April '74 vol. 10/ No. 2

# CABLECASTING
## Cable TV Engineering

SCTE
The official journal of the
SOCIETY OF CABLE TELEVISION ENGINEERS



$E_{AC}$

$10 \log_{10}(\frac{4}{BW})$

$$\text{percent modulation} = \frac{100\ (E_{max} - E_{min})}{2\ \ (E_{max} + E_{min})}$$

$$\frac{50\ E_{AC}}{E_{DC}}$$

$\log_{10}(\frac{4}{BW})$

$$\text{percent modulation} = \frac{100\ (E_{max} - E_{min})}{2\ \ (E_{max} + E_{min})}$$

analysis of

# THE FCC REPORT AND ORDER AMENDING CERTAIN PERFORMANCE TESTS AND TECHNICAL STANDARDS FOR CABLE TELEVISION SYSTEMS

# COMMUNICATE MORE CONSUME LESS

VIDCOM

## INTERNATIONAL MARKET FOR VIDEOCOMMUNICATIONS

**PALAIS DES FESTIVALS - CANNES - FRANCE - SEPTEMBER 16-21, 1974**

AN EXHIBITION FOR HARDWARE (Videocassettes, Videodiscs, CATV equipment, light equipment for program production)

A MARKET FOR SOFTWARE (standard and in-house programs)

A CONFERENCE centered on communication methods to meet needs in

Training, Education, Information, Promotion, Entertainment and Culture

VIDCOM 74 will gather:

— 4th VIDCA, (International Market for Videocassette Videodisc Programs and Equipment)

— 2nd MICAB, (International Market for Cable Television)

and

1st MIP-FORM, International Market for Multi-Media Training Programs

**BERNARD CHEVRY**
Commissaire Général

**XAVIER ROY**
International Manager

**FRANCE :**
3, rue Garnier
92200 Neuilly
Tél. : 747.84.00 +
Telex : 21550 Systele
Paris - Ext. 171
**Dominique Latard**
Représentant
international

**GREAT-BRITAIN :**
1 Lucerne Mews
London W 8 4 ED
Tél. : (01) 727.74.47
**Rodney Buckle**
Représentant
international

**U.S.A.**
250 West 57th ST
Suite 1103
New York N.Y. 10019
Tél. : (212) 489.13.60
Telex : 235 309 OVMU
**John Nathan**
Représentant
international

# CABLECASTING

## Cable TV Engineering

April '74 vol. 10/ No. 2


## Contents






CABLECASTING — Cable TV Engineering, the official journal of the Society of Cable Television Engineers, is published bi-monthly by the C. S. Tepfer Publishing Company, Inc., and is circulated to all members of the SCTE, the chief technical personnel, managers, owners and operators of all CATV systems, and appropriate consultants, distributors, manufacturers and government and military agencies.

Controlled circulation postage paid at Bridgeport, Conn. All notices pertaining to undeliverable mail or subscriptions to be sent to the publisher, C. S. Tepfer Publishing Co., Inc., at 607 Main St., Ridgefield, CT 06877.

# NEW PRODUCTS

### AUTOMATED TV INFO SYSTEMS

Data Concepts, Inc. (80 West Truman Av., Salt Lake City, Utah 84115) announces the availability of a new line of automated television information systems for cable television. Included are an automated color character generator, local time and weather, international newswire services, computer data input, local and remote keyboard messages with expanded memories, and stock market quotations.

• • •



### AERIAL/PEDESTAL MOUNTING TAP


The Magnavox ACTV Division (100 Fairgrounds Dr., Manlius, N.Y. 13104) is now marketing the MX-3700 aerial/pedestal mounting tap which offers ten values of two-output and ten values of four-output modules. These units come with "sealport" shoulders on all connector bosses for shrink-tubing application and contain separate RF barrier and moisture exclusion gaskets. They are designed for for two-way system application and come in 3dB values from 5 through 35dB.

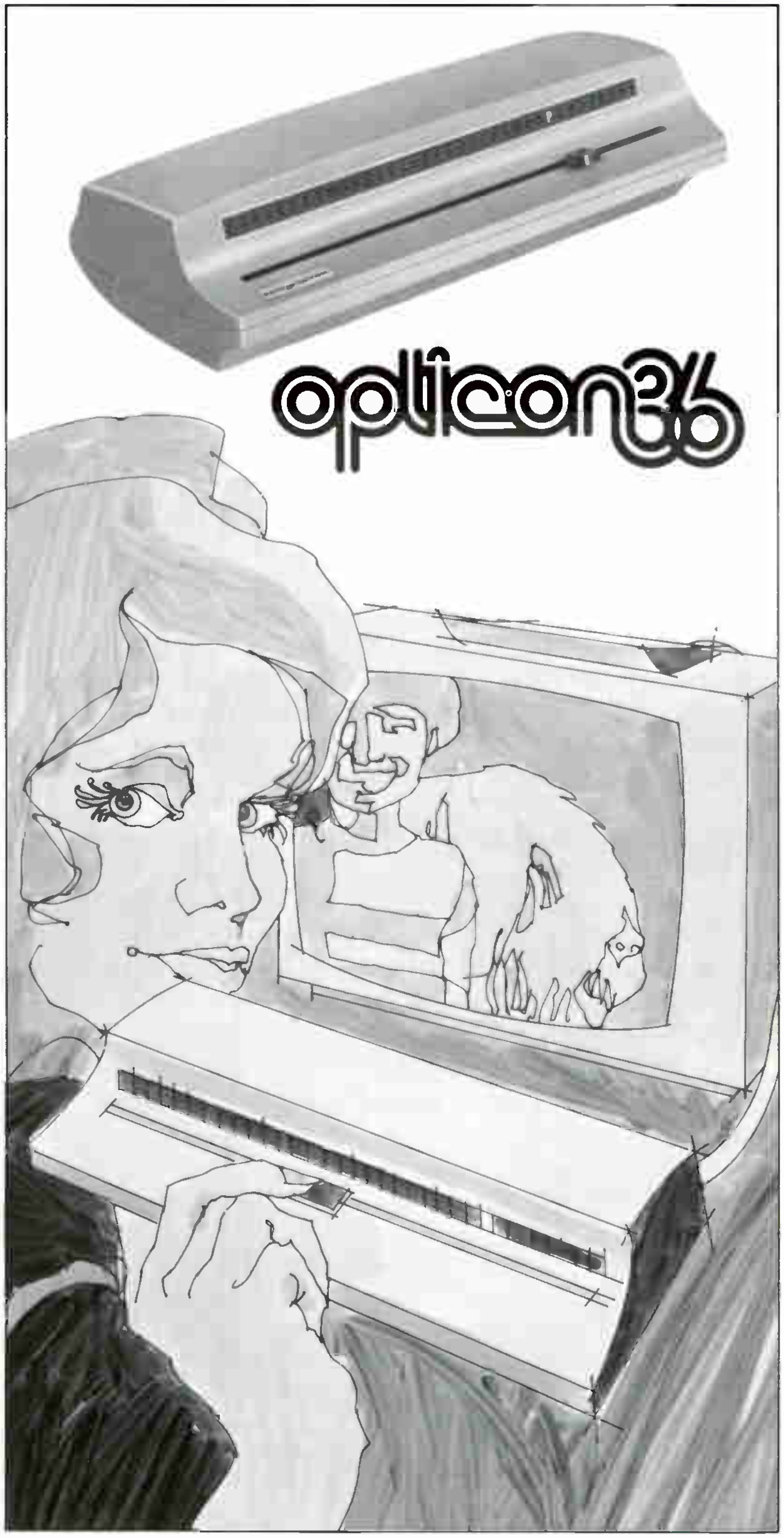
• • •

### HIGH DENSITY AREA AMPLIFIERS


Theta-Com of California (P.O. Box 9728, Phoenix, Ariz. 85068) now has two new forward amplifier modules that are designed to answer the need for a trunk amplifier in high density areas. Model XR2AF is an automatic gain control unit and Model XR2MF is a manual version. Nominal spacing of the units is 14dB cable plus 8dB flat for a recommended total loss of 22dB. They have a range of 8 to 16dB cable and 6 to 14 dB flat loss. A plug-in equalizer and pads are also available when needed for spacing other than nominal.

• • •

# CONVERT TO MAGNAVOX




**1st WITH REMOTE PUSH-BUTTON CONVERTERS**
**1st WITH VARACTOR CHANNEL TUNING**
**NOW!**

- ☐ 1st With the 36-channel optically tuned converter.
- ☐ 1st with field convertible remote or set-top choice.
- ☐ 1st with memory fine tuning, adjust once and forget.
- ☐ 1st with standard polarized auxilliary a.c. outlet.
- ☐ 1st with one-piece positive detent channel selector slide.

Magnavox brings you OPTICON 36. A converter so simple and reliable that it may outlive your subscribers. Revolutionary polarized-light tuning mechanism with only one moving part to change channels offers the ultimate in ease of operation and freedom from maintenance.

- ☐ Complies with or exceeds all applicable standards; FCC, CSA, UL.
- ☐ Optional channel 2, 3 or 4 output, AFC and on/off switch.
- ☐ Large back-lit channel numbers, no guesswork.
- ☐ Quality LDR photocells, no brownout effects, ever.
- ☐ Channels field-detunable for premium system security.

Get complete specifications on the converter you've been waiting for, simply fill-in and mail the card below:

## MAGNAVOX MEASURES-UP

FIRST CLASS
Permit No. 16
Manlius, N.Y.

**BUSINESS REPLY MAIL**
No Postage Stamp Necessary if Mailed in the United States

Postage will be paid by:

**MAGNAVOX catv division**
100 Fairgrounds Drive
Manlius, N.Y. 13104

# analysis of

# THE FCC REPORT AND ORDER AMENDING CERTAIN PERFORMANCE TESTS AND TECHNICAL STANDARDS FOR CABLE TELEVISION SYSTEMS

**BY Delmer C. Ports**

**Vice President & Technical Director, NCTA**

The FCC recently adopted a Report and Order under Docket No. 19659 relating to Sub-Part K of Part 76 of the Commission's Rules and Regulations with respect to Performance Tests and Technical Standards. This order amended the requirements for performance testing of certain technical parameters of cable systems. This action was originally initiated by a petition NCTA filed in late 1972. This petition was a request for an extension of the deadline for measuring, which was included as part of the original Report and Order establishing the existing rules under which all cable systems operate. NCTA later filed comments that included suggestions on modified testing procedures that would provide additional options for small systems.

In this recent Report and Order, the FCC chose not to define a "small system." Instead they extended the deadline for the first set of measurements until March 31, 1974. Also, the FCC made a distinction between new and old systems and made this a basis for a difference between the levels of effort for measuring requirements. The FCC also suspended the requirement for measurements that involve either expensive equipment or a clarification of intent or procedures and referred them to the Cable Technical Advisory Committee for recommendations.

The relief established for old systems (grandfathered) is actually a timetable spread over a two-year period allowing time for developing an increasing technical measuring capability. This was done rather than attempting to develop scaled levels of effort built around simplified measuring procedures.

The tests required by March 31, 1974 can be performed with a signal level meter. Those required by 1975 require the addition of a signal generator and an oscilloscope. Further tests required by the deadline of 1975 will require a frequency counter or an equivalent frequency measuring device.

The tests required of grandfathered systems for the March 31, 1974, deadline are as follows:

- Measurement of visual signal levels
- Measurement of aural signal levels
- Measurement of signal-noise ratios
- Radiation measurements

A discussion of measuring techniques using a signal level meter is included at the end of this report. If you know your system well enough, the requirement for the maximum and minimum levels over a 24-hour period can be satisfied by measuring at the maximum and at the minimum levels. If you do not know your system characteristics that well, some additional measurements may be required at first.

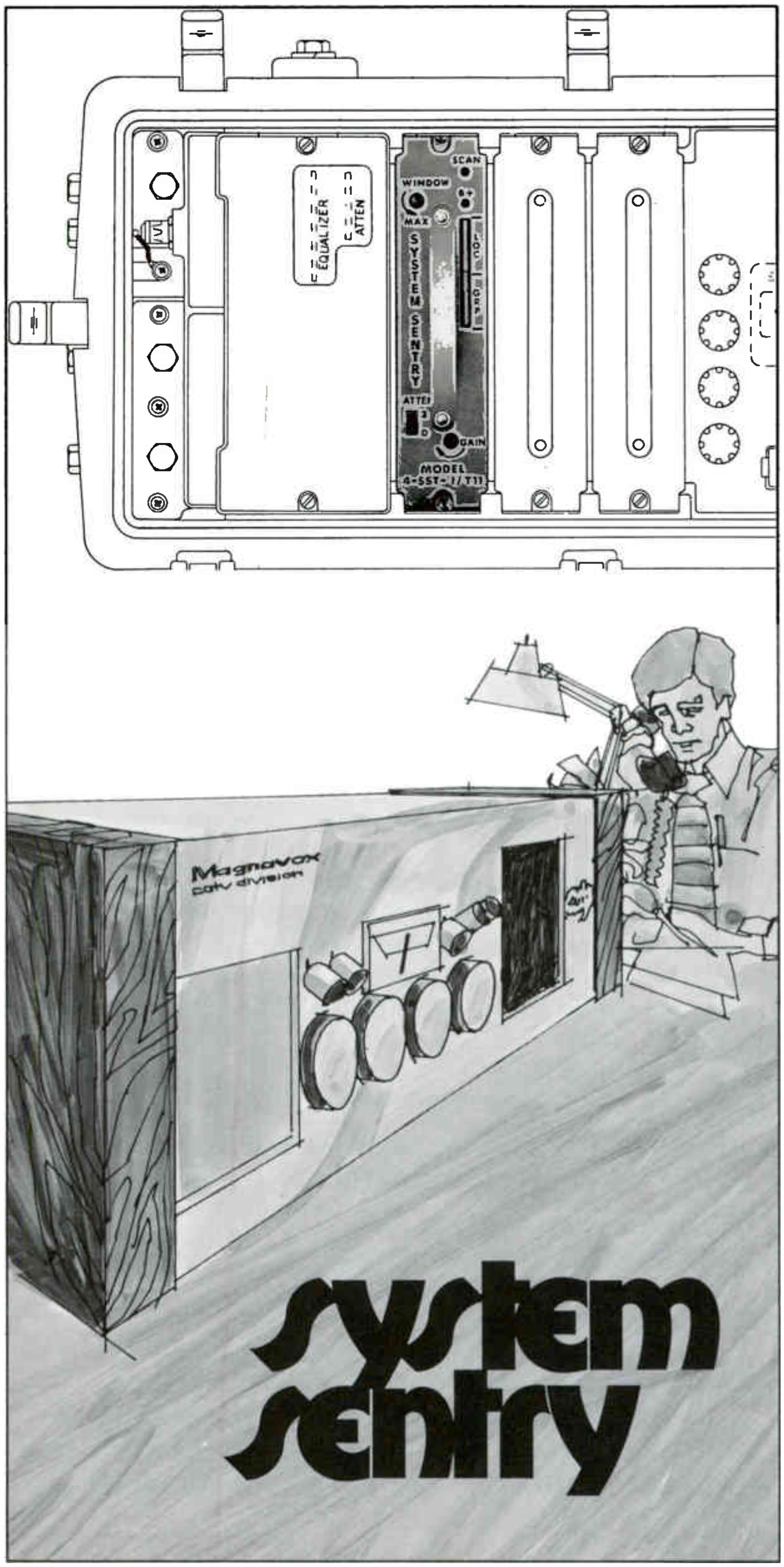
The additional tests required by the next deadline of March 31, 1975 are listed as follows:

- Measurement of hum levels
- Measurement of channel frequency responses
- Measurement of isolation between subscriber terminals.

These measurements require a signal generator and an oscilloscope as additional equipment. Discussions of permissible measuring techniques using these equipments are also included in a later section of this report.

By March 31, 1976, frequency measurements of the visual carriers will be required. The aural subcarriers need not be measured for Class I operation so long as it is translated directly from the received signal and not generated independently. The frequency stability required for the visual carrier is ±25 KHz. So, a relatively inexpen-

# ROLL BACK THE ENERGY CRISIS




Let Magnavox MX-404 System Sentry remote status monitor and alarm eliminate wasted fuel and maintenance manhours for you by pinpointing troubles early and completely. Dispatch only the help you need, when and where you need it. No futile searching and endless level checks. System Sentry is fail-safe and may be simply added to your present or future MX-404 distribution system whether you need to improve system reliability and problem response time with your present work force and equipment, or to reduce that expense without reducing quality.

- ☐ Control and Readout unit for any convenient spot, headend or hub; desk, bench or rack-mount.
- ☐ Transponder modules simply plug into any MX-404 mainstation with unused AGC/ASC function, up to 254 individually addressed locations.
- ☐ Bright, coded LED readout plus audio alarm let even non-technical personnel monitor system status; external output for strip recorder.
- ☐ Forward output level control and meter permit detection of imbalance, AGC swing; any serious level change indicating a potential failure.
- ☐ Forward interrogation on one channel at mean-band-center; reverse response on sub-VHF or any low-grade, inexpensive return path.

Ready to save fuel, manhours and money? Just fill-in and mail the card below:

## MAGNAVOX MEASURES-UP

### CARD USED?

Call toll free for literature or action—
from the East: (800)-448-9121
from the West: (800)-448-5171

OR CALL COLLECT
In New York: (315)-682-9105
In California: (213)-320-9705
In Colorado: (303)-795-0275

In Canada, call:
Can-Tech Electronics Co., Downsview, Ontario

sive frequency counter can be used for this 1976 deadline.

Since new systems (those not grandfathered) must comply with the existing FCC technical performance standards, the FCC felt that it was reasonable to expect them to perform the corresponding measurements at the time of completion of construction. This does not apply, however, to those parameters that were suspended pending the development of a recommendation by CTAC. These suspensions apply to both new as well as old systems. Those terms that were suspended relate to the measurement of co-channel interference, intermodulation, and cross modulation. The FCC expects CTAC to propose a position on these terms by June 1974.

It should be emphasized that the above timetable and the measuring procedures are options that are now available to cable systems in fulfilling their performance measuring obligations. If the necessary resources are already available for measuring any or all of these parameters by other means, you should do so. In no way is the use of spectrum analyzers or other valuable techniques excluded by this Report and Order. They are options, which you are free to use if the equipment is available to you. Be sure to keep good records of the measurements and the procedures. Considerable latitude is allowed in specific techniques so long as the approach is sound and the use is justified.

One acceptable method to measure the signal-to-noise ratio with a signal level meter is described below:

**Signal-To-Noise**

*Objective*: To accurately measure the ratio of visual signal level to system noise and to ascertain compliance with that portion of FCC standard of Section 76.605(a) (9).

*Equipment Required:*

1. Signal Level Meter (SLM).
2. 75-ohm Variable Attenuator with minimum range of 60 dB and minimum steps of 1 dB. If a Variable Attenuator is not available, use the SLM's built-in attenuators.

*Test Procedure:*

1. Place SLM on most sensitive range.
2. Switch in 60 dB of attenuation in Variable Attenuator.
3. Connect the actual output terminal of a distributional amplifier to the SLM input through the Variable Attenuator.
4. Tune the SLM to a peak reading at the center of the visual carrier for the channel to be checked. Adjust Variable Attenuator setting, SLM compensator setting, and/or SLM meter range to give a convenient reference reading, such as center scale, on the SLM.
5. At the headend, terminate the input terminal of the channel being tested with a 75-ohm termination resistor. Reduce the amount of attenuation in Variable Attenuator until a center scale reading is obtained on the SLM.

   NOTE: An alternative to the above step is as follows: Tune the SLM to either side of the visual carrier to a signal free area and reduce attenuation in the Variable Attenuator until center scale reading is obtained.
6. Record the amount of attenuation in decibels removed from the Variable Attenuator in the preceeding step. Subtract an average correction factor of 4 dB from this number to obtain the true signal-to-noise level in decibels.

   NOTE: When measuring noise levels, specified for a 4 MHz bandwidth in CATV, the SLM reads low by an amount given in decibels as $\log_{10}\left(\frac{4}{BW}\right)$, where BW represents the bandwidth of the SLM in MHz. The response to noise of the peak detector in the SLM causes a high reading. The overall correction required is to add 4 dB to the SLM's noise level reading. Experimental measurements indicate that this average correction factor of 4 dB holds true for the various typical Signal Level Meters. For greater accuracy in noise measurement, the individual SLM must be calibrated on a known noise source.

*Reference:* NCTA Engineering Standard 005-0669

Measuring techniques for hum, terminal isolation, and channel frequency response using a signal generator and oscilloscope with a signal level meter are given below: These will accommodate the second deadline in the timetable.

**Hum Modulation**

*Objective:* To measure undesired low frequency disturbances (hum or repetitive transients).

*Equipment Required:*

1. Signal Level Meter (SLM).
2. Oscilloscope.
3. CW Signal Generator.

*Test Procedure:*

1. At the headend, substitute an unmodulated carrier from the CW signal generator for the visual carrier of the channel under test.

Adjust level of the CW carrier to be equal to normal TV visual carrier level. For greater accuracy, the lower adjacent channel should be turned off or disconnected.

2. From the system's selected test point feed a signal into the SLM. Tune the SLM to peak at the unmodulated CW carrier. Adjust meter range, manual gain control or compensator setting until meter reads full scale.
3. Connect the SLM's video output to the oscilloscope vertical input with a shielded lead. To minimize stray hum loops, make sure that there is no other ground on the case of the oscilloscope. If it has a three-pin power plug, use a two-pin adapter which has no ground pin. Synchronize the oscilloscope to the "line" at a frequency of 30 or 60 hertz.
4. Place oscilloscope in direct-coupled mode. Adjust oscilloscope gain and centering so that, with the signal source disconnected temporarily, the trace is on the bottom line of the oscilloscope screen, and with the signal source reconnected the trace is within view and preferably at the top line of the oscilloscope screen. Measure and record the DC voltage output of the SLM.
5. Switch the oscilloscope to a-c coupling and center the trace vertically. Increase voltage gain of the oscilloscope ten times. Measure and record the peak-to-peak AC voltage.
6. Compute the percent of modulation by the following formula:

$$\text{percent modulation} = \frac{100\ (E_{max} - E_{min})}{2\ (E_{max} + E_{min})} \text{ or } \frac{50\ E_{AC}}{E_{DC}}$$

where $E_{DC}$ is the DC voltage measured in step 4.
where $E_{AC}$ is the AC voltage measured in step 5.

### Terminal Isolation

*Objective:* To measure terminal isolation between subscribers.

*Equipment Required:*

1. Signal Level Meter (SLM).
2. CW Signal Generator.
3. TV Receiver.

*Test Procedure:*

1. Remove CATV signals from distribution leg to be tested, or use blank channels if available.
2. Tune CW signal generator to visual carrier frequency of the channel under test. Its output is adjusted to yield a convenient level such as +30 dBmV.
3. This test signal is then back-fed to the system from a subscriber terminal location, or a simulated one.
4. The test signal is then measured and recorded at the nearest (in terms of cable length) subscriber tap.
5. The signal level measured in step 4 shall be 12 dBmV or less, i.e., at least 18 decibels lower than the signal level used in step 2.
6. The above procedure, steps 1 to 5, may be repeated at sufficient frequencies to establish that adequate isolation is provided.
7. A further test may be performed to confirm an adequate degree of isolation to avoid picture impairment due to reflections. Disconnect CW signal generator. Put CATV signals back on the distribution leg being tested. At the same test location used in step 3, the subscriber terminal location should be both open-circuited and short-circuited. Observations are then made of a TV receiver at the same test location used in step 4 to make sure that there are no visible picture impairments due to reflections.

### Channel Frequency Response

*Objective:* To measure channel frequency response.

*Equipment Required:*

1. Signal Level Meter (SLM).
2. CW Signal Generator.
3. 75-ohm Variable Attenuator.

*Test Procedure:*

1. Measure and record the output level of the signal processor for the channel under test at the headend with the SLM.
2. Switch the signal processor to manual mode of operation. Set manual gain to give the same output level as measured in step 1. If applicable, disable the internal substitution carrier of the signal processor.
3. Remove antenna feed for the channel under test and connect the CW signal generator (and attenuator, if needed) in its place.
4. Tune the CW generator to the visual carrier frequency of the channel under test.
5. Adjust signal level of the CW generator so that the output level of the signal processor is the same as measured before in step 1.
6. At the system's selected test point, this signal is measured and recorded.
7. The CW signal generator frequency is changed in 0.5 MHz increments to cover the required range of (−1) to (+4) MHz of visual carrier frequency of the channel under test. For each frequency setting, make sure that the CW generator output has not changed. Measure and record the level at the test location for each frequency.

(Cont'd. on page 14)

SCTE

# SOCIETY OF CABLE TELEVISION ENGINEERS

## SCTE ANNUAL MEETING

The annual meeting of the Society of Cable Television Engineers will be held on Sunday, April 21, at 4 PM in the Engineers' Lounge (Williford Parlor B) at the Conrad Hilton Hotel in Chicago. The time of the meeting has been scheduled and cleared with the NCTA so that it does not conflict with any other event during the annual cable television convention, which runs from Sunday, April 21, to Wednesday, April 24.

We urge all members of the Society to attend this meeting and bring other engineers and technicians with them. The business of the meeting will be concerned with the establishment of a greater number of active chapters to stimulate a busier schedule of technical meetings throughout the country. If you would like to help set up an active chapter in your area of the country, or even in your particular city, come to the annual meeting and meet the SCTE officers who will work with you toward that end.

Once again this year the SCTE is sponsoring the Eye-Opener Technical Sessions during the NCTA Convention. (They were so popular last year that the NCTA itself has imitated them with a program of competing "Sunrise Sessions".) The complete program for the Eye-Opener Sessions is published in this issue and all engineers and technicians are urged to attend these sessions for highly informative discussions on today's technical problems.

SCTE members are reminded that they are entitled to a discount of $74 in the registration fee for the NCTA annual convention. To claim your discount merely show your SCTE membership card at the registration desk.

• • •

## SCHLAFLY AND STRAUS WIN SCTE ENDORSEMENT FOR TECHNICAL ACHIEVEMENT AWARDS

Hubert J. Schlafly, executive vice president and a co-founder of TelePrompTer Corp., and Thomas M. Straus, a senior engineer at Theta-Com of California, have been named recipients of the second annual National Cable Television Assn. Outstanding Technical Achievement Awards. The winners, who were selected by a special committee of the Society of Cable Television Engineers, will be presented with their plaques at the Engineers' Reception at the NCTA convention, at 6 PM, Monday April 22, in the Waldorf Room at the Conrad Hilton Hotel.

Schlafly is presently industry coordinator of the Cable Technical Advisory Committee of the Federal Communications Commission and was chairman of the NCTA domestic satellite committee. He serves on the Cable TV Task Force of the IEEE, and holds a number of patents in the field.

Straus is best known in the cable television industry as a pioneer in the development of multichannel microwave systems. He was program manager of the AML microwave development project with Hughes Aircraft Co. and he has done extensive work in basic studies in broadband signal-to-noise characteristics.

---

**Membership:**

The Society of Cable TV Engineers is a non-profit organization.

Grades of membership are: Member, Associate Member, Sustaining Member.

The foundation of the national Society are its active regional chapters; new chapters will be encouraged by the Society.

Membership cards and certificates for framing are furnished to admitted members. Cost of membership is $10 per year for individuals. Included is a subscription to CABLECASTING — Cable TV Engineering magazine, which carries news and information on the Society and its chapters.

# APPLICATION FOR MEMBERSHIP
in
# THE SOCIETY OF CABLE TV ENGINEERS

(fill in completely and mail to SCTE, 607 Main St., Ridgefield, Conn. 06877)

Name ........................................................ Title ......................

Company ..............................................................................

Company Address ......................................................................

City .................................. State .................... Zip ................

Home Address .........................................................................

City .................................. State .................... Zip ................

Professional Experience:

Company ................................ City, State ................................

Position ...................................... Length of Time ......................

Company ................................ City, State ................................

Position ...................................... Length of Time ......................

Company ................................ City, State ................................

Position ...................................... Length of Time ......................

Education:

School: ................................ Degree or Certificate ........................

School: ................................ Degree or Certificate ........................

Two references familiar with your work: (Society Members Required as References for Grade of Member)

1. ....................................................................................
(name) (company)

.......................................................................................
(address)

2. ....................................................................................
(name) (company)

.......................................................................................
(address)

I agree to abide by the Constitution and By-laws of the Society if admitted.

Signed ........................................................... Date................

Chapter ...................................

Admissions Committee Action ....................................... Date ....................

Membership Grade: ☐ Member
☐ Associate Member
☐ Sustaining Member

## REFERENCES

(Three Society Members Required as References for Grade of Member)

Name Company

Address City State Zip

Name Company

Address City State Zip

Name Company

Address City State Zip

## DUES

(Please List All Fees Enclosed)

Annual Dues ($10 per year) .................................... $________

SCTE Pin ($3.) .................................... ________

SCTE Tie Clasp ($3.) .................................... ________

TOTAL ENCLOSED .................................... $________

I agree to abide by the Constitution and Bylaws of the Society of Cable TV Engineers if admitted to membership.

Signature ________________________

Do Not Write Below This Line

---

Chapter ....................................

Admissions Committee Action .................................... Date ....................

Membership Grade:

- ☐ Member
- ☐ Associate Member
- ☐ Sustaining Member

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |

# TECHNICAL PROGRAM OVERVIEW

## NCTA Annual Convention

## April 21-24, 1974, Conrad Hilton Hotel, Chicago

The technical program at this years national cable television convention is divided into three sets of sessions: three eye-openers, sponsored by the Society of Cable Television Engineers (SCTE); three sunrise sessions; and a half dozen two-hour technical presentations. To keep the straightforward presentations down to a minimum, the various sessions will consist of panel discussions, with interaction invited from the audience. To insure that participants will have the needed factual data to make such discussions meaningful, all papers will be pre-published in the official "1974 Technical Convention Transscript," which will be available at convention registration desks throughout the convention.

### MONDAY APRIL 22

8:00- 9:30 AM SCTE Eye-Opener Workshop
**Coping with 1977 Technical Standards**
Moderator: Robert Cowart, Gill Cable, San Jose, CA

8:00- 9:30 AM Sunrise Session
**Manpower Development**
Moderator: Jake Landrum, Commco Inc., Austin, Tex.

9:45-11:45 AM Technical Session
**Processing & Quality**
Chairman: Richard Hickman, Cox Communications, Atlanta
**Special Applications in Telemedicine, Industrial 2-Way, digital transmission.**
Chairman: Rex Bradley, TeleCable Corp., Norfolk, VA

### TUESDAY, APRIL 23

8:00- 9:30 AM SCTE Eye-Opener Workshop
**Practical Application of Frequency Channelling Concepts**
Moderator: Wayne McKinney, Texas Community Antennas, Tyler, Tex.

8:00- 9:30 A.M. Sunrise Session
**Maintenance & Reliability**
Moderator: Charles Henry, Badger CATV, Iron Mountain, Mich.

9:45-11:45 A.M. Technical Session
**Measurements, Tests, Rules & Regulations**
(S/N ratio, proof of performance, evaluating triple beat performance)
Chairman: Cort Wilson, FCC, Washington, DC
**System Development-Expansion-Inter-Connection**
(microwave vs. Cable, estimating system demand patterns)
Chairman: Nate Levine, Sammons Communications, Dallas, Tex.

### WEDNESDAY APRIL 24

8:00- 9:30 AM. SCTE Eye-Opener Workshop
**Systems Requirements for Two-Way**
Moderator: Warren Braun, Com-Sonics, Harrisonburg, Va.

8:00- 9:30 AM Sunrise Session
**Equipment Design**
Moderator: Arthur O'Neil, South Bend Tribune, Ind.

9:45-11:45 AM Technical Session
**Program Origination**
(Use of information display systems, helical interchangeability, automatic programming system, aural services for FM)
Chairman: Delmer Ports, NCTA
**Distribution Systems—System Design**
(Techniques of "hinging", status monitoring system, prediction of cable noise and distortion limits)

FCC MEASUREMENTS
(Cont'd. from page 9)

8. The above procedure, steps 1 to 7, is to be repeated for each Class I channel on the system.

   NOTE: Radio or telephone communication between headend and test location is required for this test. If two-way communication facility is not available, it will be necessary to have a well conceived test plan with a coordinated time schedule rigorously adhered to.

*If you live near....*

# BOSTON, ATLANTA, ST. LOUIS, DALLAS or LOS ANGELES

## *The VIDEO CARAVAN is coming your way in May:*

The VIDEO CARAVAN is a series of five two-day conferences held in conjunction with equipment and programming exhibitions. These are being held at the major regional centers of the U.S. to encourage attendance by a maximum number of video users in education, business, industry, government, medicine, cable television and public broadcasting. In each city, the VIDEO CARAVAN will be held in a gracious hotel, easy to get to and with comfortable accommodations. The VIDEO CARAVAN is sponsored by Educational & Industrial Television magazine in cooperation with several professional educational and industrial television user societies and video systems dealers and distributors.

### *HOW TO PARTICIPATE*

If you are a user, or potential user, of video equipment and programming in education, training, communications, medicine, government, security, cablecasting, and allied fields, you are qualified to attend the 2-day conference held in your region. The cost for attendance at the conference and exhibit will be a nominal $5.
The dates for the conferences are:

**Boston**—May 2, 3
**Atlanta**—May 8, 9
**St. Louis**—May 14, 15
**Dallas**—May 22, 23
**Los Angeles**—May 29, 30

**Avoid registration lines—fill in & return this rapid registration form.**

## VIDEO CARAVAN Registration

Send and make checks payable to:
VIDEO CARAVAN
607 Main St., Ridgefield, CT. 06877
Please register the following (please print or type) for:
☐ Boston ☐ Dallas ☐ St. Louis ☐ Atlanta ☐ Los Angeles

| Name | Title | For Clinic* | For Exhibit |
|---|---|---|---|
| 1. ______ | ______ | ☐ | ☐ |
| 2. ______ | ______ | ☐ | ☐ |
| 3. ______ | ______ | ☐ | ☐ |

School/Company ______
Address ______
City ______ State ______ Zip ______

(*) Enclose $5 for each clinic registrant.

**Sponsored by**

educational & industrial TELEVISION

**607 Main St., Ridgefield, CT 06877 203/438-3447**

September/October '72 vol. 8/ no. 4

# CABLECASTING

## Cable TV Engineering

SCTE

The official journal of the
SOCIETY OF CABLE TELEVISION ENGINEERS

ESTIMATING THE COST OF UNDERGROUND

CABLE CONSTRUCTION

ESTIMATING THE COST OF UNDERGROUND

CABLE CONSTRUCTION

ESTIMATING THE COST OF UNDERGROUND

CABLE CONSTRUCTION

ESTIMATING THE COST OF UNDERGROUND

CABLE CONSTRUCTION

# Be sure the color you originate will compare to network quality.

This is the $65,000 Norelco PC-70. The 3-Plumbicon* color television camera that's used to televise more live and taped network TV shows than any other camera. It is the standard of the television industry. Buy it, if you can afford it.

This is the new Norelco LDH-1 color camera. A remarkably stable, all-purpose 3-Plumbicon* (or Vidicon) camera that has major design advantages of the PC-70. It brings faithful live and film color within easy reach of any CATV station because it costs as little as $14,970.

# Be sure you select Norelco®

Philips Broadcast Equipment Corporation
One Philips Parkway, Montvale, N.J. 07645
A NORTH AMERICAN PHILIPS COMPANY

*Check this list for the Norelco CATV Distributor nearest you:*

**Arkansas** All-State Supply, Little Rock • **California** Tri-Tronics, N. Hollywood; General Electronics, Oakland • **Carolinas** Electronic Systems, Columbia, S.C. • **Colorado** Video Electronics, Lakewood • **Florida** Midwest Telecommunications, Miami; Florida Electronic Systems, Orlando • **Georgia** Electronic Equipment, Atlanta • **Hawaii** Hawkins Audio Engineers, Honolulu • **Metropolitan Chicago** Videco • **Metropolitan New York/New Jersey** Norcon Electronics, Brooklyn; Sonocraft, New York; Tele-Measurements, Clifton • **Michigan** R. P. Hermes, Detroit • **Mid-Atlantic** Lerro Electrical, Philadelphia • **Minnesota** Wahl & Wahl, Minneapolis • **New England** Northeast Electronics, Needham, MA • **Puerto Rico** Philips Electronic, Santurce • **Texas** Video Systems, Houston, Austin, San Antonio; Video Electronic Systems, Lubbock • **Utah** Intermountain Video, Salt Lake City

*Reg. TM N.V. Philips of Holland

Charles S. Tepfer
Editor & Publisher

Paul Daniels
associate editor

Pat Scott
art editor

Sandy Abrams
circulation &
reader service

Al Leon
national sales representative
11105 Post House Court
Potomac, Md. 20854
301-299-7224

EDITORIAL &
ADVERTISING
OFFICES:
607 Main Street
Ridgefield, Conn. 06877
(203) 438-3774

# CABLECASTING

## Cable TV Engineering

September/October '72 vol. 8/ no. 4

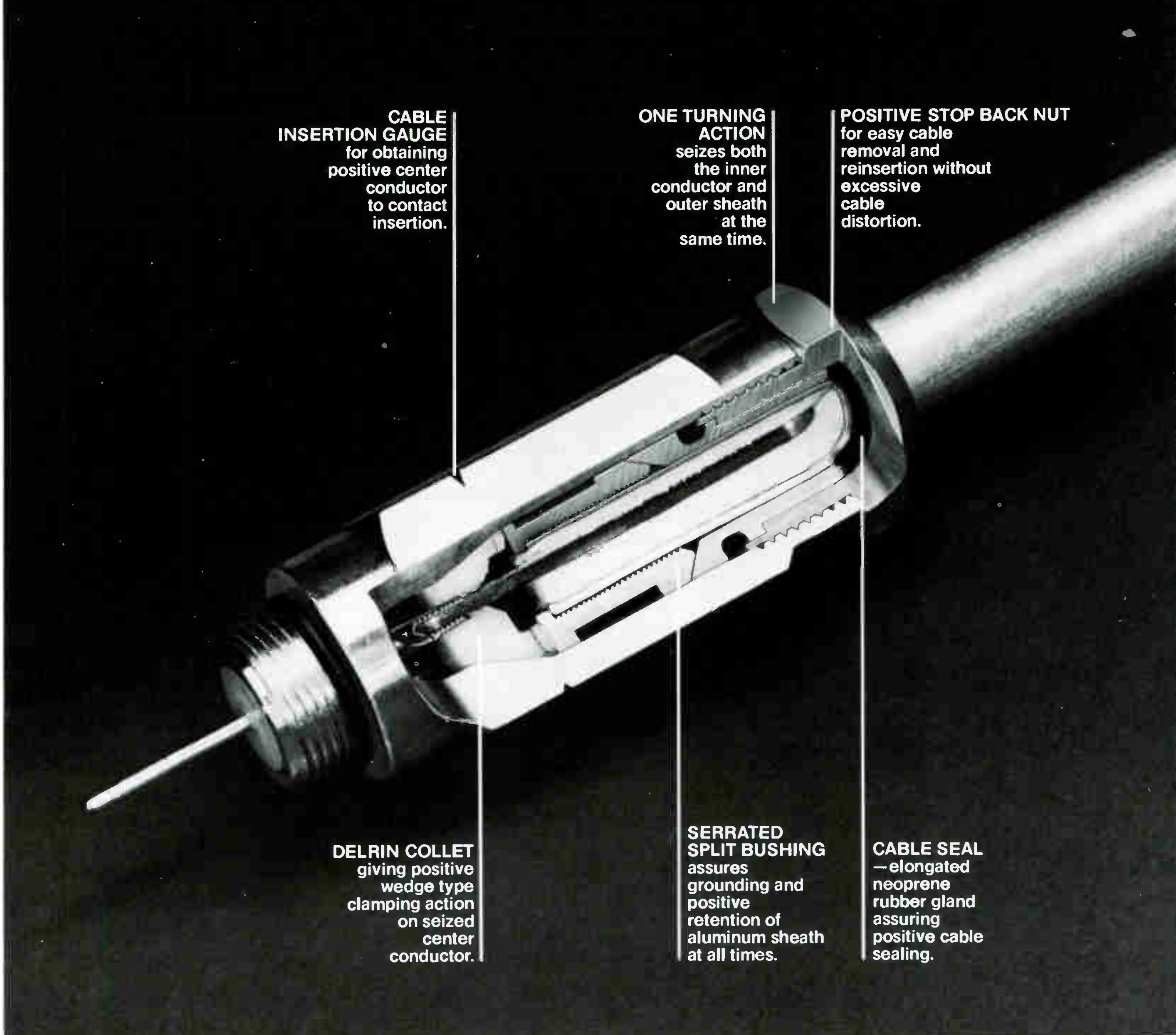
## Contents



CABLECASTING — Cable TV Engineering, the official journal of the Society of Cable Television Engineers, is published monthly by the C. S. Tepfer Publishing Company, Inc., and is circulated to all members of the SCTE, the chief technical personnel, managers, owners and operators of all CATV systems, and appropriate consultants, distributors, manufacturers and government and military agencies.

Controlled circulation postage paid at Bridgeport, Conn. All notices pertaining to undeliverable mail or subscriptions to be sent to the publisher, C. S. Tepfer Publishing Company, Inc., 607 Main Street, Ridgefield, Conn. 06877.

# Why ITT Cannon's "Scotty" is the best CATV connector.




**And the "Scotty-est" reason of them all—low cost.** That's ITT Cannon's "Scotty" story: aluminum coaxial cable connectors in .412, .500 and .750 sizes, that you don't need a torque wrench to install. Feed-through, Seized center, Inline splices, Right angle and Pedestal splice types, with exceptional long-life RFI leakage protection, that will do the job for you underground or up on poles year after year in all kinds of weather.

Be canny about CATV connectors. For more information about "Scotty" economy, immediate delivery, and the name of your nearest distributor, contact ITT Cannon Electric, International Telephone and Telegraph Corporation, 666 East Dyer Road, Santa Ana, California 92702. Telephone (714) 557-4700.

**CANNON ITT**

# PEOPLE IN THE NEWS

**NATE LEVINE** has been appointed Vice President of Engineering for Sammons Communications, Inc. in Dallas, Texas. Before joing SCI, Mr. Levine was Chief Engineer of the Jerrold Electronics Corp. Systems Operations division. A graduate of RCA Institute of Technology, Mr. Levine attended Penn State University and holds a First Class FCC license.

• • •

**THOMAS G. MORRISSEY,** a private consulting engineer in cable television for more than 20 years, has been appointed vice president and corporate director of engineering for Daniels and Associates. Mr. Morrissey, who is a registered professional engineer, was a radio research engineer for Bell Telephone Labs and a transmission engineer with AT&T Long Lines Division office in Denver. He is a senior member of the IEEE and has designed and provided engineering consultation for numerous cable television systems.

• • •

**GILBERT M. OLGUIN** has been appointed Technical Operations Manager of the CATV Systems Division of Diversified Communications, Inc. Mr. Olguin, who was formerly assistant manager and chief technician of LVO Cable Television of Perryton, Texas, will be responsible for the technical operations and engineering activities of all DCI cable television systems. Mr. Olguin is a member of the Society of Cable Television Engineers.

• • •

## PEOPLE IN THE NEWS

**MICHAEL B. ARNOLD,** who was general manager of Allband Cablevision in Olean, N.Y. has joined TelePrompTer Corp. as manager of its Islip, N.Y. cable TV system. Mr. Arnold, who is president of the New York State Cable TV Assn., was also for one year vice president of operations for TeleVigil Systems, a subsidiary of Television Communications Corp.

• • •

**LARRY HERBSTER** has been appointed Assistant Director of CATV Operations for Time-Life Broadcast. Prior to this new appointment, Mr. Herbster served as assistant business manager of Time-Life Books.

• • •

**DOUGLAS R. VINING** has been named to the newly-created post of CATV product manager of the Electro-Mechanical Division of EG&G, Inc. Most recently, Mr. Vining was marketing manager of Frequency Sources Inc., and before that, he had been with Jerrold Electronics and TACO.

• • •

**MICHAEL J. MONAHAN** is the new manager of Parker Cablevision, TelePrompTer's recent acquisition at Worcester, Mass. Mr. Monahan served as general manager of Auburn Cablevision in Auburn, N.Y. He is a graduate of Alfred University.

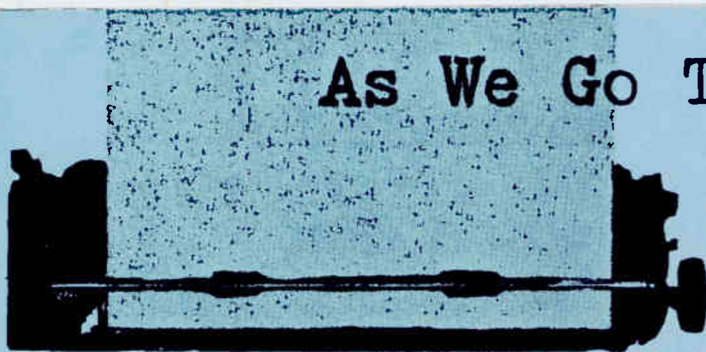
• • •

**MATHEW J. LYSEK** has joined the Jerrold Electronics Corp. as manager of subscriber materials with product management responsibilities for a line of subscriber taps and other equipment. Mr. Lysek was formerly vice president of marketing for the CATV division of the Magnavox Corp. He was formerly a member of the NCTA's Associates Committee.

• • •

(Continued on page 24)

# As We Go To Press



PILOT CATV SECURITY SYSTEM TO GO PERMANENT. The pilot cable television security system established in April by Oak Security Inc. in cooperation with LVO of Northern Illinois is to expand operations and offer full-service security by Nov. 1. According to Morgan H. Cooper, president of Oak Security of Crystal Lake, Ill.,"Homeowners and businessmen who took part in the study were extremely pleased with its results. After the central station for monitoring alarms is in operation, a major marketing effort will be started. The Carpentersville-Crystal Lake area has about 20,000 homes and is 50 miles northwest of Chicago.Oak Security is a wholly-owned subsidiary of Oak Industries Inc.

* * *

ATHENA LANDS FRANCHISE FOR DES MOINES. Athena Communications Corp. of New York City has made it known that it had been awarded the cable television franchise for the city of Des Moines, Iowa. Under Iowa law, the franchise must be submitted to voters for approval and a referendum will be held in November. Des Moines, with a population of 200,000 and about 70,000 homes with television, is the 66th largest TV market in the U.S.

* * *

WARNER COMMUNICATIONS AND CYPRESS CLOSE MERGER DEAL. Warner Communications Inc. and Cypress Communications Corp. consummated their merger under which Cypress becomes a wholly owned subsidiary of WCI. According to Alfred R. Stern, chairman and president of Warner's TeleVision Communications Corp., the administration and operation of all Cypress systems will be directed by the TVC organization, with the headquarters in New York City. It is expected that Burt Harris, president of Cypress, will be named vice chairman of TVC, based in California.

* * *

TRW ENTERS CATV EQUIPMENT MANUFACTURING WITH LARGE ORDER FOR SET-TOP DECODERS. TRW Inc, a Los Angeles based microwave manufacturing company, has entered the field of cable television manufacturing with a contract in excess of $5 million to produce program selectors for Optical Systems Corp., pay-cable company. Optical's decoder will be manufactured by TRW Colorado Electronics Inc. Optical's system works on a scrambled signal which can be unscrambled by the subscriber using a plastic ticket in the decoder. The first installation of the equipment is scheduled for the Cox Cable Communications CATV system in San Diego.

* * *

NCTA ASKS FCC TO POSTPONE PERFORMANCE TESTS ON CABLE TV. The National Cable Television Assn. has filed a request with the FCC for a postponement of a yearfor the implementation of the new performance tests required under the Commission's new cable TV system regulations. According to the NCTA,"The problem is that standardized procedures are as yet unavailable, test equipment is scarce enough so that procurement lead time is two or three months, and the number of personnel presently qualified and available to perform the tests probably numbers no more than 100 people (including MSO engineering staffs and consultants)." The NCTA petition continues,"Given the volume of work demonstrated, it can be seen that it will be virtually impossible to complete the tests for all CATV systems by the end of the year. Once standardized tests become available, the number of qualified personnel can be rapidly expanded and orderly implementation of the testing can be accomplished. But not by the end of this year." The FCC rules specifies that the testing should be completed by the end of this year, at least the initial tests. The NCTA asked that the tests not be due until the end of 1973. Systems in operation by March 31st of 1972 have until March 31, 1977 to comply with the test requirements - the regulations apply to new systems built since March. The NCTA estimates that the testing of a single small CATV system will cost between $1,000 and $1,500 and suggests that this is a significant burden. It asked the FCC to devise a set of abbreviated tests for smaller systems to offset this high cost factor.

* * *

# ESTIMATING THE COST OF UNDERGROUND CABLE CONSTRUCTION

**BY Garrett Weinberg**

**Cable Television Information Center**

This paper represents part of a research project I carried out while employed as a senior research analyst for the Resource Management Corporation of Bethesda, Maryland. The purpose of the study was to develop a series of cost estimates and cost factors to be used in estimating the complete capital and operating costs of CATV systems.

This study has two major uses: the first is as a policy tool — in answering such questions as "What are the economic implications if all systems are required to have twenty or more channels?"; the second use is in developing pro forma estimates for analysing the feasibility of new systems.

Rather than being a collection of rules of thumb, such as cable costs $4500/mile, the study develops CATV system costs through a specification process. This includes a determination of off-the-air signals by type (UHF or VHF), the number of cables required (single or dual cable), the cable diameter, the type of cable, the capacity of the amplifiers, the trunk-to-feeder ratio and the type of geographical environment in which the system will be located.

For example, in developing financial projections for proposed systems, the analysis usually assumes, a priori, a cost for underground construction — based upon previous experience. While this is an acceptable approach for small runs of underground cable, critical cost estimating errors can result if extensive underground construction is required.

Thus, one of the major weaknesses of most cable TV economic studies is that they assume beforehand a cost for underground construction. This cost, in general, is not sensitive to the specifics of a given city, i.e. its construction labor rates or the exact type of construction required. In order for the study to be useful in meeting its two main objectives, another approach for estimating underground construction was required. This paper presents such a "new" approach and some preliminary results gained from it.

### Basic Approach

When bidding on jobs, the usual practice is to build up the costs from basic components of the engineering process, i.e., trenching, back filling, compacting, etc. To aid in this process, a number of standard cost handbooks have been developed. These handbooks show basic machine and labor rates for different types of jobs and conditions; to produce realistic cost estimates, these handbooks must be used with judgment and experience.

In order to develop costs for the construction of underground cable systems, the actual steps in the construction process must be delineated. The study examined four specific cases of underground construction:

- Case 1: Direct burial in asphalt/concrete surfaces
- Case 2: Conduit burial in asphalt/concrete surfaces
- Case 3: Direct burial in non-asphalt/concrete surfaces
- Case 4: Conduit burial in non-asphalt/concrete surfaces

Table 1 illustrates the construction procedures used for burying cable for each of these cases.

Per mile costs have been developed for all of the required steps. These costs vary as a function of soil material, depth of concrete or asphalt, size of conduit, cable diameter, and labor rates.

A basic trench dimension has been assumed in order to derive per mile costs; its dimensions are 12 inches wide by 18 inches deep. These dimensions were fixed and did not vary when cable diameter or cable type changed or when conduit dimensions changed.

### Estimating the Costs

A. Labor Rates. The first step in the cost analysis process was to develop realistic labor rates in order to estimate costs. In this case, Washington, D.C. labor rates were utilized. Subsequently, the cost equations were normalized such that labor rates reflecting specific geographical locations could be used. Table 2

**Table 1**
**Construction Procedures For Burying Cable**

**CASE 1**

1. Break up concrete or asphalt
2. Load, haul and dump concrete or asphalt
3. Machine trenching for cable trench and pedestals
4. Bury cable
5. Install amplifiers
6. Back fill trench
7. Compaction of trench
8. Pour new concrete or lay asphalt

**CASE 2**

1. Break up concrete (or asphalt)
2. Load, haul and dump concrete or asphalt
3. Machine trenching for cable trench and pedestals
4. Install conduit
5. Pull cable(s) through conduit
6. Install amplifiers
7. Back fill trench
8. Compact trench
9. Pour new concrete (or asphalt)

**CASE 3**

1. Machine trench
2. Bury cable
3. Install amplifiers
4. Back fill trench
5. Compact trench

**CASE 4**

1. Machine trench
2. Install conduit
3. Pull cable(s) through conduit
4. Install amplifiers
5. Back fill trench
6. Compact trench

illustrates the development of the basic labor rate for electricians and labor overhead. In a similar manner, the equivalent rate for construction personnel is $7.00 /hour and for general laborers the equivalent rate is $6.50/hour.

B. Trenching Costs. The basic trench is assumed to be 18 inches in depth and 12 inches in width. A single linear foot of trench has a volume of 18''x 12''x 12'' or .056 cubic yards of material. The standard outputs of trenching machines are:

20.7 cubic yds/hour for Type 1 Soil (topsoil, sand, loam, or gravel)

16.7 cubic yds/hour for Type 2 Soil (clay or mixture of)

12.7 cubic yds/hour for Type 3 Soil (small rock or mixture of)

For Type 1 soil, this is the equivalent of:

$$\frac{20.7 \text{ cubic yds./hour}}{.056 \text{ cubic yds./LF}} = 370 \text{ linear feet/hour}$$

The total hourly rate including labor and machine is $35.00. Thus, the equivalent cost is

$$= \frac{370 \text{ LF/hour}}{\$35/\text{ hour}}$$

or approximately $.10 per linear foot or $528 per mile (see Table 4) for Type 1 soil. For Types 2 and 3 soil conditions, the following results are obtained:

Type 2:

$$\frac{16.7 \text{ cubic yds/hour}}{.056 \text{ cubic yds/LF}} = 298 \text{ linear feet/hour}$$

$$\frac{298 \text{ LF/hour}}{\$35/\text{hour}} = \$.12/\text{linear foot or } \$634 \text{ per mile}$$

Type 3:

$$\frac{12.7 \text{ cubic yds/hour}}{.056 \text{ cubic yds/LF}} = 227 \text{ linear feet/hour}$$

$$\frac{227 \text{ LF/hour}}{\$35/\text{hour}} = \$.15/\text{linear foot or } \$792 \text{ per mile}$$

The equivalent hourly rate of $35/hour is composed of a machine cost per hour and a labor cost per hour. The labor component is about 72 percent of the total cost and implies a labor rate of $6.50/hour. The per mile cost for each type of soil condition can then be partitioned into an equipment cost and a labor cost. By dividing the labor cost by the equivalent hourly rate, an equation that relates trenching costs to labor rates on a per mile basis is derived. For Type 1 soil this becomes:

$$\$528 \text{ per mile} = \$147.84 \text{ (machines)} + \$380.16 \text{ (labor)}$$

$$\text{or} \quad \$147.84 + \left(\frac{380.16}{6.50}\right)\left(X_1\right)$$

$$\text{or} \quad \$147.84 + 58.61\left(X_1\right)$$

**Table 2**
**Labor Rate and Overhead**

| | | | |
|---|---|---|---|
| Electrician Base Wage | | | $ 8.35 |
| Pension, Educational Fund, etc. | | | .55 |
| | | | $ 8.90 |
| **Impact of Crew and Foreman — Five Man Crew** | | | |
| | **Percent of Hour** | **Rate** | **Cost Per Hour** |
| Supervision | 20 | 9.90 | 1.98 |
| Electrician | 80 | 8.90 | 7.12 |
| Equivalent Rate/Electrician Hour | | | $9.10 |
| **Overhead Based Upon Total Labor Cost** | | | |
| (1) Unemployment Insurance, Workman's Compensation, Social Security, etc. | | | 13% |
| (2) Temporary Construction and cleanup | | | 4% |
| (3) Small Tools, Consumables | | | 12% |
| (4) Field Supervision (excluding foreman) | | | 5% |
| (5) Home Office Costs | | | 11% |
| Total Overhead | | | 45% |

For Type 2 and Type 3 soil conditions the resultant equations are:

Type 2: $177.41 + 70.22 \left(X_1\right)$

Type 3: $221.76 + 87.65 \left(X_1\right)$

C. Backfilling Costs. A standard rate of backfilling by soil condition was used in deriving per mile backfilling costs. These rates are:

$3.50/cubic yard for Type 1 soil
$4.10/cubic yard for Type 2 soil
$4.70/cubic yard for Type 3 soil

Each of these rates are multiplied by the trench dimensions to obtain a cost per linear foot or per mile.

Type 1: $3.50/cubic yard × 0.056 cubic yd/LF = $.20/LF × 5280 = $1056 per mile
Type 2: $4.10/cubic yard × 0.056 cubic yd/LF = $.23/LF × 5280 = $1214 per mile
Type 3: $4.70/cubic yard × 0.056 cubic yd/LF = $.26/LF × 5280 = $1373 per mile

This operation is 100 percent labor and a normalized cost is obtained by dividing the per mile cost by $6.50.

Type 1: $\$1056/6.50 \bullet (X_1) = \$162.46\ (X_1)$

Type 2: $\$1214/6.50 \bullet (X_1) = \$186.83\ (X_1)$

Type 3: $\$1373/6.50 \bullet (X_1) = \$211.20\ (X_1)$

Where $X_1$ = equivalent hourly rate

D. Compacting (with Pneumatic Tamper) Costs. Standard compacting rates by soil type were used in deriving per mile compacting costs. These rates are:

$3.05/cubic yard for Type 1 soil
$3.65/cubic yard for Type 2 soil
$4.25/cubic yard for Type 3 soil

Each of these rates are multiplied by the trench dimensions to obtain a per mile cost:

Type 1: $3.05/cubic yard × 0.056 cubic yard/LF = $.17/LF × 5280 = $898/mile
Type 2: $3.65/cubic yard × 0.056 cubic yard/LF = $.20/LF × 5280 = $1056/mile
Type 3: $4.25/cubic yard × 0.056 cubic yard/LF = $.24/LF × 5280 = $1267/mile

The labor content of this operation is 53 percent of the total costs. By partitioning the per mile costs into equipment and labor cost components and dividing the labor component by the equivalent hour rate used in deriving these costs, a set of normalized equations are obtained.

Type 1: $898 per mile = $421.87 (equipment) +

$$\frac{476.13}{6.50}[X_1] = \$421.87 + \$73.19\ [X_1]$$

Type 2: $1056 per mile = $496.32 (equipment) +

$$\frac{559.68}{6.50}[X_1] = \$496.32 + \$86.10\ [X_1]$$

Type 3: $1267 per mile = $595.58 (equipment) +

$$\frac{671.42}{6.50}[X_1] = \$595.58 + \$103.33\ [X_1]$$

E. Total Trenching, Backfilling and Compacting Costs. All of these operations are required for underground distribution systems. It is thus possible to add the individual costs by soil type to obtain a total trenching, filling, and compacting cost (either using D.C. labor rates or normalized). These results are shown in Table 3.

F. Breakup Concrete or Asphalt. The basic breakup cost for concrete or asphalt material is as follows:

Concrete: $15/cy

Asphalt: $ 5/cy

In order to apply these standards, a relationship between the depth of concrete or asphalt in the trench and the cubic yard dimensions of the trench must be determined. For example, a trench with 1" thick concrete has the following cubic yard dimensions (per linear foot):

12" x 12" x 1" or $\left[\frac{1}{3} \times \frac{1}{3} \times \frac{1}{36}\right]$ cubic yards or .00308

Thus each inch of material adds 0.00308 cubic yards.

The total breakup cost per mile is equal to:

0.00308 x thickness (inches) x 5280 x cost/cubic yard

or 16.27 (T) x cost/cubic yard (1)

where T = material thickness.

The labor content of this operation is 80 percent under a rate of $6.50/hour. A normalized cost per cubic yard for concrete and asphalt can be derived as follows:

Concrete

$15.00/cubic yard = $3.00 (equipment) + $12.00 (labor)

$$\$3.00 + \frac{\$12.00}{\$\ 6.50}[X_1]$$

Cost/cubic yard $= \$3.00 + \$1.85\ [X_1]$ (2)

Asphalt

$5.00/cubic yard = $1.00 (equipment) + $4.00 (labor)

$$= \$1.00 + \left(\frac{\$4.00}{6.50}\right)[X_1]$$

Cost/cubic yard $= \$1.00 + \$0.62\ [X_1]$ (3)

| | Type 1 | | Type 2 | | Type 3 | |
|---|---|---|---|---|---|---|
| Operation | DC | Normalized | DC | Normalized | DC | Normalized |
| Trenching | 528 | $147.84 + 58.61 (X_1)$ | 634 | $177.41 + 70.22 (X_1)$ | 792 | $221.76 + 87.65 (X_1)$ |
| Backfilling | 1056 | $162.46 (X_1)$ | 1214 | $186.83 (X_1)$ | 1373 | $211.20 (X_1)$ |
| Compacting | 898 | $421.87 + 73.19 (X_1)$ | 1056 | $496.32 + 86.10 (X_1)$ | 1267 | $595.58 + 103.33 (X_1)$ |
| Total (per mile) | $2482 | $569.71 + 294.26 (X_1)$ | $2904 | $673.73 + 343.15 (X_1)$ | $3432 | $817.34 + 402.18 (X_1)$ |

**Table 3 Total Trenching, Backfilling and Compacting Costs**

Substituting equations (2) and (3) into equation (1) results in the following normalized equations:

Concrete per mile

$$\text{breakup costs} = 16.27 (T) \times [3 + 1.85 (X_1)]$$

$$= 48.81 (T_1) + 30.1 (T_1) (X_1)$$

Asphalt per mile

$$\text{break up costs} = 16.27 (T) \times [1. + 0.62 (X_1)]$$

$$= 16.27 (T_2) + 10.09 (T_2) (X_1)$$

where $T_1$ = thickness of concrete (in inches)

$T_2$ = thickness of asphalt (in inches)

$X_1$ = equivalent hourly rate

G. Load, Haul and Dump Costs. This cost is independent of material type. The standard rate is $6.50/cubic yard of material. A relationship is derived using the methodology shown previously in the breakup cost section.

Per mile load, haul and dump cost = (standard rate/cy) (amount of material cy/LF) x (linear ft/mile)

= (standard rate/cy) x (.00308 x thickness) x (5280)

=16.27 (T) (standard rate/cy) (4)

The standard rate is 70 percent labor intensive. Thus,

$$\$6.50/\text{cy} = 1.95 \text{ (equipment)} + 4.55 \text{ (labor)}$$

$$\text{cost/cy} = 1.95 + \left(\frac{4.55}{6.50}\right) (X_1)$$

$$= 1.95 + 0.70 (X_1) \qquad (5)$$

Substituting equation (5) into equation (4) results in the following normalized equation:

I oad, Haul and Dump Cost

$$= 16.27 (T) \times [1.95 + 0.70 (X_1)]$$

$$= 31.73 (T_1 \text{ or } T_2) + 11.39 (T_1 \text{ or } T_2) (X_1)$$

where $T_1$ = thickness of concrete (in inches)

$T_2$ = thickness of asphalt (in inches)

$X_1$ = equivalent hourly rate

H. Direct Burial of Cable. This procedure consists of two major operations

- Cable Reel set-up
- Pulling Cable.

The standard outputs for these operations (based upon 1500 linear feet of cable per reel) are:

| Cable Size (assumed armored cable) | Set-Up (M hrs. per LF) | Pulling (M hrs. per LF) | Total (M hrs. per LF) |
|---|---|---|---|
| 0.412 | 0.001 | 0.01604 | 0.01704 |
| 0.500 | 0.002 | 0.020 | 0.022 |
| 0.750 | 0.003 | 0.033 | 0.036 |

To calculate the per mile cost for this operation, the following steps are required.

(1) Multiply total M hrs per LF by 5280 and then by equivalent hourly rate for electricians
(2) Multiply result from (1) by 0.45 to obtain overhead
(3) Sum (1) and (2) and multiply by 10 percent to obtain fee
(4) Total cost (1) + (2) + (3) (single cable)
(5) For two cables multiply (4) by 1.8

Using a normalized labor rate, the results are, for one - 0.412" cable:

Step (1) 0.01704 M hrs/LF x 5280 x $(X_2)$ = 89.97 $(X_2)$

Step (2) 89.97 $(X_2)$ × 0.45 = 40.48 $(X_2)$ (overhead)

Step (3) [89.97 $(X_2)$ + 40.48 $(X_2)$] x .10 = profit

Step (4) Total cost per mile = 89.97 $(X_2)$ + 40.48 $(X_2)$ + 13.05 $(X_2)$ = 143 50 $(X_2)$

In a similar manner:

one – .500" Dia. Cable = 185 $(X_2)$

one – .750" Dia. Cable = 303 $(X_2)$

For two cables:

two – 0.412" cables = 143.50 $(X_2)$ x 1.8 = 258.30 $(X_2)$

two – 0.500" cables = 185 $(X_2)$ x 1.8 = 333 $(X_2)$

two – 0.750" cables = 303 $(X_2)$ x 1.8 = 545.50 $(X_2)$

where $X_2$ = equivalent hourly rate (electrician)

I. Pulling Cable through Conduit. The procedures employed in pulling cable through a conduit are identical to those used in the direct burial of cable. Both alternatives require the setting up of a 1500 foot reel and the pulling of cable. The standards or man-hours per linear foot are higher in this case, which is as expected. These standards are:

| Cable Size (non armored cable) | Set-Up (M hrs. per LF) | Pulling (M hrs. per LF) | Total (M hrs. per LF) |
|---|---|---|---|
| 0.412" | .001 | .01901 | .02001 |
| 0.500" | .001 | .023 | .024 |
| 0.750" | .003 | .037 | .040 |
| Drop Cable | NA | .006 | .006 |

Drop cables require no reel set-up. Pieces are cut when required.

Utilizing the same steps shown in the previous section, the following normalized results are obtained.

For one - 0.412" cable

Step (1) = 0.0200 M hrs/LF × 5280 $(X_2)$ = 105.65 $(X_2)$

Step (2) = 105.65 $(X_2)$ × 0.45 = 47.54 $(X_2)$ (overhead)

Step (3) = (105.65 $X_2$ + 47.54 $X_2$) × 0.10 = 15.31 $(X_2)$ (profit)

Step (4) = Total cost per mile

= 105.65 $(X_2)$ + 47.54 $(X_2)$ + 15.31 $(X_2)$

= 168.50 $(X_2)$

In a similar manner:

One – .500" cable = 202 $(X_2)$

One – .750" cable = 337 $(X_2)$

One – drop cable = 50.50 $(X_2)$

For two cables:

Two – 0.412" Dia. Cables = 168.50 $(X_2)$ × 1.8 = 303 $(X_2)$

Two – 0.500" Dia. Cables = 292 $(X_2)$ × 1.8 = 363.50 $(X_2)$

Two – 0.750" Dia. Cables = 337 $(X_2)$ × 1.8 = 606.50 $(X_2)$

Two – drop cables = 50.50 $(X_2)$ × 1.8 = 91.00 $(X_2)$

Where $X_2$ = equivalent hourly rate (electrician)

J. Conduit Installation and Material. Two basic types of conduit have been examined during this study; rigid steel and PVC. For each type three sizes may be required. The size and specific use is shown below:

| Cable Diameter | Use |
|---|---|
| 2" | Single cable (any cable diameter) |
| 3" | Dual cable (any cable diameter) |
| 3/4" | Drop cable only (single or dual) |

The specifications and standards that apply to each conduit are as follows:

A. Rigid Steel Galvanized Conduit

Based upon 10' lengths, 1 coupling per length, straight runs.

| Diameter | Material Cost (per LF) | Manhours/LF |
|---|---|---|
| 2" PVC | 0.70 | 0.078 |
| 3" PVC | 1.41 | 0.094 |
| 3/4" PVC | 0.22 | 0.04 |

B. Rigid PVC Conduit

Based upon 10' lengths, one coupling per length, straight runs only.

| Diameter | Material Cost (per LF) | Manhours/LF |
|---|---|---|
| 2" PVC | 0.45 | 0.078 |
| 3" PVC | 0.93 | 0.094 |
| 3/4" PVC | 0.15 | 0.04 |

To calculate the per mile cost for this operation, the following steps are required:

(1) Multiply Material cost per LF by 5280

(2) Multiply Manhours per LF by 5280 and then by equivalent hourly rate for electrician

(3) Multiply result from (2) by 0.45 to obtain labor overhead

(4) Sum (1), (2) and (3) then multiply by 10 percent to obtain fee

(5) Total cost (1) + (2) + (3) + (4).

For the 2" rigid steel case, the following normalized equation results:

Step (1) 0.70 × 5280 = 3696 (material cost)

Step (2) 0.078 × 5280 × $(X_2)$ = 411.8 $(X_2)$ (Direct labor)

Step (3) 411.8 $(X_2)$ × 0.45 = 185.3 $(X_2)$ (labor overhead)

Step (4) [3696 + 411.8 $(X_2)$ + 185.3 $(X_2)$] × .10

= 369.6 + 59.7 $(X_2)$ (fee)

Step (5) Total cost = 3696 + 411.8 $(X_2)$ + 185.3 $(X_2)$ + 369.6 + 59.7 $(X_2)$ = 4066 + 657 $(X_2)$

The normalized equations for the other cases are:

3" Rigid Steel 8190 + 791.5 ($X_2$)

3/4" Rigid Steel 1276 + 337 ($X_2$)

3" PVC 5403 + 791.50 ($X_2$)

3/4" PVC 869 + 337 ($X_2$)

K. Conduit Material and Installation and Cable Pulling Costs. Because the last two cases usually exist together*, the normalized equations developed in the last two sections can be combined for user efficiency. For example, the costs associated with pulling two 1/2" cables through a three inch rigid steel conduit can be estimated from the following equations:

A. Pulling two .500" dia. Cables = 363.50 ($X_2$)

\+ B. 3" RS conduit (material and installation) = 8190 + 791.5 ($X_2$)

or C. The combined equation = 8190 + 1155 ($X_2$)

Combining all the realistic "options" the normalized equations shown in Table 4 are obtained:

**Table 4**
**Conduit Material and Installation Plus Pulling Cable**

| | A. Single Cable | B. Two Cables |
|---|---|---|
| **Rigid Steel** | | |
| 0.412 | 4066 + 825.50 ($X_2$) | 8190 + 1094.50 ($X_2$) |
| 0.500 | 4066 + 859 ($X_2$) | 8190 + 1155 ($X_2$) |
| 0.750 | 4066 + 944 ($X_2$) | 8190 + 1398 ($X_2$) |
| Drop | 1276 + 387.50 ($X_2$) | 1276 + 428 ($X_2$) |
| **PVC** | | |
| 0.412 | 2612 + 825.50 ($X_2$) | 5403 + 1094.50 ($X_2$) |
| 0.500 | 2612 + 859 ($X_2$) | 5403 + 1155 ($X_2$) |
| 0.750 | 2612 + 994 ($X_2$) | 5403 + 1398 ($X_2$) |
| Drop | 869 + 387.50 ($X_2$) | 869 + 428 ($X_2$) |

L. Amplifier Installation Cost. The amplifier installation standard is two man-hours per amplifier. This includes the installation and balancing of the amplifier. This number is based upon industry averages and aggregates trunk amplifiers, bridger amplifiers, combined trunk and bridger amplifiers, and line extender amplifiers into one homogeneous grouping.

The procedure employed in developing a normalized equation for amplifier installation costs is as follows:

(1) Multiply standard by equivalent hourly rate for electrician

(2) Multiply (1) by 0.45 to determine labor overhead

(3) Add (1) + (2) and multiply by 10 percent for fee

(4) Add (1) + (2) + (3) for total amplifier installation cost.

Step (1) $2 \times (X_2)$

Step (2) $(2X_2) \times .45 = .90(X_2)$ (overhead)

Step (3) $(2X_2 + .90\ X_2)\ .1 = .29X_2$ (fee)

Step (4) Total cost = $2X_2 + .9\ X_2 + .29X_2 = 3.19X_2$

where $X_2$ = equivalent hourly rate — electrician

M. Pedestal Material and Installation. In underground systems, the electronics (amplifier and taps) are usually contained in a vault or pedestal. This vault is adjacent to the cable and conduit and is designed so that the electronics can be replaced or adjusted without ripping up concrete or asphalt. It can be constructed of concrete or steel and is usually buried flush with the street or sidewalk. Because the concrete pedestals are less expensive than comparable steel versions, this study examined only concrete pedestals.

The average cost for such pedestals is $75.00. This is for the pedestal and complete installation. For the pedestal sizes required in a typical system, there is very little difference in cost between these sizes.

Eighty percent of the cost is labor and labor overhead and was based upon an equivalent rate of seven dollars per hour. This can be normalized in the following manner:

Pedestal Material and Installation = $75 = 15 (material) + $60 (labor)

$$= 15 + \frac{60}{7.00}(X_3)$$

$$= 15 + 8.57\ (X_3)$$

Where $X_3$ = equivalent hourly rate

N. Concrete Repaving. Concrete repaving standard costs are usually expressed in $/sq. yards as a function of thickness. These costs, which are shown in Table 5, are average costs based upon bulk work. The

**Table 5 Concrete Repaving Costs**

| THICKNESS (INCHES) | $/SQ YD | $/LF | $/MILE |
|---|---|---|---|
| 2" | 2.36 | .262 | 1382 |
| 3" | 3.45 | .383 | 2024 |
| 4" | 3.80 | .422 | 2229 |
| 5" | 4.25 | .472 | 2493 |
| 6" | 4.80 | .533 | 2816 |
| 7" | 5.23 | .587 | 3098 |
| 8" | 5.85 | .650 | 3432 |
| 9" | 6.43 | .714 | 3772 |
| 10" | 6.85 | .761 | 4019 |
| 11" | 7.54 | .838 | 4424 |
| 12" | 7.95 | .883 | 4664 |

* The only exception to this is when the CATV system makes use of existing ducts and only cable pulling costs are needed.

dollars per square yard can be converted into dollars per square foot. This measure is actually a cost per linear foot since the width of the trench is assumed to be a foot.

Twenty-nine percent of the per mile cost is labor related. Thus, each total cost can be partitioned into a material cost and a labor related cost. If the labor component is divided by the Washington, D.C. hourly labor rate, a normalized series of equations can be derived.

For example, 2" thick concrete costs $1382 per mile

$$\$1382 = 981.22 \text{ (material)} + 400.78 \text{ (labor)}$$

$$\text{Cost per mile} = 981.22 + \frac{400.78}{7.00} (X_3)$$

$$= 981.22 + 57.25 (X_3)$$

The concrete per mile repaving costs can thus be expressed in the following form (see Table 6):

$$Y = A + B (X_3)$$

where Y = repaving cost per mile

A = material cost

B = labor component cost

$X_3$ = equivalent hourly rate

**Table 6**

**Concrete Repaving Costs**

| THICKNESS (INCHES) | A | B |
|---|---|---|
| 2 | 981.22 | 57.25 |
| 3 | 1437.04 | 83.85 |
| 4 | 1582.59 | 92.34 |
| 5 | 1770.03 | 103.28 |
| 6 | 1999.36 | 116.66 |
| 7 | 2199.58 | 128.35 |
| 8 | 2436.72 | 142.18 |
| 9 | 2682.38 | 156.52 |
| 10 | 2853.49 | 166.50 |
| 11 | 3141.04 | 183.28 |
| 12 | 3311.44 | 193.22 |

O. Asphalt Repaving Costs. Asphalt repaving costs are developed in almost the identical manner as concrete repaving costs. The specific differences between the two arise because:

- Asphalt is not usually found in the same thickness as concrete
- The cost per square yard is different (asphalt is cheaper)
- Asphalt is less labor intensive (15% versus 29% for concrete)
- Asphalt repaving requires a one-time equipment move-in charge of $250.

Table 7 shows asphalt repaving costs as a function of thickness.

**Table 7**

**Asphalt Repaving Costs**

| THICKNESS (INCHES) | $/SQ YD | $/LF | $/MILE |
|---|---|---|---|
| 2" | .77 | .086 | 452 |
| 3" | 1.19 | .132 | 698 |
| 4" | 1.58 | .176 | 927 |
| 5" | 1.91 | .212 | 1117 |
| 6" | 2.33 | .259 | 1136 |

Utilizing the 15 percent labor component of the total per mile costs and normalizing the labor rate, the total per mile asphalt repaving cost can be expressed in the following form:

Asphalt repaving cost = A + B($X_3$)

where A = Material component cost

B = labor component

$X_3$ = equivalent hourly rate

Table 8 illustrates this form.

**Table 8**

**Asphalt Repaving Cost (Per Mile)**

| THICKNESS (INCHES) | A | B |
|---|---|---|
| 2 | 384.20 | 9.69 |
| 3 | 593.30 | 14.96 |
| 4 | 787.95 | 19.86 |
| 5 | 946.90 | 23.87 |
| 6 | 1161.95 | 29.29 |

### How to Use the Results: An Example

Although the previous equations appear somewhat complex, the actual use of the equations is simple once the process of estimating construction costs is understood.

Before the equations can be used, a number of inputs are required. These are:

Total underground strand miles
Total underground trunk miles
Total underground feeder miles
Number of cables
Diameter of trunk cable
Diameter of feeder cable
Conduit requirements
Soil conditions

The process of estimating construction costs, once the inputs are determined, is as follows:

(1) From Table 1 select appropriate case

(2) If concrete or asphalt, determine $T_1$ or $T_2$ (Thickness)

(3) Determine or specify $X_1$, $X_2$, $X_3$ (labor rates)

(4) Select appropriate equations

(5) Estimate total per mile cost of all components except cable pulling

(6) Multiply total per mile cost and the number of strand miles

(7) Multiply per mile feeder cable pulling cost and number of feeder miles

(8) Multiply per mile trunk cable pulling cost and number of trunk miles

(9) Total underground construction cost = (6 + 7 + 8)

A similar procedure is also available for developing subscriber drop costs.

The following hypothetical example has been developed to illustrate this process.

**Inputs**

Underground strand miles = 315
Underground trunk miles = 300
Underground feeder miles = 50
Single cable system
Trunk cable = 0.750" Diameter
Feeder cable = 0.412" Diameter
Conduit required
4" asphalt road

This is illustrative of Case 2 - Table 1.

**Assumptions**

Conduit is 2" PVC

$X_1$ = $6.50/hour (general laborer)

$X_2$ = $9.10/hour (electrician)

$X_3$ = $7.00/hour (construction)

**Equations**

(a) Breakup asphalt = 16.27 ($T_2$) + 10.09 ($T_2$) ($X_1$) (315 miles)

(b) Haul asphalt = 31.73 ($T_2$) + 11.39 ($T_2$) ($X_1$) (315 miles)

(c) Trench (type 3 soil) = 221.76 + 87.65 ($X_1$) (315 miles)

(d) 2" PVC conduit – Installation and Material = 2612 + 657($X_2$) (315 miles)

(e) Pull single .412" cable = 168.50 ($X_2$) (300 miles)

(f) Pull single .750" cable = 337 ($X_2$) (50 miles)

(g) Install amplifiers = 3.19 ($X_2$) 50 miles – trunk and bridge amps

(h) Install pedestals = 15 + 8.57 ($X_3$) 300 miles – line extenders

(i) Backfill trench = 211.20 ($X_1$) (315 miles)

(j) Compact trench = 595.58 + 103.33 ($X_1$) (315 miles)

(k) Repave asphalt = 787.95 + 19.86 ($X_3$) (315 miles)

(l) Move-in cost = $250

where $T_2$ = 4"

$X_1$ = $6.50

$X_2$ = $9.10

$X_3$ = $7.00

The results of these equations are shown in Table 9.

**Table 9**

**Trunk and Feeder Cable Construction Costs**

| OPERATION | COST PER MILE | TOTAL COST (315 Strand MILES) |
|---|---|---|
| Breakup Asphalt | 326 | 102,690 |
| Haul Asphalt | 423 | 133,245 |
| Trench (Type 3) | 792 | 249,480 |
| 2" PVC Conduit | 8,591 | 2,706,165 |
| Pull Single .412" cable | 1,533 | 459,900 |
| Pull Single .750" cable | 3,066 | 153,300 |
| Install Trunk Amplifiers and Pedestal | 223 | 11,150 |
| Install Line Extender and Pedestal | 515 | 154,500 |
| Install Bridger Amplifiers and Pedestal | 104 | 19,292 |
| Backfill Trench | 1,373 | 432,495 |
| Compact Trench | 1,267 | 399,105 |
| Repave Asphalt | 927 | 292,005 |
| Move-in Cost | | 250 |
| Total Underground Construction Cost | | 5,113,577 |

**NOTE:**

1. Amplifier installation and pedestal cost (per mile) 104.00 X 2.14 Trunk amplifiers per mile $223 (50 miles) - This is an assumed amplifier spacing.
2. Line extender and pedestal cost (per mile) 104.00 X 4.95 line extender per mile $515 (300 miles)
3. Total bridge amplifier and pedestal cost 104.00 X 185.5 Amps. (assumed number of bridger amps) $19,292

# SOCIETY OF CABLE TELEVISION ENGINEERS

## CENTRAL ATLANTIC CHAPTER

The Central Atlantic Chapter of the SCTE held a highly successful meeting on Sept. 30th at the Holiday Inn in Jersey City, N.J. More than seventy cable television system engineers and chief technicians attended the meeting, which included a lunch and two well presented talks on two-way transmission techniques.

Henry B. Marron, manager of communication electronics at Jerrold Electronics Corp.'s Terwood Laboratory in Hatboro, Pa., gave an incisive review of two-way distribution system requirements. This was followed by a presentation on two-way interrogation systems for fire alarm, data transmission, burglar alarm, and other uses by Robert G. Holman, of the cable communications division of Scientific-Atlanta, Inc.

An active question and answer period followed the two presentations. Especially interesting was the comparison of costs for burglar alarm services that developed during the questioning of a representative of Wells Fargo services who was in the audience. The capabilities of handling such services economically via cable TV became immediately apparent.

The next meeting of the Central Atlantic Chapter is scheduled for October 28th, again at the Holiday Inn in Jersey City. For more information, contact Steve Dourdoufis 201/224-9177.

**APPRECIATION.** The members and officers of the Central Atlantic Chapter recently presented Earl Quam, the first president of the Chapter, with a plaque in appreciation of the effort and leadership he contributed towards getting the chapter going. Shown in the presentation are, from left to right, Charles Snyder, vice president; Steve Dourdoufis, present president of the chapter; Earl Quam; Peter Chunka, secretary of the chapter; and Charles Tepfer, national secretary of the SCTE.

## QUEBEC CHAPTER

The Quebec Chapter of the SCTE held a meeting on September 16th in Montreal, which featured a presentation on the specialized measuring instruments for CATV work, including the TDR, spectrum analyzer, and bridges.

There will be another meeting on October 28th in Trois Rivieres on noise, cross modulation and beats. All engineers in the vicinity at that time are invited. For more information, contact Henri Bertemes at TeleCable De Quebec, 276 Rue du Roi, Quebec 2, P. Q. Canada.

• • •

## NEW ENGLAND CHAPTER

The organizational meeting of the New England Chapter was held on September 23rd at the Corville Motor Lodge in Hartford, Ct. Acting officers were elected to serve for the rest of this year. Elected president was Brian Lenhart of Danbury. Vice President is J. J. Mueller of Manchester, Vt. Secretary-treasurer is Jim Grant of Danbury.

Following the short business meeting, Michael Rubera of Times Wire & Cable described some of the special bridge attenuators and loads that his company had developed to make sweep measurements of cable more precise and less error prone.

The next meeting of the New England Chapter will be held at the end of October in cooperation with the New England Regional NCTA conference, in Hartford. For more information on this meeting,,contact Mr. Lenhart at 203/792-0900

• • •

## CANADA-WEST CHAPTER

Since the promulgation of the DOC's BP-23, all cable television systems in Canada have had to re-examine the technical capacities of their staffs, at least insofar as their ability to make the measurements required in those regulations. To aid the mem-

# APPLICATION FOR MEMBERSHIP

in

# THE SOCIETY OF CABLE TV ENGINEERS

(fill in completely and mail to SCTE, 607 Main St., Ridgefield, Conn. 06877)

Name ........................................................ Title ........................

Company ..........................................................................

Company Address ..................................................................

City ........................................ State .................... Zip ................

Home Address ......................................................................

City ........................................ State .................... Zip ................

Professional Experience:

Company ...................................... City, State ..................................

Position ......................................... Length of Time ......................

Company ...................................... City, State ..................................

Position ......................................... Length of Time ......................

Company ...................................... City, State ..................................

Position ......................................... Length of Time ......................

Education:

School: ...................................... Degree or Certificate ..........................

School: ...................................... Degree or Certificate ..........................

Two references familiar with your work: (Society Members Required as References for Grade of Member)

1. ..................................................................................
(name) (company)

..................................................................................
(address)

2. ..................................................................................
(name) (company)

..................................................................................
(address)

I agree to abide by the Constitution and By-laws of the Society if admitted.

Signed ........................................................... Date ..............

Chapter ....................................

Admissions Committee Action ........................................ Date ....................

Membership Grade: ☐ Member
☐ Associate Member
☐ Sustaining Member

## SCTE NEWS
*(Continued)*

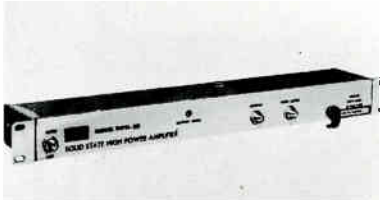
bers of the Canada-West Chapter of the SCTE in this task, the Chapter will present a technical session on spectrum analysis and the use of the time-domain reflectometer (TDR) on November 4th in Vancouver. The meeting is scheduled for 9 AM (it will be over by 5 PM) and will be held at the Sheraton Plaza 500 Hotel, 500 West 12th Av. at Cambie St. (right across from City Hall).

First thing on the agenda for the meeting is a report on the last meeting at the Canadian CTA Convention in Banff, followed by informal discussions and lunch. In the afternoon there will be a presentation on spectrum analysis by Vince Terpstra of Hewlett Packard. This will be followed by a discussion of the TDR by Andrew Oksakovsky of H-P, and a demonstration of measurement techniques utilizing H-P equipment and Vancouver Cablevision signals. The sessions will concentrate on the technical aspects of equipment use.

Cost of registration for the meeting, which includes the cost of the luncheon and coffee breaks, is $4 for members and $6 for those who are not members of the Society. If you want further information on the meeting or want to register in advance, so that the size of the meeting can be ascertained, contact Bing Mui at the SCTE, 5594 Cambie St., Vancouver 15, B.C.

# NEW PRODUCTS

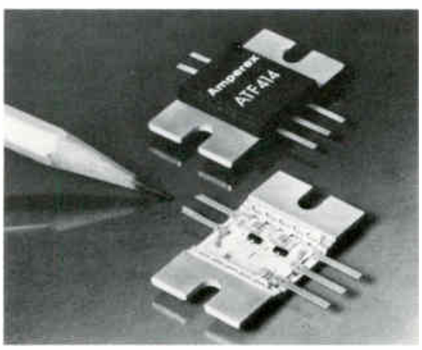
## 6 VOLT MATV AMPLIFIER



Jerrold Electronics Corp. (401 Walnut St., Philadelphia, pa 19105) is now delivering the THPM-S series of single-channel six-volt output MATV amplifiers with AGC, covering each channel in the VHF band. The gain of the amplifiers is 58.8 dB. A front panel AGC setting provides an adjustable range of output levels from two volts to six volts, with a range of usable input levels between 8 dBmv and 37 dBmv. Triple tuned input circuits and double tuned output bandpass filters provide skirt selectivity greater than 26 dB at the next non-adjacent channel edge. The directional design of the output filter simplifies jumper mixing. VSWR is less than 1.50: 1. Each amplifier contains a self-contained power supply.

• • •

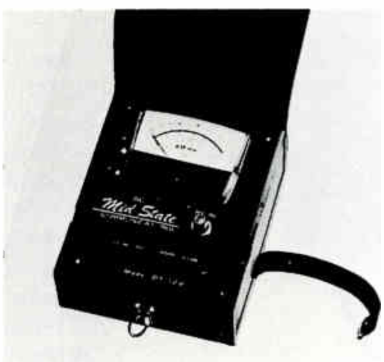
## HYBRID UHF/VHF AMPLIFIERS FOR MATV/CATV




Amperex Electronic Corp. (Slatersville, R.I. 02876) has developed a new line of low-cost hybrid IC UHF/VHF broadband amplifiers for use in antenna amplifiers and signal processors. The amplifiers were designed to incorporate integrated RF components and other components of a distributed form. Four types are available: the ATF415 and ATF419, which deliver 16 dB gain between 40 and 890 mHz with VSWR of 2 at the input and 1.8 at the output; the ATF417 with an amplification of 26 dB and a noise figure of 4 dB; and the ATF414, with a gain of 15 dB and noise figure of 7 dB and VSWR of 1.5 at both the input and output. The first three are plastic encapsulations measuring about an inch by a half inch by a quarter of an inch. The ATF414 is packaged on a metal heatsink. They operate from a 24 volt DC supply and the operating temperature range is from -25°C to +70°C.

• • •

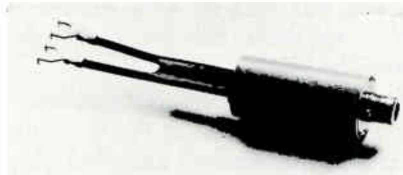
## SIGNAL LEVEL METER



MidStater Communications Inc. (40 North Seventh Av., Beech Grove, IND. 46107) is offering the model DT-12V signal level meter for CATV installers. The LOW band makes a wideband composite measurement from 54 mHz to 86 mHz. The HIGH band makes a similar measurement from 150 mHz to 250 mHz. The operating range is from -10 dBmV to +36 dBmV. Four pushbutton controls are used to select the band of operation or attenuate the signal. The DT-12V also contains a 0 to 60 volt AC and DC voltmeter. Complete with leather carrying case, neck strap, belt loop and batteries, the DT-12 sells for $149.

• • •

## MATCHING TRANSFORMER



Electronic Switch Corp. (40 Page St., Providence, R.I. 02903) has introduced the Model MT 3201 matching transformer. This is a low-loss unit which is completely shielded and comes with a male F-type connector.

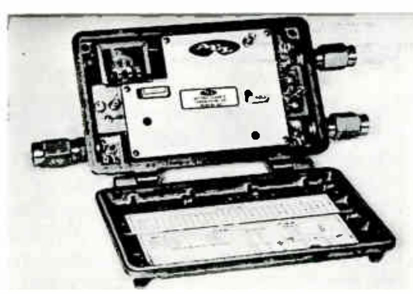
• • •

## CO-CHANNEL REJECTION UNIT

RF Systems Inc. (155 King St., Cohasset, Mass. 02025) is now marketing a new co-channel rejection unit for TV channels 2 through 13, which is said to decrease co-channel interference by 20 to 30 dB. The unit measures 9" x3" x3-5/8" and is priced at $750.

• • •

## AUTOMATIC CABLE TRANSFER SWITCH



AEL Communications Corp. (P.O. Box 507, Lansdale, PA. 19446) announces the automatic cable transfer switch, Model

AS-1, which automatically switches to an alternate cable feed when normal signal input is lost, or falls below a pre-set level. AS-1 switches may be located within trunk or distribution sections and are operable in either Uni- or Bi-directional systems. Designed as a strand mounted device enclosed in a standard extender amplifier housing, the AS-1 accepts standard 5/8''-24 connectors. Power may be 30 or 60 volts.

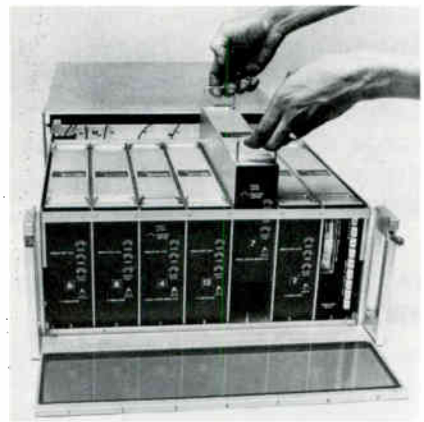
• • •

### PORTABLE RFI ANALYZER

Singer Instrumentation (3211 South La Cienega Blvd., Los Angeles, CA. 90016) is now marketing a portable RFI analyzer which can make measurements in the range 10 kHz to 250 mHz, with a sensitivity of .014 UV. Formerly manufactured under the Stoddart brand name., this instrument, the Model NM-12AT, will determine the source and analyze the characteristics of radiated and conducted interference. It is line or battery operated. The instrument provides its own solid-state, spectrally-flat impulse generator for calibration.

• • •

### PHASELOCKED MODULATOR



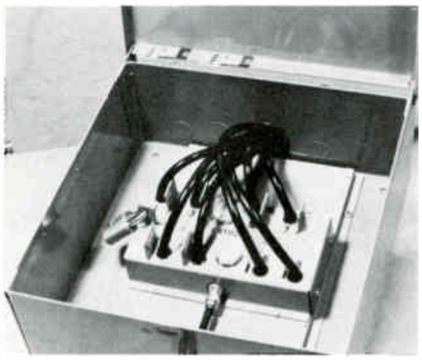
Phasecom Corp. (6382 Arizona Circle, Los Angeles, CA 90045) is now marketing its Model 7120 modulator, which is compatible with the System/7 main frame. The Model 7120's output carrier frequency can be phaselocked to a sampled off-the-air TV signal from a local or nearby station. This technique is said to eliminate differential frequency beats. Price of the Model 7120 is $1575 and delivery is quoted for thirty days.

• • •

### SINGLE CHANNEL AMPLIFIERS

A new series of UHF/VHF/FM single channel amplifiers, capable of delivering up to one watt, 8.5 volts output per channel, have been developed by Riker Communications Inc. (142 Central Avenue, Clark, N.J. 07066). The "Channelflex" 3800 series amplifiers are designed to run at a high level of output with extremely low distortion. They are completely solid state and AGC controlled with mixing in and out. The units are lightening and surge protected and have a regulated and current limited power supply.

## RAPID DISCONNECT SUBSCRIBER TAP



Entron, Inc. (Route 79, Morganville, N.J. 07751) has developed a multiple outlet tap which provides quick connect/disconnect and locks for security. Called "Key-Tees", they are modularized, with each module able to handle up to eight subscribers. Each customer drop is connected to the Key-Tee by means of a numbered printed circuit called "Sekur-A-Key". To make a disconnect, a guard plate is unlocked and the Sekur-A-Key is removed. This automatically disconnects the subscriber drop from the directional splitter circuitry, grounds the drop, and terminates the unused splitter output. An internal tamper-proof guard plate secures legitimate connections and prevents illegal connections. This subscriber tap is recommended for connecting apartment house tenants to cable television systems. The taps are available with a full range of isolation values. Auxiliary built-in return circuits provide 2-way capability.

• • •



## INTERMODULATION TEST SET

AEL Communications Corp. (P.O. Box 507, Lansdale, PA 19446) has made available the model FTS-4 four-channel intermodulation test set. The unit provides four high purity signals and the required filters and amplifiers to test broadband rf amplifiers. The FTS-4 provides sufficient sensitivity to measure intermodulation performance with a field strength meter or the more graphic display of a spectrum analyzer. Its sensitivity allows measurement of devices with gains as low as 0 dB. Price of the FTS-4 is $550.

• • •

## PEOPLE IN THE NEWS

(Continued from page 8)

**RICHARD J. SABINO** has been named operations manager of the Cable Television Division of TelePrompTer Corp. Mr. Sabino has served for the past nine months as Northeast regional operations director for the firm; earlier he was manager of the company's Newburgh, N.Y. system.

• • •

**LOWELL I. SMILEN,** formerly with the RCA's Defense Electronic Products, Missile and Surface Radar division, has been appointed Vice President of Engineering at Laser Link Corp. Prior to joining RCA, Dr. Smilen was Assistant Chief Engineer for Research and Head of the Applied Research Dept. of Loral Electronic systems division. He has also served with Sperry Gyroscope, the Hughes Aircraft Co. and Bell Telephone Labs. A graduate of Cooper Union in New York City, he has a Ph. D. degree from the Polytechnic Institute of Brooklyn.

# BIG INCH

Comm/Scope's ALUMAGARD® Trunk Coaxials. The electricals are right. The price is right. And we'll guarantee the performance before and after installation.

That's why it's a

# TOUGH COMPETITOR

This is the low-loss, low-cost trunk coaxial you can put your trust in.

It has a copper clad aluminum center conductor surrounded with rugged Cell-O-Air® —the dependable dielectric of expanded polyethylene.

The extra high-strength aluminum sheath gives it plenty of protection. So it's easy to install with standard practices.

And to make this great deal even better, Alumagard Series 1000 Trunk Coaxials are available with Comm/Scope's exclusive five-year guarantee. Insist on it.

You won't find a better bargain.

For information and prices, write or call: Comm/Scope Company, P.O. Box 2406, Hickory, North Carolina 28601. Phone 704/328-5271.

**Warehouse locations:** San Rafael, California; Dallas, Texas; Tampa, Florida; Seattle, Washington; Sherrills Ford, North Carolina; Woodbridge, New Jersey; Moline, Illinois.

Transmission Data

| Frequency (MHz) | Maximum Attenuation (dB/100 ft.) |
|---|---|
| 50.0 | 0.37 |
| 216 | 0.70 |
| 240 | 0.83 |
| 270 | 0.87 |
| 300 | 0.92 |

**FITTINGS AVAILABLE FROM STOCK**

**Comm/Scope Company**
Division of Superior Continental Corporation
A Member of Continental Telephone System