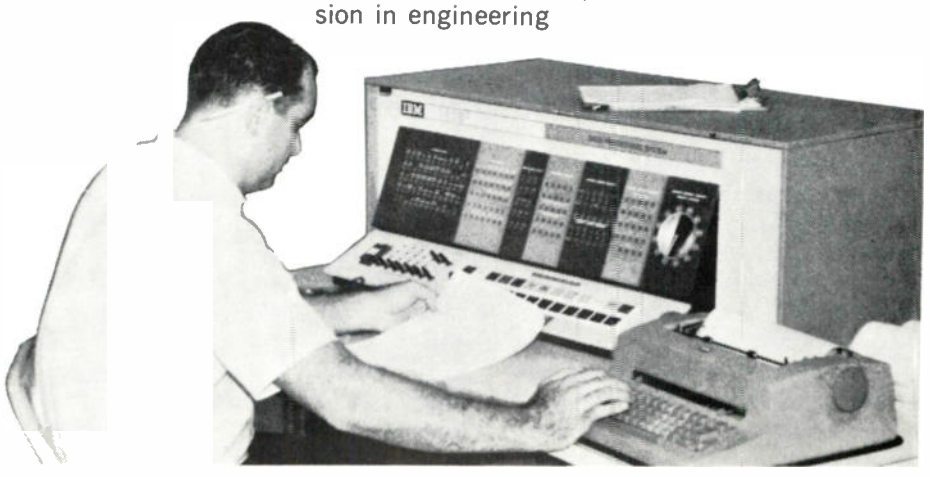

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Automatic Equalization as a Factor in System Level Control

By Argyle W. Bridgett
Manager, Design Engineering
Spencer-Kennedy Laboratories, Inc.

The basic problems of CATV are really only two. First is obtaining a sufficient number of high quality TV signals and second is transmitting these signals through coaxial cable without degrading the original quality too much. The cable which is obtainable today does only one undesirable thing to the signal to any major degree. It attenuates the signal. It also causes a delay, but the delay, in general, is not a type which degrades the signal and the amount of delay is small. In a system of 1,000 dB of cable attenuation, the cable delay will be approximately 100 micro-seconds.

The attenuation, however, is enough to completely lose the signal in snow and must be compensated for by providing amplification at close enough intervals to avoid losing the signal. It is in providing this amplification that most of the problems originate, since any amplifier will degrade the signal in several ways. First, if the total response of the amplifiers does not match the loss of the cable fairly well, the picture quality will suffer. Second, it will add some noise to the signal. Finally, it will add distortion signals to the desired signals. These last two effects, noise and intermodulation, are usually the factors which limit either picture quality which can be attained or system length.

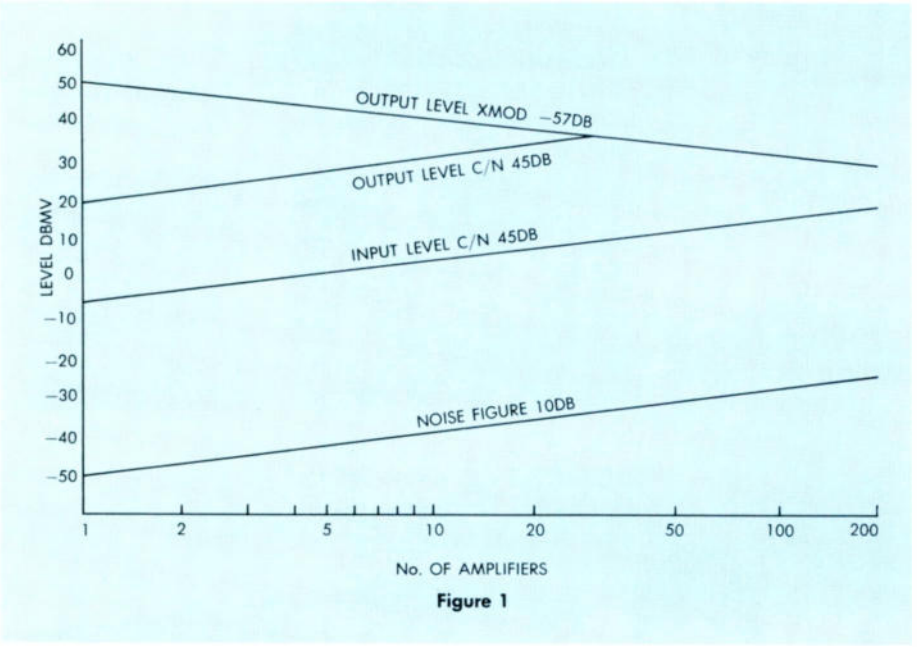


Figure 1

I believe we are all familiar with the V curves shown in Figure 1 which show how the amount of noise and intermodulation introduced in a system by the amplifiers depend on signals levels, amplifier gain, and number of amplifiers. The top curve shows the maximum output level at which a given number of amplifiers can be operated with a given amount of cross-modulation. (This will depend on the amplifier, the gain setting and the signal level tilt). The bottom curve shows the minimum input level at which the same number of amplifiers can be operated with a given carrier to noise ratio. The difference between these two curves for one amplifier is what is called by Shekel the "k" factor for the amplifier. The intermediate curve shows the minimum output level at which the amplifiers can be operated without degrading the carrier to noise ratio. The distance between these two curves is "system margin" which is the range of output levels at which a system of any number of cascaded amplifiers can be operated without exceeding either limitation. The ideal way to operate a trunk is with all amplifiers operating midway between these limits so that the "system margin" is equally divided between noise and intermodulation.

The important thing to remember about these curves is that the "system margin" obtained from them assumes that all amplifiers are operating at the same levels. In practice this is not always true. There will generally be a difference in levels from amplifier to amplifier due either to measuring equipment errors or variations with temperature.

It would seem at first thought that one could predict results by using the average of the levels throughout the system, but this does not turn out to be the case. As an extreme example, suppose that we consider a system of two ampli-

fiers and set one at the highest operating level for one amplifier. The amplifier which is at the high level will contribute a very small amount of noise and the amplifier at low level will contribute a small amount of intermodulation. Our system of two amplifiers will have exceeded the system limits by a small amount regardless of the "k" factor.

Thus, if we operate alternate amplifiers a few dB above and below the average level, we find that we have reduced our "system margin." Figure 2 shows the reduction in "system margin" which would result from this type of operation. Notice that the degradation is very small if we do not deviate a great deal from the central value but becomes very great when the deviations from average are large.

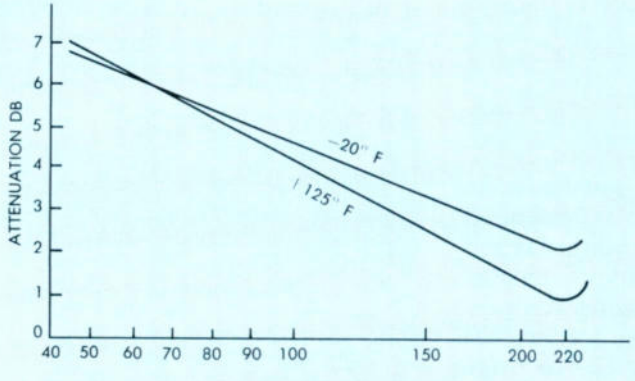
cable loss will decrease approximately 16%. Thus, if the total high temperature cable loss in a long run is 1,000 dB at channel 13 there can be a change in loss of 160 dB at channel 13 and a slope change of 80 dB in the system from a summer day to a winter night.

It is obvious that it is impossible to obtain a system margin large enough to accommodate such a wide swing in levels. Therefore, it is necessary either to adjust amplifier gains and slopes every time the temperature changes, or to provide some automatic method of level adjustment. Automatic level control amplifiers by themselves can only correct for one half of the cable variations. It is necessary to provide some method of automatic slope correction.

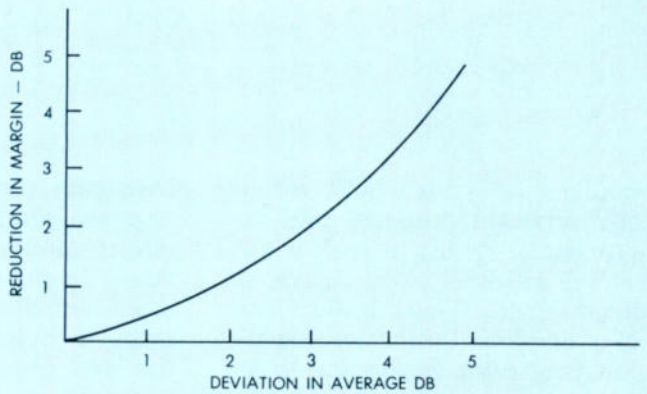
square root of frequency response of cable cannot be obtained. However, the errors in shape can be made very small and once a considerable number have been cascaded and the errors measured, a thermally operated mop-up equalizer can be designed to correct them.

(2) The cable is spread out over an area in such a way that some of it is in direct sunlight and some is in the shade. On the other hand each equalizer is in a fixed location. Therefore, an exact match to the cable variations is difficult to achieve. However, if a sufficient number of them are used and they are suitably located, this effect can tend to average out.

(3) If exact control of level at every amplifier is to be achieved,



RESPONSE OF TYPICAL THERMAL EQUALIZER.
Figure 3



REDUCTION IN CASCADABILITY WHEN
ALTERNATE AMPLIFIERS ARE SET HIGHER & LOWER THAN AVERAGE.
Figure 2

This can be very important when the system is long enough to provide very little "system margin."

Frequency Effects

The cable attenuation is not a constant value for all channels but varies almost directly as the square root of frequency. The loss at channel 2 is approximately one half of that at channel 13. In a system having a total cable loss of 1,000 dB this requires 500 dB less gain at channel 2.

Temperature Effects

Probably the most annoying problem in maintaining a system and operating it so as to obtain the best system margin is that the cable losses (and to a lesser degree the amplifier gains) vary with the temperature. If the temperature varies from + 140° F to - 40° F the

Automatic Equalization Methods

(1) Temperature Operated Equalizers

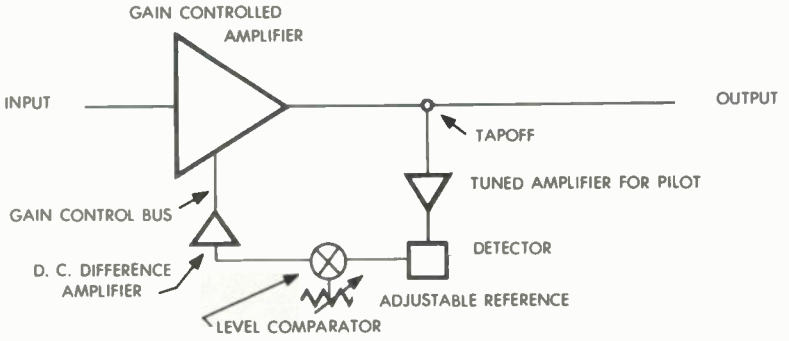
These are designed and built in the same manner as ordinary fixed equalizers using resistors, capacitors and inductors. However, one or more of the elements uses a temperature sensitive element such as a thermistor, selected in such a way that the transmission response varies with temperature in a way as to be complementary to that of cable. Figure 3 shows the characteristics of a typical equalizer. These are placed in the system at intervals so as to minimize the variations in slope at all amplifiers. Their only disadvantages are:

(1) As with any lumped constant networks, an exact match to the

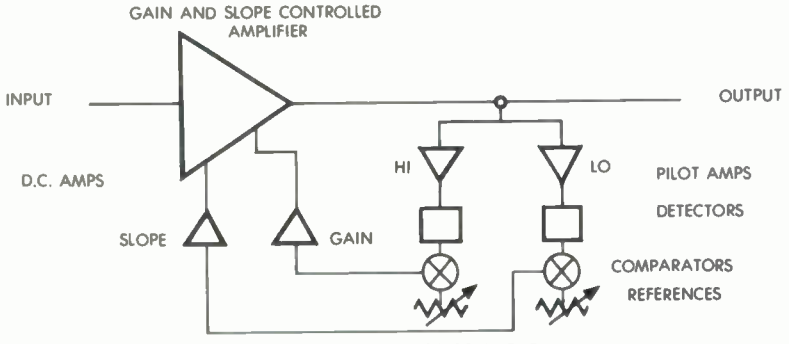
each equalizer should be designed to exactly match the span of cable preceding it. This would require that every equalizer be custom designed or that the system be built with spans which exactly match the equalizer. In practice this is usually undesirable for other reasons. As Figure 2 shows, however, a slight deviation from desired signal levels will not lower the "system margin" very much and some errors can be tolerated. It is, however, desirable to calculate the location of each thermal equalizer quite accurately using accurate measurement of cable spans. This type of equalizer has been proven to work very well in systems over a period of 6 or 7 years.

(2) Compensated Gain Controls with ALC

Some automatic level control



BLOCK DIAGRAM – ALC AMPLIFIER



BLOCK DIAGRAM – ALC/ASC AMPLIFIER

COMPARISON OF ALC AMPLIFIER & PILOT CONTROLLED EQUALIZER.

Figure 4

amplifiers have been built with a slope variation designed into the gain control circuit in such a way that the amplifier slope is reduced with the gain. While absolute control of amplifier output level at the operating pilot frequency is obtained, this system also suffers certain disadvantages.

(1) There is the same difficulty with matching square root of frequency response common to any of the methods.

(2) The amount of slope compensation should be custom designed for the amount of cable being corrected for. In regard to correction for slope changes, this method is about the same as temperature operated equalizers. In one case, temperature is measured directly and a slope compensation made. In the other, a level change is measured and a slope compensation made on the assumption that the level change was due to cable temperature change.

(3) If, after construction of a system, it is found that there is too much or too little slope correction for temperature changes, it is not possible to make corrections as easily as with temperature operated equalizers, where relocation of equalizers can easily be made.

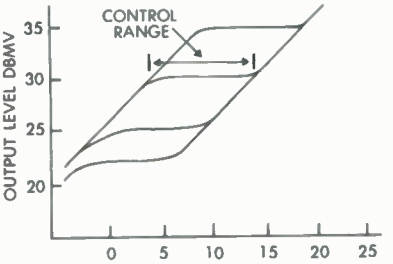
(3) Automatic Pilot Operated Equalizers

These have been in use in CATV systems since 1957. They operate in somewhat the same way as an ALC station except that the level of two pilot signals located near the two ends of the frequency range are used. If the levels of the two signals change an equal amount, the amplifier makes a correction in gain only to maintain signal level. If, however the two pilots do not change equally, the amplifier also measures the difference in levels and provides a slope correction in much the same way that a person observing the slope with a sweep or field strength meter might adjust the tilt control on the amplifier.

This system has the advantage that, since it measures actual signal levels, errors in slope correction cannot build up but will be corrected at the next amplifier.

However, just as automatic gain controls require that the range of incoming signal levels must correspond to the control range of the amplifier, so must the range of incoming signal tilt correspond to the slope correction range of the ASC amplifiers. This of course requires that if the units are to be used under normal conditions when preceding cable spans may be different from one another, the intial setup be made carefully.

A knowledge of the control characteristic is very important in planning the use of the qualizers if full advantage is to be obtained from their use. Figure 5 shows a typical set of control characteristics.



TYPICAL AUTOMATIC
CONTROL CHARACTERISTICS.

Figure 5

Combining of Methods

Since all of the equalization methods suffer from the one basic trouble that an absolutely exact match to cable response cannot be obtained, and cascading a large number of any one kind of unit will allow any errors to build up, it appears that the best way of operating a system is to use a combination of both temperature operated equalizers and automatic pilot operated slope control amplifiers. In this way is is possible to provide almost constant levels at the output of each and every amplifier so that the system margin will be degraded least. Errors in correction will be held to a minimum and cost of both construction and maintenance will be very low.

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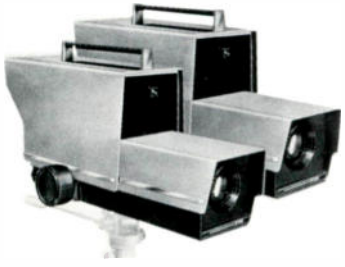
PRODUCT REVIEW

NEW COMPONENTS FOR CABLE TELEVISION SYSTEMS

TWO NEW VIEWFINDER CAMERAS

Two new TV viewfinder cameras are now being offered by Television Utilities Corporation. Both cameras feature built-in zoom lenses with operator controls remoted to the rear of the camera, five inch viewfinders, 600 line resolution and modular construction. According to the manufacturer these cameras weigh under 23 lbs. each. The model VF1000 camera is self-contained with internally generated random interlace sync.



The model VF1500 offers a choice of four types of sync including externally driven EIA RS-170. This model has remote control of beam, target, focus and pedestal and is priced at $1,995.00. A companion integrated circuit EIA sync generator is offered at $975.00.

For further information on these new products contact Television Utilities Corporation, 10-11 50th Avenue, Long Island City, New York 11101.

NEW PHASE CONTROL UNIT

A new phase control unit for use in sweep testing a CATV or similar video signal distribution system has been introduced by the CATV Systems Division of Jerrold Electronics Corp. According to the manufacturer the PCU-60 unit is designed for use in tests where the distance between a sweep generator and a monitoring oscilloscope hamper use of the 60-Hz horizontal output of the generator as reference. The PCU-60 is said to provide the necessary variable-voltage 60-Hz reference voltage. The dual-input of the model permits it to acquire the signal either from a CATV

system's 30-volt power or from a standard 115-volt source. A controllable phase range of 0 to 330 degrees is also featured in the unit.

For more information contact CATV Systems Division, Jerrold Electronics Corporation, 401 Walnut street, Philadelphia, Pa. 19105.

VIKOA MUSTANG III LINE EXTENDER

Vikoa, Inc. has introduced a third generation Mustang solid state line extender called Mustang III. The new unit is said to combine low noise figure with high output capability. The modular feature of the Mustang III makes it particularly easy for a CATV technician to restore service to subscribers in case of failure. He simply unplugs the amplifier module from the die cast case and plugs a new module in. There is no necessity for unsoldering, removing connectors, or re-

moving the line extender case from the messenger cable. Separate gain and tilt controls compensate for 12 to 20 db of cable. An internal switch may be used to reduce gain by 6 db, to accommodate additional taps if they should be required at a future time. To speed bench servicing of the module, all RF transistors are mounted in individual sockets.

For further information on this new product contact Vikoa Inc., 830 Monroe St., Hoboken, New Jersey.

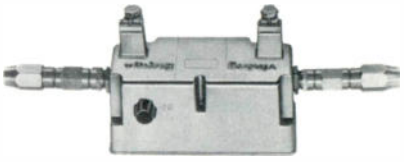
SUB-CARRIER CONVERTER

Catel Co. has announced the development of a solid-state FM stereo sub-carrier converter for use in microwave relay service. The model FMR-2500 offers choice sub-carrier frequencies from 5.8 MHz to 8.0 MHz for the transmitter link, and converts back to 88-108 MHz at the receiving end. The output level is said to be +35 dBmv with 50 dB of spurious rejection. The model FMR-2500 complete price is $450.00

For additional information contact the Catel Company 1357-59 Laurel Street, San Carlos, California 94070.

CRAFTSMAN CONNECTOR

A new connector designed by Craftsman Electronic Products Corporation is now available. The Sure Grip connector is designed for use with Craftsman's Vu-Sharp modular directional tap but will also work with other trunk and feeder line CATV distribution equipment.



For further information on this new product contact Craftsman Electronic Products Corporation, 133 West Seneca St., Manlius, New York 13104.

CONSTANT-VOLTAGE TRANSFORMERS

Sola Electric has announced availability of its CV constant-voltage transformer, designed to meet the requirements of solid-state systems components. The output of the Sola C V is said to be dept at 30 volt or less. The unit is said to compensate for voltage variation in the field and to protect equipment from lightning surges as well as providing regulated power. Sola has designed six 30-volt units with current output ranging from 1 amp to 12 amps.

For additional information on this product contact Sola Electronics.

COAXIAL CONNECTOR FOR CATV

American Pamcor's Series "U" connectors for use with .375", .412", .500", and .750" diameter aluminum sheathed television cable are said to be 75-ohm impedance matched. According to the manufacturer VSWR is less than 1.06 over the entire VHF band from 54 to 215 MHz. Installed with a hand tool, these crimp-type connectors use the center conductor of the cable as the male contact pin. An inner support sleeve prevents collapse of the soft aluminum sheath and controls cold flow to provide a high tensile connection. A built-in "O" ring and neoprene gasket are said to seal the finished assembly against moisture.

For further information on this new product contact AMP Corp., Harrisburg, Pennsylvania 17105.

RAYCLAD TUBES ANNOUNCES CATV PRODUCTS

Rayclad Tubes Inc., a developer of heat shrinkable products, has developed a series of parts for use in the cable television industry. Each of these heat shrinkable parts is fabricated from U.V. resistant, thermally stable, cross-linked polyethylene. The inside surface of each part is coated with an elastic adhesive. When exposed to heat in excess of 250° F., each part shrinks and tightly encapsulates connections, connectors, cable, conduit, etc.

A torch shrinking device is also offered by Rayclad, the model FH-2602 which has been designed especially for the "elastic memory" products used in CATV applications. Model FH-2602 is designed to attach to a propane bottle, and to produce the type of flame required for heat shrinking the polyethylene.

For additional information on these products contact the Raychem Corp., 300 Constitution, Menlo Park, Calif.

BALL BROTHERS ANNOUNCES NEW PRODUCTS

A video signal multiplexer for use with general purpose video sweep generators has been developed by Ball Brothers Research Corporation. Designated the Mark 81, the new general purpose multiplexer is said to provide increased usage of existing equipment in the adjustment of television systems and equipment. The Mark 81 adds EIA television synchronization pulses to the output of video sweeping oscillators. The composite video output of the Mark 81 is a test signal in television format for measuring frequency response of video amplifiers.

A new video waveform monitor has also been introduced by Ball Brothers. A flat-face, rectangular 5-inch CRT with an edge-lit IEEE-type graticule provides a bright trace on a large viewing area, according to the manufacturer. Silicon semiconductors are used throughout the electronic circuitry, including the integrated circuitry. Solid-state circuitry allows the employment of convection cooling and electronically regulated high and low-voltage power supplies are said to provide constant trace brightness and low-drift amplitude calibrations.

For further information, contact Information Services, Ball Brothers Research Corporation, Boulder, Colorado 80302. □

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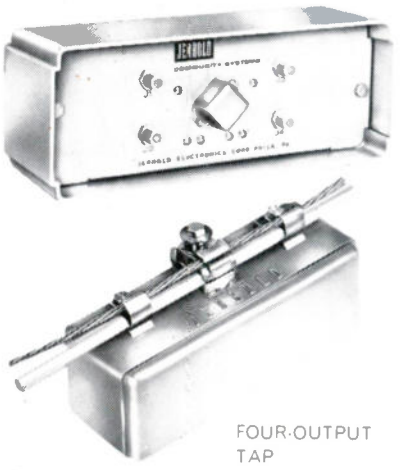

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