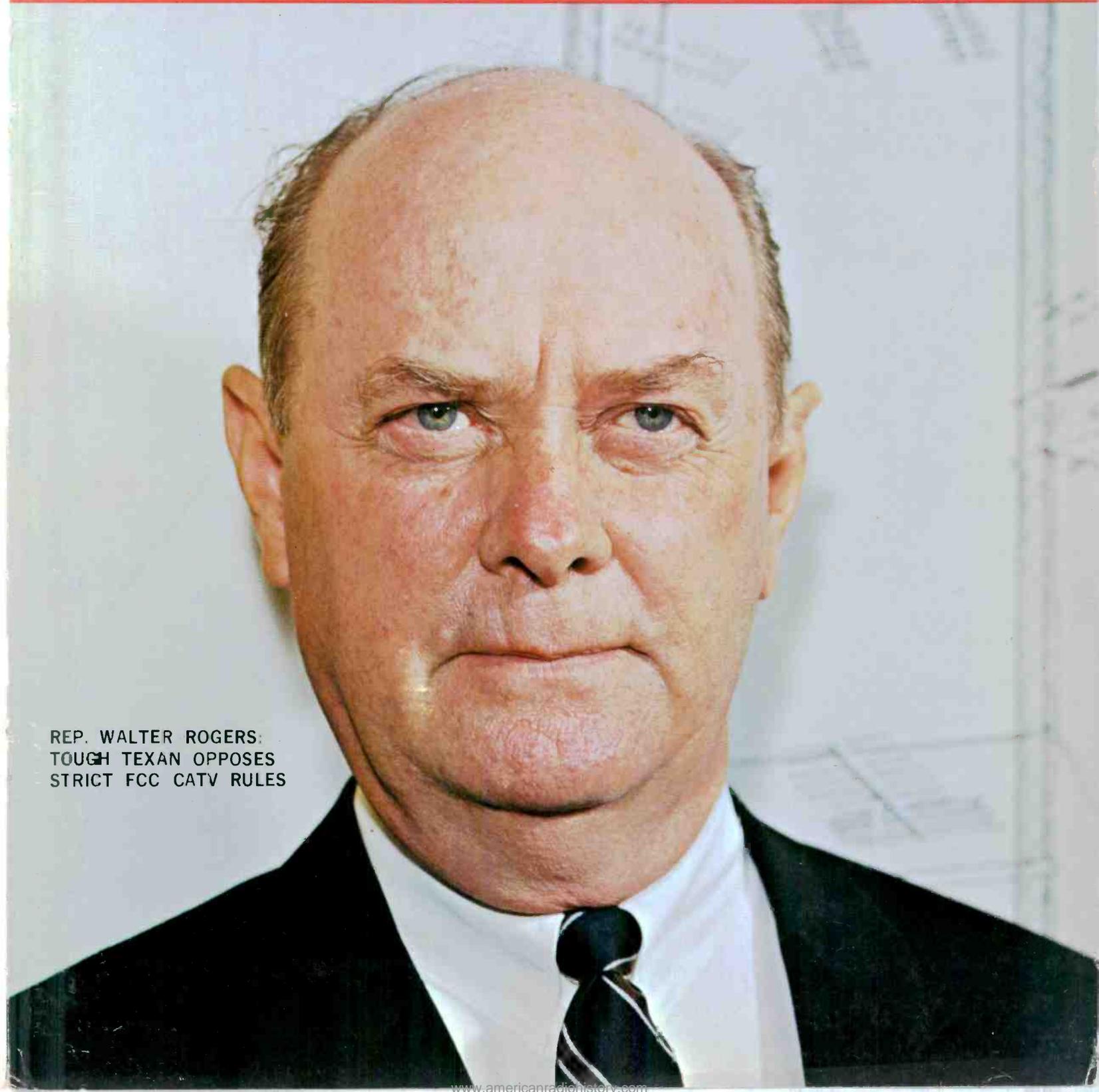




MAY, 1966

# TV & Communications

The Professional Journal of the Cable Television Industry



REP. WALTER ROGERS:  
TOUGH TEXAN OPPOSES  
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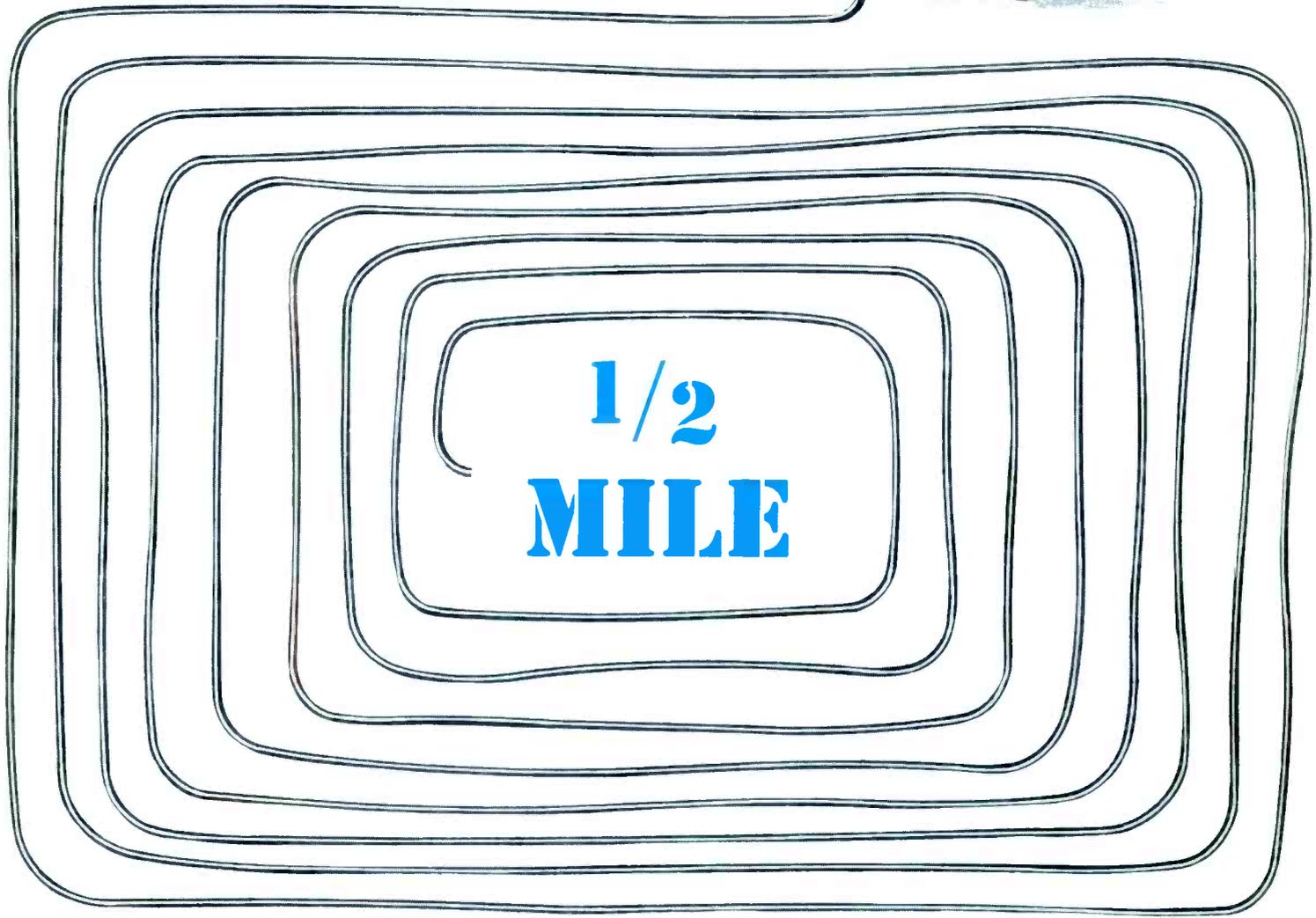
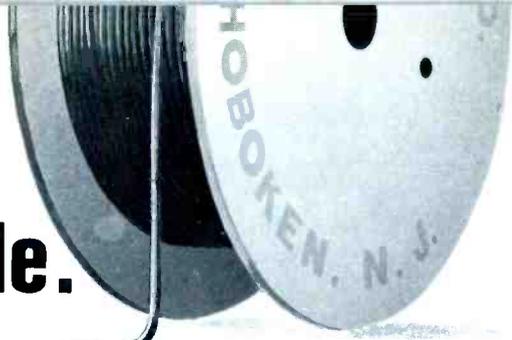
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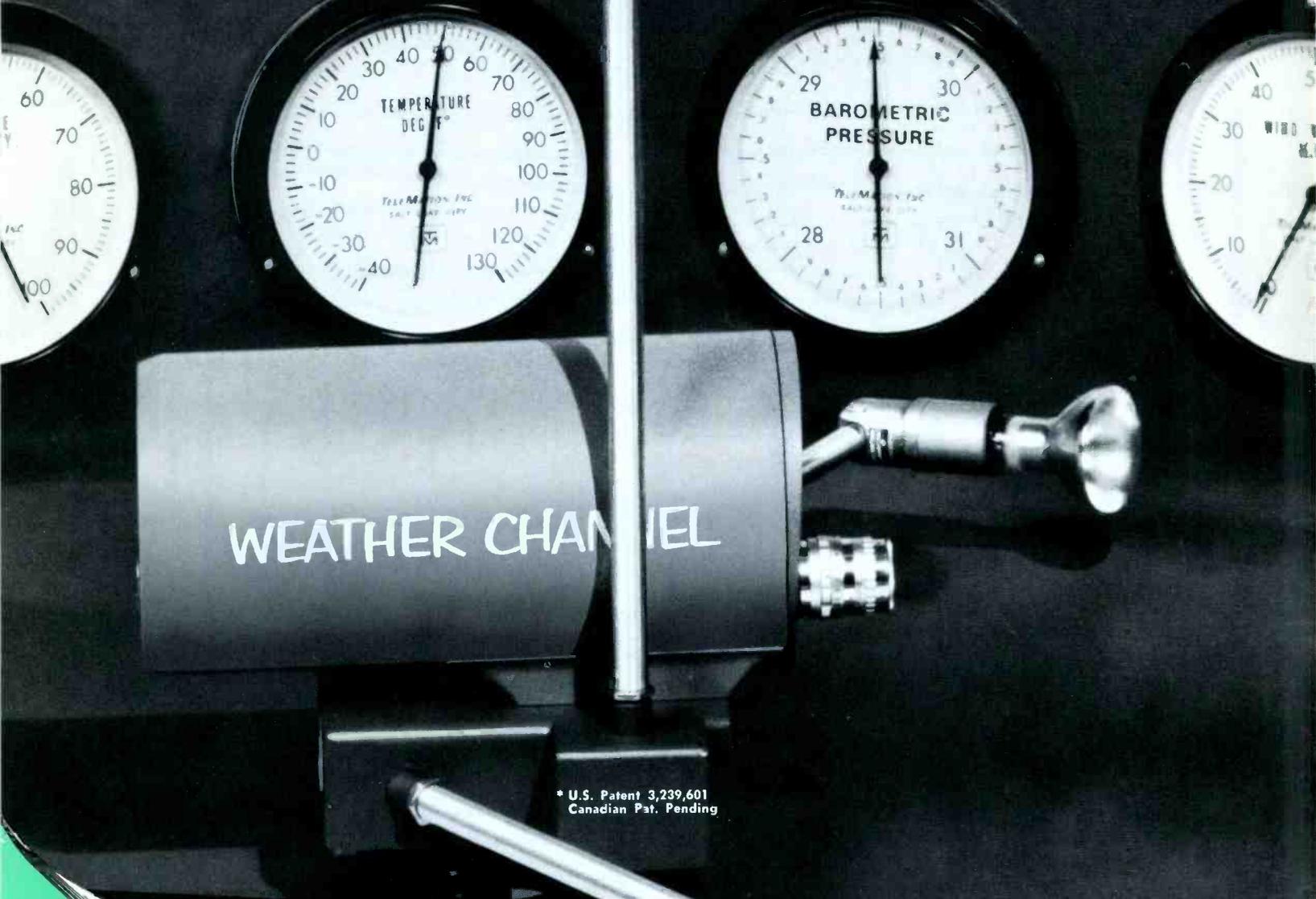
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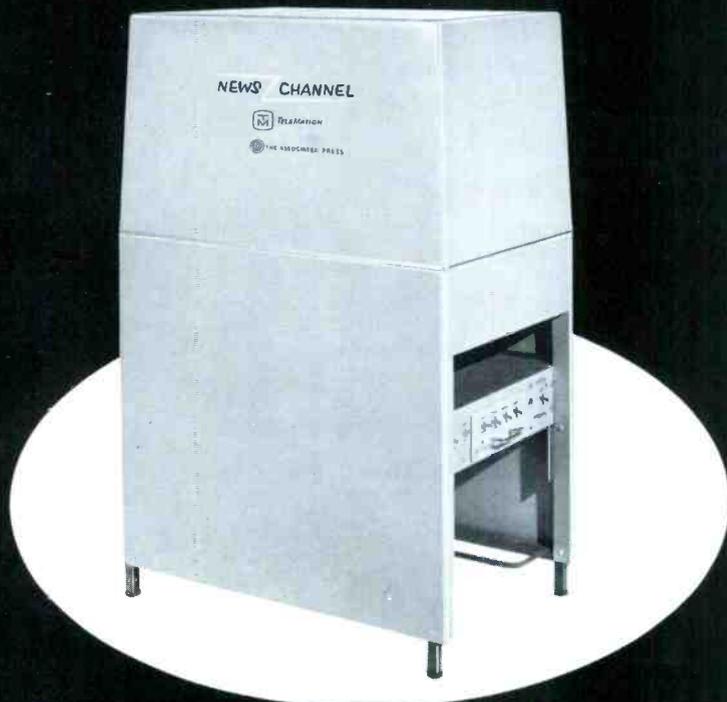
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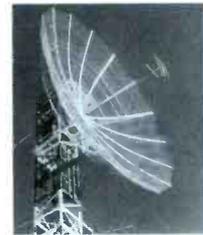
## IN THIS ISSUE

### A VISIT TO ATR



Many thriving cable systems in the U.S. owe their existence to the microwave relay services which make signal extension possible. Through microwave, educational and other desired TV channels as well as new programming concepts, can be extended to greater numbers of people. TV&C takes an inside look at American Television Relay, Inc. on page 34.

### UNIQUE ANTENNA DESIGN



The elements which contributed to Stanley Hosken's success in design engineering began with an electronic training course in Toronto, Canada, a duration in the Royal Canadian Navy, and early interest in the art of television signal reception. Today he claims with satisfaction that his Tropo-Scatter Antenna is the most powerful available to CATV operators—page 48.

### NAB-IEEE SHOW REPORTS

The NAB Convention in Chicago and the trade show in conjunction with the convention of the IEEE displayed millions of dollars worth of electronic equipment and components of interest to the CATV operator. Highlights of both exhibitions — from directional coupler taps to spectrum analyzers — are discussed in the special staff report on page 44.

### OUR COVER

This month's cover subject is Congressman Walter Rogers, Chairman of the House Communications Subcommittee and outspoken foe of FCC's move into CATV regulation. Cover photo courtesy of Texas CATV Association and Dean & Bain Advertising, Inc.

Stanley M. Searle, Patrick T. Pogue PUBLISHERS

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# TV & COMMUNICATIONS

THE PROFESSIONAL JOURNAL OF THE CABLE TELEVISION INDUSTRY

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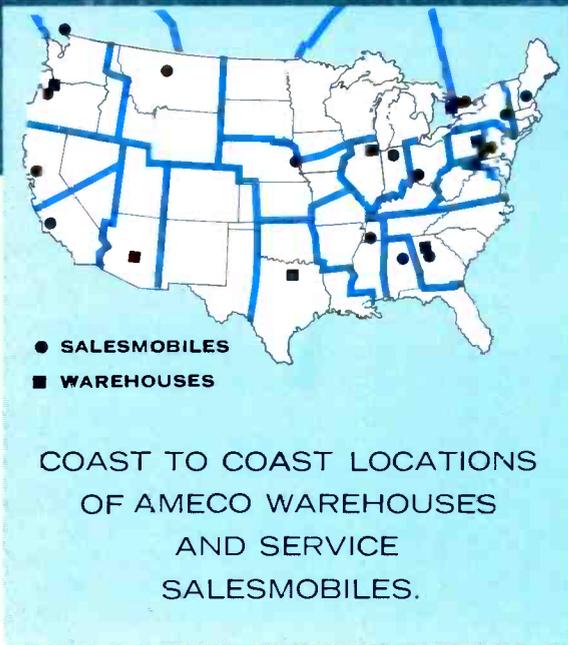
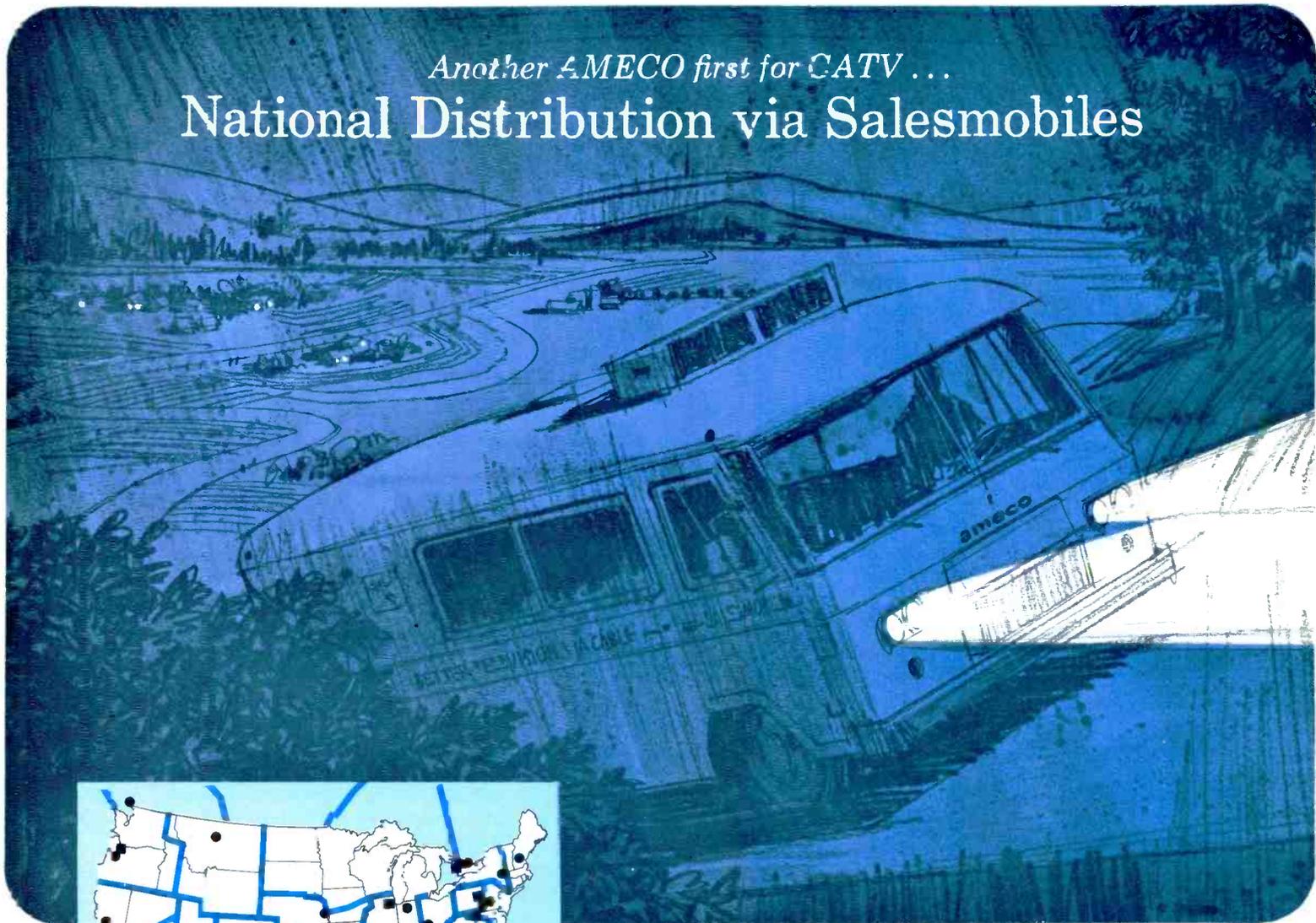


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## EDITORIAL

By Stanley M. Searle

# FCC Restricts UHF

The FCC's Second Report and Order abounds with concern for UHF stations. The Commission has served notice that it intends to make sure that CATV's contribution "should not be made at the expense of healthy maintenance of UHF operations." Commissioner Cox states that the "regulation of CATV operations must channel their growth in ways which will not add to the problems facing upcoming UHF stations."

Facts clearly demonstrate that the cable television industry wants to see UHF broadcasting prosper, and has in many cases done a great deal to aid UHF by extending coverage and by converting UHF signals to the VHF band on the cable. But while CATV operators have consistently tended to help UHF, the FCC's first "top 100 markets" act has been obviously discriminatory against UHF!

The Commission ordered Buckeye Cablevision Inc. to show cause why it should not be ordered to stop importing into the Toledo market the signals of a UHF station, WKBD-TV Detroit. There is a distinct incongruity between the Commission's words in support of UHF and this overt legal action which actually hinders the carriage of a UHF, primarily for the purpose of protecting three VHF stations. All four Detroit stations operate from 1000-ft. towers

in the same tower farm. But the three V's place a grade B signal over Toledo, while the predicted grade B of the UHF falls 5 or 6 miles short of Toledo. (Parent firm of WKBD, Kaiser Broadcasting, tells us that many Toledo viewers already receive signal on tall house-top antennas, and that application will be made to increase transmitter power so that Toledo will be within their grade B contour.)

**Quite a number of people in Toledo apparently want to receive channel 50 and, sooner or later, they'll find a way to do it. But the Commission seems to feel that its responsibility is to delay the process as much as possible . . . all in the name of "public interest and necessity," of course!**

Having loudly dedicated itself to "the healthy growth of UHF," the Federal Communications Commission now adheres with marvelous tenacity to the letter of its self-made law. And the victim is a UHF station.

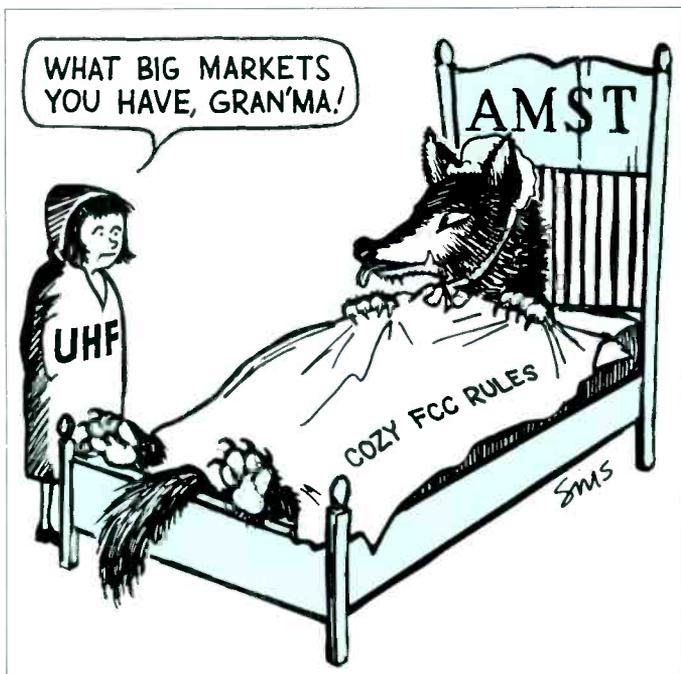
The Commission's Second Report and Order states that "CATV systems tend to bring in the distant big city independents rather than the new UHF stations." Speculative concern over CATV is voiced as follows, "If . . . CATV blocks the development of UHF broadcasting . . . If CATV were to undermine the healthy development of UHF . . ." And in his statement accompanying the Report and Order, Commissioner Cox vows that the FCC must regulate growth of cable television in "ways which will not add to the problems facing upcoming UHF stations."

It would seem that a big problem now facing at least one UHF operator is the discriminatory action of the Commission itself toward UHF!

We conclude, in light of the Buckeye case, that the Commission's real aim is not to foster the growth of UHF telecasting in the public interest—but, rather, to protect powerful VHF stations at the expense of both the UHF station and the cable system operator.

How ironic—and typical of the FCC's illogical methods—that the first application of their arbitrary "top 100" rule should be aimed at blocking the extension of a UHF signal.

We thought that the FCC had gone a bit overboard in protecting UHF . . . but now that ponderous regulatory creature seems to be eating its young! It is high time that Congress issue a stern reprimand, redirecting the Commission to its real purpose, the responsible policing of the airwaves.



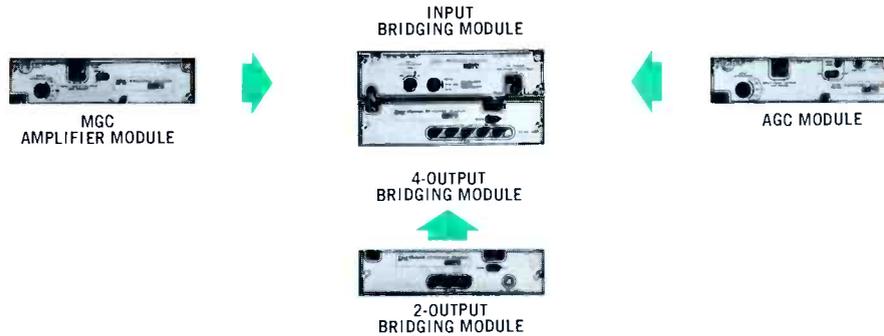
*Stan Searle*

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FEEDER LINE FULL GAIN @ Ch. 13 — 2-outputs	— — —	33 db, min.	31 db, min.
— 4-outputs	— — —	30 db, min.	28 db, min.
TRUNKLINE OPERATIONAL GAIN — Spacing @ Ch. 13	25 db	25 db	— — —
MAX OUTPUT CAPABILITY @ ½ TILT † — Trunkline	35 dbmv @ Ch. 13	35 dbmv @ Ch. 13	— — —
— Feeder Line — 2-outputs	— — —	43 dbmv @ Ch. 13	43 dbmv @ Ch. 13
— Feeder Line — 4-outputs	— — —	40 dbmv @ Ch. 13	40 dbmv @ Ch. 13
NOISE FIGURE @ Operational Gain	12 db, nom.	12 db, nom.	— — —
TRUNKLINE INSERTION LOSS	0	0	1 db.
BANDWIDTH	50-220 Mc	50-220 Mc	50-220 Mc
RESPONSE FLATNESS — Trunkline	±0.25 db	±0.25 db	— — —
— Feeder Line	— — —	±0.5 db	±0.5 db
AGC RANGE (Automatic GAIN & TILT) — Automatic Gain Units Only	±1 db output change with up to 6 db (cable equivalent) input change		
TRUNKLINE CONTROLS — INPUT ATTENUATOR (Switchable Pad)	Range: 0, 3, 6, 9, 12 db (steps)		
GAIN (Variable) — MGC Units Only	Range: 0-5	Range: 0-3	— — —
TILT (Variable) — AGC Units	Range: ±3 db (cable equivalent)		
— MGC Units	Range: 22 to 28 db (cable equivalent)		
LINE POWER (Switch)	Function: AC power source selection — IN, OUT, BOTH		
EQUALIZER (Switchable)	— — —	— — —	Range: 0, 3, 4-9, 10-15 db (steps)
AGC LEVEL (Variable) — AGC Units Only	Function: set automatic control output level		
MGC LEVEL (Variable) — AGC Units Only	Function: set manual control output level		
AGC-MGC (Switch) — AGC Units Only	Function: AGC-MGC operation selection		
FEEDER LINE CONTROLS — GAIN (Variable)	— — —	Range: 0 to 3 db (continuous)	
TILT (Variable)	— — —	Range: 0 ± 3 db (continuous)	
INPUT ATTENUATOR (Switchable Pad)	— — —	— — —	Range: 0, 3, 5, 9, 12 db (steps)
ISOLATION (between feeder outputs)	— — —	17 db	17 db
IMPEDANCE MATCH — Trunkline Input	21 db Return Loss (VSWR 1.2:1)		
— Trunkline Output	15 db Return Loss (VSWR 1.4:1)		
— Feeder Line Output	— — —	18 db Return Loss (VSWR 1.3:1)	
TEST POINTS — Trunkline Input	-20 db (RF)	-20 db (RF)	-20 db (RF)
— Trunkline Output	-20 db (RF)	-20 db (RF)	-20 db (RF)
— Feeder Line Output	— — —	-20 db (RF)	-20 db (RF)
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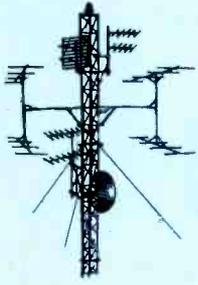
† For — 57 db cross-modulation and 32 amplifiers in cascade, 12 channels  
\* See footnote on inside back page.

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# CATV Industry PERSPECTIVE

Continued growth of cable television is anticipated, despite operators' concern and outright indignation toward FCC power play. Intervention by Congress should come within six months, with lawmakers in Washington imposing restrictions on program origination by cable operators. News, weather and some other "limited" services are sure to be exempted, however. Education of Congress about CATV in general and on public service role of systems will remain the paramount industry need.

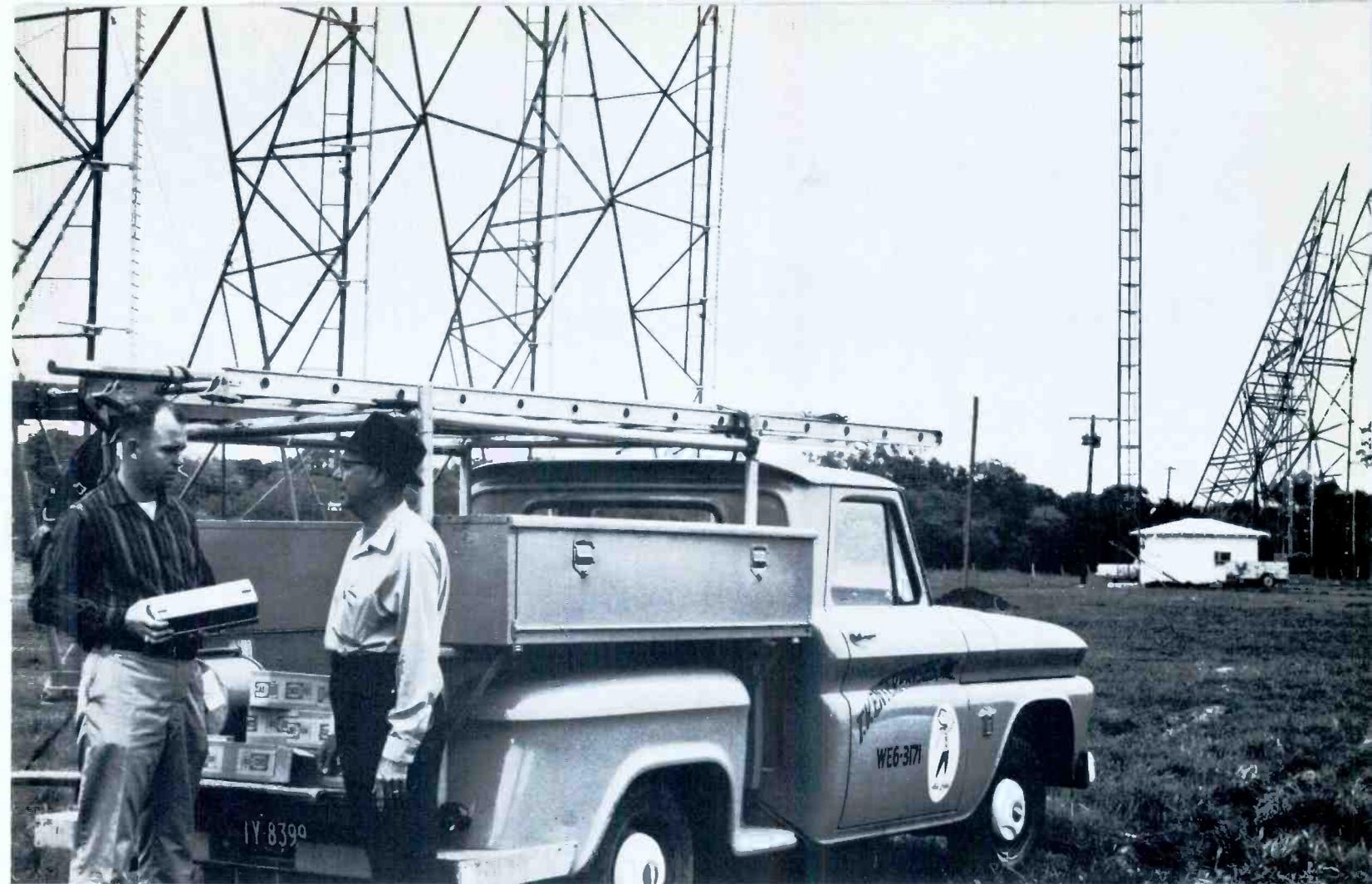
The new FCC rules, meanwhile, should slow CATV development in "top 100" markets, but public acceptance of the service and availability of adequate financing for these urban areas will overcome backwardness in Washington. With the exception of this effect on biggest markets, the rules will spur activity in franchise acquisition and construction of new plant. . . municipal confidence should be bolstered by compromising actions of Commission, favorable attention in Congress. Operators seeking franchises will do well to take advantage of ground gained in Washington through publicity on the local level.

Public utility status for cable systems may become the CATV industry's biggest threat. Action toward that end has been initiated in several states; will be started in more states soon. So far only Connecticut has placed CATV under PUC control, but state bureaucrats are on the scent of power over CATV, and will continue to push for control of franchising, rates, standards. Ruling by Federal Appeals Court (in TAME case) that CATV is not a common carrier will help in the fight. . . But organized effort by operators at all levels remains the only effective tool in combatting public utility status for CATV systems. Operators who have left the support of state, regional and national associations to others---seemingly getting the benefits without sharing the cost and effort--will find the problem much closer to home in PUC fight.

FCC Chairmanship and vacancy on Commission remain anyone's guess. . . but if President Johnson chooses to select the new man from within the Commission staff, possibilities include James E. Barr, Chief of Safety and Special Radio Services Bureau, FCC Executive Director Max D. Paglin, and Commissioner Henry's administrative assistant, John F. Cushman. STV's Sylvester L. "Pat" Weaver, and former CBS news director Fred Friendly are also possibilities for the appointment.

Manufacturers association appears likely. Apparent lack of manufacturers' collective voice in recent hearings accelerated trend. Association could become a potent and beneficial arm of the CATV business. Suppliers make it clear that full support would be given to NCTA.

Biggest challenge to most operators is the promotion of additional subscribers. The operator who successfully solves this problem early in the game will collect dividends throughout the system's life. Citizens who understand cable service are best potential subscribers--biggest asset after they subscribe. Operators should afford substantial executive time for promotional planning, and cannot afford to bypass professional assistance. Reputable firms will give their opinions without obligation. Specific counsel is high priced, but good investment.



Jack (left) and John Threadgill inspect new CAS amplifiers. Tropospheric parabolic scatter antenna in background was designed by Jack to eliminate fadeouts in the Threadgill's Marlin, Texas, system.

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# LETTERS

## RUSSIA WANTS CATV DATA

• The Institute of Scientific Information of the USSR Academy of Sciences . . . is trying to supply our readers with maximum information about the latest achievements in science and technology. Therefore we kindly ask you to send us a specimen copy of your publication *TV & Communications*. This will assist us in publicising your journal.

Institute of Scientific Information  
The USSR Academy of Sciences  
Moskva, U.S.S.R.

*We are glad not only to provide technological information about CATV to scientists anywhere in the world, but also to publicize the benefits of our free enterprise system to citizens of Soviet Communist countries. Certainly the cable television industry is a shining example of what business entrepreneurs can do for the public under the free enterprise system.*

## WANTED, CATV DIRECTORY

• As a subscriber and thorough reader of *TV & Communications*, I was looking forward with considerable interest to receipt of the annual *CATV Directory*, which had been advertised in recent issues and would be automatically received by all subscribers.

To my surprise, I note in the "Letters to the Editor" of the March issue that persons are congratulating you on the Directory. Since I have not yet received my copy, I assume my name was overlooked.

Dan W. Shields, V-President  
Television Community Services, Inc.  
Lancaster, Pennsylvania

*The CATV Directory is part of yearly subscriptions to our weekly CATV news service, Cable Television Review, but not of TV & Communications. Subscriptions to the Review are \$50 per year—copies of the CATV Directory are available at \$4.95 each, plus handling.*

## ANOTHER STOCK LISTING

• I have noted your newly added section of *Cable Television Review* called "CATV Related Stock", and would like to suggest that you add International Cablevision Corporation to

the listing. To my knowledge, ICC, which went public in July, 1961, was the first public corporation dealing 100% with CATV operations from the beginning. It has between 400 and 500 public shareholders and is listed on the Monday morning weekly OTC.

Kenneth S. Gunter  
Texas Cablevision Corp.  
San Angelo, Texas

*We appreciate the suggestion, and have arranged to add the ICC listing to the CATV stock section of the Review.*

## CABLE OR COMMUNITY

• Thank you for the fine article (Utility Trucks for CATV) in the March issue of *TV & Communications*. Rudy and I look forward to each issue of this excellent magazine, and almost fight over who will read it first. I am filing each copy for future reference.

May I take this opportunity to cast my vote to change the name of NCTA to "Cable" (instead of "Community").

Mrs. Rudy Rileigh  
Systems Engineering, Inc.  
Athens, Georgia

*Letters may be addressed to:  
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Oklahoma 73106*



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# THE NEW CRAFTSMAN MODULAR DIRECTIONAL TAP

Here's one way to keep your labor costs down, profits up. Craftsman's new Modular Directional Tap, shown above, is one proven way to easily, surely, service

subscriber line changes using labor that can change connections from one to four subscribers in less than five minutes, tops. Here's all there is to it.

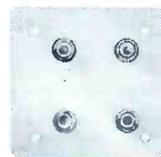
Don't Disconnect . . .

## INTERCHANGE!

The four plates shown here are the outlet connecting plates for use with our new Modular Directional Tap. They are easily interchangeable in the bottom of the housing, a simple matter of unscrewing four permanently held screws, removing one plate and replacing it with another. Each bottom plate has a cut-off corner which allows it to be connected in only one way—the right way. They provide a perfect connection every time, even when the subscriber is not home. Each unit has a radiation-proof gasket to prevent signal leakage. And these new Craftsman Modular Directional Taps provide extremely low through loss (only .25 db for 18 db tap attenuation), and high return loss. Try a few of these Modular Directional Taps on for size in your system. We believe you'll find they are among the most significant advances ever made in CATV. We'll be glad to send you more technical information. Just write to us at the address below or call us collect.



Bottom view of housing with module plate removed.



Four way module plate



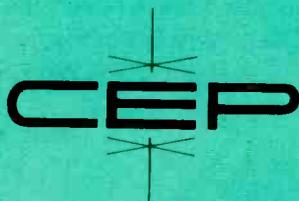
Three way module plate



Two way module plate



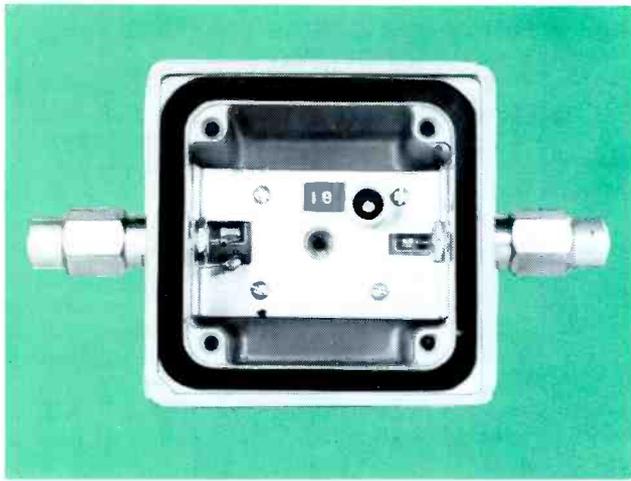
One way module plate



CRAFTSMAN ELECTRONIC PRODUCTS, INC.

133 WEST SENECA ST., MANLIUS, N. Y. 13104

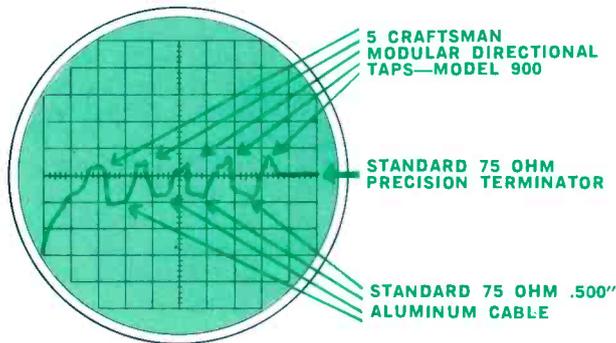
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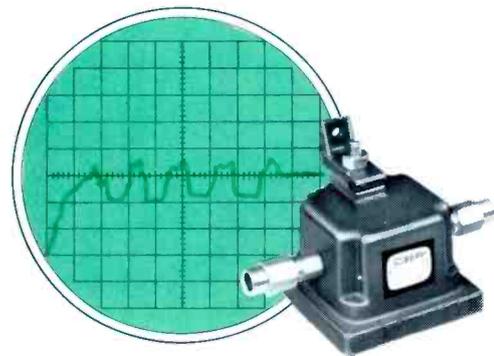
Bottom view of housing with module plate removed illustrating RFI gasket.

# THE CRAFTSMAN QUALITY STORY...

Aside from the prospects of faster service, lower labor costs, and resulting higher profit margins for subscriber service changes, perhaps the most intriguing features of the new Craftsman Modular Directional Taps are the extremely low through loss (only .25 db for 18 db tap attenuation), and high return loss. We feel the easiest and most believable way to show this to you is to show you a TDR test simulating actual field conditions, terminated and unterminated at the tap.



In the top scope trace, 5 Craftsman Modular Directional Taps (14, 18, 22, 26, and 30 db tap units) are connected to a section of standard 75 ohm .500" aluminum cable. They are unterminated at the tap port. Notice how the peaks representing the Modular Tap Units are closer to the ideal 75 ohm reference line than the .500" aluminum cable. Thus we may reasonably state the Craftsman Taps are more ideally matched than the cable itself.



In the bottom scope trace the only difference is the tap off ports of the five units are terminated. As you can see, the difference between the two scope traces is negligible. No appreciable impedance mismatch is introduced to the feeder line in either case.

Now add this to the lower labor costs, and faster changeover from 1 to 4 units (less than five minutes), and you'll begin to see why we believe this Craftsman Modular Directional Tap is a uniquely significant advance in CATV. We'll be glad to send you more technical information. Just write to us at the address below or call us collect.



CRAFTSMAN ELECTRONIC PRODUCTS, INC.

133 WEST SENECA ST., MANLIUS, N. Y. 13104 AREA CODE 315—OVERbrook 2-9105

**SOUTHERN REGIONAL MEETING**

Discussion at the Biloxi, Miss. Southern CATV Association meeting focused almost exclusively on the House hearings which were in progress that week. Attendance ran to over 240, as representatives from 58 systems, 22 associates and 7 guest companies gathered at the Broadwater Beach Hotel to hear a distinguished group of speakers. Opening day activities included a technician-oriented meeting, featuring a technician's seminar directed by Dick Nicholson of Jerrold.

Both NCTA Board Member Frank Thompson and Arlo Wollery, Ameco executive and past-president of the Arizona association, set aside their planned speeches to go into detail concerning the Congressional hearings. Thompson stated that the "battle" now will hinge upon the organization and liaison between the local cable operator and his state and national organizations. He noted that in the future CATV forces must "wield a two-edged sword" — from subscribers who want full CATV service, and from mobilization of state, regional and national CATV associations.

Wollery stated emphatically that "the House Committee is holding a wake for CATV, with the FCC as pallbearers." Commenting caustically on the recent Commission Report and Order, he assured operators that "the FCC has something for everyone," and that "just because you're not in the top 100 markets doesn't mean the Commission has nothing in there for you." He urged all in attendance to immediately contact the members of the House

Commerce Committee, as well as their local congressmen. "What happens in the next ten days will probably effect what will happen in the next ten years for CATV," he noted.

Newly-elected officers for the association are as follows: president, Fred J. Stevenson, Rogers, Ark.; vice president, Orlando Brillante, Melbourne, Florida; secretary-treasurer, Byron D. Jarvis, Dallas, Texas. Directors are: B. Hillman Bailey, Jr., Ira Crosby, Robert Jernigan, Bob Neathery, Donald Curtis, L. H. Taylor, John Campbell, and R. E. Rutherford. Robert Jernigan, this year's association president, was unanimously placed in nomination for re-election to a longer term as NCTA Director.

**COX WITHDRAWS FROM AMST**

Cox Broadcasting officials have confirmed reports that the firm's five VHF stations are severing relations with the Association of Maximum Service Telecasters. Involved in the decision are Cox's five VHF stations: KTVU, Oakland-San Francisco; WIIC-TV, Pittsburgh; WHIO-TV, Dayton, Ohio; WSOC-TV, Charlotte, N.C. and WSB-TV, Atlanta.

**VIKING TO BUILD NEW PLANT**

Viking Industries, Hoboken, New Jersey, has announced the acquisition of 30 acres of land in Freehold, New Jersey, for the construction of a new cable plant. The one-story plant will encompass 200,000 square feet and is designed solely for manufacturing various types of cable for the CATV and communications industry.

**CONVENTION COVERAGE ANNOUNCED**

Plans for a unique publication to be distributed during the 15th Annual Convention have been announced by Terry Lee, convention chairman. The daily "NCTA Convention Review" will feature full-color cover illustrations and thorough daily photo coverage of convention highlights. Published in standard 8½" by 11" magazine size, the "NCTA Convention Review" will be distributed free of charge each morning during the convention.

The "Convention Review" will be produced by the combined staff of *TV & Communications* and *Cable Television Review*. According to Stan Searle, publisher of the two CATV industry periodicals, the new daily convention issues "Will be of the same high quality as *TV & Communications*. In addition to news and pictorial coverage of the convention, there will be several high interest feature articles.

**REDIFON BUYS BENCO**

F. T. Metcalf, president of Metronics Corp., Ltd., Guelph, Ontario, has announced the purchase of Benco Television Associates by Redifon Canada, Ltd., manufacturers of electronic and communications equipment. According to an announcement by T. A. Cross, president of Redifon Canada Ltd. and managing director of Redifon, Ltd., England, of which the Canadian firm is subsidiary, the Benco line will continue to be manufactured, with extensions into the solid-state technology. In addition, the Canadian plant will be utilized to manufacture other items in the Redifon product range.

**PNCTA MEETS**

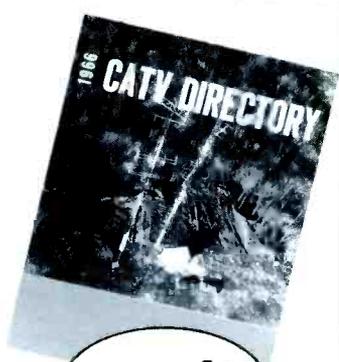
Nearly 170 cable operators and suppliers braved four inches of late-March snow in Spokane, Wash. to attend the 11th annual spring convention of the Pacific Northwest Community Television Association.

Speakers for the meet included area tax representatives, who discussed personal property assessments and the possibility of taxation as utilities, and industry technical representatives. The NCTA legal report consisted of an amplified telephone conference between PNCTA President Sam C. Haddock and NCTA President Fred Ford with General Counsel Bob L'Heureux.

Association actions at the meeting included decision to consider enlarging the area served by the Association to take in Alaska and Wyoming; selection of Portland as the site for the fall meeting; and a resolution to NCTA nominating Bob Magness, Sam Haddock and Robert Rosencrans as NCTA Directors.

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# Win

The Rome Unifoam™ CATV Cable

# No-Contest Contest!



Figure out the amount of your own cash prize and declare yourself the winner. (No time limit, no limit on dollars. And no present users of Rome Unifoam CATV Cable, please, since you've already received your prize.)

Here's how:

Fill in the blanks below, making the calculations indicated.

1. Write in your present trunkline amplifier spacing \_\_\_\_\_ db
2. Write in cost of one trunkline amplifier.....\$ \_\_\_\_\_
3. Write in Channel 13 cable attenuation of your present 3/4" cable ..... db/1000'
4. Multiply Item 2 by Item 3 and divide the result by Item 1. This gives the amplifier cost per 1000' of your present 3/4" trunkline cable. Write it here .....\$ \_\_\_\_\_
5. Channel 13 attenuation of Rome Unifoam 3/4" cable .....  
.....8.6 db/1000'
6. Multiply Item 2 by Item 5 and divide the result by Item 1. This gives the amplifier cost per 1000' of Rome Unifoam 3/4" cable. Write it here .....\$ \_\_\_\_\_

7. Write in the number of feet of trunkline to be installed \_\_\_\_\_ . Now, ÷ this figure by 1,000. Put answer here \_\_\_\_\_

8. Subtract Item 6 from Item 4 and write answer here \$ \_\_\_\_\_

9. Multiply Item 7 by Item 8 and write it here.

**It's your prize! \$ \_\_\_\_\_**

Now collect: just order Rome Unifoam CATV cable and save the amount of money you've just calculated.

Example:

Trunkline amplifier @ \$350: 22 db gain  
 Typical 3/4" cable Channel 13 attenuation: 11 db/1000'  
 Required: 1 amplifier every 2000'  
 Amplifier cost:  $\$350/2 = \$175/1000'$   
 Rome Unifoam Cable Channel 13 attenuation: 8.6 db/1000'  
 Required: 1 amplifier every 2,550'  
 Amplifier cost:  $\$350/2.55 = \$137/1000'$

**Savings (prize):  $\$175 - \$137 = \$38/1000'$  of trunkline**

Want more information? For a fact-filled folder on Rome Unifoam CATV Cable, write to Rome Cable Division of Alcoa, Rome, N.Y.

**NEW FROM  
BENCO**



**BENA VAC**

**AUTOMATIC  
AUDIO/VIDEO  
CONTROL UNIT**

The BENA VAC head end control unit is a complete VHF television channel signal control designed to provide low noise preamplification, channel conversion where required, plus precise carrier level control.

**Features:**

- Crystal Controlled Inputs and Outputs
- Noise Figure. Low Band 4 db. High Band 5 db.
- AGC Sensitivity.  $\pm 1/2$  db.
- Adjacent Channel Rejection. 50 db
- A Crystal Controlled Substitution Carrier is automatically switched on in the absence of the received signal.
- Dual Outputs. 75 ohms. Back Matched
- Output VSWR. 1.2
- Compatible with existing head-end equipment.
- Easy-to-Install — Simple to Maintain.

For complete specifications contact the BENCO Representative in your area or.



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**BROADCASTERS MANIFEST SILENCE**

The 44th Annual Convention of the National Association of Broadcasters converged in Chicago with an accent on national and international newsmaking personalities, controversial broadcasting issues, and wide-ranging management and engineering assemblies. Convention attendance swelled to nearly 6,000 as radio and television executives gathered to hear special speakers including General Maxwell D. Taylor and FCC Chairman E. William Henry.

Unlike last year, CATV was not the overt topic of discussion at this year's meeting. But the NAB staff member who commented that the annual gathering was "a dry well as far as CATV is concerned," obviously was paying more attention to the official meetings than to the talk in the corridors. The impression was that while the broadcasters hushed about CATV last year, many were ready to "talk turnkey" this time around.

The CATV exhibitors' ranks rose to 15 this year, compared with only 4 last year, and the broadcasters flocked to inquire about the industry and its equipment. Manufacturers present included: Advance Industries, Ameco, American Pamcor, Collins, Entron, Fort Worth Tower, Jerrold, Kaiser-Cox, Lenkurt, Rohn Mfg., Spencer-Kennedy Labs, Tape-Athon, Telemation, Utility Tower, and Viking. (See article in this issue concerning products displayed)

**Ken Cox Speaks:**

FCC Commissioner Kenneth A. Cox, speaking on the last day of the convention, expressed his and the Commission's current views on CATV. According to Cox, "The Commission has simply tried to take hold of the problem (of CATV) by assigning jurisdiction over all CATV operations." FCC rulings have been designed to deal with CATV on two levels, he indicated. "Conventional CATV", that is, cable services in remote areas with little or no off-the-air television, is the first. The second aspect of jurisdiction is aimed at "the invasion of markets having here-to-fore adequate three network service." In Cox's view, the Commission should reinstate the 15-day non-duplication ruling. He indicated that the Commission's moderation on this point was due to the "irresponsible write-in campaign" waged by CATV companies and their subscribers.

In general, the closing session of NAB, which some had expected to be the scene of considerable fireworks on the subject of cable television, was not only devoid of any controversial discussion on CATV, but also almost totally lacking in excitement of any kind.

The mood of both audience and panel participants reflected the belief that the CATV issue was apparently being handled quite adequately by the NAB forces in Washington. Apparently the broadcasters who were getting information and placing orders at the CATV equipment exhibits felt that there would be nothing gained by an untimely identification with cable television interests in the presence of their fellow broadcasters.

**FRANCHISE DISPUTE  
ENDS IN LAWSUIT**

A lawsuit for some \$68,000,000 has been filed again Cox Broadcasting Corp., the Toledo *Blade* and the city of Toledo, Ohio, by Edward Lamb Enterprises. Lamb, an unsuccessful franchise applicant for Toledo, filed suit against the three for "conspiring to effect a monopoly," after the Cox-Blade interests received a franchise in the 26th-ranked market to operate Buckeye Cablevision, a 750-mile lease-back from Ohio Bell.

The system, partially built in less than a week, began operation only 8 hours before the FCC Report and Order deadline, and was the first target of FCC action concerning unauthorized activity in the top 100 markets.

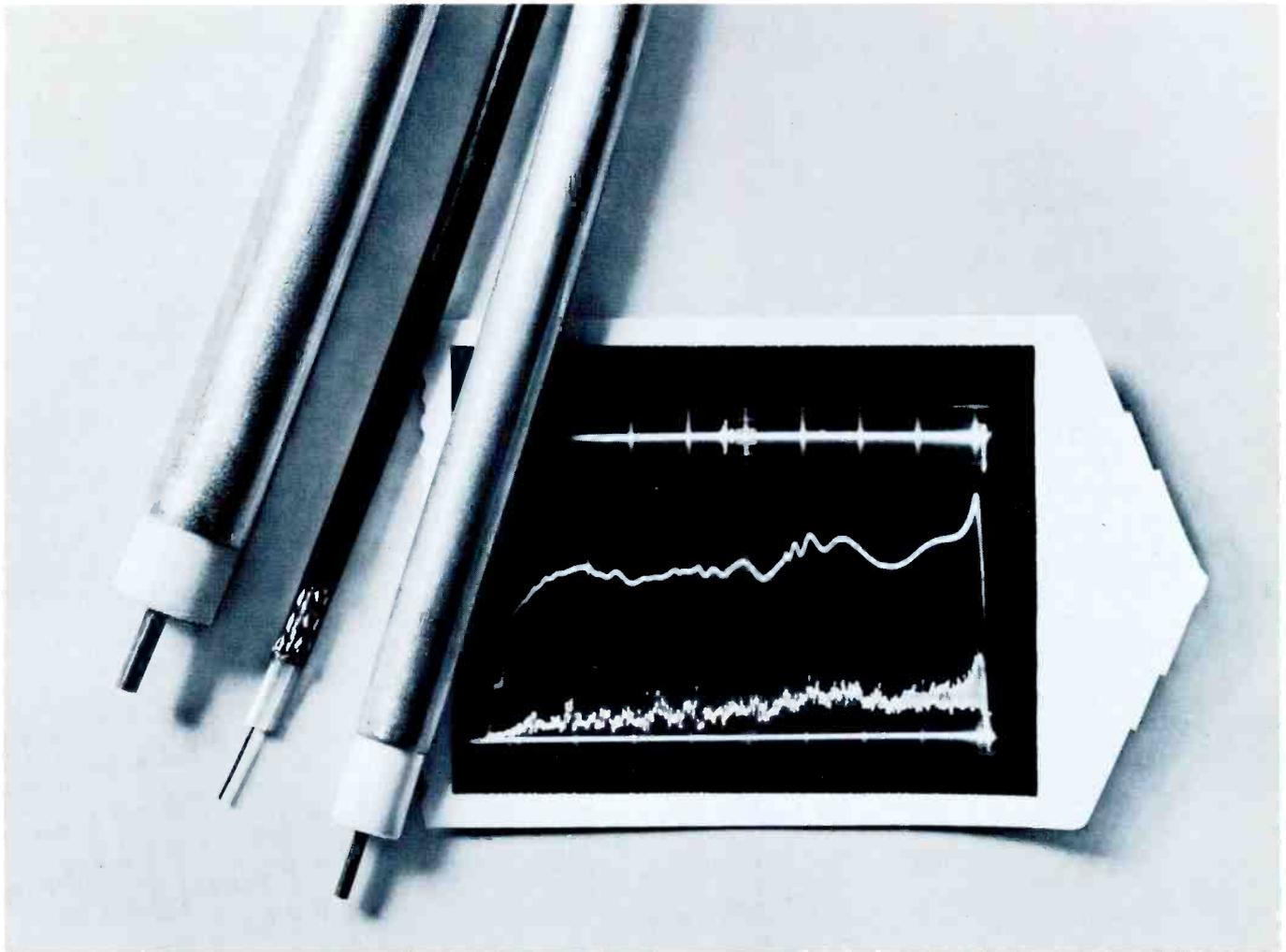
**CALENDAR**

**May 6-7** The California Community Television Association will hold its semi-annual meeting at the Palace Hotel in San Francisco, California. For further details contact Walter Kaitz, % California Community Television Association, Suite 1506, Latham Square Building, Oakland, California 94612, ph. (415) 834-5300.

**May 9-12** The National Community Antenna Television Association (NCATA) of Canada will hold its 1966 Convention and Trade Show at the Bayshore Inn, Vancouver, British Columbia, Canada.

**May 27-29** The Mid-Atlantic Community Television Association will meet at the Daniel Boone Hotel in Charleston, West Virginia. For details contact Buford Saville, pres., Potomac Valley TV Co., 100 South Liberty, Cumberland, Maryland, ph. (301) 722-6540.

**June 26-30** The NCTA National Convention will be held at the Americana Hotel, Miami Beach, Florida.



**Three proven Amphenol CATV cables offer you  
low loss, low attenuation, uniform VSWR**

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

**1. HEAD-END CABLE.** Seamless, lightweight aluminum cable, .750" in diameter, gives you moisture and radiation protection. Attenu-

ation variance is minimal from the smooth curve: 0.25 db/100' at channel 2, 1.03 db at channel 13. Easy to install in 1000' minimum lengths. Available with all-weather black poly jacket.

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

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

**FOR MORE INFORMATION,** see your Amphenol Sales Engineer. Or write to Amphenol Cable Division, 6235 S. Harlem Ave., Chicago, Illinois 60638.



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Specify Amphenol . . . the leading name in cable, connectors, assemblies, RF switches, potentiometers, motors, microelectronics

# FOCUS

... On Progress

## Systems

Robert H. Huston has been appointed executive vice president and general manager of American Cable Television Inc. Bruce Merrill will reassume the presidency of ACTI and will continue as chairman of the board.

John H. Carter has received appointment as executive vice president of Meredith-Avco, Inc. Carter succeeds Thomas J. Michel, who returns to the Avco Corp.

Winfield W. Bemis has assumed the position of director of engineering at National Teline Corp. Bemis recently served as engineering sales manager at Spencer-Kennedy Laboratories.

Robert Pace has been appointed regional manager for Kansas CATV, Inc., covering systems in Chanute, Neodesha, Independence, and Parson. Bob Rhodes will serve as assistant regional manager for the firm.

Lee Druckman is president of Tucson (Ariz.) Cable TV Company which, upon completion, will carry all Tucson channels plus 4 Phoenix channels, music, and a time/weather service.

Joseph Keeton is general manager of American Cable Television's new Geneva, Ala. system. Keeton also serves as manager of ACTI's Florida Antennavision at Panama City.

Norman Schwatkin has been appointed manager of the Kansas CATV Inc. system in Independence, Kansas.

Mrs. Nellie Welch Knorr, chairman of the board of Jackson TV Cable Corp., has been named "Ad Woman of the Year" by the Women's Advertising Club of Detroit. Mrs. Knorr is also president of Southern Michigan Broadcasting Corp.

Richard J. Sabino has joined Vidi-Communications, Inc., Saugerties, N.Y. Sabino will be responsible for coordinating the expansion of Vidi-Communications' cable facilities.

Gary A. Vierk has been named manager of the Bosco Cable Co., East Hampton, N.Y. Vierk was formerly employed by the Greater Lafayette TV Cable Co.

Everett Kocheiser has been appointed manager of Bakersfield (Calif.) Cable TV, according to an announcement by Trans-Video president Lee Druckman.

## Suppliers

Duane W. Crist has been appointed executive vice president and general manager of Kaiser-Cox Corp. Crist, who has been vice president in charge of finance and general administration, will have complete charge of the entire Kaiser-Cox operation.

William E. Socia, Jr. has been appointed vice president and director in charge of construction for Stan Socia Corp. George T. Griffin has been named secretary-treasurer and director of the corporation.

Bruce Merrill, president of Ameco, Inc. has announced the formation of Ameco Engineering Corp., a wholly-owned subsidiary of Ameco, Inc. Earl Hickman, formerly with Kaiser-Cox, has been named president and general manager of the new firm, which will be headquartered at 3019 Grand Ave., Phoenix, Arizona.

Ray M. Unrath has been named marketing manager for TeleMation, Inc. Unrath will be responsible for advertising and sales promotion programs, coordinating convention exhibits and new product development.

Robert J. Rodday, general manager of the Brand-Rex Division of American Enka Corp., has been elected to the office of vice president.

Robert D. Johnson has been elected a corporate vice president by the board of directors of Collins Radio Co. Johnson will continue as general manager of the Newport Beach, Calif. region.

Reid O. Clark has been appointed assistant to the president at Ameco, Inc. Clarke will coordinate Ameco executives' transportation and, as director of market research, supervise the integration of sales research into the CATV firm's data processing department.

Electronic Distribution Sales Corp., a sales subsidiary, has been formed by Superior Cable Corp. J. H. Bowman, Superior's vice president in charge of marketing, will serve as president; O'Connor Bailey has been appointed executive vice president.

## Professional

E. William Henry, Chairman of the Federal Communications Commission, has formally announced his resignation from the Commission. Official confirmation of Henry's decision came early in April, when White House deputy press secretary Robert Fleming issued President Johnson's acceptance of the resignation.

John P. Cole, Jr. and Roger E. Zylstra have announced the formation of a new Washington-based law firm, Cole & Zylstra. Both attorneys were formerly associated with Smith & Pepper. The new firm has offices in the Munsey Bldg., Washington, D.C., phone (202) ST 3-6767.

Don Atwell has entered the private consulting business, with headquarters in Phoenix, Arizona. Atwell was formerly president of American Cable Television, Inc.

Richard D. Obarski and Tom Machie have announced the formation of CATV Construction Company, Inc., a firm specializing in CATV engineering, consulting and construction. Offices are located at 302 Praetorian Bldg., Dallas, Texas. (214) 741-3496.



Robert Huston



John Carter



Winfield Bemis



Duane Crist



Bill Socia



E. William Henry

FIVE REASONS WHY FORT WORTH TOWERS  
ARE THE STANDARD OF THE CATV INDUSTRY:

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*Complete Fabrication  
and Erection Service*

*Antenna Installation*

*Head End Structures*

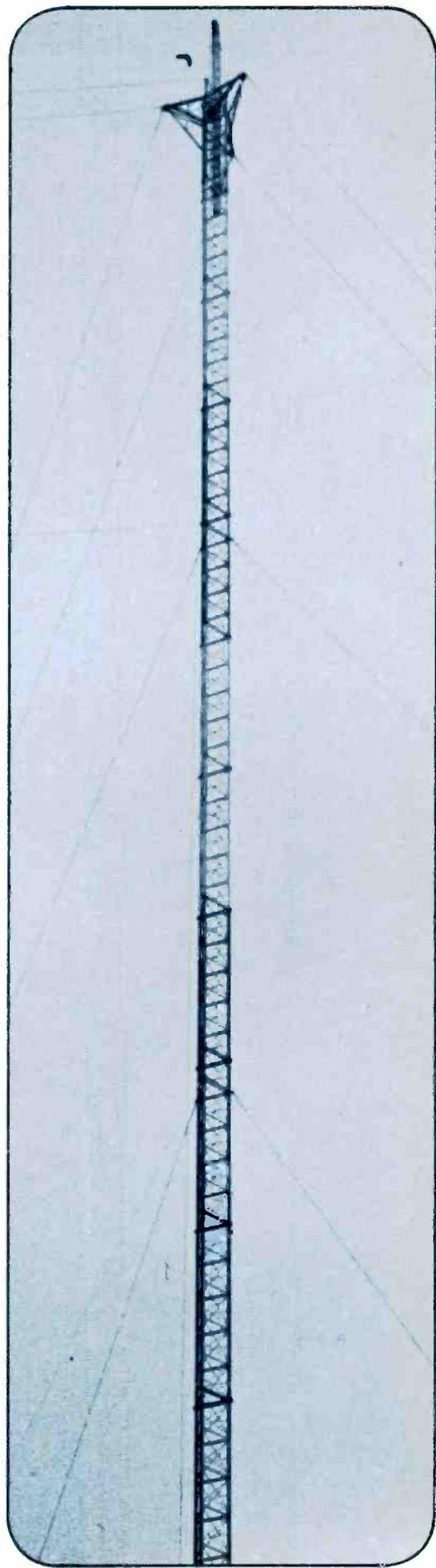
*Maintenance Support*

Fort Worth Tower Company offers complete "tower package" service for all your CATV needs. From drawing board to total construction supervision, Fort Worth's professional tower men guarantee you the finest CATV and microwave towers. Each tower is engineered to the specific requirements of the job; pioneer construction experience assures that the job will be done right.

Quality-built Fort Worth towers give you an added feature... a premium product at a very reasonable price. Compare our quotations and specifications. You'll see that quality and economy go hand in hand at Fort Worth. Call or write for information today.

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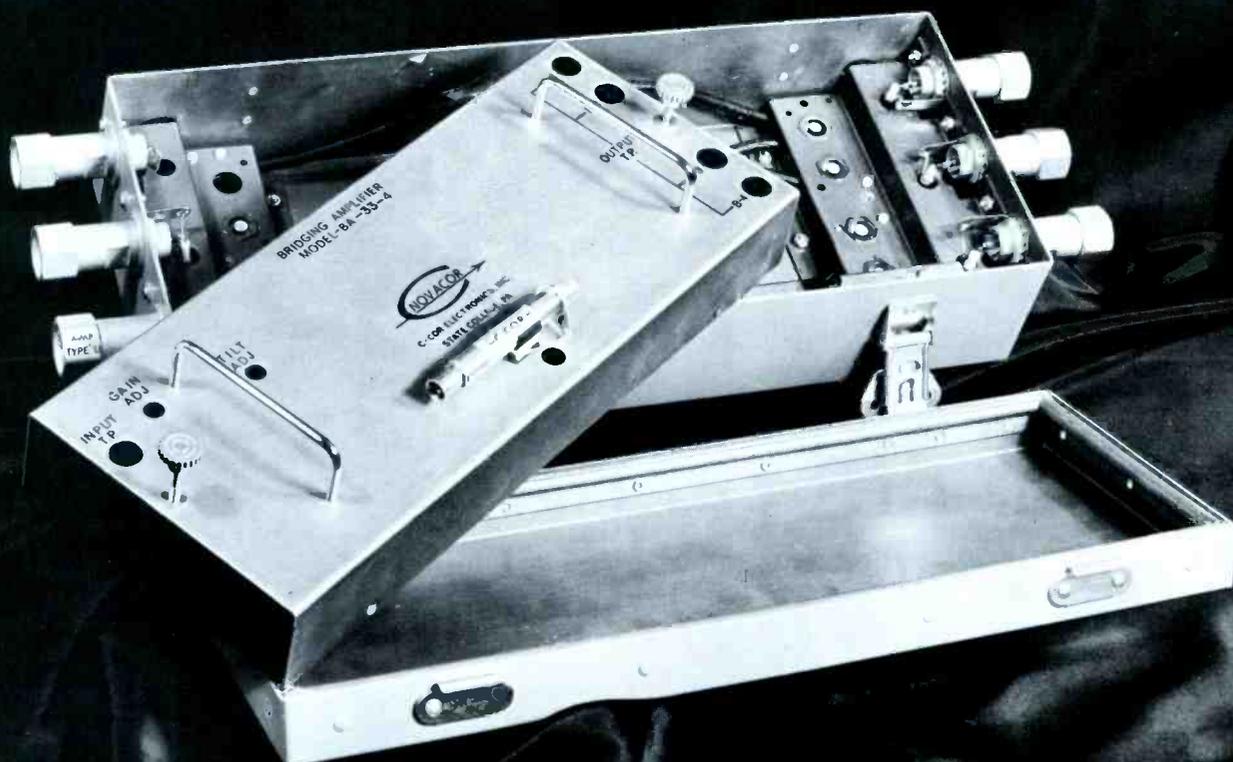


# MEET THE GREATEST ENGINEERING BREAKTHROUGH IN CATV AMPLIFIERS



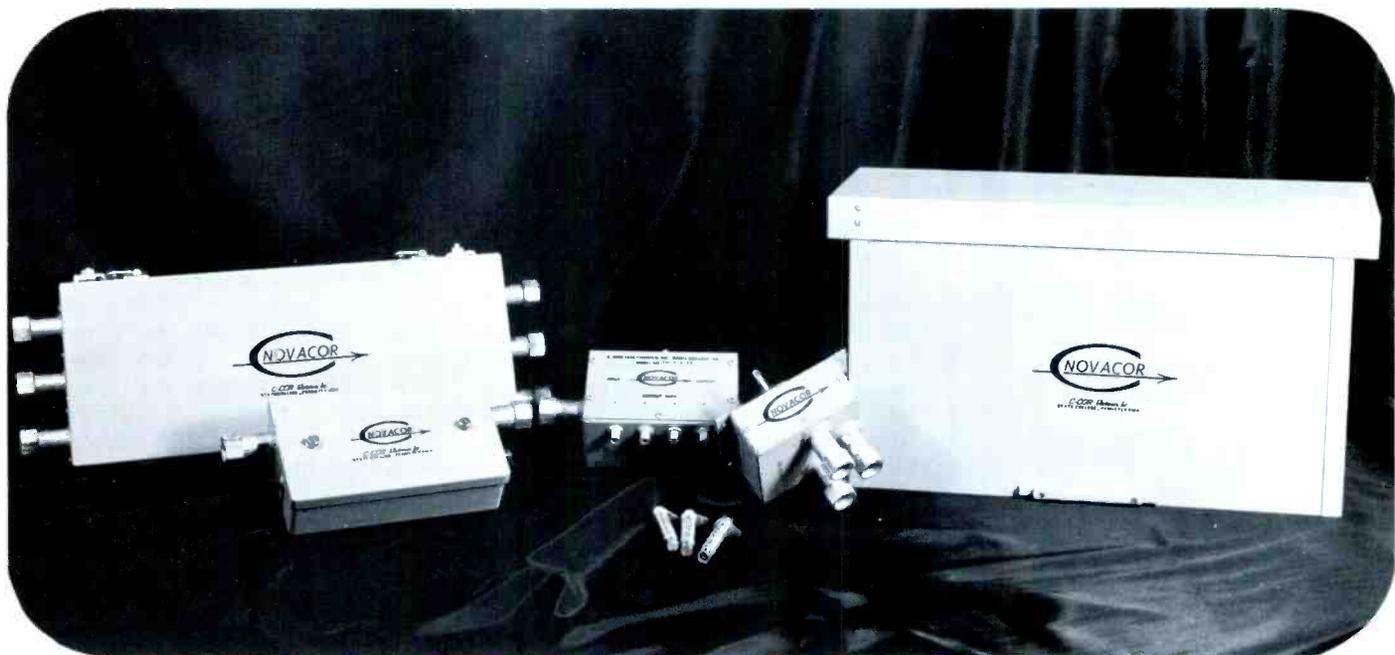
- HIGH OUTPUT
- NEW MODULAR DESIGN
- IMPROVED CIRCUIT DESIGN
- RADIATION-PROOF HOUSING
- 12 DIFFERENT MODELS
- FIELD-TESTED IN SYSTEMS

C-COR Electronics, Inc. introduces an advanced line of CATV products: NOVACOR. This is a breakthrough in engineering achievement, producing output capabilities at least 10 db greater than other units now on the market. The NOVACOR Bridging Amplifier shown on this page is modular in design, and incorporates significantly different and vastly improved integrated circuit designs. The weathertight housing, with cables and connectors attached, can become a permanent part of the plant, with the modular electronic chassis unplugging. Bridgers, available in 12 different models, feature direct feed, and directional coupler feed configurations. The direct feed is designed to feed from a "bridger out" of a trunk amplifier, an external splitter, or directional coupler. The coupler feed is designed for insertion in the trunk without external coupler or splitters.





NOW MEET THE REST OF OUR FIELD-TESTED, SYSTEMS-PROVEN FAMILY ...



#### LINE EXTENDERS

NOVACOR Line Extenders utilize solid state circuit design for high output-low noise capabilities. Equipped with both fixed and variable attenuation for flexibility in sys-CATV amplifier. The case can become a permanent part with power feed thru or power "link" disconnect for feeding either end.

#### TRUNK AMPLIFIERS

NOVACOR Trunk Amplifiers supply 10 db more output than any other CATV Amplifiers. They are available in three basic models, which differ in gain and tilt capability to provide optimum spacing in systems of varying length and customer density.

#### POWER SUPPLY

The PS-30 Power Supply is housed in a weather-proof aluminum case. Power feed and distribution is made through the connectors on the bottom of the case.

#### TAP UNITS

NOVACOR Tap Units, a hybrid design for flatest response, are housed in epoxy sealed, aluminum cases, and come with pedestal mountings (TU) or messenger mountings (TM). These units feature true impedance match on service drops.

#### SPLITTERS

All NOVACOR Splitters are weather sealed with epoxy for long lasting, trouble-free performance. They feature a universal mounting for messenger or surface by use of a throw-away stud and messenger clamp assembly.

#### TEST PROBE

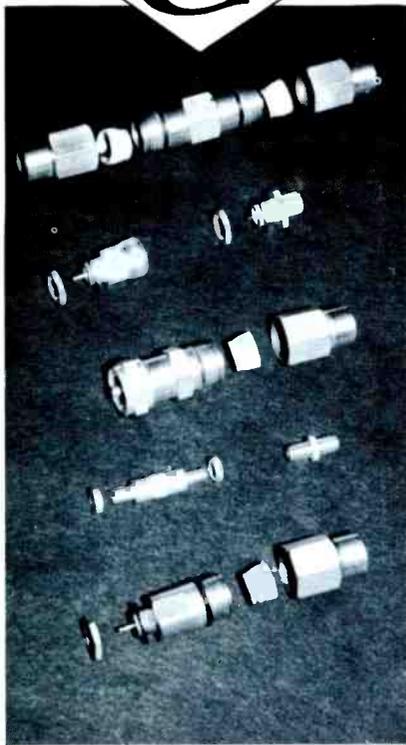
A NOVACOR Test Probe, TP-30, is supplied with each amplifier. It is designed with 30 db of attenuation  $\pm 1$  db with 3' of RG-59U cable. It can be utilized for measurements either at the input or output test points.



*C-COR<sup>®</sup> Electronics, Inc.*

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DIAMOND CONNECTORS



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■ Diamond "G" connectors and fittings are CATV's standard for quality and performance under all operating conditions.

■ A high volume of production has been attained by our CATV automatic components department, and electronic engineering and assembly divisions.

*CATV Manufacturers and  
Systems specify . . .*

**DIAMOND G CONNECTORS**



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ENGINEERING  
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# Congressional CATV Hearings

The House Commerce Committee hearings on recommended CATV legislation and the FCC's new CATV rules have ended. After six full days of exhaustive and exhausting testimony, a large volume of facts and theories, predictions and assumptions, and several rather hectic moments, the ultimate effect of the hearing was fated to remain uncertain. House Committee members, enlightened on the pros and cons of CATV regulation, tabled their comments and recessed for Easter vacation.

Committee Chairman Harley Staggers (D-W. Va.), contacted minutes after the hearing concluded, said he was "a little uncertain" about future developments. Staggers said that, although FCC members might be called back to testify in closed session, there would be no more public testimony. Asked about the results of the hearings, he noted that Congress had amassed a terrific amount of information on CATV and that Committee members had had a chance to voice their complaints. The latter comment was apparently an allusion to Rep. Walter Rogers (D-Tex.), Communications Subcommittee Chairman and an ardent foe of the Commission's assumption of CATV jurisdiction.

Rogers, also contacted immediately at the conclusion of the hearing, said he had unsuccessfully asked the Commission not to adopt their rules. Referring to a move by some Congressmen to get the FCC to postpone the date the new rules were to go into effect (a petition signed by 26 members of Congress from Pennsylvania was presented to Staggers), Rogers emphasized that he was "not in the habit of begging." The FCC should have conferred with the Committee first, he said, then added that it was "highly possible" that the Commission would be called back.

The dominant voice at the first week of hearings belonged to Rep. Rogers. He closely questioned virtually every witness, especially FCC Chairman E. William Henry and other proponents of strict CATV controls. Committee Chairman Harley Staggers on the other hand, said almost nothing, asked no questions, and generally let Rogers dominate the proceeding.

The general tenor of the Congressional questioning was favorable to CATV forces. The early sessions with

the FCC were especially well attended by the Congressmen, with all but a handful of the 34-man group present at the testimony. (It is not uncommon for only three or four representatives to be present at hearings.) The legislators were obviously interested and aware of the CATV controversy, and their questioning indicated an increasing sophistication in the CATV industry. Any members of the Committee favoring the FCC rules were mostly silent, and indeed the general mood of the Committee seemed to be against the FCC. Rogers was the leader of the anti-commission group, saying it had no CATV jurisdiction at all. Pointed questions were also addressed by Rep. Fred Rooney (D-Pa.) and Rep. James A. MacKay (D-Ga.), among others. Always paying close attention was Rep. William Springer (R-Ill.), ranking minority member of the Committee, who also made obvious efforts to thoroughly understand the issues. Rogers, Rooney, MacKay and Rep. Arthur Younger (R-Calif.) were among those who explicitly indicated that the FCC's rules and legislative proposals should be reworked extensively by Congress. From the Committee standpoint, therefore, the hearing seemed definitely favorable to the CATV industry.

### Formal FCC Statement

The formal FCC statement, presented by Chairman E. William Henry Tuesday morning, recounted the Commission's CATV thinking and asked for clear Congressional guidelines on CATV program origination, whether systems should be required to get permission to carry TV station signals, and the possible relationship of CATV to pay TV. Henry said "there are a considerable number of CATV systems that do not carry the local station" and that "this kind of CATV operation is patently destructive of the Congressional and Commission goal of allocating TV channels to different areas and communities." Carrying programs for which stations have paid in terms of exclusive rights is another way "CATV has acted in an unfair and potentially destructive manner toward the broadcast industry," he said.

"CATV is currently in a period of explosive growth," Henry noted, with about 2,250 franchise applications pending around the country. He cited

both the same-day non-duplication rule and the local carriage rule as reflecting a compromise approach, and he emphatically claimed that the FCC had CATV jurisdiction, although it felt Congress should clarify that authority.

In defending the Commission's policy of setting for hearing CATV applications in the top 100 markets, he said "CATV has entered a new and potentially revolutionary phase." He expressed the fear that CATV might harm UHF in the top markets and might squelch the possibility of a fourth network. He opposed a bill of Rep. Walter Rogers, that would forgo the regulation of broadcast reception. Henry said the bill "is aimed at reversing" the FCC's CATV rules. Rogers promptly said he did not recall telling Henry why he introduced the bill, but that it wasn't aimed specifically at CATV, but at safeguarding the right to uncensored broadcast reception.

#### **Bartley Dissents**

Commissioner Robert T. Bartley gave a dissenting statement, saying the pro and con arguments on CATV are so confusing that "finding the truth from among these fears and contention is like shoveling smoke." He said the Commission should keep its nose out of CATV, calling instead for a law that would strictly forbid program origination by CATV systems. That would be sufficient protection for everyone, he stated.

#### **Henry Favors Utility Approach**

In a personal statement adlibbed from notes, Henry addressed the problem of whether to consider CATV a public utility. "CATV does have many of the attributes of public utilities," he noted, backing his argument that regulation of rates, franchises, etc., should be left to local authorities. Aside from legal considerations, he said, such work would be a terrible administrative burden on the FCC.

#### **Committee Grills Henry**

Compared to the relatively routine FCC presentation, the Congressional quizzing of Henry displayed some welcome fireworks, most of them emanating from Rogers. He repeatedly tried to pin down Henry on the question of whether the Commission was trying to regulate reception, and Henry kept squirming away by saying that indirectly the FCC's decisions control reception, but not directly. Committee Chairman Harley Staggers allowed Rogers considerably more than the usual 5 minutes for queries, but he seemed unhappy at Rogers' anti-FCC attack.

"You're asking for the right to censor what goes on a CATV system, aren't you?" he asked Henry, who replied,

"No." Rogers said that by requiring CATV's to carry TV stations, it was thus controlling what people could receive. When Henry said the Commission applies the rule of reason, Rogers said, "You mean, the rule of *your* reason." The broad control the FCC wants, he emphasized would mean that future Commissioners could impose even more drastic CATV regulation, a theme echoed by other Congressmen.

Also stern in his admonitions to the FCC was Rep. Fred Rooney, who is from a strong CATV area that "has been well served by CATV for years." He said that CATV seems to have been put in the role of "villain" by the FCC. He said the Commission has "stymied" CATV and set it back "five or six years," and he strongly criticized the Commission for acting hastily in adopting CATV rules without Congressional authority. He pointed out that Henry had justified the rules as protecting the growth of UHF stations, and he asked how many UHF's have gone off the air in the last year because of CATV. Henry gulped and said none.

#### **City Wants CATV Protected**

Sandwiched between the high-powered and influential testimony of the FCC and NCTA President Frederick W. Ford was a smaller voice, but one that brought home some of the problems that may be created by the Commission's new rules. Edward Davis, vice-president of the Akron Ohio, City Council, made a plea for the protection of CATV in his town.

Akron was just getting ready for a CATV system run by Akron Telerama Inc., and the City Council had passed a resolution asking that the Commission "take steps to see that the city of Akron may not be deprived" of its new CATV service. The company had expended and committed \$901,100, he said, only to face the threat of being torpedoed by the FCC. He hit the top 100 market grandfathering clause as unfair and arbitrary, and he urged that "where the CATV system is to be located in a community outside the top 100 markets and the main post office of the community in which it is to be located is at least 25 miles from the main post office of the community that is within the top 100 markets, then there should be absolutely no prohibition upon the number or type of signals carried on the CATV system." He also said the new rules were adopted without adequate notice, and he called on Congress to protect CATV's service.

#### **NCTA Testimony**

Frederick W. Ford, President of the National Community Television Association, in a statement that ran 64

pages plus appendices, thoroughly explained NCTA's objections to the FCC's new rules. Much of the statement was a point-by-point refutation of Commission opinions, both sides of which had been aired before. Ford chastized the Commission for having no evidentiary hearing on CATV, and he once again asserted that the FCC has no jurisdiction over CATV.

The industry leader wholeheartedly supported a rule against any CATV system cutting ads out of signals of TV stations. The Commission's ruling, he said, "would expressly forbid a CATV system from cutting off advertising and inserting other advertising in its stead, because this would not be a signal which is 'carried in full.'" He noted that "it is this Association's understanding that this comports with the present and traditional practices of CATV operators. NCTA and the whole CATV industry would strongly support this principle in the Commission rules."

Objecting to the possibility of multiplicity of state, local and federal rules for CATV, Ford called instead for clear, centralized and strictly limited controls. "It would seem that the relationship between the federal and state-local jurisdiction with respect to CATV is well settled because of CATV's integral part in the reception of interstate signals," he remarked. "The courts have held CATV to be engaged in interstate commerce. If the Commission is even partially right that the Communications Act preempts the field of CATV, there is no area for regulation of the industry by the states except to the limited degree that broadcasting is regulated, such as zoning laws or other exercise of police power or taxes which are not an undue burden on interstate commerce. This should be affirmed."

#### **Beisswenger Submits Proposals**

An outstanding witness during the Thursday session was Robert Beisswenger, president of Jerrold Corp., who outlined his legislative proposals.

"My company supports regulatory measures which will provide for the continued healthy growth of both the broadcast and CATV industries," he said. Local stations should be carried with simultaneous non-duplication protection, he noted, and no CATV system should be sued for pay TV without FCC or Congressional approval. He argued that CATV program origination should not be shackled, and that CATV should not be regulated as a public utility. Beisswenger continued: "The existing CATV industry, rather than being 'grandfathered,' as many might believe by a cursory examination of the Commission's press release, has, in

fact, been saddled with unreasonable and extremely burdensome regulations which will seriously affect additional service to the public."

#### **NARUC Wants Utility-Type Regulation**

During the second week of hearings, Paul Rodgers general counsel of the National Association of Railroad and Utilities Commissioners, said that the interest of the NARUC is focused upon the franchising of CATV systems and the regulation of their rates and services by the state commissions." Whether the FCC is granted CATV jurisdiction is the problem of Congress, he said, but state commissions seek to regulate the rates, services and operating territory of CATV companies."

#### **Merrill Cites Public Interest**

Outstanding restatements of classic CATV industry arguments were made by Bruce Merrill, president of Ameco Inc., and Bill Daniels, Denver CATV broker. "The genesis of CATV is the public interest," said Merrill. "Recently, when we informed the public we serve that we honestly felt that their inherent freedom of broadcast reception was in jeopardy, over two-thirds of them responded in some overt manner. From the date of its inception, to this date, I know of no place where the public has rejected the concept of CATV . . . From a background of ignorance and bad information the Com-

mission has now come forth with rules for the construction and operation of CATV facilities. It is our opinion that it is the intent of the Commission staff to use these rules, not to constructively promote the benefits that expanded CATV operations can provide to the public, (the Commission has never done anything constructive toward CATV) but rather to choke off any future growth of the industry and to harass the existing operations."

#### **NAB Cautious at Hearing**

Little news was contained in the testimony submitted by the National Association of Broadcasters. Vincent T. Wasilewski, president of the NAB, largely concentrated on summing up the broadcasting industry position on CATV as already argued for months. He did have to enunciate a position, however, on the bill introduced by Rep. Walter Rogers, that would ban the regulation of broadcast reception. As conceived by Rogers, the bill would outlaw censorship, a position very much favored by the NAB. As interpreted by the broadcast industry, however, the bill would forbid the federal regulation of CATV. The NAB therefore had to move with care. "While we oppose any censorship of radio communications through the control of reception or otherwise, to the extent that HR 12914 would remove from the Commission

authority that it has and urgently needs to regulate CATV operations, we are opposed to it," Wasilewski said. Under later questioning by Rogers, Wasilewski admitted that the NAB had been "meticulous" in its choice of words. He said that "there is no reception until it's in the home . . . for this purpose."

#### **AMST Cross-Examined**

Association of Maximum Service Telecasters Executive Director Lester W. Lindow, like the NAB's Wasilewski, had little new in his testimony, but he underwent extensive and frequently unfriendly questioning from Communications Subcommittee Chairman Walter Rogers and others. His statement backed FCC jurisdictions over all CATV; warned that CATV could foreshadow pay TV; predicted that unfettered CATV would undermine UHF; and — again like Wasilewski — said that the Commission rules don't go far enough.

Again referring to his bill to forbid reception censorship, Rogers said the AMST was "begging the question" and "failing to face the facts" in supporting the FCC's assumption of jurisdiction over all CATV. Rep. Arthur Younger indulged in some biting sarcasm. "The viewers don't have a maximum organization, do they?" he asked Lindow. Since AMST recognizes that "traditional" CATV helps TV service, Younger said, AMST should admit CATV system owners to its ranks, or else change its name.

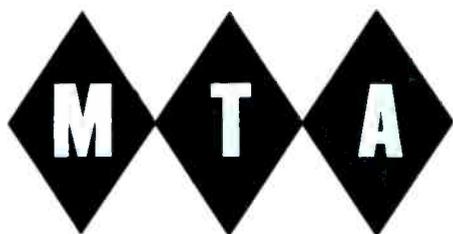
#### **Daniels Hits "Economic Impact"**

Bill Daniels asked the Committee to "explore this so-called and threatening economic injury situation posed by some broadcasters in more detail, although I am frankly at a loss to understand what place it has in even being considered in a land of free enterprise.

#### **Other Testimony**

The session saw a rapid succession of witnesses, many of whom concentrated primarily on problems of their own sections of the country. One unusual angle was supplied by professional football: National Football League Commissioner Pete Rozelle and American Football League Commissioner Joe Foss both asked for restrictions on CATV systems that carry pro games into areas that contractually are blacked out by local TV stations.

Other groups whose stands should be noted at least in passing, were the National Grange and the TV Division of the International Brotherhood of Electrical Workers. Both endorsed federal CATV regulation, taking the stance that CATV might financially cripple local TV service. □



**MALARKEY, TAYLOR & ASSOCIATES**

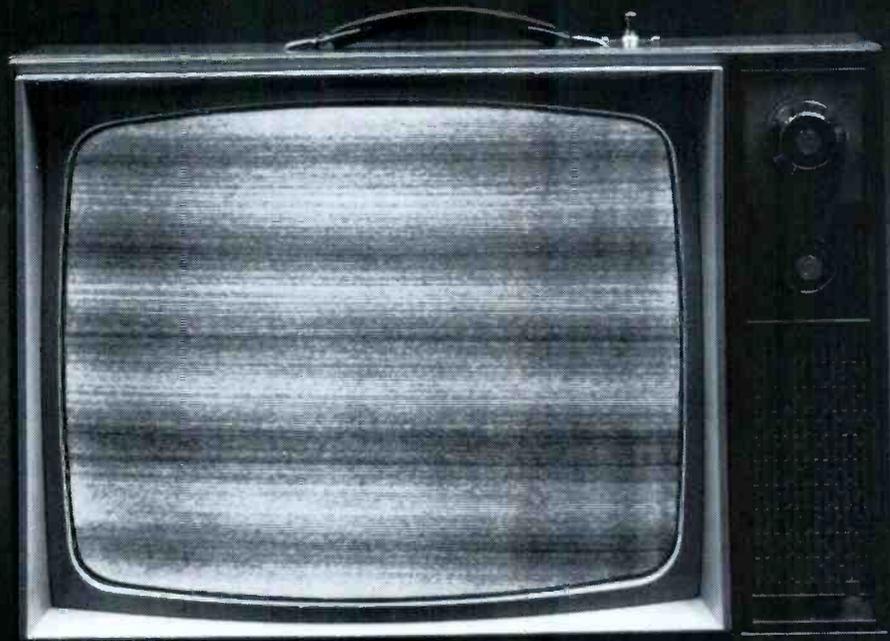
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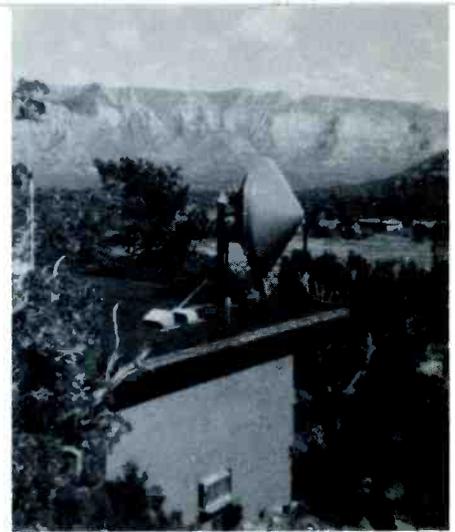
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# AMERICAN TELEVISION RELAY, INC.



ATR installation at Sedona, Arizona.

Helmut Dieter is a cable television man; although he is now president of ATR (American Television Relay, Inc.) in Phoenix, he never forgets that all services are directed to the satisfaction of the consumer, the television viewer on the cable. Cable television has wiped out the inequities inherited by small communities because they might be distant from metropolitan areas. Mr. Dieter says that public interest is served by making as many programs as possible available for the choice of the viewing public all over the U.S.

If a television station is able to come up with new programming concepts having great popular appeal, then it is in the Public Interest to route these programs into all the population corners that can be reached. Stations that have the resources, the money and talent to be creative and interesting, should not be limited to local grade A and B coverage areas.

Or why limit educational television channels to audiences living within their immediate range? Huge audiences hunger for this rich cultural fare, but are barred by distance from being in position to select these programs. Then too, there are the ethnic stations geared to language and tradition that members of selected audiences hold in common. These programs are available to those who live close in, but what about those who would like to be viewers and live beyond the fringe reception areas? There are millions of Americans who would want to tune in on this "voice from home."

Cable television, through microwave, is opening new pathways so that the outputs of these desired TV channels can be extended to greater numbers of people. "This," says Dieter, "is the Public Interest."

A recent announcement of permits granted to American Television Relay, Inc. of Phoenix, Arizona, to carry the four Los Angeles independent channels to Farmington and Silver City, New Mexico, marked some giant strides for the community antenna relay service. This is in line with the process that is making available to all America the latest news, information, entertainment and cultural happenings regardless of where a person might be living.

Fortunately, on our call to ATR, an Ameco affiliate in Phoenix, we caught the executive leadership of the microwave company, all together. Had we come one week earlier we would have had to seek many of them out on top of Mt. Torro, California where they were battling gusts of winds hitting 120 miles per hour while rearranging the antenna arrays to improve signals.

Helmut Dieter, President of ATR and his executive associates had come together for a day of planning. The expansion of numbers of employees and office and lab facilities is a long way from the humble beginnings in 1954. The microwave company, then, was founded to serve the Safford, Arizona cable system owned by Bruce Merrill. It was then called, Antennavision Service. Now, there are

divisions devoted to development of microwave components, and engineering surveys of structural properties with mounting and guying supports. Men are at work on maps and polar plot drawings of signals to be beamed around the country in a web of services to cable systems.

The new headquarters of ATR are literally humming as plans are being transformed into reality. Signals are scheduled to be strengthened as they are transported hundreds of miles in all directions from their sources. For example, the Los Angeles pick up point that now serves the western states has been moved some fifty miles closer to the television transmitting site. Cable subscribers in the systems served will benefit from markedly improved reception.

ATR has been installing five watt transmitting equipment, a far cry from the one tenth watt gear used in earlier days. Helmut Dieter quoted typical costs that go into building a microwave facility. About \$12,000 per channel for transmitter and receiver; add to that figure the costs of a tower, antenna shack and antennas plus power plant. There is the cost of land and other miscellaneous expenses. Several channels can run to a figure of \$100,000.

Rates paid by systems for this service depend on the number of hops between the point of signal origination, and the number of systems using microwave. These rates are also subject to approval by the Federal Communications Commission.



Helmut Dieter, ATR president (left) with Bob Hannon, sales engineering, at home office in Phoenix.



ATR has its own air force. Helicopter provides access to installation at Toro Peak, California.

American Television Relay presently serves over fifty cable communities in all parts of the United States.

No matter how far from its Phoenix operational center these microwave points are being established, maintenance facilities and people go along with the service. The use of motorized weasels, amphibious vehicles, or helicopters are part of each installation. Vehicles capable of carrying men and equipment in all kinds of weather and over every variety of terrain are a must. ATR employs an expanding corps of field technicians, men who are well trained to begin with, and are required to keep current with the latest information in this field. Even the most remote mountain peak can promptly be reached by an ATR maintenance engineer.

We wanted to know what gains are anticipated by typical cable systems. Therefore, we interviewed Robert Cowley, Vice President of the Harriscope Company, and manager of the cable systems in Flagstaff, which is outside the good reception range of the Phoenix stations. Quoting Cowley, "In the past we were driving a Model "T" automobile. Today we are in the driver's seat of a Cadillac. That's how much difference there is between off the air pick up and microwave here. The benefits to the cable system are manifold. Pictures are better. Although we have translators in town, these translators cannot match the consistency of good black and white and color reception provided by microwave. This is becoming a factor of increasing importance to the growth of a cable system with the greater degree of saturation of color sets in the home."



Dishes reflect the fluffy clouds over the Toro Peak installation.



Maintenance man is dwarfed by reflector atop Mt. Hutchinson.

Cowley also pointed to the dealer appreciation earned because microwave brings five FM radio channels into Flagstaff. Not only does this give cable an additional edge over translators, it has opened a whole new market to retail radio and TV stores.

Hardly and FM set had been sold previously; now hundreds of receivers and tuners are going into the homes of these mountain communities. Stereo consoles selling for two and three hundred dollars are common objects of display in the stores, and are being sold. Radio and television repairmen, too, have expressed gratitude, because there are simply more sets, both TV and FM to be serviced. These local businessmen become cable TV's most powerful boosters.

Clarence Fusselman, Chief Engineer in Flagstaff, had this to say of the effects of microwave on the technical staff. "The pressure of town-wide outages has been lifted. At most, service might be out on one leg of the hub. Transportation to the seat of trouble is no problem." Fusselman explained that previously there had been an antenna run miles long from the top of Mount Elden. An outage at the head-end meant a dangerous climb over a deep snow packed rough mountain trail. In storms, which are frequent, this road is impassable. Trouble in the head-end meant that the entire town would be out of service during the time it took to climb to the antenna site and make repairs. With microwave, the signals are shot down from the peak directly to the head-end housed in the cable office building.

We also looked at the system in Sedona, a colorful community in northern Arizona. There would be no television here at all, if the people were to depend on off-the-air signals. One hundred and twenty miles distance from Phoenix, plus a range of mountains between Phoenix and Sedona raised quite an effective barrier to off-the-air viewing. This cable system was written up in an earlier issue of *TV & Communications* as a thriving one, owing its existence to microwave.

"This is what we have done for cable systems," says ATR's Dieter, "We have given more television choice to more people. We have even brought television to people who had none before. In this way, we have helped the entire broadcasting industry." □

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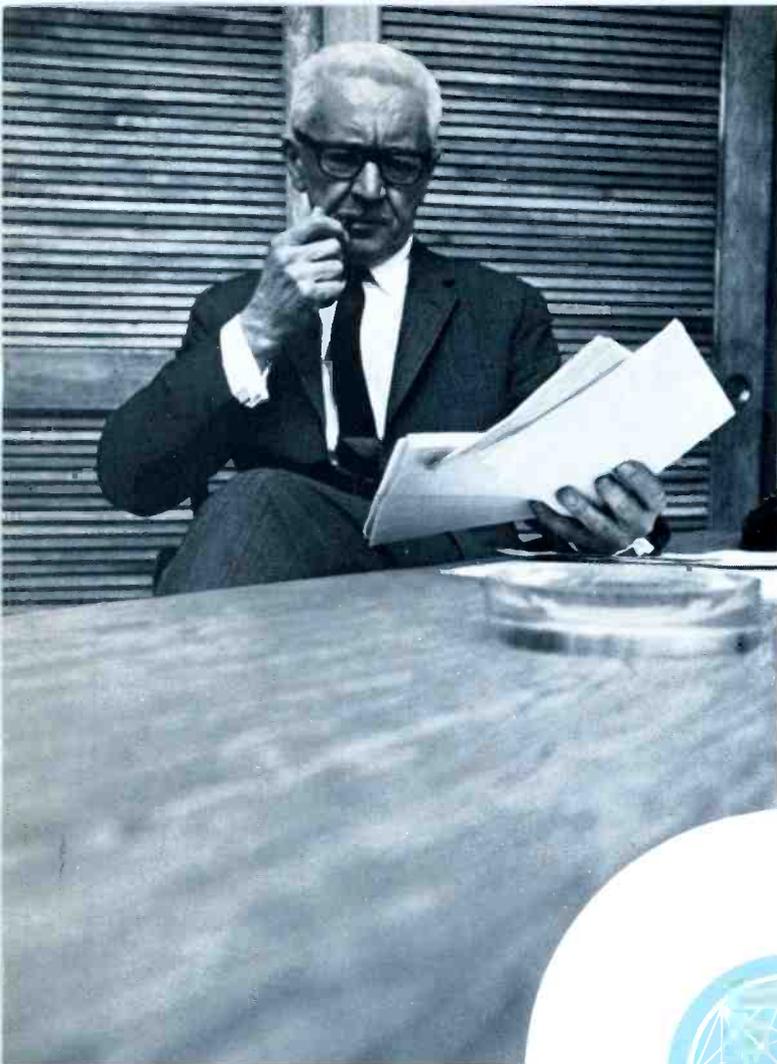
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# Allocation of Purchase Price On Purchase of Assets

By *Monroe M. Rifkin*  
*Daniels & Associates*

The accounting and tax treatment given a lump purchase of assets can prove extremely important in terms of *net after tax dollars* earned by the assets purchased over a period of years. Sales of CATV systems today are normally based on the application of a factor to cash flow (operating profit before depreciation, interest and income taxes). The sales price-cash flow relationship has been accepted in the industry with buyers generally assuring themselves of a complete income tax shelter for approximately five years or more. Depreciation and amortization of assets acquired play a most important role in creating and protecting this tax shelter. Accordingly, careful consideration and tax planning should be given to prospective "lump" purchases of assets even prior to the execution of purchase agreements since the ground work laid and the case and facts built up will form the basis for the position taken in connection with the tax deductions taken for depreciation and amortization of the assets acquired.

In CATV acquisitions, the assets purchased will normally break down into the groupings of tangible and intangible assets. Tangible assets consist of plant and equipment, automotive equipment, test equipment, furniture and fixtures, leasehold improvements, land, inventories, receivables, prepaid expenses, etc. The tangible fixed assets acquired in a lump purchase are subject to annual depreciation charges. Tax deductions for depreciation of tangible fixed assets are readily allowed and the IRS depreciation guidelines currently suggest a six year useful use for such assets. Since depreciation of such assets is normally easily defensible, our action in a lump purchase of assets should initially be directed to the tangible fixed assets in an attempt to establish the highest possible valuation for them.

When a "write-up" in assets follows an acquisition the new cost basis must be solidly supported. The tax code requires that the new basis be established

on the fair market value of the assets required.

As step one in complying with these requirements, the purchase agreement should have as an exhibit attached to it, a detailed inventory of the assets being acquired. Sellers will normally be able to prepare such a list from their plant records and such listing readily establishes "quantity" beyond the shadow of a doubt. Further, it would certainly be advantageous if the purchase agreement could contain a rough allocation of the total purchase price. That is, X dollars for current assets, Y dollars for tangible fixed assets, and Z dollars for intangible assets. The figures used should be rounded off approximations and while certainly not binding on the Internal Revenue Service, they will add further support to a detailed costed-out inventory of the assets acquired or an independent appraisal of such assets. Normally, sellers are not reluctant to agree to such valuation in the purchase contracts but quite often they will not permit the inclusion of such statements because the figures desired by the purchasers may violently contradict their own historical tax practices. In such cases, the buyer should relent since the practice of including such valuation in the purchase agreement is at best the weakest part of the case he is attempting to establish.

It should be borne in mind that the detailed listing of assets annexed to the purchase agreement may contain broad categories such as (a) 118 strand miles of plant, or (b) 500 foot tower with antennas. It is expected that an actual detailed inventory will later be prepared for valuation purposes or for use by independent appraisers and such listings will attempt to fill in and supply all the missing detail using the broad categories only as check points.

Let us now assume that the purchase of assets has been consummated and the buyer is preparing to set up his books. The question that arises at this point is "Should I prepare my own in-

ternal valuation of the tangible fixed assets acquired or secure an independent appraisal from an expert?" There is no recommended answer here since each individual purchaser must rely on his own tax advice. Independent appraisal by experts certainly lend a great degree of credibility to the valuation of assets acquired and the cost of such appraisals is relatively small in relation to the overall purchase price of the assets. Of course, when using such outside experts, control is usually lost, and while certain of the appraisal companies have now gathered a great deal of experience in CATV, it is quite possible that the major advantage of an internal valuation is lost at this point—that advantage being the experienced CATV operators' ability to recognize asset values where perhaps independent appraisers might overlook them. Items that might fall into this category would be provision for pole line changeouts at an estimated average cost per mile; overhead factor to be loaded into valuation to provide for the general and administrative overhead required to engineer, purchase and construct a CATV system, etc. In other words, in valuing tangible fixed assets, we as operators can conceivably develop theories which would tend to support higher valuations; which theories we are prepared to defend if ever attacked by IRS. Independent appraisers will normally be more conservative and may therefore arrive at lower total valuations.

One of the most intriguing questions that comes up in valuing tangible fixed assets is the manner of arriving at "fair market value" or "depreciated replacement costs". The more commonly used method is depreciated replacement cost in which individual items are costed at the current replacement cost with an allowance then being taken by category or group for depreciation to recognize the fact that the assets being valued are not new and accordingly not as valuable as new assets.

Exponents of the fair market value theory felt that the used assets are every bit as functional and valuable as new assets and accordingly make no allowance for depreciation. The latter theory has a good deal of merit as it relates to the CATV industry and the functional status of our equipment, but I am afraid that if scrutinized carefully it will not stand up to the technical regulations contained in the Revenue Code.

Assuming we use depreciated replacement cost, we raise another serious problem, that being what percentage of depreciation shall we use. Of course, we want the percentage as low as possible, but how can we justify 10% depreciation on a CATV system built four years ago when we are depreciating similar new assets over a six year useful life?

When you value your acquired assets internally, be sure to keep a complete file of work papers substantiating your calculations. In pricing components, attach price catalogs of the various equipment manufacturers to your work papers so that in years to come you may, if required, produce the evidence to support your calculations. This practice can prove extremely useful particularly since we are in an industry where competitive factors and advances in technology are producing a downward trend in equipment prices.

Let us turn now to a discussion of the very nebulous and perplexing subject of the intangible assets acquired in a lump purchase of assets. By intangibles we of course, mean that portion of the total purchase price paid which cannot be attributed to the tangible assets previously discussed. Such intangibles will normally be in the form of franchises, licenses, patents where applicable, contracts, trademarks, good will, etc.

The growing popularity and recognition of the CATV industry has pushed price-earnings and price-asset ratios sky high and accordingly, the problem of intangible assets acquired has become an ever increasing one.

The Internal Revenue Code is quite specific as to the deductibility of the amortization of intangibles. Such amortization will normally be allowed on intangibles other than good will which have a *fixed and determinable useful life*. This definition is of paramount importance and in structuring our tax position we should attempt to conform our intangibles to qualify for amortization allowances. Once this has been accomplished we then face the equally important problem of valuation of intangibles for this will determine the amount of the annual amortization charge.

Again, we should start to construct our case with the purchase agreement. In this agreement, we should specifically list the important franchises, licenses, and contracts being purchased or assigned to the purchaser. In the past, many CATV "franchises" were actually business permits issued in perpetuity or for an extended period of years. My firm I believe has initiated the practice of advising purchasers to have amendments written to such "franchises" providing them with a limited life. We further advise that the purchase agreement should not make reference to such amendments or revisions but rather should refer only to that which is ultimately being purchased, namely, a limited life franchise. A typical way this is accomplished is by having as a condition precedent to the buyer's obligation to consummate the transaction a provision that "the seller shall have obtained all necessary franchises, together with consents to their transfer, for the operation of the system, which franchises shall, by their terms, have a duration of approximately 10 years from and after the closing dates." This type of treatment appears very elementary, but I have seen cases in which the purchase agreement will recite that the seller prior to closing will obtain amendment to perpetual rights. I dare say that a clever internal revenue agent examining this contract at some future date may well question the business reasoning behind such a move and attack the very basic document and right on which amortization is based. I have heard the argument given that counsel for the buyer feels that perpetual franchises are unenforceable and advises clients to obtain a limited life franchise to protect them. Suffice it to say that it is probably best to show a clean picture and since the transaction itself and the case we are building commences with the purchase agreement, it should refer only to the end product to be received from the seller.

Our industry is young and most franchises have not as yet reached their expiration dates, thus raising the question of extension or renewal. IRS may claim that our franchises will be subject to automatic renewal and therefore approach being perpetual. Their position in this may be similar to that taken in the Corinthian case where they have disallowed amortization of network affiliation contracts.

While I do not know of any situations where a franchise has been terminated upon the expiration of its initial term, I am familiar with a case or two where they have been renewed only with much harsher terms than the

original document contained. It is extremely important that we build up a history of such cases as well as those situations where franchises may actually be terminated. As the various city governments are becoming more and more aware of the value of CATV, they are becoming increasingly difficult to deal with and accordingly in the years to come, we should be able to document our position that our franchises are not automatically renewable.

If CATV franchises carry exclusive rights with them, there is little question as to the deductibility of the amortization of value assigned to them and the absence of good will. Unfortunately, the vast majority of franchises in the CATV industry are non-exclusive and, therefore, raise the question of how such non-exclusive rights can be so extremely valuable when in theory others could obtain similar rights and compete with us. In answering this question we must point to the fact that while our franchises are non-exclusive by their terms, cities normally grant only one such franchise and accordingly, we do gain exclusivity. Further, since the utility companies will normally allow but one CATV attachment to their poles, the first non-exclusive franchise holder to construct his system normally gains exclusivity in this manner. Summing up, while not exclusive by their terms, our CATV franchises usually grant us economic exclusivity and upon this we will base our argument in the future.

Once we have established the validity of our intangible assets for amortization purposes, we are faced with the far more difficult and complex problem of valuing them.

If valid averages can be drawn, I would say that of the transactions in mature systems I have seen in the past year, approximately 40-50% of the purchase price paid represented tangible assets with the remainder being allocated to franchises. With many sales in the million dollar range, it is easy to see the magnitude of dollars allocated to franchises and the importance of sustaining the resulting amortization deductions.

Recent developments in the CATV industry provide some basis for defending the high values assigned to franchises. Within the past year, the practice of competitive bidding for franchises has become prevalent and a franchise for limited areas within the City of Glendale, California was recently awarded to the high cash bidder of \$35,000. Even more recently, a franchise for Bakersfield County (exclusive of city) was awarded to the bidder who offered \$100,000 plus a

continuing franchise fee. Large sums such as these offered in purely developmental situations would indicate that franchises in established and successful CATV markets have great value.

The two valuation theories I have seen advanced time and time again are the "gap theory" and the "present worth concept of future earnings" with the "gap theory" being utilized in a great majority of cases. Definition of this theory is rather simple since it refers to the practice of applying all purchase price in excess of that assigned to tangible assets to the franchise.

The present worth theory attempts to develop a more scientific approach and by the use of various formulae and assumptions arrives at the present worth of the franchises and then assigns any remaining value to good will. Proponents of this theory feel that it will be more readily acceptable to IRS since the various formulae used are based on assumptions that can be defended. They further advocate this method because it does provide for some recognition of good will and supports the old Wall Street theory that "the bulls and bears all make money, but the pigs go broke."

Possibly the most interesting facet of purchase price allocation rests right on the question of valuing intangibles since it is almost impossible to secure unanimity of opinion among the tax and accounting experts in the country.

Ernest & Ernest follows the gap theory. The Tax Department of Dow, Lohnes & Albertson, experienced attorneys in the broadcast industry, recommend the gap theory and say that "the balance of the purchase price over that allocated to tangible assets should be allocated to the franchise and amortized over the life of said franchise. It is our opinion that where only one system operates in a community, good will apart from the franchise is not present." Price Waterhouse initially attempted to develop a present worth theory for a major CATV company, but finally abandoned it and adopted the gap theory. The national accounting firm of Arthur Young & Company presents some interesting contradictions. Out of one office they recommended the gap theory for clients. In another office in a major city they have several clients in the CATV business and use the gap theory for one and the present worth theory for another.

Since their annual reports are public information, I would like to point out the statement contained in the H & B American Corporation Notes to Financial Statements. They say that

"the portion of the purchase price allocable to local operating franchises is being amortized over the lesser of the lives of the respective franchises or 15 years. The excess of the purchase price over amounts allocable to plant and equipment in locations where there are no franchise agreements is being amortized over 10 years." This practice could result in many unusual situations and the theory certainly departs from all others mentioned here today.

I think it might be interesting at this point to briefly describe one company's present worth theory. This company actually prepares detailed operating projections of the systems being acquired over the remaining lives of the franchises. They even go so far as to project future capital improvements and depreciation thereon adjusting depreciation in later years so that all fixed assets are reduced to zero net asset value at the expiration of the franchise lives. From cumulative net cash earned over the lives of the franchises, they deduct an amount equal to 6% of the average investment in physical assets and then discount the resultant figure by an arbitrary percentage to arrive at the present worth.

We can credit this approach with containing a certain degree of logic and at least providing a point for arguing with the IRS, but the problem that arises is the lack of flexibility in the formula. Initially, it is constructed so as to leave just a very small portion of the purchase price allocable to good will. I wonder what will happen in later years if the company using this method makes additional acquisitions and if general price levels of CATV vary widely.

This discussion has been intended not to give you specific tax advice since this would be beyond this author's qualifications, but rather to describe as fully as possible the various problems encountered in the allocation of purchase price together with a discussion of the various practices followed in the field. My firm's position as a broker in the CATV industry has placed me in a position to witness the allocation problem as treated by most of the larger companies in the field and to consult with their very excellent legal and tax advisers.

We cannot be certain of the deductibility of the amortization of franchises and should look forward to the fact that one day the Internal Revenue Service will test the matter and we will certainly have lengthy litigation.

There is an old tax case involving the broadcast industry which provides us with precedent, considered favorable by some and unfavorable by others.

I will let you make your own judgment.

During 1957, the Internal Revenue Service issued a ruling to the effect that network affiliation contracts in the broadcasting industry are not subject to amortization for income tax purposes. The ruling was contested by the Corinthian Broadcasting Company and in 1964 the tax court ruled that their network affiliation contracts could be amortized over a 20 year period. The Corinthian position was based on an exhibit they submitted which traced the history of network contracts since 1948 in 84 markets having three or more television stations in operation. The tax court accepted their argument that a 20 year life was a reasonable basis for depreciation. The Court of Appeals, however, said that the exhibit and survey was more apparent than real and ignored the facts of life of the television broadcast industry. In essence, the Court said that although there were more terminations of network contracts in early years, television was a young industry and now a much higher degree of stability exists with regard to network affiliations.

Where depreciation of intangibles is concerned, the Court of Appeal said "Where there is no reasonable basis for the prediction of the expected valuable life of an intangible asset, it follows that the asset is not the proper subject of depreciation allowances."

Corinthian has indicated that they will now take further appeal to the Supreme Court, and additional time will elapse before the issue is finally resolved.

While our CATV franchises normally contain a good deal more substance than television network affiliation contracts, This Corinthian case does establish an element of precedent that we may have to face in the future.

In closing, I would like to further qualify my remarks and indicate that they are generally directed to persons or companies acquiring CATV systems who desire tax shelters for the earnings the assets are expected to realize.

Recently, large publicly-held companies have been entering the CATV field and their line of thinking may be completely different. Such companies generally have large capital resources available to them and are motivated primarily by the desire to report increased earnings per share to their stockholders. Companies such as these in their quest for reportable earnings may desire to value intangibles including good will extremely high and take a longer write-off than is the case when dealing with tangible fixed assets. □

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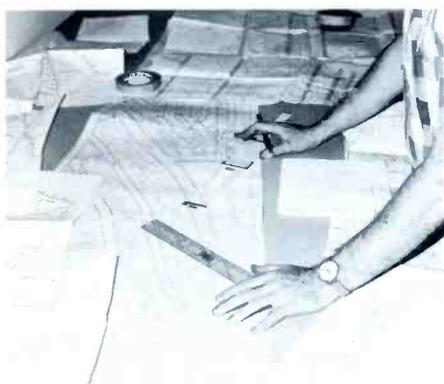
# GETTING YOUR SYSTEM DESIGNED

By D. Michael Ganley  
Contract Coordinator  
Ameco, Inc.

A vital, but often overlooked, step in building or revamping a CATV system is electronic design mapping. Generally, an equipment manufacturer provides this service free of charge if the owner buys that firm's equipment.

Up to this point, things have usually been completely within the scope of the owner, with little outside consultation. But as soon as one begins dealing with others, problems in communications, information flow, etc., develop. There is no universal panacea for all the troubles that can arise. However, these are some of the solutions for the avoidable pitfalls that have held up jobs for many months:

(1) Before soliciting outside help, determine what you are looking for (i.e. What areas do you wish to feed? What sections will be excluded? What future areas will you serve?)



Piecemeal maps such as these take more time and greatly increase the chances of inaccuracy.

(2) Settle on one head-end site. Most reputable manufacturers design CATV systems from the head-end location out. Sometimes a change of a few hundred feet in the placement of the tower will require a new design for the entire system. No one can insure that a change won't occur, but following these points decreases this possibility: (A) Run a signal survey. It costs much less than a tower move; (B) Check title to the land. Outright purchase or long-

term lease is best; and (C) File FAA Form 117 for a Tower Construction Permit. It is best to secure a copy of the FAA Publication, Part 77 (Revised May 1, 1965), "Objects Affecting Navigable Airspace," for the latest information. Remember, allow 30 to 60 days for approval.

(3) Take the trouble to get scaled city maps, showing pole locations, and indicate upon them the routing for your system; maximum scale should be 1" = 300', or less. Many city maps are not accurate; it is a good idea to use a measuring wheel on some selected sections to check your map. Remember, some strand maps don't show the latest connections; a check by driving out the routing is invaluable. Is there a river or major highway in your community? Where do you wish to cross it? These precautions will save you time and money.

Invite a manufacturer's sales representative to visit you. Get his help and the help of his home office. If this is not possible, send a map. Include the following information so you can get a quick return of accurate information: (1) Your name and address and, especially, your telephone number. (2) Specify the proper name of the community on the map. This doesn't sound serious, but we have found it to be so. (3) Outline the area to be covered and show the head-end site. Show the routing of the strand. (4) Specify what line of equipment you desire. (5) Indicate size and type of cable. (6) Remember, head-end installations are as individual as the person designing them. If you have any special desires along these lines, indicate them. If a signal survey has been done, enclose a copy.

Usually you will have questions about financing, new equipment specs, prices, etc. Indicate them when you send your maps, and you can expect a return call from the proper parties in a short time. This is an important point because in the larger CATV

companies a customer deals with several departments of the same company, and occasionally one department doesn't know that other departments are involved.

A company may have to send personnel to your community to run a signal survey if none is available; make a strand map of the town if others aren't suitable; and take soil samples for underground distribution and pole placement. These projects are going to take time.



Head-end specialists shown using accurate system design information supplied by system owner.

Finally, note and explain the peculiarities of your job. CATV systems are custom projects. Obvious differences are:

(A) Do you plan to install house drops yourself or have the prime contractor do it? Also, do you expect to use that company's house drop material?

(B) Do you wish to stock spare amplification equipment?

(C) Does the manufacturer understand if he is to bid on head-end equipment, building, and tower? If so, are you contemplating microwave and/or a weather or news service?

Considering all these points, one can see that some editing and tailoring of system design requests can save a lot of time in securing a construction bid. □

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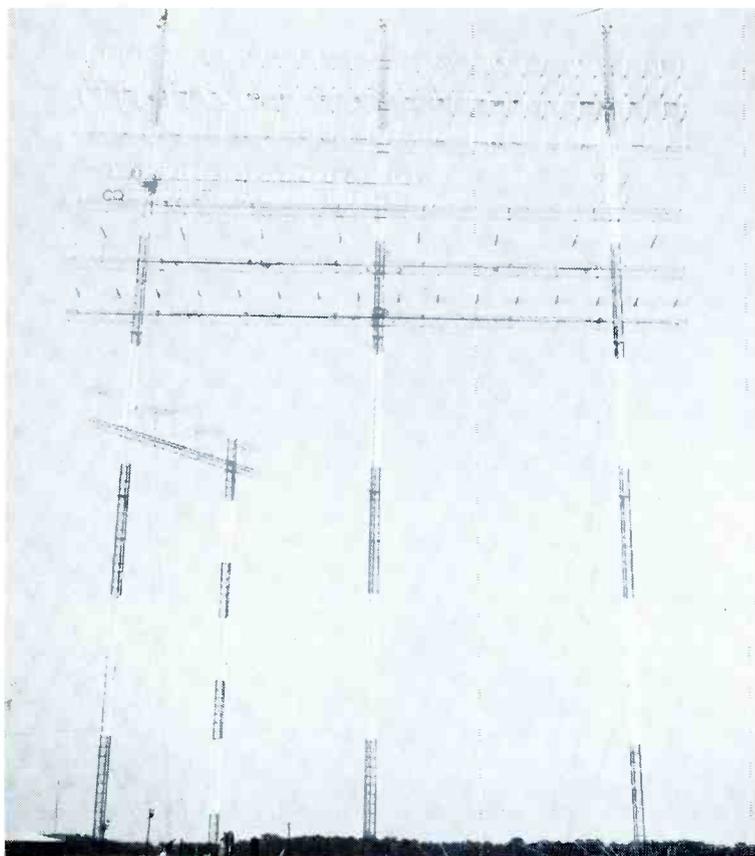
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# NAB and IEEE Shows

Staff Report with Special Assistance  
from Technical Associate I. Switzer

## PART I: NAB SHOW

This year's National Association of Broadcasters Convention was held at the Conrad Hilton Hotel in Chicago. Color overshadowed everything else at the equipment exhibition at NAB. The exhibition of live color at this show is probably the very best that has ever been presented with all the manufacturers out to make the very best showing. Philips, which made such a sensation at last year's show with their plumbicon tube color cameras, was back with an excellent display of camera equipment for color using their plumbicon camera tubes. General Electric also showed live color cameras using plumbicons. RCA featured their orthicon systems but there was no sign of the "selenicon" tubes on which they were supposed to be working. Marconi cameras were also being shown. All the manufacturers had live sets for showing their cameras to advantage and the results were spectacularly beautiful, although some credit may be due the beautiful models adorning the demonstration sets.

Professional monitors (Conrac) were used in most demonstrations and we did not see any household type receivers in any of the demonstrations. It would have been very interesting to make a direct comparison between the splendid color demonstrated under these ideal laboratory conditions to the color that might be viewed in a CATV subscriber's home. CATV operators can be assured that the color right out of the live camera or film chain is first class, or can be if properly operated.

CATV equipment was displayed by Advance Industries, Ameco, American Pamcor, Collins, Dynair, Entron, Fort Worth Tower, Jerrold, Kaiser-Cox, Lenkurt, Rohn Mfg., Spencer-Kennedy Labs., Tape-Athon, TeleMation, Utility Tower and Viking.

Ameco showed their 70 series equipment in new housings and the "dummy" housing for new solid-state (double heterodyne, head-end equipment which

they have under development. Directional coupler taps were shown in new color-coded plastic housings with internal shielding. Connectors on the new main line amplifiers have been redesigned and offer optional extra long collets or captive center conductors.

Entron introduced a solid-state terminating distribution amplifier with distribution line outputs. Also shown were a new inline multiple tap directional coupler with variable attenuation and a new inline solid-state repeater amplifier with ALC.

Jerrold had no new equipment on display, i.e. new since Denver. Their "Starline" package still looks very good and seems to have set a pattern in the industry.

Kaiser-Cox has revamped the Kaiser equipment line shown at Denver last year with all electronic modules fitting into a standard, heavy cast housing. Cables terminate in the housing with center conductors clamped down firmly. AGC system has been redesigned along more conventional lines.

SKL has repackaged the 1-volt solid-state distribution amplifier that they showed at Denver and this amplifier is now apparently available for immediate use. There has been some redesign of their mainline amplifier series. A solid-state amplifier using distributed techniques is now available. This is the same circuit technique that made SKL such a well-known name in broad-band tube amplifiers. SKL people that we spoke to were not quite sure what the advantages of the distributed technique were, but I am sure that we will hear more from SKL about it by the time of the NCTA convention in Miami in June. Many CATV manufacturers at NAB seemed to have new inexperienced personnel. This is probably an unavoidable consequence of the great expansion in the CATV equipment manufacturing field.

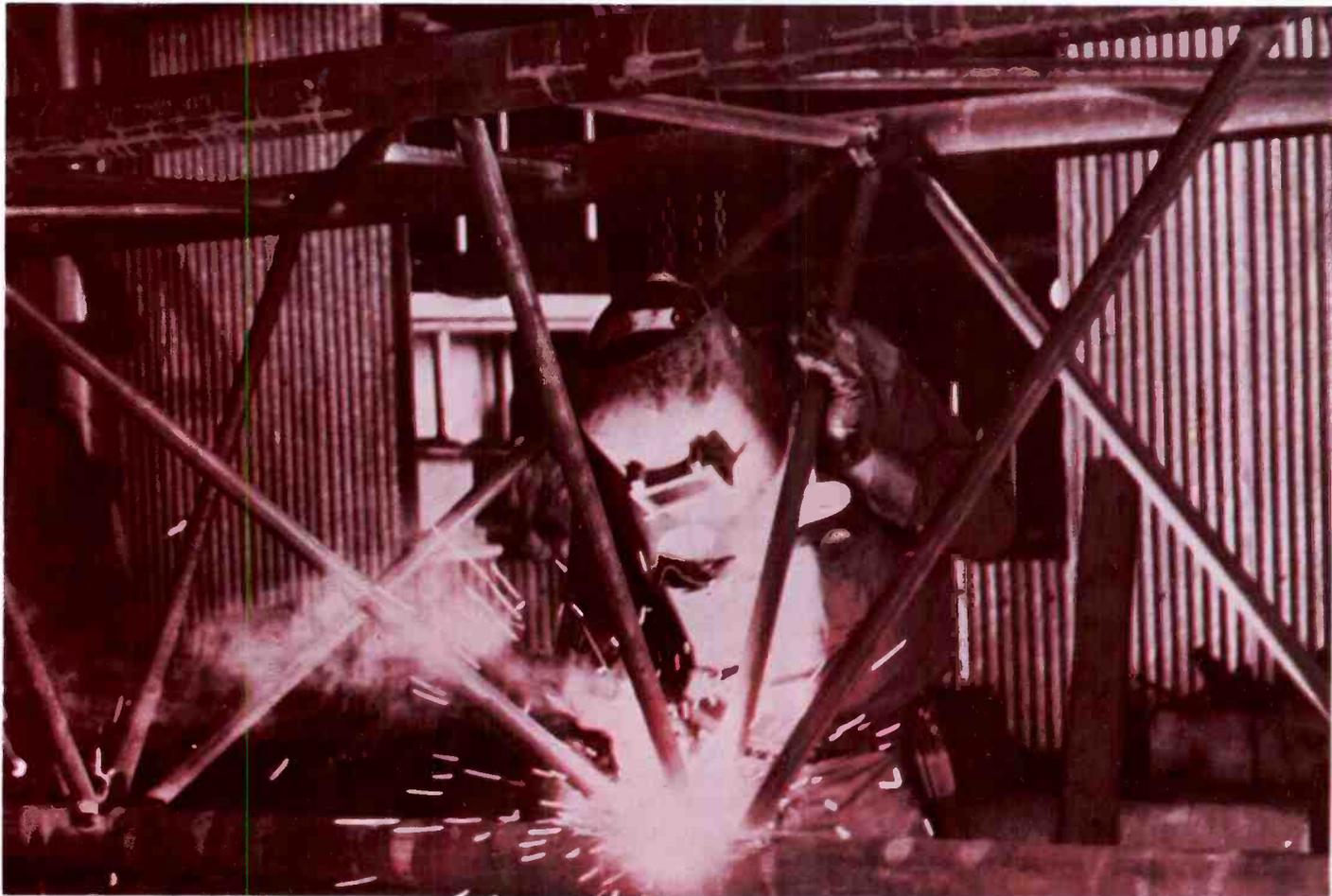
Viking had a large display of equipment and accessories. Of prime interest was the prototype of their news service system developed in cooperation with United Press International. The prototype consisted of a vidicon cam-

era monitoring the output of a standard Teletype Model 15 page printer. This series Teletype has the disconcerting feature of jumping up and down as it shifts from letters to numerals, and the effect is to make the whole page jump up and down as viewed by the camera. We were assured by Viking people that this prototype had been assembled in a hurry for this exhibition and that production versions will have good legibility with a steady display.

Dynair showed their tube and solid state modulators. These are already popular among CATV system operators. A solid-state tuner was shown, with the promise that delivery will begin this summer. This has been a popular item at trade exhibitions for more than a year now and prospective users will welcome news that deliveries are in sight. Dynair also showed a TV sideband analyzer in a price class that will appeal to CATV operators. Sideband analyzers by RCA and Marconi have been standard equipment for some years for lining up TV transmitters. Dynair's version at less than \$1,000 should be popular among CATV operators operating several modulators. The side band analyzer is a combination video sweep and narrow band spectrum analyzer and is an excellent instrument for alignment of modulators used in CATV systems.

Riker Industries has a comprehensive line of video processing equipment, including a very compact standard TV sync generator. Riker also has a "colorizer" system which adds color to B&W pictures by converting shades of grey to various colors. It adds striking color to B&W slides for ID's announcements, test patterns, etc. Cost depends on whether present sync generators etc., can be converted to color, but it does offer possibility of operating weather dials, announcements, etc., in vivid colors with a minimum of equipment and expense. The equipment is all solid-state and would add minimal maintenance trouble and expense.

A number of microwave companies showed their wares. Emphasis is on



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solid-state and heterodyne repeating. Most companies have designs which are all solid-state except for transmitting klystron.

Broadcasters showed considerable interest in 1 KW UHF translator equipment. Ever since the FCC authorized the first 1 KW UHF translator operation in Iowa there has been considerable interest in such operations and there is no doubt that many of these broadcasters feel that increased power in translator installations will help ward off CATV in certain markets.

Townsend Associates showed the prototype 1 KW amplifier which they built for the Iowa translator. This amplifier has 30 db gain and 1 KW output capability using a single 4-cavity klystron. The amplifier is priced at about \$20,000. EMCEE had preliminary data on a similar klystron amplifier which they are developing and Microwave Associates has a 1,000 watt travelling wave tube which they may develop into an amplifier for UHF translator use.

There is a wide variety of lower cost cameras available for operators interested in local origination. Most of these have been developed for ETV installations and use vidicon camera tubes. Phillips and Bell showed cameras using plumbicon tubes which should appeal to operators interested

in better "live" camera performance. Kalart showed a low cost 16 mm projector suitable for light duty closed circuit use. Medium priced video tape recorders abounded, and there is a wide variety of these available for operators interested in them.

AMP (American Pamcor) displayed a line of connectors for CATV use. They use a common collet for most size cables to permit easy interconnection of different types of cables. They have a series of connectors for the disc type cables which are commonly used in telephone carrier applications and which are often used in CATV systems in Canada. These fittings permit pressurization of this cable which will be a boon to operators using these disc types. Their weatherproof "F" fitting is also interesting although expensive compared to common "F" connector. AMP also showed a subscriber grounding block and an outlet plate that featured a resistive termination when the jumper to the set is removed.

Fort Worth Tower Company showed models of twin parabolic antennas that they had built recently for a system in Texas. Their version of the Canadian pioneered antenna system is somewhat larger and the use of dual antennas for diversity is an interesting concept. The Fort Worth parabolics are partially prefabricated, considerably simplifying erection on the site.

We had hoped that the CATV displays at NAB would give a preview of the NCTA display at Miami at the end of June, but instead got the impression that the CATV companies are holding back their big guns for the Miami show.

## PART II: IEEE SHOW

The trade show connected with the convention of the Institute of Electrical and Electronic Engineers is held each spring at the New York Coliseum. This year's exhibition had 735 exhibitors showing their wares to more than 60,000 visitors!

Here are a few highlights of the IEEE exhibition of interest to the CATV operator.

The first impression is one of overwhelming crowds and size. The immense Coliseum building is virtually full of exhibits — millions of dollars worth of electronic equipment and components.

We found only one CATV amplifier on display. This was shown by C-Cor Electronics as part of their display of instrumentation amplifiers. C-Cor was a pioneer in the CATV equipment field under the name Community Engineering but for the last several years has concentrated on instrumentation

amplifiers. They showed a sample of a solid-state bridging amplifier which is part of a new line of CATV amplifiers and accessories which are marketing under the trade name "Novacor". The bridging amplifier shown was a plug-in module that fitted into a standard weatherproof case.

Jerold showed test equipment and featured their new 900C sweep generator. This sweep generator is perhaps too fancy and high-priced for general CATV application. Their 3 position high speed switch was shown again this year and would be a very useful CATV test tool if they would develop a 75 ohm version. Jerold showed some very fine turret type attenuators, but again these were available only in 50 ohm versions.

There was a great deal of test equipment of all kinds on display. Kay Electric, Telonic and Texscan showed sweep equipment suitable for CATV use. The Kay 159B seemed very suitable for CATV application and has indeed been successfully used in a number of CATV systems. All three companies have a wide variety of sweep equipment suitable for CATV use priced from about \$550 up. Texscan showed some compact double deck turret attenuators at a reasonable price and made for 75 ohm use. These are much more convenient to use than the conventional toggle switch types and should be given serious consideration. Kay showed a broad-band high impedance probe suitable for signal tracing and bridging in CATV maintenance, and also a logarithmic mode amplifier covering 20 KHz to 220 MHz with an 80 db dynamic range.

Hewlett-Packard had several accessories for their immensely successful Time Domain Reflectometer. These included a 75 ohm adapter and a set of filters for restricting pulse rise times to more closely match frequencies of interest to any particular user. The TDR has been successfully used by a number of CATV systems and has been in use by virtually every connector and cable manufacturer since it was introduced almost two years ago. H-P also showed a new 'scope with variable persistence — the Model 141. The 141 can be used as a storage scope and accepts the same plug-ins as the older 140A, including the TDR plug in. Cost is almost double that of the 140A but might be justified in some CATV applications. H-P also showed a new Vector Voltmeter which permits direct phase measurements at frequencies up to 700 MHz and voltage measurements in the millivolt range.

Tektronix had a new TDR plug in for their 'scope line. This unit has



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advantage of offering facility of a sampling 'scope as well as TDR but sampling scope applications in CATV are very limited compared to TDR applications, and the combined plug in and 'scope were too costly and complicated for ordinary CATV use.

RCA featured their overlay transistors. Their overlay 2N3866 has been very successful in the CATV field and a number of CATV equipment manufacturers are currently using this type. RCA showed an excellent film on overlay transistor manufacture and operation.

TRW had a number of power VHF transistors applicable to CATV amplifiers and also showed a "fuse diode" which combined a fast acting fuse with a rectifier diode.

Bendix showed silicon power transistors suitable for CATV amplifier power supplies. These silicon types are now very reasonably priced and could be used in CATV power supplies.

G. E. and Motorola showed low cost SCR devices. Cost of these units is now very low and we expect that CATV manufacturers might begin using them in power control and surge suppression systems.

A wide variety of spectrum analyzers were shown covering sub-audio to millimeter frequency ranges. These instruments can be considered as "swept field strength meters" with 'scope display. Nelson-Ross showed a plug-in unit for either Tektronix or H-P 'scopes which covers CATV frequencies. A specially modified version will be offered to the CATV industry later this year.

Sony showed an intriguing color disc recorder. This appeared to be an LP sized, oxide disc spinning at about 1,800 RPM. It stores 20 still color frames which are automatically sequenced. Each frame can be held for as long as desired. The system seemed to run continuously for the four days of the show, and the color as viewed on a Sony monitor was excellent. Sony people present had few details, but said that they hoped to market it this fall at about \$2,000. It can be loaded from any standard color picture source, such as a TV station's color slide or film chain, and would provide a CATV system with a low cost, continuous color demonstration and promotion facility. Sony's reel-to-reel video tape machines were also shown.

Wanlass Electric Company showed their newly developed AC power regulators. These operate by clipping peaks of the input AC waveform and in their simplest form yield AC outputs with constant peak voltage. They can be elaborated with RMS sensing and feedback to give constant RMS out-

puts. They are priced and sized to compete with Sola type constant voltage transformers in ratings to 250 VA. We suggested that they be modified to provide square wave outputs for cable powering CATV amplifiers. Their clipped top waveforms are nearly ideal for cable powering most CATV amplifiers.

The general impression received was that there is a great deal of test equipment available for 50 ohm system use but not much for 75 ohms. Systems working with the Hewlett-Packard Time Domain Reflectometer feel a particular need for a good 75 ohm impedance transmission line standard.

Several are available in 50 ohm impedance but none in 75 ohm. Weinschel Instrument expressed some interest in developing such a standard and more may be heard from them about it.

Siemens showed a small gas tube surge protector which could have significant CATV application. Current models fire at 230 volts but a 90 volt model will be available soon. These have surge carrying capabilities much greater than the NE-2 neon glow lamps presently used by some manufacturers. The very low shunt capacitance (about 2 pf) would permit their use directly across the coaxial cable center conductor. □



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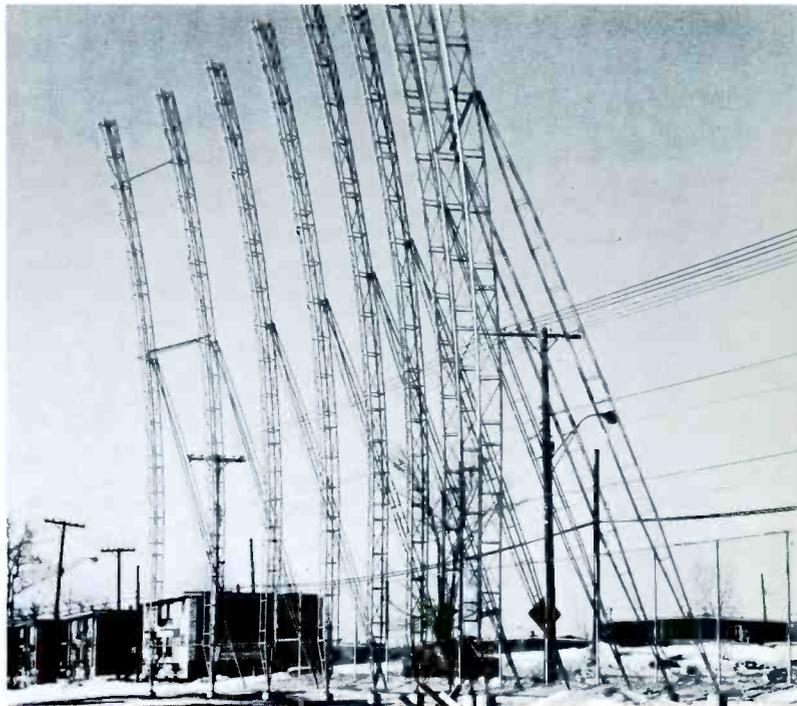
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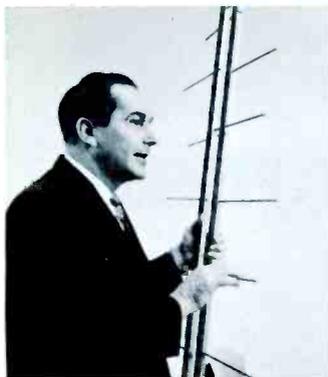
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# HOSKEN CABLE TV ANTENNAS LTD.



In early February 1966 most CATV systems received a simple brochure describing two new sensitive antenna systems designed for CATV reception. The brochure came from—of all places—Ajax, Ontario, Canada where Stanley Hosken has established a specialized plant to produce tropo-scatter and exponential curved antennas.

With the knowledge of parabolics used on radar during World War II, and with the assistance of Charles Pilon, Hosken constructed a 30-foot parabolic antenna which could be universally rotated on its mounts. This was the first large dish reflector used in Canada for CATV. Its main purpose was to receive a UHF station, Channel 17, Buffalo, N.Y. and test troposphere and ionosphere conditions. (Incidentally this antenna tracked the first United States Satelites.) This antenna produced an extremely narrow beam on Channel 17 because of the very small wave lengths of the UHF band and Stan knew that a much larger antenna would work well



Stan Hosken



Hosken Headquarters

on the lower frequency, longer wave length television channels. However, the new design had to be such that the large reflective screen would be mounted in a fixed position and the focal point antenna set in the desired location for the channels to be received. Designing such an antenna required two years.

Incidentally, the small 30 foot parabolic beamed on Channel 9, Toronto, Ontario (approximately 200 distant) reportedly outperformed 32 wide spaced perfectly phased ten

element "yagi" antennas. All these findings, however, meant nothing at the time since even the National Research Institute of Canada claimed only tall towers would work at distances, in line of site, and could see no value in the ability of the antenna to have a large usable capture area.

From the small bowl it was only a matter of time to the development of the large fixed tropo-scatter antenna with the ability to receive stations within a 40 to 60 degree radius. To the American CATV companies it all made good sense, too. Within one week of mailing its brochure, Hosken Cable TV Antennas Ltd. had received 150 requests for further information and had accepted ten firm commitments to make technical feasibility studies.

On reflection, it's not so surprising that Hosken, pioneer in certain types of antenna design, should be a Canadian due to Canadian law not allowing the use of microwave for Cable TV systems. For many years Canadian viewers could receive television only by long-distance reception from United States stations and consequently developed certain specialists in antenna design. Hosken himself brought television to remote North Bay in 1954 when he assembled an array of 16, 40-foot "yagis" with 288 elements, to bring in Channels 2 and 4 from Buffalo, N.Y., some 300 miles away.

### ABOUT THE MAN

Stanley Hosken's interest in antennas goes back to the early thirties. First he took electronic training at Danforth Technical School in Toronto, Ontario, Canada and became a Ham Radio Operator.

During World War II he started as a Wireless Operator and later was transferred to Electronic Maintenance, calibrating direction-finding equipment on all ships entering Halifax harbour.

As Chief Radio Artificer in the Royal Canadian Navy he supervised installation of all radio and radar plus navigation equipment in Ontario shipyards. Stan says the Navy gave him his start in an exciting career which has led to important developments in the art of television signal reception.

Today he confidently claims that the Tropo-scatter antenna is the most powerful available to CATV operators. He has Canadian Patent No. 728748 and United States Patents pending. Similar patent applications for his Exponential Curved Antenna are also being processed.

Among the features cited by Stan Hosken for the tropo-scatter design are extreme long distance reception; excellent color signal quality; and excellent co-channel and adjacent channel rejection, due to the narrow beam angle and high front-to-back ratio. The Hosken firm sells its tropo-scatter antennas in three standard screen sizes, 100', 200' and 300' in length, all 80' high. Specially built units up to 1000' are available for unusual requirements.

A 100 foot curved screened reflector antenna was installed for "Videotron" in Montreal, Quebec in a period of four days under not too favorable conditions. No other antenna would work in this location and extreme precision was required since this site has a river immediately in front and 15,000 voltage hydro lines very close to the back of the reflective screen; also, a well travelled road immediately behind the reflective screen, and the entire city of Montreal in front of the antenna, plus local channel 7 and channel 10 stations; strong co-channel from Cornwall, Ontario—channel 8 and channel 8 Poland Spring, N.Y. As space was limited, this was the largest possible antenna that could be used in this location. "Videotron" wanted to receive the ABC network from Mount Washington—channel 8—approximately 140 miles distance.

The focal point antennas for the large curved screens are specially designed exponential curves with a double screened reflector to give the highest possible front-to-back ratio. These focal point antennas come in low-band and high-band.



Tropo-scatter antennas are prefabricated in the Ajax, Ontario plant.

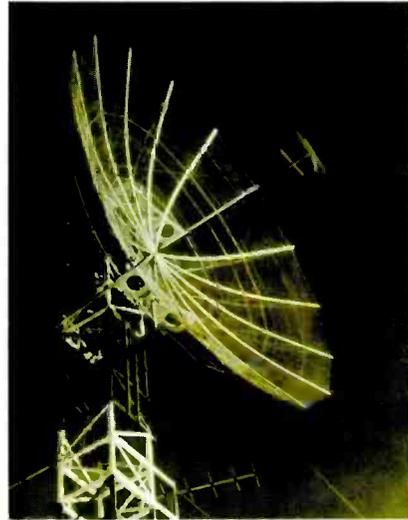
In many cases only one low-band and one high-band antenna need be used at the focal point for all channels to be received from the one city. Stations to be received at other directions require additional focal point antennas. Gain figures run from 25 to 50 DB depending on antenna size and channels received. The gain alone does not mean very much, since under fluctuating conditions, the useable gain of any antenna can be less than a quarter of what its normal power would be on a steady signal. The large capture area does reduce to minimum airplane type flutter as sometimes noted on large arrays.

"Unfortunately," noted Hosken, "most operators in the field assume that the gain structure of this antenna will guarantee an absolutely perfect picture and this is not always the case. We simply state that it will outperform any other cable TV antenna known at the present time."

Hosken put one year's research into designing a focal point antenna to utilize to the best advantage a fluctuating television signal. His focal point antenna elements not only

receive a completely horizontal polarized wave but also one coming in at an angle. His focal point antenna's front-to-back ratio when double screen reflectors are required on the low channel model is 24 db; on the high channel model, 30 db.

The Tropo-scatter antennas are designed to withstand a wind pressure of 100 miles per hour with a half inch ice load according to the manufacturer. The base load of the vertical sections is approximately 45,000 pounds per tower section.



Hosken's original 30-foot dish, which led to development of the curved-screen tropo-scatter design.

The vertical supporting members have a special design to give a smooth curve throughout the entire 60 ft. screen height.

The design of this antenna is not a true parabolic. If it were, the focal point antenna would have to be inside the aperture of the screen or, in other words, across its mouth. Such an antenna would allow only the reception of signals from one exact direction. The Hosken antenna, on the other hand, was designed to receive stations well off the immediate central axis while still having good power pickup.

The antenna is constructed by first accurately installing concrete bases for the front and rear tower supports. The next step is the installation of the towers: "It must be remembered," points out Hosken, "that the first towers installed in North Bay, Ontario, using this tropo-scatter method, took 9 months, during which I spent 3 months, at times at 20-below zero, in the field working on this installation myself. This personal work made me realize that a much faster approach was necessary. Next came the "A" frame technique. Even this meant thousands of spare pieces in the field and long periods of time assembling this jig saw puzzle. Many more months were taken to re-design the supporting members without changing any of the original patent and we have now come up with a product we are very proud of."

Hosken outlined a typical timetable of installation under good weather: One day required to bolt together all the various tower sections; one day to raise and secure by the use of cranes all the tower sections; the following two days are required on the installation of the 100' reflective screen.

While this screen work is being done, the Ajax plant is manufacturing the special focal point antenna. The exact distance of the focal point from the large curved screen is being plotted at the plant. The various focal points and antennas are completed and later installed.

With many of the installation problems solved by prefabrication, and years of design engineering now behind the tropo-scatter antenna, it has a promising place in the future of U.S. and Canadian CATV—as does Hosken Cable TV Antennas Ltd. □

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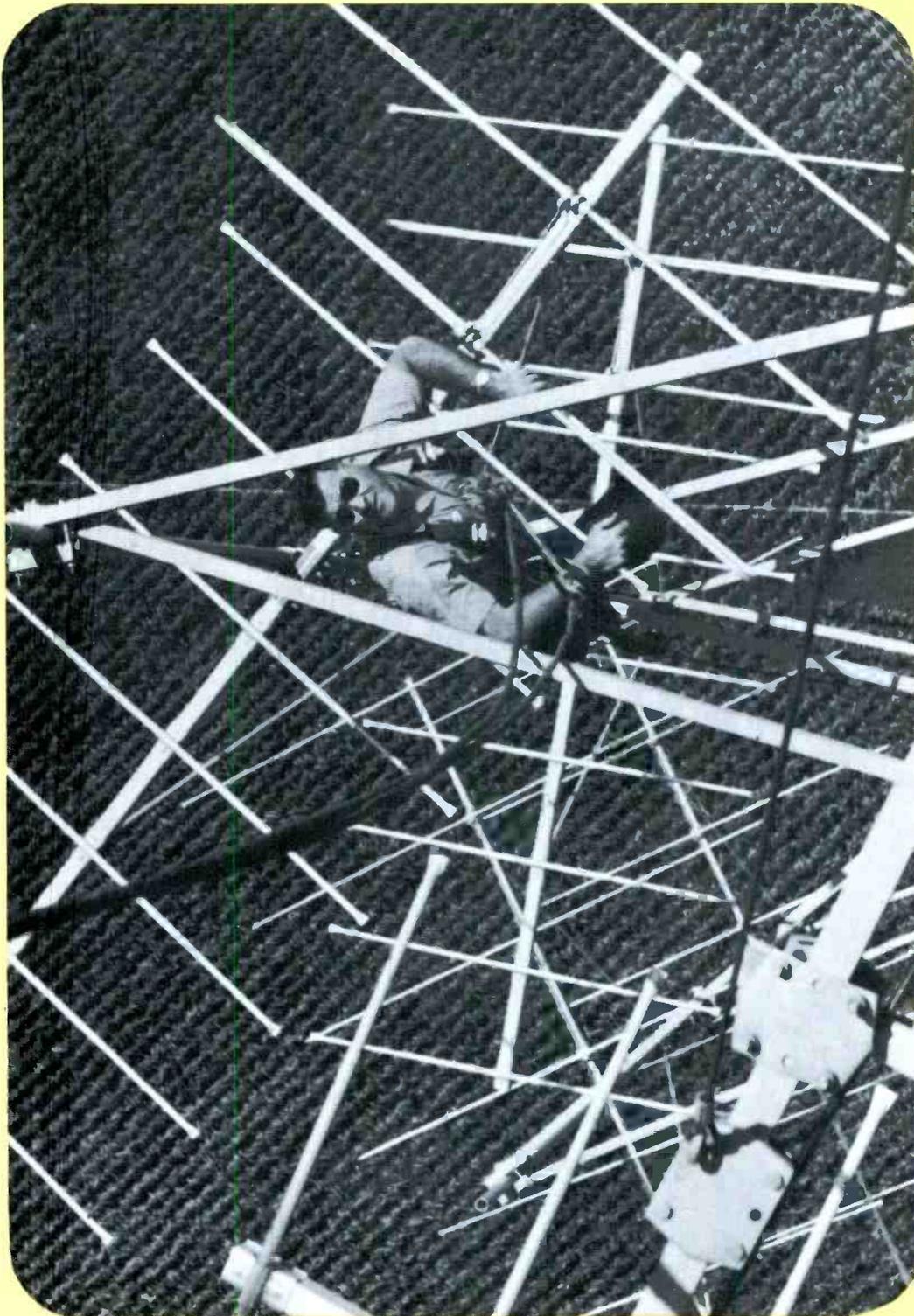


Photo courtesy of Cox Cablevision Corp.

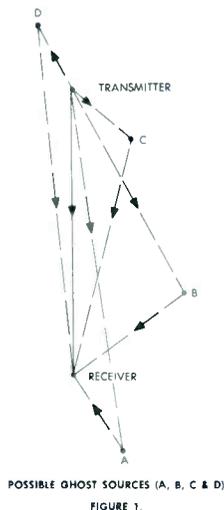
- Removing Off-Air Ghosts
- Sweep & Level Setting
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# REMOVING OFF-AIR GHOSTS

By James B. Wright



One of the most frustrating problems for a system engineer is that of ghosts, or reflections, received along with the desired TV signal. If the direction of arrival of the ghost is substantially different than that of the prime signal (A or B, Figure 1) it can usually be removed by antenna phasing such as one would phase for co-channel interference. However, when the ghost originates near the transmitting antenna (C or D, Figure 1) other techniques must be sought.



In seeking to remedy such interference, one must not mistake "ringing" for ghosting. Ringing is caused by high-Q circuits such as traps or filters and results when abrupt changes in the video level (e.g. black to white) shock excites the circuit into damped oscillations and appears as in Figure 2-b. The transmitted signal usually contains a slight amount of such ringing, however, the bulk of the ringing seen in CATV systems is generated in the head-end of the system (by tuners, demodulators, traps, etc., which are improperly tuned) or by the TV receivers. The characteristic appearance of a pulse of video degraded by ringing is shown in Figure 2-b, as it would appear both on a television set and an oscilloscope. Such degradation can only be corrected at its source through proper alignment and/or design.

Figure 2-a shows both TV receiver and scope presentations of true ghosting. Such ghosts can be caused by transmitter to antenna reflections, by multipath reception, by antenna-to-receiver reflections and by reflections from poor terminations within the cable system itself. Such a ghost is nor-

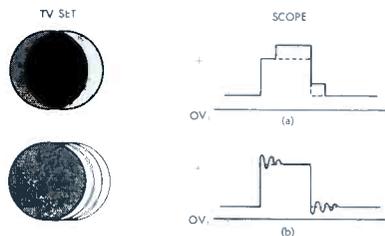


FIGURE 2. GHOSTING VS. RINGING

mally a solid picture of reduced intensity, superimposed over the prime picture and displaced (usually to the right) by  $\frac{1}{8}$ " to  $\frac{1}{2}$ " or more. Its appearance on the scope is as shown in Figure 2-a, in this case a positive type of ghost.

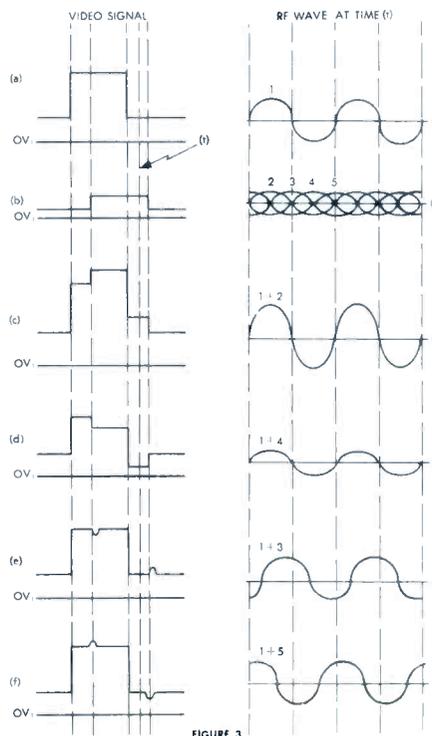


FIGURE 3.

Figure 3 shows the development of the typical positive and negative ghosts as well as the "ring" type of ghost (also either positive or negative). For clarity, Figure 3-a depicts a black, square pulse, of about 5 microseconds duration, on a grey background and a ghost (Figure 3-b) which is about 14 dB down and delayed by about 2 microseconds. Two RF cycles of each of the signals shown at time (t) in the first column of Figure 3 are shown in the second column. The ghost signal (b) is shown at  $0^\circ$ ,  $90^\circ$ ,  $180^\circ$ , and  $270^\circ$

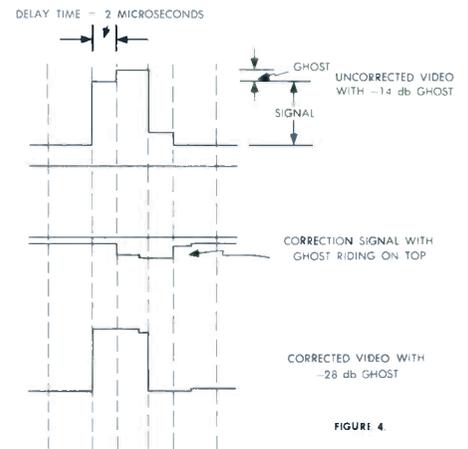


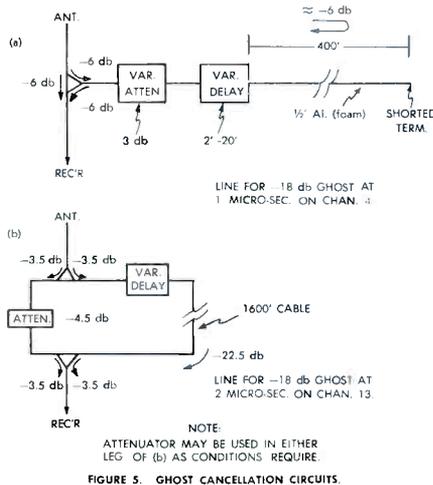
FIGURE 4.

with relation to the prime signal (a). Fig. 3, (c) through (f) show the effects of adding the combined signals to the ghost signal for each of the four phases. The  $0^\circ$  signal addition produces a positive ghost; the  $180^\circ$  signal addition produces a negative ghost; the  $90^\circ$  signal addition (leading) produces a sudden advance in the phase of the prime signal and produces a negative "pip" at the beginning of the ghost pulse and a positive "pip" (or "ring") at the end of the pulse; and the  $270^\circ$  signal addition produces the reverse effect of the  $90^\circ$  signal.

The cancellation of such ghosts involves taking a portion of the incoming signal, delaying it to the same extent as that of the "off-the-air" ghost, attenuating it to the same level as the offending ghost and mixing it with the desired signal in phase opposition to the ghost signal (see Figure 4).

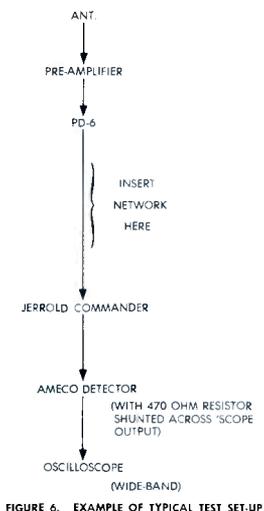
Because the phase and amplitude of the receiving ghost may vary somewhat with changes in the weather or season, the ghost cancellation network is provided with a variable delay and a variable attenuator.

Three possible networks are suggested in Figure 5. The cable used must have low attenuation to prevent excessive differences in loss across the channel being used and to minimize the insertion loss of the circuit as a whole. It may be necessary to precede the circuit with a pre-amplifier although amplifiers must not be used within the actual circuit itself as slight variations in gain would cause unbalance. Ghosts with short time delays can be cancelled with the circuit shown as Figure 5-a, however, as the delay time increases it will be necessary to use circuit shown as Figure 5-b, or to use three directional couplers instead of the single resistive splitter in the first circuit and to relocate the attenuator in the bypass leg thus created. This is necessary because the excessive delay requires long lengths of cable with the attendant losses and the generated ghost is weaker than required. The split path allows the basic signal to be reduced so that the cancellation may take place.



The test equipment used to observe the results may be simply a TV set or as elaborate as a high quality demodulator feeding a laboratory quality oscilloscope. Ideally, the corrected signal is fed to a good quality TV receiver and a demodulator (such as a Conrac or a Jerrold Commander) feeding a high frequency detector). The video output, without the 4.5 mcs. sound component, is connected to an oscilloscope with a delayed triggering circuit to permit viewing the equalizing pulses in the vertical sync interval. The test signals broadcast by the stations are very useful and consist of sharp (sin<sup>2</sup>) pulses, broad, square (window) pulses,

a "staircase" waveform, and others, all of which provide ideal conditions for analysis of the problem and for observing the effects of the correctional steps taken. Any good high-frequency scope will permit locking on the horizontal sync signal which will allow one to work on most ghost problems.



The test equipment is first set up as shown in Figure 6. A horizontal sync signal is obtained with a 7875 cps sweep which will look something like that shown in Figure 4. The delay time is very carefully calculated using expanded sweeps, etc., as this will determine the length of the cable to be used. The ghost and signal amplitudes are measured to determine the level of the synthetic ghost and the network then designed and roughed together. If cable losses cause the synthetic ghost to be weaker than required the variable attenuator is installed in the signal leg. Fixed pads are inserted as needed so that the variable attenuator may have a  $\pm 6$ db control range. The variable delay line (available from Jerrold) is used, in conjunction with short jumpers, if required, to adjust the RF phase of the synthetic ghost to a 180° out-of-phase relationship with the off-the-air ghost.

Ghosts can be cancelled or reduced to negligible levels. A good test set-up is essential and precautions must be taken to assure that the tuner-demodulator is not causing ringing or apparent ghosts. Before employing ghost cancellations, one should be sure that the transmitted signal is as clean as it should be; that the receiving antenna system is not creating ghosts; and that the ghost cannot be phased out by antenna design. Having constructed a ghost cancellation network, it will in some cases be necessary to adjust the variable attenuator and the variable phasing box to follow variation in the strength and phase of the received ghost.



BY J BENNETT

### INTERNAL CORROSION AND PIPE TOWERS

Will a tower constructed of steel pipe be safe after a few years of service or will it be weakened by internal rusting? of course this depends upon the construction of the tower. Galvanized pipe towers are "open member" constructed to allow the inside of the pipe to be coated. Towers that are painted only are hermetically sealed to prevent internal corrosion. By utilizing some of the trusty info learned in chemistry class we can visualize basically what happens inside a sealed pipe.

Hydroxyl ions combine with ferrous ions to produce ferrous oxide (Fe(OH)<sub>2</sub>). As the supply of oxygen in the tube becomes exhausted the ferrous hydroxide dehydrates and oxidizes to form Fe<sub>3</sub>O<sub>4</sub>. Further oxidizing produces Fe<sub>2</sub>O<sub>3</sub>. It is not possible for the air inside a hermetically sealed pipe to contain enough moisture and oxygen to cause damage before the reaction is in equilibrium. Had there been a corrosive gas present when the pipe was sealed it would also be neutralized by ferrous ions and the reaction would stop.

Towers whose members are open and permit the passage of water must be protected on the inside by painting or galvanizing (the latter is definitely preferred). Galvanized towers must have their members open because the internal pressure produced by the expansion of the air inside a sealed pipe as it is being dipped would be so great it could rupture.

Every once in a while someone says "what about condensation?" This is possible in an "open member" constructed tower because all of the necessary elements are available. On the other hand, in a hermetically sealed pipe tower, condensation cannot occur because the available moisture will be used up as shown earlier. Even before the above reaction occurs the amount of moisture that could be produced by condensation is minimal. □

# SYSTEM SWEEP AND LEVEL TESTING

By I. Switzer

Accurate setting of system operating levels and tilt is often a problem when working with broad-band systems. Amplifiers are usually aligned on the bench to have the proper response for their intended position in the distribution network. Level and tilt controls are then touched up manually after installation in the line, to bring the amplifier output levels to the designed values. This usually involves considerable dial twisting with field strength meters, constantly retuning them from high to low channels while touching up the amplifier tilt and gain controls. We have developed a method that sets amplifier tilt and gain in the same operation and assures accurate set-up in broad-band CATV systems.

A CATV system is basically a cable distribution system containing amplifiers which make up for the attenuation of the cables. Amplifier response must exactly compensate for cable loss at each frequency. The combined system of cascaded amplifiers and cable sections must have a frequency response from one end to the other which is essentially flat. Flat response does not imply that the system will be operated with "flat outputs", i.e. that amplifiers will operate with all channels at the same output level. The requirement that the distribution system have flat response holds true no matter what scheme of output levels is finally used — flat, half tilt, full tilt, or any other arrangement. Once the distribution system has been adjusted to have flat overall frequency response, the desired tilt condition can be obtained by adjusting head-end output levels. In a properly adjusted system, the output at each amplifier will follow the levels set at the head-end.

The sweep techniques employed for adjustment of individual amplifiers on the service bench can be extended to the system as a whole. A sweep frequency signal is fed into the system at the head-end instead of the normal head-end TV signals. The sweep signal can be observed down the system at successive points and each amplifier in turn can be adjusted to give the

desired flat response at the desired operating level. It sounds simple, and actually it is, after you take care of a few practical problems that arise:

(1) Synchronizing sweep generator and oscilloscope, particularly in cable powered systems.

(2) Method of accurately measuring the RF level of swept frequency signals.

(3) Provision of suitable pilot carrier to activate the system AGC.

(4) Powering test equipment to check cable powered amplifier stations.

(5) Taking account of problems arising from jumper lengths, and simultaneous sweep and CW signals.

Nevertheless, system set-up using full system sweep technique is practical and has been found by our systems to be the fastest, simplest way of initially setting up a broad band system and subsequent checks on set-up.

Most CATV AGC systems use a pilot carrier to activate the system AGC. This pilot carrier may be outside the regular TV bands, or the system

pilot sources to be mixed, usually by a hybrid splitter, without any interaction. If several pilots are required or desired, several traps can be used in tandem to notch out the sweep at the pilot frequencies. Be sure that the traps used have flat response at all frequencies except that being trapped.

Very few sweep generators used by CATV systems have metered RF output. Sweep output level cannot be checked by conventional field strength meters. We use a comparison technique to check the level of any sweep display. Figure 2 illustrates the equipment set up. One section of a high speed RF switch is used to alternately feed sweep and a standard CW signal to an RF detector. Thus the detected sweep and the detected CW signal are alternately displayed on the 'scope screen. We prefer 'scopes with DC response for this type of work since the base line for each display remains the same. The standard CW signal is then adjusted until its detected level as displayed on the 'scope coincides with the detected

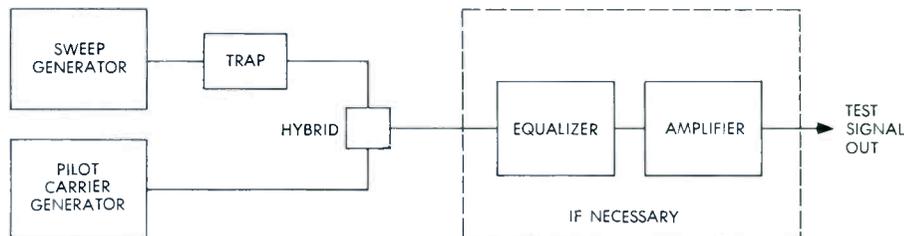


FIGURE 1. Composite sweep and CW pilot signal source at head-end.

may use one of the standard TV carriers as a pilot. In either case, levels cannot be accurately set without presence of the required pilot carrier. In this sweep testing system we provide the required pilot carrier on a continuous basis by mixing the carrier with sweep signal. Direct mixing would cause serious beat problems whenever the CW pilot signal and the sweep signal coincided. We solve this problem by trapping a deep "notch" in the sweep signal at the pilot frequency. We use an ordinary "High Q" trap for this purpose, tuned to pilot frequency. This permits the sweep and

sweep signal. The sweep signal and the standard CW signal then have equal level.

This reference standard CW source can be any source whose level can be accurately determined or set. It can be a lab type signal generator, or an uncalibrated CW generator whose output is monitored by a suitable RF voltmeter. The frequency chosen for this reference can be any frequency within the flat response range of the detector. We often use a low cost RF signal generator whose output is amplified by a small amplifier and is monitored by a FSM through a calibrated splitter. Pads

are used to assure that the generator is working into a fairly constant load, so that the monitored level does not vary as the high speed switch switches from the detector load to no load and back again. We often use a CW frequency at about 65 mc. but any frequency can be used that is within the detector flat response range and that can be conveniently and accurately measured.

The test signal is set up at the head-end by combining the pilot carrier and sweep sources as shown in Figure 1. The level of the pilot is adjusted using the field strength meter to the normal system operating level for this carrier. The sweep level is then adjusted by measuring it at the test output by means of the switching system just described. The sweep display as observed at the combined sweep/pilot output will be high because the detector is flat in response and is continuously adding the sweep and pilot signals. If the pilot and sweep signals are to be the same level, the observed level on the scope when compared with the standard reference will appear 3 db higher than the actual sweep level. The detector is continuously adding the two equal energies of the sweep and CW signal and the detected output therefore appears to have double the expected level, hence

indicates 3 db high. The following numerical example will illustrate.

Suppose that the pilot generator is adjusted to indicate + 35 dbmv at the test source output. It is desired to set the sweep level to + 35 dbmv also. The sweep level may be adjusted with the pilot turned off by comparing it to a known standard using the switching

be checked by direct measurements with pilot on and off. Similar corrections must be made if more than one CW pilot is added to the sweep. The dbmv levels may be converted to power (watts), added, and converted back to dbmv levels in the standard 75 ohms.

A complication may arise if the distance from the head-end to the first

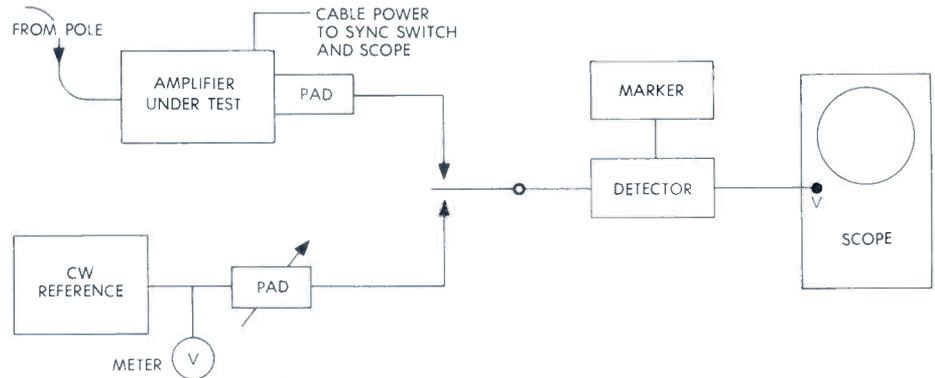


FIGURE 2. Equipment arrangement for setting amplifiers.

method described. If the pilot is now turned on, the display will be seen to increase in level and when checked against the standard will be found to be + 38 dbmv. If the pilot is operated at lower levels this effect will be reduced. The correction to be applied may be calculated from the relative levels of sweep signal and pilot or may

amplifier is "non-standard." This sometimes occurs when designers wish to take advantage of the high output capability of some types of head-end equipment. A system may be designed so that the spacing between its main line repeater amplifiers is normally 20 db at channel 13. The spacing between the head-end and the first amplifier

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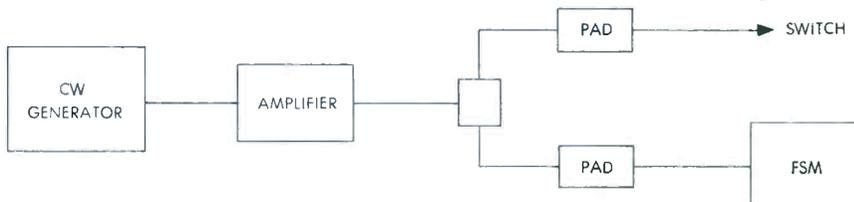
**INDEPENDENT SPECIALISTS IN CATV CONSTRUCTION AND ENGINEERING**

may be made 40 db at channel 13 to take advantage of the high output capability of the head-end equipment. In such a case, the sweep generator may not be capable of matching the high output levels of the head equipment on the high channels (possibly + 55 dbmv), and it may be necessary to boost the sweep output by using a flat broad band amplifier. A tube "distributed" type amplifier is very suitable for this purpose. A passive equalizer is usually also required in such a case to correct for the extra 20 db of cable between the head-end and the first amplifier. The equalizers often supplied for use with "distributed" type amplifiers are suitable for this purpose. They should be carefully adjusted for the particular excess spacing encountered. If the head-end output is the same as that used for subsequent amplifiers, the problem does not arise.

Synchronization of sweep and 'scope is not a problem when tube type equipment is used and there is 115 V AC power available at each amplifier station. The 'scope sweep may be driven from the line and phased to provide proper display. The high speed switch can be similarly synchronized. When cable powered amplifiers are used, it becomes necessary to power the test equipment from a truck mounted in-

verter or generator of suitable capacity, and there is no longer a link to the common AC power system on which to establish synchronization. This link can, however, be restored by simple modifications to the 'scope and high speed switch. Most 'scopes and switches

voltage through the small filament transformer. The DPDT switch connects either the external transformer or the internal one to provide the sync voltages depending on whether the 'scope is being powered from the truck generator or from normal power lines.



**FIGURE 3.** Typical set up for CW reference source. CW generator drives amplifier which drives splitter. Two identical pads (typically 10 db) in output legs provide constant loading for amplifier. FSM monitors the reference level.

derive their 60 cycle drive for synchronization from the filament winding of the power transformer. We have modified our 'scopes and switches with a DPDT switch which permits connection to an external source of 60 cycle synchronization. If the equipment is to be used on 30 volt cable power we install a small transformer in each instrument that will step the 30 volt AC down to the 6 volts usually provided by filament transformer. A small 115 volt to 25 volt filament transformer will provide the necessary step down ratio. A suitable jumper wire connected to the cable power in the amplifier under adjustment provides the synchronizing

We have been using cable power systems that used normal sinusoidal waveforms. Any distortions in the waveforms used for cable power, caused either by the use of regulating transformers or by voltage drops along the cable will still permit the system to operate but will cause the frequency scale (horizontal) to be non linear. Frequencies can still be identified by the use of a marker generator.

When the test signal source has been set up and the test equipment suitably modified to permit synchronization from the cable power we are ready to start system adjustments.

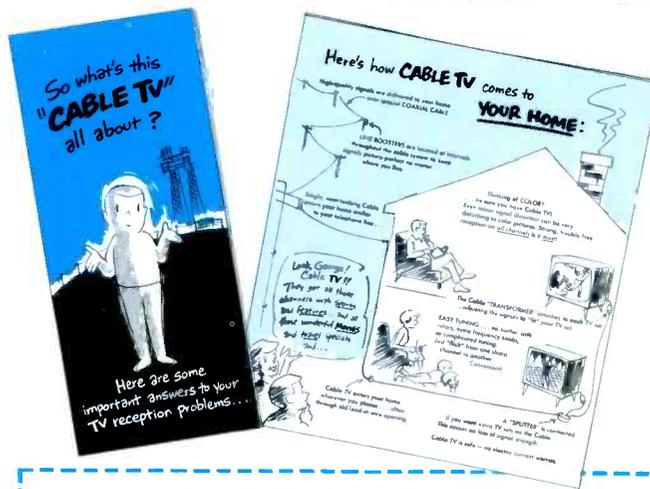
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Detail of technique at amplifier stations will depend upon local circumstances. If amplifiers are mounted in cabinets using jumpers to connect to the main lines, the amplifier may be brought down to the service truck and connected to the cabinet with a jumper cable. This jumper cable should be as short as possible and should be a good, low loss, flexible cable. In systems where power and signal may come from separate directions it may be necessary to use an adapter in the cabinet to permit power through the cabinet while diverting both power and RF into the jumper cable to the truck. Power passing pads may be used to reduce effect of mismatch of jumpers and special test fixtures. Attenuators so used should be taken into account when setting operating levels. Signal output of the amplifier can be observed on the 'scope using the switch to compare with standard CW generator. The amplifier tilt controls can then be adjusted to give the desired flat response and the gain controls adjusted to give the desired operating level.

The test system operates as though it used flat output, i.e. amplifier has same output level at all frequencies. Once the system is set up the desired mode of tilt is attained by adjusting the head-end levels.

If a "bucket" truck is available, it may be feasible to mount the test equipment in the bucket, with a suitable shade to permit 'scope observation, and lift the whole test equipment up to amplifier level. Amplifiers could then be adjusted in place in their cabinets by connecting to the monitor test points. These test points are usually 20 db down from output level. This usually produces a level too low for use with ordinary detector and 'scope systems. A good quality flat broad band amplifier, of known gain, such as a good "distributed" amplifier, could be used to boost this test signal back up to more convenient levels. This amplifier should be adjusted for good flat response and its gain accurately determined. It should have well regulated power supply so that gain remains constant under varying power supply conditions.

Setting of tilt and gain controls becomes very easy under this system. The CW generator is set up to give the desired reference, and gain and tilt controls are then adjusted so that amplifier display is suitably flat and coincides with the reference generator display. Any "holes" developing in system response soon become apparent and their sources can be tracked down and corrected. The pilot generator assures that the AGC system is properly activated and permits adjustment of AGC stations under proper operating condi-

## CABLE SYSTEM SAFETY

By Jack Pruzan  
Pruzan Company

### PROTECTIVE EQUIPMENT

#### PART I, HARD HAT AND GLOVES

Protective equipment for the CATV lineman includes both items he will wear on his own person and items used for external protection. Primary items in the first category are hats, gloves, belts and straps.

Not too many years back many utility men scorned hard hats, but fortunately this hazardous attitude has been almost completely corrected. Almost all utilities, including CATV, rigidly enforce the hard hat rule.

However, there still is some lack of understanding on the type of protective hat to wear. No metal hats of any kind should ever be used in any CATV line work. Only non-conductor plastic hats should be worn. These should include an adequate inner suspension, and there should be sufficient clearance between the suspension and the top of the hat. This space is what provides the protection from falling objects. Care should be taken to secure comfortable fit both on the hat and the chin strap, and the chin strap should be secured during wind storms or hazardous situations.

Rubber gloves and leather cover gloves are most important protective items for the CATV lineman. I can hear a lineman asking, "Why would I want 15,000-volt gloves when I never come in contact with anything close to that voltage?" The answer is that we must always protect for the potential voltage as well as that with which we come in contact daily.

I had a good friend who was a seasoned veteran lineman. One day a few years ago he was ground foreman on a line job, and was paying out high-strength messenger. Suddenly the end of the line flipped up and made contact with high voltage. My friend was electrocuted immediately. I am sure he thought there was no danger, but his life could have been saved if he had been wearing rubber gloves.

Properly fitted cover gloves protect the rubber glove so it will not be subject to abrasion, tears or other damage that would destroy the rubber glove's protection. Most protective gloves are of horse hide or goat skin. Both rubber gloves and cover gloves should be stored in a canvas bag, clearly marked. Then the lineman will provide maximum protection for his gloves and will have them always within easy access.

Rubber gloves should be tested at least once a year by an authorized testing agency. At any indication of the glove's failure to withstand the voltages for which it is intended, the gloves should be destroyed or replaced immediately. This testing service often is provided by larger utilities at a nominal charge.

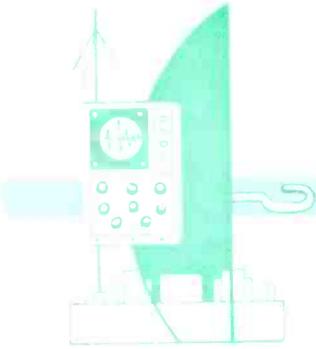
Ordinary work gloves are not considered in this series on safety and protective equipment, except to emphasize that they do not replace either rubber or cover gloves for the CATV lineman.

In the next article we will discuss the lineman's climbing equipment—belts, straps, climbers, gaffs, pads, etc.—all of which are of great importance to the safe performance of his work. □

tions. Pilot level can be verified at any time by connecting the field strength meter. The presence of the sweep signal does not materially affect field strength meter readings of the CW signals. The presence of the CW carrier does, however, affect the apparent level displayed on the 'scope, and must be taken into account as previously explained.

The method has been used very successfully by several of our systems for the initial set-up before starting subscriber service. Subsequent checks of set up either require taking the system out of service or must be perform-

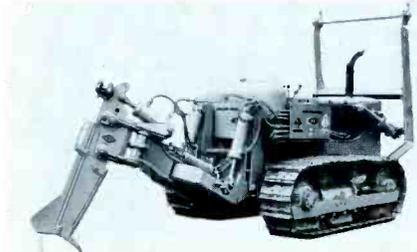
ed after normal television service hours. Variations in technique to suit a particular form of cabinet or amplifier will become apparent to technicians studying the basic method. The basic principles are use of traps to permit mixing sweep and pilot signals, and use of switch comparison technique to permit easy accurate determination of sweep signal levels at any point in the system. Test equipment must be modified to permit powering from truck power but synchronization from the cable power. Synchronization power used is very small and has no loading effect on the cable power system. □



# PRODUCT REVIEW

## OFFSET CABLE LAYER

A new, offset Cable Layer, Model OCLR-HD-II, designed for use on AC-HD-II tractors, has been introduced by American Tractor Equipment Corporation, Oakland, California. A hydraulic linkage device situated between the tool beam and the cable plow, can move the shank up to 24 inches to the right or left of center, permitting the operator to lay cable close to buildings, poles, driveways, pavement, and other fixed obstacles.



According to the manufacturer, a front mounted, ATECO hydraulic reel carrier results in a well balanced load distribution on the tracks for easier steering and longer track life. Shank lengths and cable tubes are available in many sizes.

## VIKING/UPI "NEWS-A-RAMA"

Viking Industries and United Press International have announced production of the "News-a-rama" 24 hour, continuous and instantaneous news service for the CATV industry. The "News-a-rama" accepts locally produced news to be run over the same channel connected to the UPI printer. The printer is designed with a type compatible with CATV system operation. The "News-a-rama" is now available for purchase or leasing. The price of the "News-a-rama" is available upon request.

## NEW CATEL MODULATORS

Catel CATV Co. has announced the development of an FM modulator and a Stereo Multiplex modulator for use in CATV systems. Both units are completely transistorized and crystal con-



trolled with built in modulation meter. Rack mounted with self contained power supply, they are priced at \$250 and \$350. For additional information contact Catel CATV Co., 1375 Laurel Street, San Carlos, California 94070.

## 5-IN-1 SUPPORT CLAMP

Because of its exclusive "flip-over" feature, Superior Cable's new support clamp can be used with five different sizes of IM (figure 8) facilities.

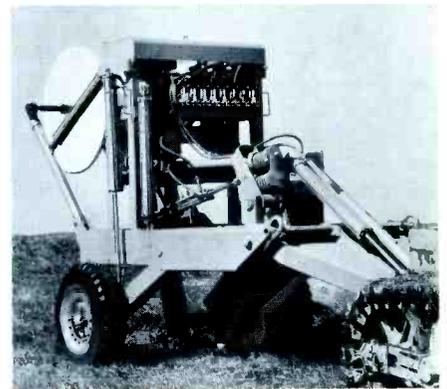


One groove accommodates insulated stranded support members of 1/4" and 5/16" diameters. Flip it over and the other groove accommodates insulated solid support members of .109", .134" and .148" diameters. Installed with 1/2" or 5/8" standard through-

bolt, the design of this aluminum clamp prevents spiral migration and longitudinal pull-through; the clamp grooves hold securely yet minimize insulation crushing, according to the manufacturer. For cross-arm installation, a cross-arm bracket assembly is available. Catalog designation of this tangent support clamp is IM-931, accepted by REA per Specification PE-48. For product data bulletin and technical report, write Product Manager, Systems Equipment Division, Superior Cable Corporation, P.O. Box 489, Hickory, N.C.

## MAINLINE CABLE PLOW

A heavy duty plow designed for line contractors has been introduced by Midwest Lawn-Saver Equipment Co. The mainline plow will reportedly place distribution facilities 52 inches underground with minimal surface disruption at speeds averag-



ing 1 1/2 miles per hour. Eight hydraulic controls permit control of depth, angle of plow attack, colter pressure, plow bed level on rough terrain, and self-loading of cable reels up to 8 feet in diameter, 4 1/2 feet in width. Contact Midwest Lawn-Saver Equipment Co., Box 588, Appleton, Wisconsin 54911.

## MODULAR PARTS CABINETS

A "Modular System" of small parts storage cabinets manufactured by Akro-Mils, Inc., of Akron, Ohio, has been designed to expand from a single cabinet into a complete storage center to meet both immediate and future parts storage requirements. The uniform 17 7/8" wide cabinets can be stacked like building blocks, horizontally or vertically, to fit available space. "See-Thru" or "X"-tra heavy-duty, high-impact drawers are available in six different sizes. Cost of these Modular cabinets ranges from \$12.48 to \$20.00 each, plus shipping charges. For further information write Akro-Mills, Inc., Box 989, Akron, Ohio 44309, requesting Catalog No. 7-1.

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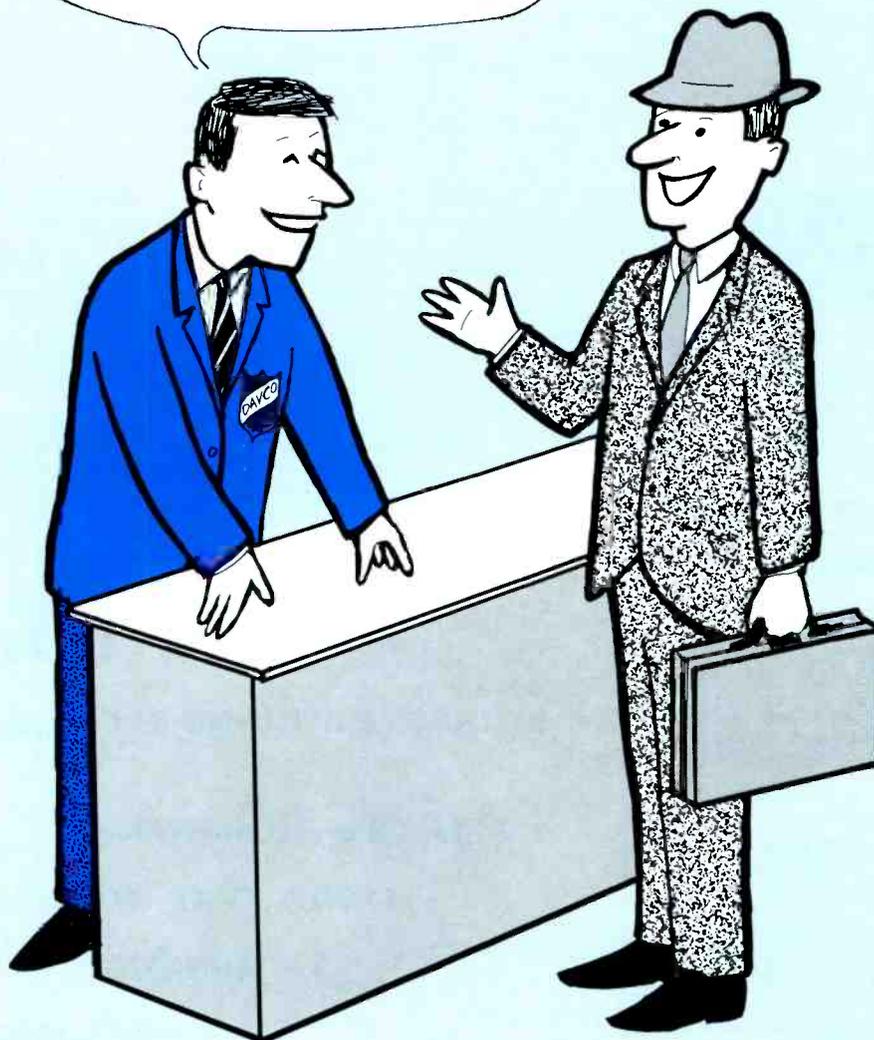
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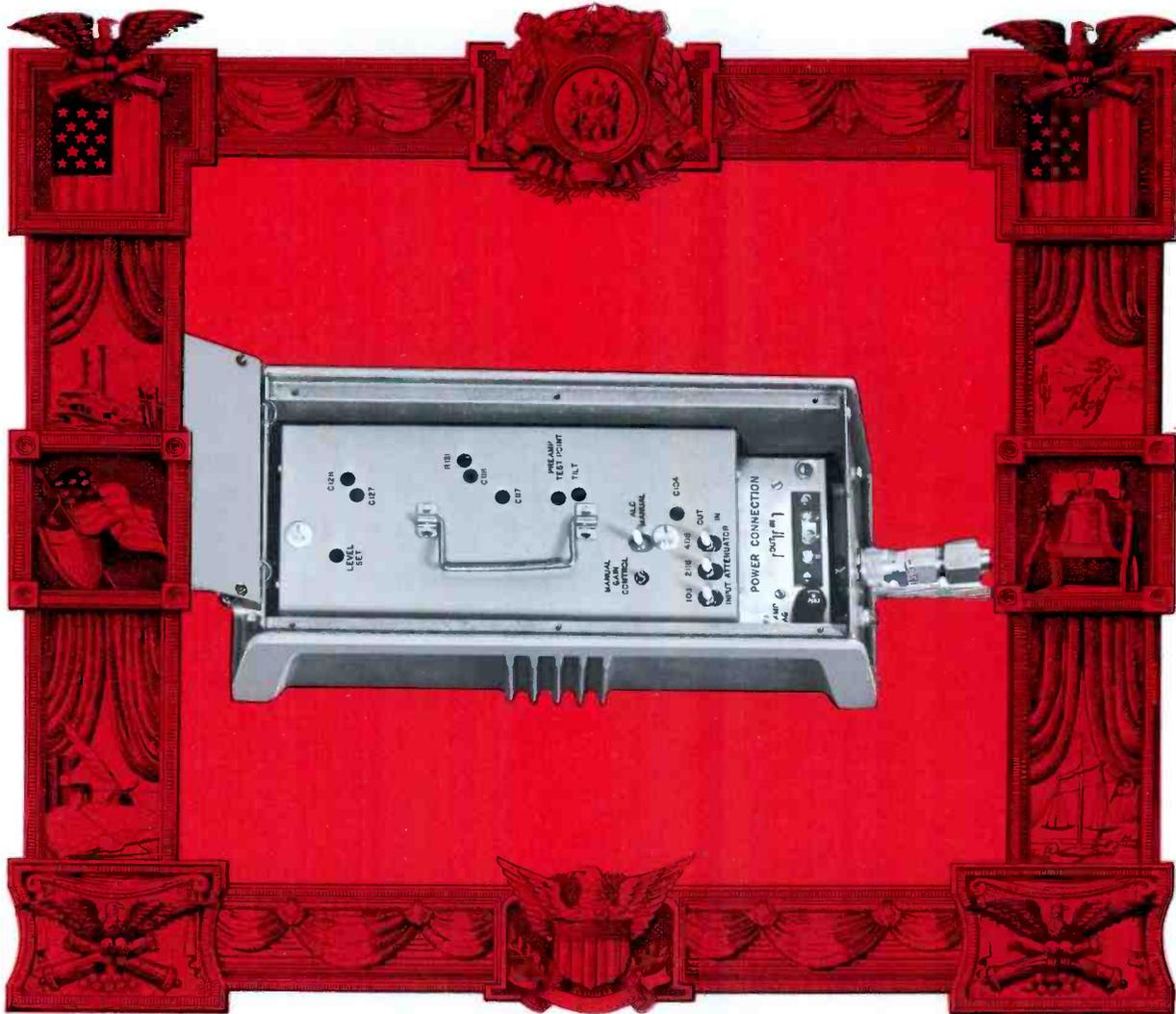
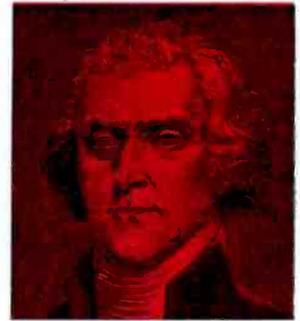


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