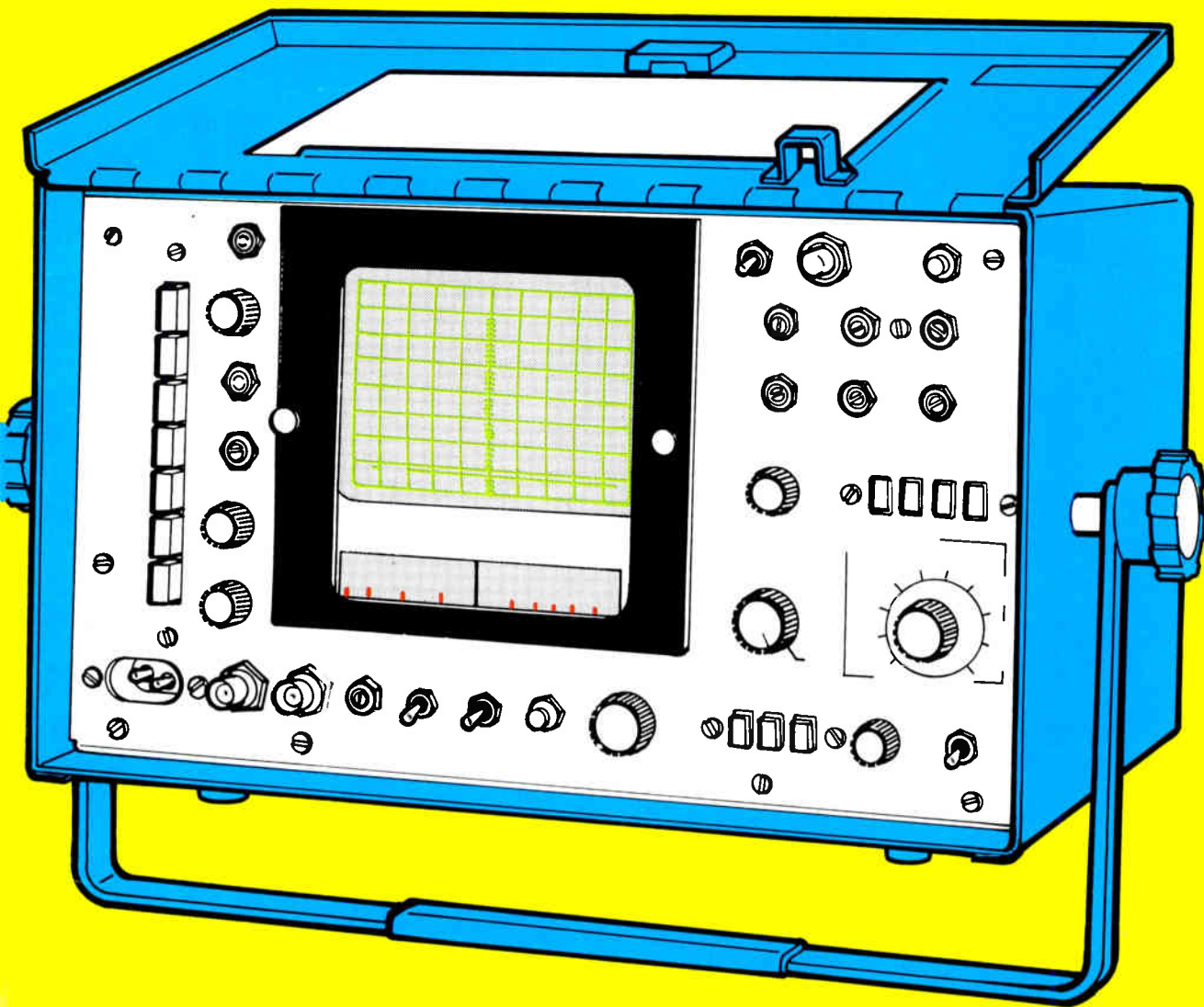


C-ED

Interfacing Engineers and Management
A Comprehensive Guide on Test Equipment



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Reporting the Technologies of Broadband Engineering

August 1978
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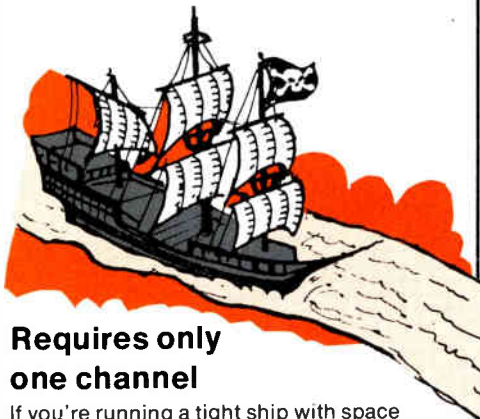


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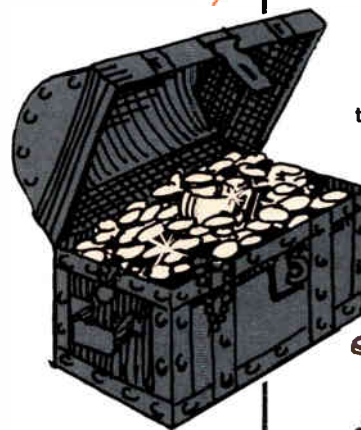
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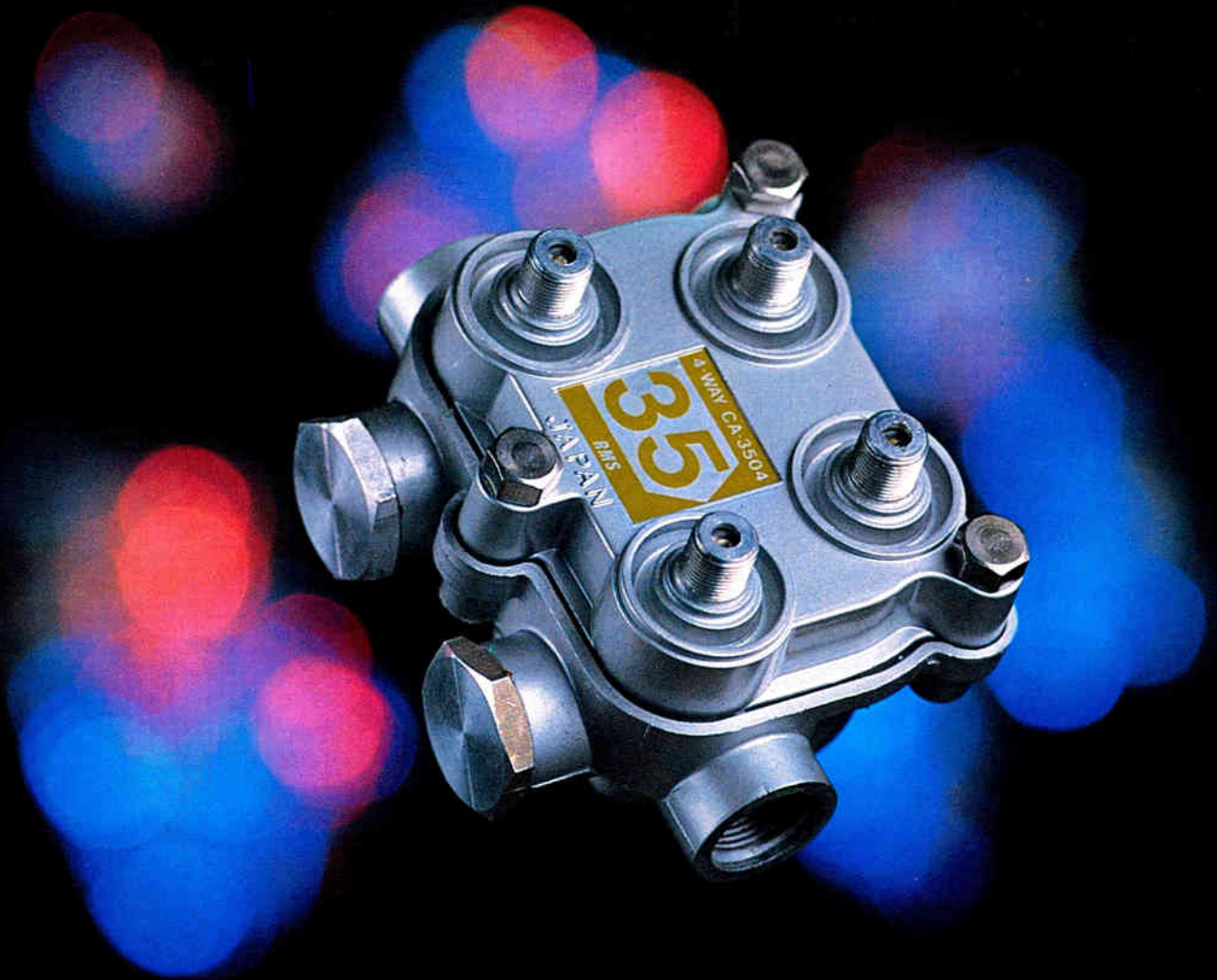
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C-ED News at a Glance

WASHINGTON, D.C.—**Streamlined complaint procedures and clear guidelines for agreements are the key to speedy resolution of pole attachment disputes** between utilities and cable television companies, the **NCTA** has **told the FCC**. NCTA's comments were filed in the FCC's current pole attachment rulemaking proceeding.

NCTA also urged the commission to establish detailed pole attachment rate guidelines to encourage negotiated settlements.

The new pole attachment law requires that rates charged to cable companies by utilities fall within a zone of reasonableness between "additional costs"—the direct cost of installation and maintenance of cable attachments—and "fully allocated costs"—the total cost of the pole and maintenance apportioned by the amount of space occupied by each pole user.

WASHINGTON, D.C.—**The Federal Communications Commission should adopt a uniform spectrum management policy towards microwave relay operations** whether they serve broadcasters or cable television systems. This policy was urged by NCTA.

NCTA also asked the commission to open bands A and B to CARS, bringing the CARS spectrum in line with broadcast auxiliary services. See *C-ED* page 16.

AUSTIN, TEXAS—**A number of Texas utilities are putting the pressure on the Public Utility Commission of Texas to take over jurisdiction to regulate pole rental rates.** The Texas PUC has now requested an official opinion from the attorney general of Texas.

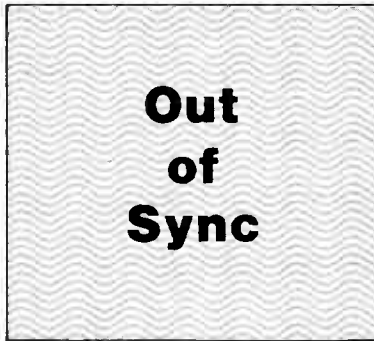
WASHINGTON, D.C.—**NCTA senior vice president for operator services Wally Briscoe has resigned as of August 1 to become vice president of Gardiner Communications.** Briscoe will play a major role in that company's development in satellite earth station communications.

Replacing Briscoe will be Ivan Johnson, currently executive director for the Arizona Cable Television Association. The starting date for Johnson has not yet been determined.

WASHINGTON, D.C.—**The NCTA has finally added an assistant director of engineering to help Bob Luff challenge Washington, D.C. David G. Reiser**, formerly with Comsat and Microdyne, will be occupying that position.



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Page 29



Page 33

FEATURES

Engineering and Management

This article offers the view that "engineering is a tool of management." Page 11

Test Equipment

The section on test equipment is offered as a guide on the various types of equipment available. It also features a handy reference on the types of test equipment used in headends, distribution systems, repair and maintenance, video and local origination, microwave and satellite communications Page 17

Management/Technology Partnership

Technologists are managers anyway Page 26

DEPARTMENTS

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Fiberoptics finally arrives in the home in Arnhem, Holland Page 31

OPINION

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Cover: The field strength meter on the cover of this issue of *C-ED* depicts the thrust of this issue. A comprehensive guide on test equipment can be found beginning on page 17.

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Editor's Letter

Test equipment is probably one of the most vital instruments used by the engineer and technician. Because of this, the August issue of *C-ED* offers a comprehensive guide on this equipment. The equipment is logged into five categories: headend, distribution system, repair and maintenance, video and local origination, and microwave and satellite communications. In addition, most of the major manufacturers are listed in each category, including addresses and telephone numbers. The test equipment section, in its own magazine format, begins on page 17.

For some thought-provoking articles, we have provided features on the interfacing of engineering and management. These articles, both written by engineers, offer distinct viewpoints. Whether you agree with them or not, we think you'll find them interesting. The article, "Engineers and Management" by Cablecom's Bill Petty is on page 11. And the feature, "Management/Technology Partnership" by Jim Emerson of Northern CATV can be found on page 26.

As announced in the July issue of *C-ED*, we are featuring a monthly department called "People." From the title, that's exactly what the department will be about—engineers and technicians on-the-move. That department is on page 28. Just a reminder, our other new department "Out of Sync" is *by and for* engineers. We hope this forum will help solve some of your problems. And you'll find this section on page 29.

Paul A. FitzPatrick



"Now I can reach population pockets without emptying my own."

"Loleta had 195 potential subscribers, Hydesville, 190. That's plenty if you can reach them economically." And that's exactly what Sam Shults, President of Redwood Cable Vision of Fortuna, California did. He serves several small communities profitably with a Hughes AML microwave system feeding 50 1/2 miles of aerial distribution. Hughes AML receivers are cable powered, designed to work outdoors, and feature 40-channel capacity with VHF input and VHF output. There are more than 6000 video channels being distributed by Hughes AML systems around the world.

If you'd like to know more about how you can make small population pockets fill your pockets, call or write Hughes Communications Products, P.O. Box 2999, Torrance, CA 90509; (213) 534-2146. And in Canada: Micro-Sat Communications, Ltd., (416) 839-5182.

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Safe and Secure Headend Sites

By Harold Null
 Vice President-Engineering
 Storer Cable TV
 Sarasota, Florida

In this day and age when everything has gone up in price, the prime concern of any cable operator is cost. With most operators investing \$200,000 and up at the headend site, it makes sense with this amount of investment that the site is a secure and safe one. The security and safety of a site can be improved by following these guidelines:

- Housekeeping
- First aid kit in building
- Fire extinguisher in building
- Trash can in building
- Building locks secured
- Lightning protection devices (for both tower and building)
- Night light
- Safety climbing device on tower
- Ease of access of authorized personnel to site, tower and surrounding area.

All of the above are relatively inexpensive steps and, if adhered to, might save many dollars in maintenance, repair or damage costs, or possibly the life of an employee.

At this point, a thought comes to mind concerning your insurance carrier. When you have a good program let your carrier know about it. Explain your plan to a representative from your insurance company and show him the condition of your site. You may be surprised to find that his recommendations to his superiors may even be passed on to yours.

In addition to safety, security is an important segment of your company's investment in the headend site. Some guidelines for securing your site are: housekeeping, securing doors and fence gate, and securing fence around building, tower, satellite earth station and other permanent structures.

With security in mind, the two major problems operators face are fire and vandalism. Vandalism can be reduced if the guidelines are followed and adequate measures are taken to eliminate entry to the site as much as

possible. Fire, on the other hand, is a subject that most operators are usually not concerned about. Ironically, it is a very serious one. I, myself, have become very concerned about this since I know of two such fires in the last eight months at this company's headend sites.

The destruction of a fire goes beyond the loss of the headend building and can involve weakening of the tower, guy wires, anchors and other metals engulfed in the heat of the flames. The obvious precautions can be taken concerning fire such as: NO SMOKING signs around and near the site, proper grounding methods and non-flammable protection agents on or near equipment. Most operators overlook the fact that proper house-

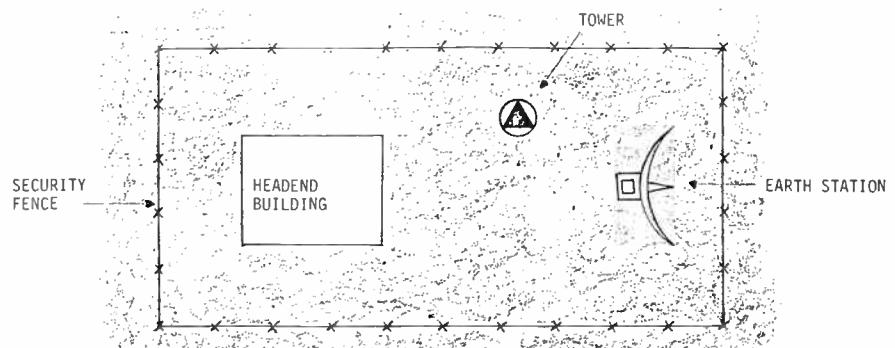
keeping, even in the case of fire, is a major deterrent against such a catastrophe. If the grounds near the building, tower, earth station and other structures are maintained in a way that there is no growth of grass or brush, many fires can be eliminated.

Of the two cases I mentioned, both were associated with just such a problem of growth.

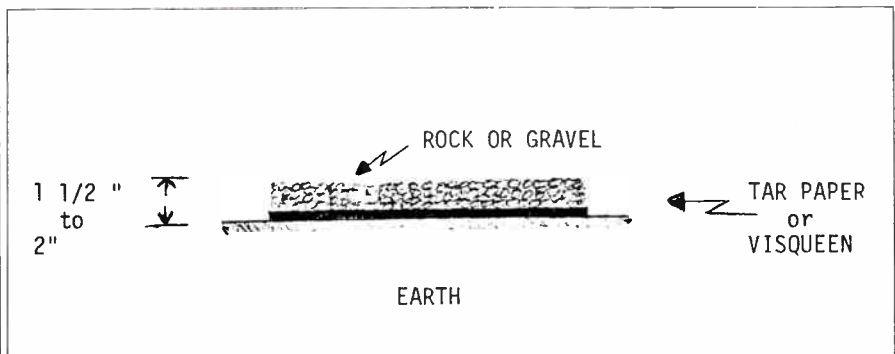
You should also have sufficient night lights which will help with service at night and ward off vandals.

Again, all of these items are relatively inexpensive and will be of great benefit. Don't forget your insurance company when you implement programs that will possibly reduce a hazard. They too, may have suggestions to further reduce hazards.

The following is a drawing of a typical headend site and the methods that I use to reduce fire hazards:



All grass should be sprayed with a liquid grass killer, given a sufficient time to die and then raked away and disposed of. When this has been done tar paper or Visqueen is put down as reflected in this drawing:



If you have a problem with the rock washing away, take a cement and sand mix and spread over the rock area, wet down and you will have a permanent fix. If your site is on an extreme slope, you will need a border around the area much like a border around a flower bed.

SCTE to Address Bonding and Grounding Issues

WASHINGTON, D.C.—SCTE will arrange and host a meeting in Washington, D.C. during the late summer to discuss the topic of Bonding and Grounding. Anyone with an interest in this issue is invited to attend. Many SCTE members are concerned about Bonding and Grounding and intend to do something about it. This topic is now appearing more often on SCTE sponsored meeting agendas.

SCTE's office has received inquiries from manufacturers on what the CATV industry needs in the way of hardware and assistance. These manufacturers will also be invited to attend the proposed meeting.

The date, location and other relevant information on the SCTE hosted meeting will soon be released.

Video Telephone Patent Awarded to SCTE Member

WASHINGTON, D.C.—Vic Nicholson,

recently retired from the CTIC in Washington, D.C., and an SCTE charter member, has been awarded a U.S. Patent #4077006 for the "Bi-Directional Uni-Cable Switching System." The BUSS "takes advantage of recent developments in computer engineering technology to introduce a new type of coaxial cable system that also provides high definition video telephone in monochrome or color," says Nicholson.

According to Nicholson, a BUSS subscriber has a private television channel which can be used for reception of programs "on request," transmission of control signals to select and address the programs, and two-way video transmission to any other subscriber.

SCTE Upcoming Meetings

July 30-31: As *C-ED* goes to press, the Pacific Northwest CATV Association is hosting two days with hands-on *TVROs, Test Equipment and Headends* with Larry Larson of Scientific-Atlanta;

Keith McIntosh of LRC on *Connectors, Installation and Problem Solving*; and Dick Covell of Sylvania speaking on *Plant Maintenance*. The sessions are being held in Sun Valley, Idaho.

August 9-11: On Friday, August 11, the Central-Atlantic Chapter of the SCTE will sponsor the technical portion of the New Jersey Cable Television Association meeting in Atlantic City, New Jersey. *Fiberoptics, Grounding and Bonding* is included on the agenda. Tabletop exhibits and computer games will be featured. For more on this meeting, contact Ed Horowitz at (212) 556-2826, or Bob Bilodeau at (201) 672-3033.

Sept. 24-26: The Southern CATV Association convention is noted as being one of the high spots for programming, tabletop exhibits and good entertainment. The convention will be held in Atlanta, Georgia. Technical programs are scheduled for Monday, September 25 with round-table/give-and-take programs. For more information, contact Judy Williams at (404) 393-0480.

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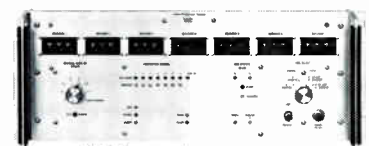
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ENGINEERING *and* MANAGEMENT

By William D. Petty, Ph.D.
 Director of Engineering
 Cablecom-General, Inc.
 Englewood, Colorado

Why is it that whenever the subjects of engineering and management arise they seem to be in adversary roles? One might think that the one is the antithesis of the other. This is clearly not the case. Let's consider why it so often appears to be this way and, with a rational approach to the subject, show why it should not be.

When conflict develops it is usually for one of three reasons:

- 1) Engineering does not recognize its place in the organizational structure.
- 2) Management has failed to properly define the required objective.
- 3) Management has failed to support the engineering role in the organization.

A proper understanding of these is important to both engineers and managers. An examination of each in turn, therefore, should shed light on some common problems.

The Role of Engineering

Engineering is a tool of management. No more, no less. It does not exist on its own merits. Engineers are not hired to achieve technical elegance, but to serve (along with marketing, operations, finance, etc.) the business goal of making a profit.

For engineers to simply understand the above statement would be a great step in eliminating conflict. But the simple fact is that most engineering schools traditionally do not require extensive courses in business administration or economics. Many engineers, therefore, simply do not seem to grasp the significance of the dollar in the business world. In personal

life money is merely a resource to be used (the means to an end). In business it is the end in itself. A person spends money. A business invests it. To do otherwise detracts from the basic goal of the business.

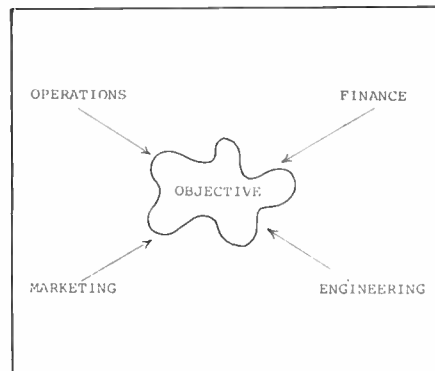


Figure 1

The Definition of Objectives

Almost any objective has many variables, even when it is well defined. Thus, the viewpoint is critical when deciding how a given objective is to be achieved. Figure 1 shows the same objective observed from several different views. Each view contributes a unique perspective. Taken together, these define the parameters of the problem much better than any view alone, so that a decision made taking all viewpoints into account (giving proper weighing) will be better than one considering only one.

Problems arise when the objective is vague or is defined too broadly. When not clearly defined, the situation in Figure 2 can develop. The general area may be understood, but each support group sees a different objective within that area (often without realizing it). So that if each were asked "What is your objective?" several different answers might be received, each consistent with the general objective stated by management.

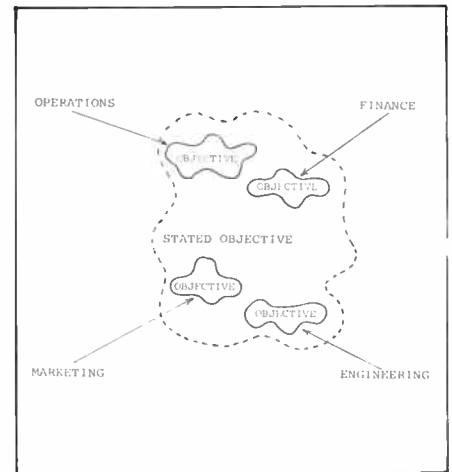


Figure 2

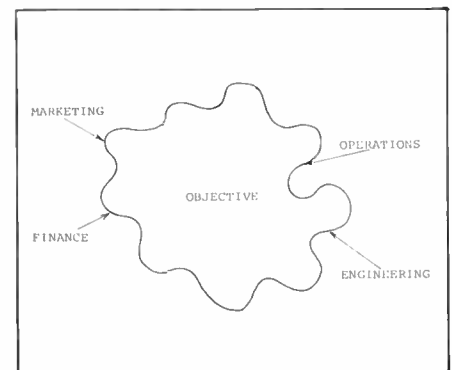


Figure 3

The concept of time is one example of the above problems which can easily lead to trouble. Traditionally engineers think in generalized long-term goals (maximize life expectancy, etc.). Management more often perceives a problem within a precise time framework (five-year plan, next year's profit, etc.) Therefore, the time portion of the objective must not be neglected. Visibility into the future varies considerably from individual to individual. An instruction to design a new plant should include how long it must last. Obviously, if one has a nonrenewable ten-year franchise, it

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may be wasteful to design a plant which will last 25 years. Also, if one predicts changes in the state-of-the-art which will make existing designs obsolete in a given time period this must be taken into account.

If the visibility of management and engineering do not conform, either money will be wasted or the project will fail, neither of which is acceptable. Figure 4 shows this graphically for the case where engineering achievement exceeds management's need. Figure 5 shows the converse, where management's visibility exceeds that of engineering.

Optimization of results and elimination of conflict can be achieved only when the visibility of management and engineering in a given project

If engineering is to maintain its vitality and not become dulled, or an echo, management must provide the opportunity for interaction and continuing education. These are vital functions to the long-term health of an engineering operation. Without external interaction ideas will turn in upon themselves and become stereotype, thus becoming "yes new" for an old point of view. Without continuing education engineers become quickly obsolete.

Engineers have long realized the importance of both the interaction and educational needs of those practicing in the various fields. Thus, the professional societies have been created. These do not exist for "good times," or generally as lobbying activi-

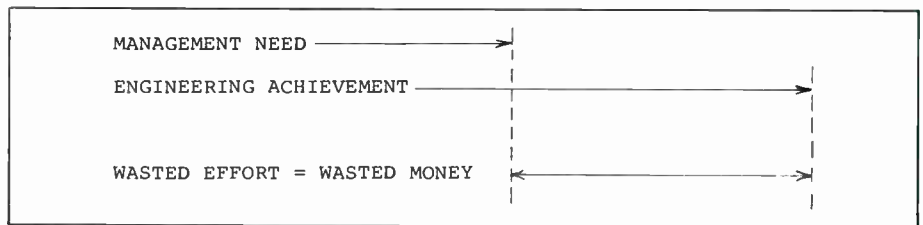


Figure 4

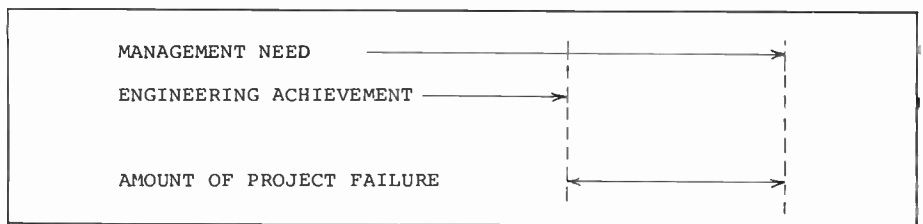


Figure 5

coincide. This takes continuous communication on both sides as it is obviously a two-way educational process.

In that the operation of a business is the responsibility of the manager, it becomes the duty of the engineering personnel to bring the range of their activities into harmony with the objectives set by management. However, because engineering fulfills a vital and unique function it is essential that in the process of this adjustment engineering does not change the way in which it perceives these objectives. In doing this the value of the engineering function would be severely diminished. Engineers should think like engineers, not like salesmen or financial analysts.

The Support of Engineering

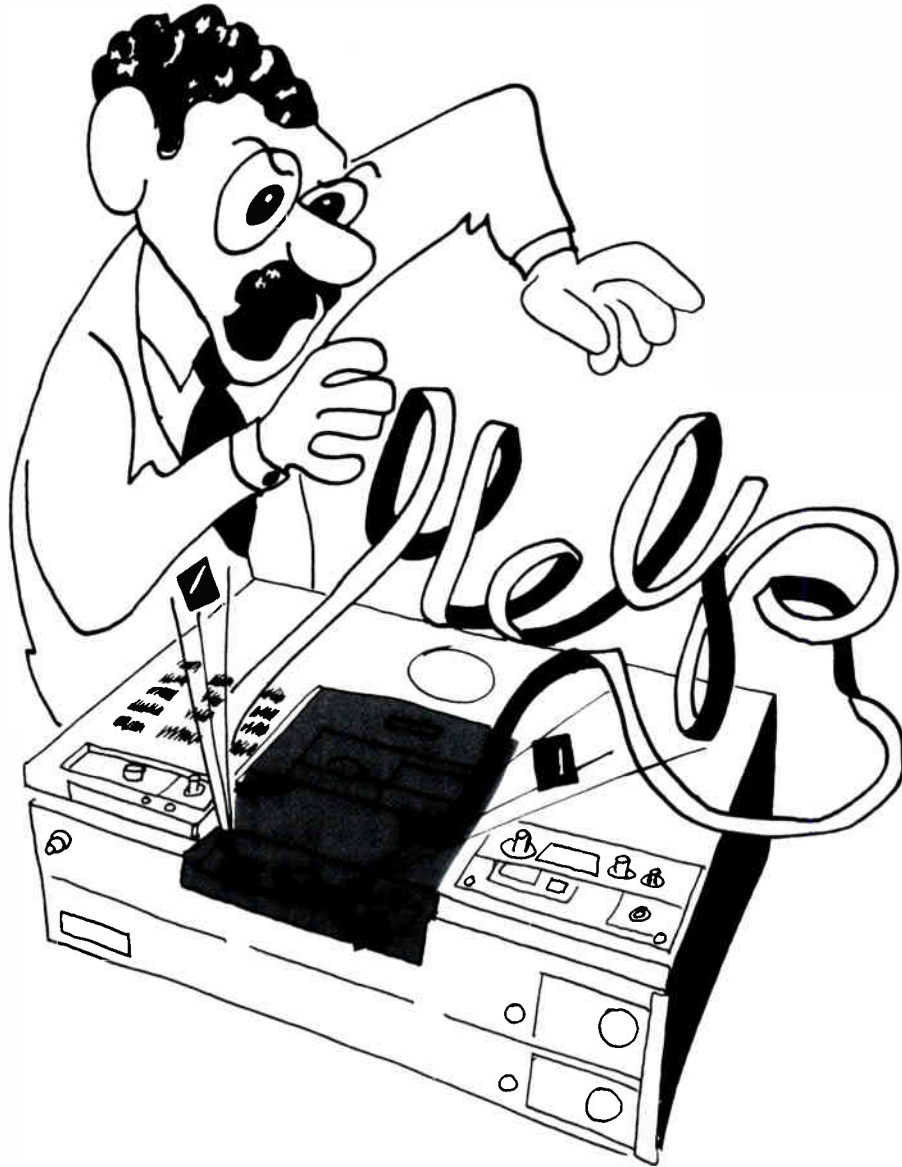
Management has a very real responsibility to the engineering function if it is to remain an effective part of the total organization.

ties, but rather to provide the opportunity and encouragement for personal contact between practicing members of similar disciplines. This is combined with continuing educational opportunities through conferences and seminars.

Managers who do not encourage, let alone allow, their engineering staffs to take advantage of the opportunity to participate in these professional activities do harm to the engineers and in the long run they also do their organizations a serious disservice.

An attempt to find basic disagreements in concept between engineering and management would be futile. The role of engineers and managers are not in conflict. Engineering merely provides a unique viewpoint toward a management stated objective, and when each understands the objective in the same terms, this viewpoint can and should be used to advantage to achieve the best possible route to the objective.

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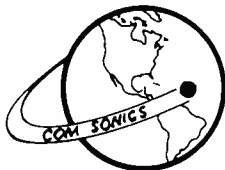
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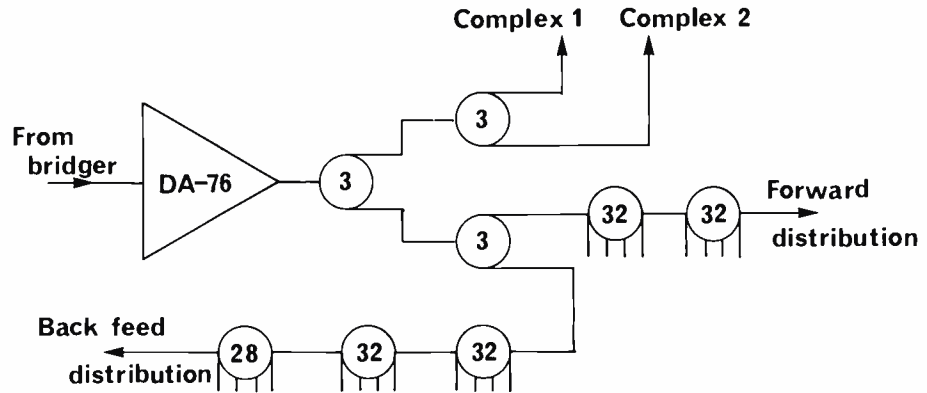
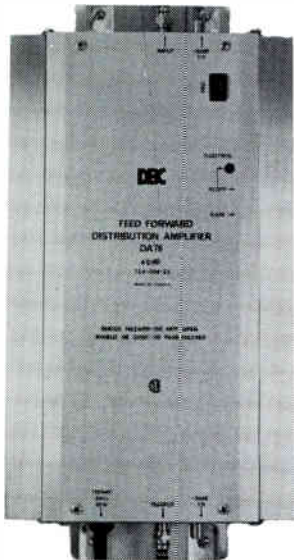


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Successful NECTA Show Convention

WENTWORTH-BY-THE-SEA, NEW HAMPSHIRE—On July 9-12, more than 300 participants gathered for the 1978 New England Cable Television Association's annual meeting. For the first time in the NECTA's convention history, the attendees were greeted by a satellite earth station, a result of the joint efforts of Antennas for Communications and the Microdyne Corporation.

NECTA executive director Bill Kenny set the tone for the gathering in a forward to the convention program. "In retrospect," he wrote, "1978 will be viewed as a milestone year for CATV. New service exploration utilizing satellites and coaxial capability is accelerating." Kenny continued: "Cable television moves on and up, which must serve to benefit America. Legislative and regulatory pressures from Washington may well serve as impetus for focusing industry activities.

Certainly, whatever the motivation, new service exploration is upon us."

The technical program included sessions on *Signal Leakage* by MidState's Larry Dolan; *Drop Wire Leak Testing* by Ken Smith of Times Wire and Cable; *Addressables* by Jeff Headley of GTE Sylvania, Magnavox' Joe Ostuni, Dave Fear of Delta-Benco-Cascade Ltd., and Bob Wilson of MCE, Inc. George Bell of Microdyne spoke on *Earth Station Technology*.

NAB Responds to Rewrite

TORONTO, CANADA—At its semi-annual meeting held in Toronto the end of June, the National Association of Broadcasters board of directors addressed the rewrite of the Communications Act of 1934 (H.R. 13015). The board noted that the language of the proposal is "positive and forward looking."

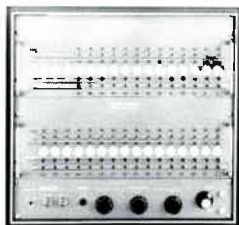
While applauding "the efforts to free broadcasters from the excessive restrictions on political broadcasting,

the over-regulation involved in the Fairness Doctrine, and unnecessary paperwork," the board maintained, "We cannot agree with some of the elements of H.R. 13015, such as: the establishment of a new and undefined standard . . . for the future regulatory agency in lieu of the 'public interest, convenience and necessity' mandate; the threat of revocation of license which would lead to instability in the industry and the resultant negative effect on the public interest; the philosophy which permeates the bill that apparently looks to the eventual breakup of all combinations including AM/FM in the same market . . . the removal of all federal cable regulations and the imposition of a spectrum tax which is a clear and dangerous break with precedent and opens broadcasters to taxes of unknown future magnitude . . ."

In conclusion, the NAB board recommended a "creative blending of the Communications Act of 1934 with the most constructive provisions of H.R. 13015. The board further voted to

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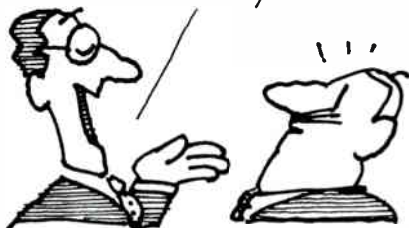
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establish a series of meetings throughout the country to brief broadcasters on the Communications Act rewrite as proposed in H.R. 13015. The meetings are designed to encourage broadcasters to participate in the ongoing discussions of the initial proposals for legislation.

Texscan Training Seminars

INDIANAPOLIS, INDIANA—Texscan Corporation has announced the continuation of its 1978 technical training seminars. These seminars are five days each and cover all facets of CATV system operation, as well as tests and measurements.

Tuition is \$150.00 per enrollee. Locations and dates: • September 11-15, Philadelphia; 18-22, Indianapolis • October 9-13, Dallas; 16-19, Atlanta • November 6-10, Los Angeles Area; 13-17, Seattle • December 4-8, Western Canada; 11-15, Eastern Canada.

NOTE: Lunch is provided from 12:15 to 1:15 PM each day. There are two coffee breaks, 10:15-10:30 AM and 3:15-3:30 PM. The daily sessions will close at 5:00 PM.

NCTA Urges Uniform Frequency Allocation On CARS Band

WASHINGTON, D.C.—The Federal Communications Commission should adopt a uniform spectrum management policy towards microwave relay operations whether they serve broadcasters or cable television systems. This policy was urged by the National Cable Television Association in its comments filed with the FCC.

The FCC is currently considering expansion of the spectrum space allotted to cable television relay services (CARS) within the high frequency band D. The present CARS allotment is already saturated in 38 areas nationwide, restricting cable systems' ability to offer new or expanded services to consumers.

"We wholeheartedly support the commission's proposal to expand the band D spectrum space available for the cable microwave's services," NCTA engineering vice president Robert Luff said in releasing the association's comments. "But the commission should be moving in the direction of uniform spectrum policy and technical standards for both CARS and broad-

cast auxiliary services (BAS), not perpetuating a completely artificial distinction between the two." Under current FCC regulations CARS is eligible to operate in band D between 12.70 GHz and 12.95 GHz. The commission has proposed contiguous expansion within band D to 13.2 GHz. Broadcasters, however, are permitted to operate the same microwave services not only in band D but also in the lower frequency bands A and B. Signals transmitted in lower bands are less susceptible to atmospheric disturbances and have fewer technical reception problems.

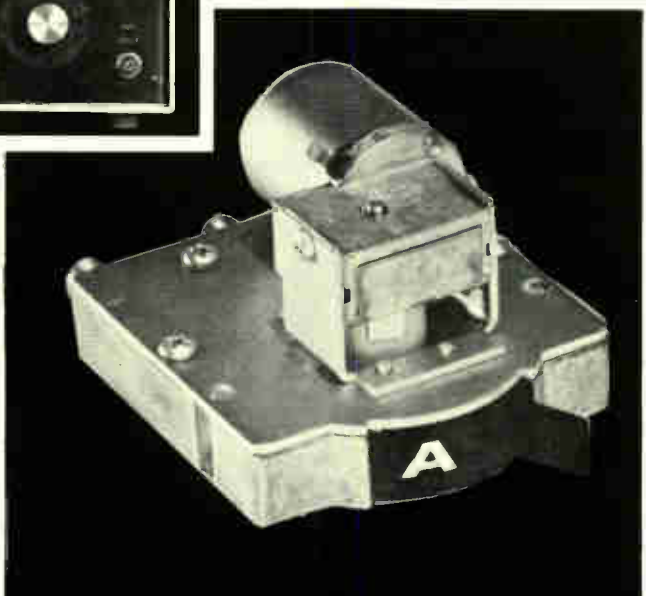
In its comments, NCTA asked the commission to issue a further Notice of Proposed Rulemaking opening bands A and B to CARS, bringing the CARS spectrum in line with the BAS. The commission should "consider all needs for microwave services by cable television systems on an equal footing with broadcasters," NCTA said.

The association also urged that new technical standards proposed by the FCC for CARS operation should be extended to other similar microwave services—broadcaster, auxiliary and television transmitter relay services.

In addition to its spectrum space expansion proposal, the commission is considering reduction of the CARS channel bandwidth from the current 25 MHz to 12.5 MHz. While NCTA expressed strong support for the commission's intention to provide for more efficient use of spectrum space by all microwave users, the NCTA opposed across the board limitation to 12.5 MHz, arguing that the limits could seriously degrade signals on long-haul microwave transmissions. Also, NCTA said the reduction proposal would require cable systems in rural areas to invest in expensive solar equipment even when there is little likelihood of signal congestion in their areas. Furthermore, NCTA urged the commission to delay implementing any new technical standards for the 13 GHz band until they can be applied across the board to all users sharing the band.

Strong support was expressed by NCTA for the commission's proposal to prevent transmitter relay service stations to transmit signals to CATV systems. The association pointed out that the long-haul capability of band A coupled with signal sharing between CARS and translator stations could stimulate increased rural broadband services.

G-ED's TEST EQUIPMENT GUIDE



This section of *C-ED* features a guide to the various types of test equipment presently used in the CATV industry. The test instruments are divided into the following categories: Headend, Distribution System, Repair and Maintenance, Video and Local Origination, and Microwave and Satellite Communications. You will note that many instruments listed in one category are applicable to one or more additional categories.

Because of the volume of different types of test equipment utilized in the CATV industry, we were unable to list all of the equipment for all the manufacturers. We believe, however, that we have provided a well-rounded sampling of this equipment and hope this section serves as a guide for your test equipment needs.

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HEADEND

Attenuators

Texscan

Texscan has a varied line of attenuators. Its model BMA-577 is a new "packaged attenuator" used in measurement-by-comparison test applications and for reduction of high-level signals from sweep generators to oscilloscopes and spectrum analyzers. The advantages of the "packaged attenuator" concept are convenience of operation and a neater test bench.

The rotary attenuators provided by Texscan are laboratory-type precision instruments for bench use or inclusion in test equipment.

Wavetek

Wavetek's series 5000 and 7500 attenuators are miniature turret-type units that operate over wide frequency ranges, making them suitable for bench setups, field use or test instrumentation. Units having 1 dB, 10 dB, 35 dB and 70 dB of attenuation, variable in 0.1, 1, 5 and 10 dB steps, are available in either 50 or 75 ohm versions.

The 5000 series units (50 ohms) cover the DC to 2000 MHz frequency range, and the 7500 series units (75 ohms) cover the DC to 1000 MHz range.

The models 5080 and 7580 are dual concentric-type attenuators that provide a total of 80 dB attenuation, variable in 1 dB steps.

All units are direct reading, ruggedly constructed and have provisions for panel mounting.

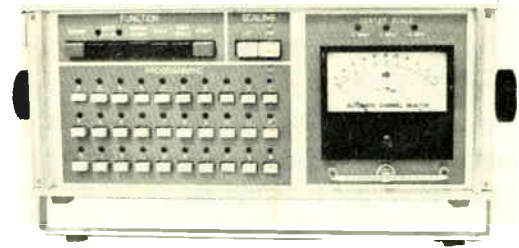


Recorder Monitors

ComSonics

The ACM-31 automatic channel recorder monitor from ComSonics is capable of making full use of input signals from -10 dBmV to +10 dBmV. It has a 20 dB dynamic reading range at all three center scale settings (-10 dBmV, 0 dBmV and +10 dBmV), and a total usable range of 40 dB. The channel hold

selector (when depressed) provides a continuous reading on any channel, and the device records for 96 hours with a full roll of recorder paper.



Sweep Systems

Tektronix

The SW 503 sweep generator covers a frequency range of 1 to 400 MHz. It has a variable sweep rate, step attenuator, 20 dB vernier attenuator, and a crystal-controlled marker generator which provides comb-type markers at 1, 10 and 50 MHz.

A unique feature of the SW 503, when used with a DC 502 digital counter with Option 7 installed, is its ability to provide a variable marker covering the entire 1 to 400 MHz frequency range with the marker frequency read directly on the digital counter.

Texscan

Texscan manufactures two sweep generators for CATV services. The model WB-714F VHF sweep generator is a combination of discrete and hybrid integrated circuitry that provides impressive stability and flatness in all modes of operation. This solid-state unit covers the frequency range of 4 to 400 MHz in a single band. It features a full +54 dBmV RF output with spurious and harmonic responses typically 40 dB below rated output.

Texscan's WB-713F is a versatile sweep generator that covers both the UHF and VHF frequency ranges in two bands: 1 to 500 MHz and 450 to 960 MHz. The sweep width is continuously adjustable from 100 kHz to 500 MHz. This feature, plus the vernier center frequency control, an excellent (1 percent) linearity and flatness produce distortion-free measurements over wide or narrow frequency ranges.



Wavetek

Wavetek manufactures a broadband, 1-400 MHz sweep generator specifically designed for use in the manufacture or repair of CATV converters and processors. In the model

1402A sweep generator, external programming may be used to sweep any or all of the 400 MHz frequency range. This allows the instrument to be used on the test bench for normal amplifier, passive and cable repair and evaluation.

The unit includes a front-panel switch providing 36 preset, detent positions. Each position provides a fixed center frequency at channels IF (43.0 MHz), 2 through 13 and A through W. The device comes complete with crystal-controlled, pulse-type markers at the sound and video carriers of each channel.

Wavetek also offers the solid-state 1801A sweep/signal generator that provides features and options ideally suited for CATV manufacturers and installers.

The 1-500 MHz frequency range of the basic unit and the optional (450-950 MHz) high band, adequately covers bands now in use as well as those of the future. The instrument will sweep each band in its entirety, or as narrow as 200 KHz.

DISTRIBUTION SYSTEM

Radiation Monitoring

ComSonics

The Sniffer RF leakage detection system is designed solely for troubleshooting RFI/EMI leakage in a CATV system. Proper use of the instrument can permit distinction between leakage sources such as a loose drop fitting, loose major port connector or a hairline cable fracture.

The Sniffer is a three-part system comprising a source, sensing unit and detector. Features of the Sniffer include maximum signal in noise detection via selected modulation, high-threshold receiver AGC circuit, and a non-interfering pilot tone that can't be mistaken for any other signal. Double receiver conversion and ceramic IF filters eliminate the need for bandwidth adjustment and the front panel meter allows go-no-go limit testing when used with a dipole. The internal calibration source provides 20 microvolts per meter reference, and spike noise suppression circuits aid in aural low level detection.



Mid State

The RD-1 radiation detector is a tuned dipole feeding a 16 dB gain flat amplifier. It is battery operated and comes with an insulated hoisting pole. The device is designed to test compliance with FCC CATV radiation specification 76.609. The RD-1 contains a built-in battery-powered pre-amp and works with any signal level meter.

Mid State manufactures the model ST-1 Cuckoo radiation tester. This is a unit that mounts in the headend and introduces a unique modulated carrier on the cable. The

operator then uses inexpensive FM radios to hunt for leaks and other cable breaks. The modulation characteristic of the ST-1 is such that the closer you get to a leak, the more tones you hear.

Texscan

The Bloodhound leakage monitoring system from Texscan provides complete radiation protection. Monitoring two discrete frequency bands permits the acquisition of precise system integrity data.

The headend unit (model FDM-1) injects signals at appropriate frequencies. The remote receiver (model FDM-2) may be vehicle mounted or hand carried operating on its own battery source.

The Bloodhound is a dual-frequency, crystal-controlled, FM transmit-receive system designed to rapidly locate signal leakage in a cable system. Received leakage signals greater than the adjustable sensitivity threshold activate visible and audible alarms.

Wide Band Engineering

WBE offers the model A61 high output RF detector that provides a flat DC voltage gain better than 10 dB over conventional detectors. The unit replaces most detectors where easily increased gain is desired.

The A61 basically consists of a specially designed voltage doubling wideband RF transformer, loaded at the secondary by a frequency compensating termination network. More gain in voltage is accomplished by applying a dual microwave diode voltage doubling network at this termination. Additional DC output is gained from raising the diodes' operating point in the square law region with respect to the RF input level.

Voltmeters

Fluke

The new 8920A AC/dB voltmeter is a 3½-digit device designed for RF applications. The frequency response extends from 10 Hz to 20 MHz. A midband accuracy of 0.5 percent is assured by a solid-state monolithic rms converter which responds to the true heating value of the signal.

REPAIR AND MAINTENANCE

Bridges

Sadelco

Also from Sadelco is the model PB-2 Porta-Bridge, which permits measuring return loss and VSWR without an oscillator. This device checks FSMs (wideband output can be used to check field strength for flatness), and permits many other measurements without the use of oscilloscopes and sweep generators. For the latter measurements all that is needed is a field strength meter.

Texscan

The RCB-3/75 reflection coefficient bridge is a broadband RF bridge which, when combined with a sweep generator or an oscilloscope, provides an accurate display of reflection coefficient or return loss vs. frequency. Model RCB-3/75 features 75 ohm connectors on test ports.

Spectrum Calibrators

Mid State

Mid State produces an MC-50 meter calibrator designed to calibrate signal level meters for CATV systems. The +50dBmV output level and 5 kHz frequency stability make this instrument useful as a general purpose signal generator or marker generator. The unit operates from 4 to 300 MHz as a signal generator and can be switched to an amplitude modulated mode with simulated TV modulation.

Sadelco

Sadelco has introduced a new concept for FSM calibration and measurements in its model 260-B spectrum calibrator. The 260-B (used in conjunction with a field strength meter) provides data directly in dB across the entire VHF spectrum continuously. The unit emits a continuous, flat signal from 4.5-300 MHz. The accuracy of this wideband generator is ± 0.25 dB throughout its frequency range. Minimum guaranteed output is +10 dBmV—measured with a FSM having 0.5 MHz IF bandwidth.

Signal Level Meters

Arvin

The model 500B SLM is a unit that combines convenience, accuracy and portability. This unit features pushbutton channel selection, a four-step measurement procedure and an audio/video switch. Accuracy is ± 0.25 dB maximum error on any channel at 70 degrees F, and 36 individual channels are tuned to maintain optimum accuracy. The 500B is housed in a compact, rugged case for long life and uses internal NI-CAD batteries for complete mobility.



Avantek

Avantek's SL-300 signal level meter with new plug-in modules was recently demonstrated at the NCTA convention in New Orleans. The SL-300 itself is a precision RF voltmeter

tunable to any frequency between 4.5-300 MHz. It can read signal levels from -40 dBmV to +60 dBmV (10 μ V to 1V) with guaranteed ± 1.0 dB accuracy when calibrated at the operating ambient temperature using the internal level calibrator.

A three-digit LED display indicates the frequency to which the SL-300 is tuned with 1 MHz resolution and guaranteed ± 1.0 MHz accuracy. Signal levels are displayed on a true logarithmic meter scale with equally spaced and fully usable divisions over a 20 dB range. The combination of digital frequency and analog level readout permits the fastest possible measurement speed, allows the operator to view gradual level variations, and minimizes the possibility of errors.

A front-panel opening, normally covered with a protective plate, is provided on the SL-300 to accept plug-in modules. Four plug-in modules extend the capabilities of the SL-300. The SL-301 adds a voltmeter to the SL-300. It is calibrated for positive or negative DC voltage, and both sine and square-wave rms measurements. The SL-302 adds a module that converts the SL-300 and any service oscilloscope into a practical CATV spectrum analyzer. The SL-303 provides a module that allows the functions necessary to drive a chart recorder and make a permanent CATV spectrum plot. It includes a timer to permit unattended periodic operation at 1/4 to 4-hour intervals. Model SL-304 adds coverage of the 470-890 MHz UHF channels to the basic SL-300 measurement range.



Mid State

At the NCTA show in New Orleans, Mid State unveiled its new signal level meters, the SAM I and SAM II. The basic difference between the two units is frequency tuning.



The SAM I is a conventionally tuned meter and the SAM II is a digitally controlled meter with keyboard and conventional tuning. Both meters contain the same basic features and capabilities.

While these units are contemporary in design, many popular features from past units have been incorporated. These units have manual gain control, which was useful in the 727 SLM, and percent modulation from the old 704 for hum modulation measurements. Also, the easily read meter and attenuator system from SLIM have been incorporated.

New features such as the spectrum analyzer are offered with the SAM I and are standard on SAM II. The internal calibrator is standard on both.

Sadelco

Sadelco carries several signal level meters ideal for signal-to-noise measurements. It continues to upgrade its DIGIT-LEVEL-100 Series SLMs. This unit has a unique display window containing a half-inch three-digit LED readout and provides a 90 dB total range with 0.1 dB resolution.

The digital dynamic range is 20 dB within any individual attenuator position, and all attenuators can be switched in 10 and 20 dB steps. The DIGIT-LEVEL-100 SLM has been touted as one of the easiest meters to use.

The newest SLM from Sadelco is the model FS-733 B low cost installers VHF plus superband signal level meter. This meter has many features similar to Sadelco's FS-35C, and maintains an accuracy of 2 dB. Its circuitry and attenuation range have been tailored to provide the basic requirements for the CATV installer at an economical price. This solid-state unit is portable, lightweight and battery operated. The meter reads directly in dBmV and microvolts to show exact signal levels, and provides continuous coverage 54-216 MHz for VHF, FM; and midband plus full superband coverage, 216-300 MHz.



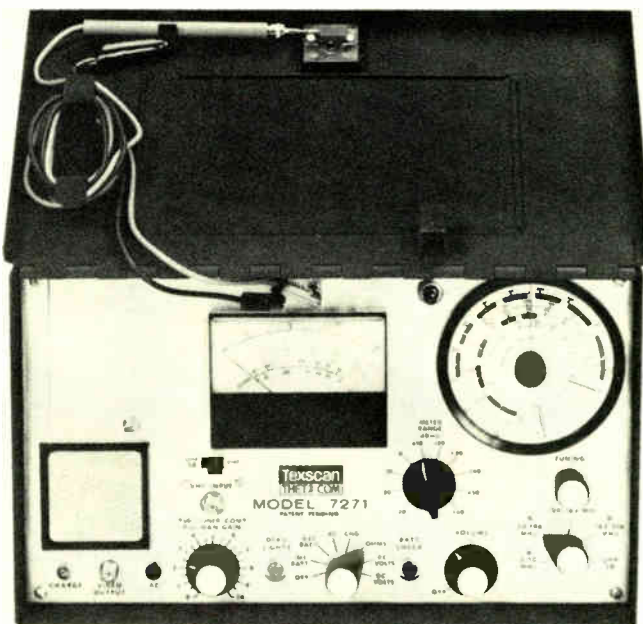
Texscan

Texscan manufactures a wide variety of signal level meters. The model 7270 SLM is a high performance instrument featuring a ten-position rotary attenuator. The

unit permits rapid and convenient attenuation selection from 0 to 90 dB in 10 dB steps. Meter scale readings are clearly visible on the control knob, eliminating unnecessary searching when setting the manual range index. The 7270 is a solid-state, portable instrument, with an operator choice of three different power sources—(1) built-in, rechargeable nickel-cadmium batteries; (2) any 115V AC outlet; and (3) any external 12 to 15V DC battery. This device provides guaranteed accuracy to ± 1.5 dB, with measurement ranges from 10 microvolts to 3 volts in ten range steps.

The model 7271 is a SLM that has the same features as the 7270 with an important addition. This unit features a volt ohmmeter with 60 volts full scale DC, 120 volts full scale AC and 1000 ohms full scale. The meter circuit is completely isolated from the FSM circuitry and fully protected against overvoltage or other inadvertent connections.

Texscan also produces an installers signal level meter. The model 797B is a battery-operated, portable and DC powered instrument. The unit is a tunable RF voltmeter, and features a double-balanced mixer and peak-detector measuring circuit. Power is supplied by a 12V, 1.5 Ah rechargeable battery.



Radiometers

Times Wire and Cable

Times Wire has introduced a new radiometer that measures RF leakage from CATV drop cables in absolute values. The new instrument yields separate figures for the two parameters of energy transfer that determine radiation into or out of the drop cable.

VIDEO AND LOCAL ORIGINATION

Laboratory Amplifiers

C-COR Electronics

C-COR's model 4375-C is a versatile laboratory amplifier designed for use with video and VHF-RF signals. It is

especially designed for 75-ohm systems and is used primarily as a laboratory post-amplifier and for amplifying the output of sweep signal generators in sweeping cable or systems. The unit provides a total gain of up to 60 dB and has a minimum dynamic range of 47 dB at any gain setting and full bandwidth. The 12 channel cross modulation is better than -60 dB at +50 dBmV output with 60 dB of gain.

The model 4375-C consists of the case, power supply and two 30 dB gain modules with an attenuator between the modules. The unit is intended for use as a single amplifier, but the pre-amplifier and post-amplifier modules can be operated simultaneously and independently.

Wide Band Engineering

WBE's models A56 and A57 are broadband balun transformer type RD IN-RF OUT impedance bridges with the unknown port balanced against a reference termination. Return loss is read directly as insertion loss through the bridge. This method may be preferable to simpler resistor-diode (RF IN-DC OUT) bridges since models A56 and A57 function independently of input level and do not require diode square law corrections, special scope graticules and calibrated mismatches.

RF Comparators

Arvin

Arvin offers a unique RF switch that requires DC current only during the switching interval. The 601B-DC coaxial relay switch features absolute indication of cable selection and terminates unused input internally. Bandwidth is DC to 300 MHz, isolation between cables is 90 dB, and impedance is 75 ohms.

Texscan

The TC-2-7F RF coaxial switch is an electronically controlled switching unit that provides simultaneous test and reference traces on an oscilloscope for measurement by comparison. Manual switching is also provided to select individual traces.

This RF coaxial comparator consists of two basic units mounted one on top of the other for convenient bench use or may be separated for rack mounting purposes. The upper unit houses the solid-state driver circuitry and controls. A three position function switch is used, and a phase control allows the 50 or 60 Hz line frequency to be placed in phase with the sweep signal.

Wide Band Engineering

Model A49 is a totally solid-state, dual channel RF comparator for comparison of gain, loss and impedance with an attenuator or master reference. This is a technique used in the more advanced network analyzers. The model A49 has the stability and high isolation required for measuring insertion loss in steps of .01 dB to SRL and shielding effectiveness testing beyond -80 dB. With both ports balanced, measurement error can be reduced to that of the standard alone without compensating for errors resulting from dual trace scopes, detector tracking, scale accuracy, linearity, drift, etc.

The frequency range is 1-500 MHz with 50 or 75 ohms impedance. Isolation is 45 dB min. at 300 MHz, 50 dB per switch typical, and loss is 1 dB per switch typical.

Frequency Counters

Mid State

The CM-20M is a compact, high speed digital frequency counter designed specifically for CATV applications. This solid-state unit provides for external DC operation (12V) and has an optional rechargeable battery pack that provides four hours of portable operation. The internal battery charger incorporates overcharge protection circuitry and enables the CM-20M to operate from an AC line as the battery is being charged.

Texscan

The highly accurate TFC-7 tuned frequency counter is a broadband preselector/stripper developed for CATV proof-of-performance measurements. It provides precise count accuracies in fully loaded 36-channel systems, and allows reliable frequency measurements at any test point in the system down to -5 dBmV input level. Intercarrier spacing is measured at the push of a button, and a digital LED readout provides convenient frequency tuning. The TFC-7 has an RF output capability of +40 dBmV and provides a detected video output of 4 MHz bandwidth.



Directional Couplers

Wide Band Engineering

A73 series directional couplers from WBE are of reciprocal hybrid ferrite circuitry, featuring broad bandwidth with good directivity and flatness. Some general applications for the A73 series are line monitoring, power measurements and load source isolator.

Signal Generators

Wavetek

The model 3001 signal generator is a rugged, solid-state unit designed to offer measurement convenience when testing receiver sensitivity, antenna gain, channel selectivity, signal-to-noise ratio; and the gain bandwidth and transmission line characteristics of passive and active components.

The design of the 3001 is based on a crystal-controlled oscillator that serves as a stable frequency source for the derivation of various reference frequencies. These reference frequencies are heterodyned with phase-locked voltage controlled oscillators that enable the 3001 to provide high stability signals to an accuracy of 0.001 percent over its specified 1 MHz to 520 MHz range.

Oscilloscopes

Tektronix

The model 442 dual trace oscilloscope is a high-performance portable unit. The DC to 35 MHz frequency response (10 ns risetime) provides the bandwidth needed to troubleshoot most logic circuits. Its high 2 mV/div sensitivity allows the operator to display and measure low level signals.

Calibrated sweep speed range is from 10 ns/div to 0.5s/div, using the 21 step calibrated dial and a 10X magnifier. The high, 150 mV external trigger sensitivity permits the user to trigger on TTL levels when a 10X probe is required to minimize capacitive loading.

Typical applications include production line testing and servicing of digital equipment as well as communications and telemetry equipment.



Texscan

Texscan features the model DU-720 large-screen oscilloscope for sweep/signal applications requiring a large, easy-to-read display with low-frequency X-Y performance. This instrument, complete with vertical and horizontal deflection amplifiers, incorporates a 12-inch CRT with a P7 phosphor. Four calibrated vertical sensitivity ranges are provided: 1 mV, 10 mV, 100 mV and 1 volt per division.

MICROWAVE AND SATELLITE COMMUNICATIONS

Bandpass Filters

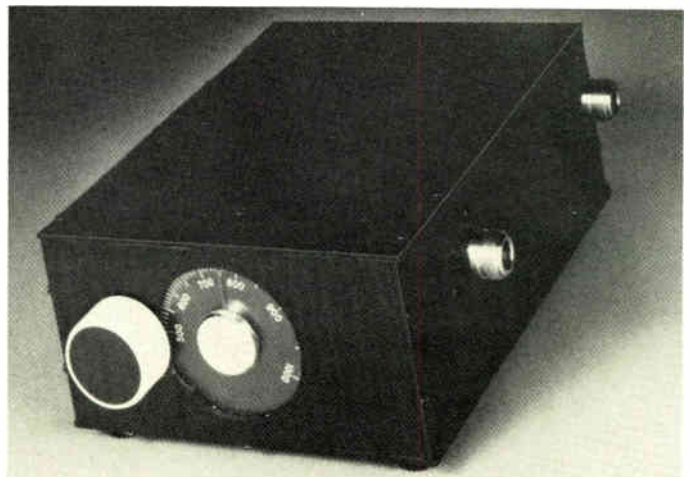
Texscan

Texscan's tunable bandpass filter series covers a frequency range from 48 MHz to 400 MHz with any single model covering more than an octave. These units are available with either a three or five section response, and have a 3 dB bandwidth of 5 percent or 3 percent with low insertion loss values from 0.2 dB through 1.5 dB. VSWR is less than 1.5:1.

Wavetek

Wavetek's series 5200 tunable bandpass filters are used extensively where wideband noise or harmonic rejection is required, and for specific channel selection in duplexers and multiplexer applications.

These direct reading tunable bandpass filters cover the 30 MHz to 2 GHz frequency range in six octave band units. All are capacitively tuned iris-coupled four-section filters with five percent 3 dB bandwidths and have typical 30 dB/3 dB form factors of 2.2. Insertion loss is less than 1.0 dB and power rating is a minimum of 60 watts. **CED**



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C-COR Electronics, Inc., 60 Decibel Road, State College, Pennsylvania 16801, (814) 238-2461.

ComSonics, Inc., P.O. Box 1106, Harrisonburg, Virginia 22801, (703) 434-5965.

Fluke Manufacturing Company, P.O. Box 43210, Mountlake Terrace, Washington 98043, (206) 774-2211.

Mid State Communications, 174 South First, Beech Grove, Indiana 46107, (317) 787-9426.

Sadelco, Inc., 299 Park Avenue, Weehawken, New Jersey 07087, (201) 866-0912.

Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97077, (503) 644-0161.

Texscan Corporation, 2446 North Shadeland Avenue, Indianapolis, Indiana 46219, (317) 357-8781.

Times Wire and Cable Company, 358 Hall Avenue, Wallingford, Connecticut 06492, (203) 265-2361.

Wavetek Indiana, Inc., 66 North First Avenue, Beech Grove, Indiana 46107, (317) 783-3221.

Wide Band Engineering Company, Inc., P.O. Box 21652, Phoenix, Arizona 85036, (602) 254-1570.

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Get the answers promptly with VITEK's compact Tracer* (TR-1) or Tracer* (TR-2) RF Detection Receivers. Both locate and measure leakage and determine whether radiation exceeds FCC limits. They provide early warning of hairline cracks in expansion loops, loose connectors, leakage from electrical equipment housings, trunks and feeders due to loose covers or corrosion . . . typical leakage problems.

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VITEK

The Management/ Technology Partnership

By Jim Emerson
Northern CATV Distributors, Inc.
Manlius, New York

If you're a system engineer, chief tech, or foreman, then you're also a manager, whether you like it or not. You manage your men, your equipment, the maintenance function and most likely, take part in purchase, construction and acquisition decisions. How good a manager you are of manpower material and expense is fast becoming as important (if not moreso) than how good a technologist you are. Once you accept these facts, you are obligated to give your role as technical manager some heavy thought.

The CATV industry would not exist without its service-enabling technology. There would be no business, nothing to manage. Too, the technology of CATV is much too complex to "manage" in conventional terms; i.e. an MBA degree buys you half (or less) of needed CATV system management capability. It is quite apparent then, that there must be a "partnership" of management at system level, at least until many more dual-qualified technical managers are provided.

Over many years of observation, it has become abundantly clear that some of the best run and most profitable systems are those managed in the main by technologists who are also managers in the truest sense. Closely following in efficiency are systems in which technical management is at least on a par with "office" management; a neo partnership arrangement. Notably, poorly run systems are often those in which the chief tech is kept in a distinctly subservient decision-making position, often beneath an insecure and barely competent "manager." This latter scheme has failed miserably because it is wrong to segregate purely technical function from business form. Good technical procedures do impact operating expense. Equipment

performance and reliability, as bought, also influence capital expenditure. In humanistic terms, since a man cannot efficiently serve two "masters," techs should normally report to their chief for both job-related and administrative purposes.

The broadband technology is so complex and fast-changing as to require more than usual dedication just to keep-up. The impact of decisions in technological areas is so closely intertwined with considerations of profit and return-on-investment that it is pragmatically impossible to separate technology and management into discrete disciplines. Under the current, general division of authority in some CATV plants and companies, there appears to be attitudes of diverse, even diametrically opposed technical and management objectives. In the extreme, chief techs and managers view each other as barely tolerable, necessary evils.

Some managers feel that if only the "maintenance" people did their job better and for less pay that the system would somehow become more profitable. Some chief techs feel that the manager should stick to his (or her) clerical duties and "books" and let the techs make the important, technical decisions. Of course, both attitudes are wrong. It is not the managers' function to cut "needless" technical expense and manpower to the bone. And it is not the chief techs duty to employ every single new piece of hardware to advance the "state-of-the-art." It is, of course, the charter of all system personnel to deliver the best service for the least cost to ensure continuance of the highest permissible profit and return-on-investment. Thus, it behooves both technologists and administrators to constantly explore what is cost-effective in these terms.

Top management of many systems and companies have found out, the hard way, that absolute minimum

expenditure and maximum monthly profit over the initial franchise term are the surest means to marginal service and loss of the franchise in a subsequent term. Other lofty and blue-sky oriented extremes obtain fantastic service together with fantastic monetary losses, resulting in failure before the first franchise term expires. As in any other service business, an intelligent balance must be achieved between expenditure, quality/quantity of service and profitability. In CATV, it is evidently nearly impossible to accomplish this balance without technically-oriented management and management-oriented technologists. This is a goal which all system personnel must strive for.

You see, managers, or the "bosses" are not your enemies or just plain rotten money-grubbing people. You have a common goal; the success of the CATV system. You have other common objectives too, which you may not have considered; e.g. your continued employment in a stable workforce, reliable plant equipment and profitable new services. Your job, at the very least, is to help top management understand how technical matters affect these objectives. At best, it's your job to ensure that the technology employed matches business objectives.

The manager often can't "speak" technology and more often, the chief tech can't "speak" business. To obtain more responsibility (much less, new test equipment) you must make the move. Nearly as common as mathematics, "business" is a universal "language." It is much more beneficial for you to gain business acumen than vice-versa. Practically speaking, the manager or administrator has enough new things to learn regarding rapidly changing regulations, marketing and administrative procedures to expect him (or her) to learn an entire technology as well.

Trends today dictate that a CATV system really has two managers, or management "partnership," an administrative and marketing manager, plus an operations and technical manager. In more sophisticated cable plants, this system works eminently well. Each set of skills complements the other and delegation of authority and responsibility functions smoothly. The common bond between these diverse functions is good management practice and a thorough understanding of basic business principles.

The current trends are based upon the dire (and very real) shortage of experienced technical personnel and the ever-more complex nature of a CATV system. New hires for chief tech and chief engineer positions are finding more and more emphasis placed on management experience and training. If you occupy (or intend to occupy) either position, you are (or will be) a manager. Many chief techs have sort of stumbled into their present position and have learned to function and thrive the hard way, by direct on-the-job experience. Unfortunately, this learning method alone is as likely to instill bad habits and procedures via expediency, as it is to result in correct conclusions and good management techniques. It's a real tribute to most chief techs' (and managers') common sense that the industry functions as well as it does.

A chief tech today must be able to relate the cost of new hardware vs. its reliability and cost of maintenance. He (or she) must be able to design and implement procedures for construction, installation and maintenance that observe the need for operating economy. Technological characteristics must be translated into budgetary data so that adequate marketing and financial planning can assure business success. For instance, the addition of pay-TV to a good, working cable TV plant must be profitable. Not so obvious is the fact that hardware and delivery-concept selection together with employment of correct procedure can make or break profitability. The "traditional" system manager is ill equipped to make such decisions. It is the technologist's role to translate decision-enabling data into business terms so that a mutually satisfactory and profitable solution can be obtained.

If these management responsibilities are not yours now, just give it

time. The industry is growing up fast and you must grow with it or be cast aside, at best, into a role with less responsibility and less compensation. In short, if you want to advance and to improve your situation, or even keep-up over the next several years, you must improve yourself via management training.

Traditional "put-down" situations, where the system manager (so-called) dominates the chief techs' every move and ignores his every suggestions, are fast disappearing. If you live in this archaic environment, you need to improve your management capabilities too, in spite of the temporary stalemate in your management practice. Technicians should also be preparing for decision making in a business environment. Surely you'll be a chief someday soon?

So, where do you get all this new knowledge and professionalism? Start with your local community college or university extension. Take at least one course in "Understanding Management," "Introduction to Management" or "Management for Line Supervisors." Then, take as many courses as you can handle in the areas you found the

greatest weaknesses in. Study budgeting, planning, marketing, basic accounting (principles), manpower and material control, human relations and finance. Sound too "far-out" or too tough? So be it. Some folks like bench maintenance, balancing, installation or some other fragment of the total technical job. Some would rather "let George do it" when it comes to decision making. We'll always need these folks, but big opportunities will seldom knock at their door. It has to do with reward matching risk and effort.

More companies every year are recognizing this need for management skills as well as keeping up with the technical changes as they occur. Thus, more companies are approving and encouraging such scholastic endeavor. Many companies have full or partial tuition assistance plans. Even if your company does not at present, ask your boss. Chances are that he's aware of the trend (and the severe manpower crunch) and will institute such a program, or help you on a more informal basis. However it's necessary though, get on your way to becoming a dual-capability technical manager for the good of your future. Do it! C-ED



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This issue of C-ED introduces a new monthly department for engineers and technicians on the move.

★ **Charles J. Rothers**, president and treasurer of WGN Electronic Systems Company, subsidiary of **WGN Continental Broadcasting Company** of Chicago, has been named director of engineering and development of the WGN Continental Station Group. He retains the cable company presidency.

★ **James Oldham** has been appointed general manager of the **Meadowlands Communications Systems, Inc.** Lyndhurst, New Jersey cable television system. Oldham has been assigned to Meadowlands by **Comcast Corp.**, the company that will build and operate the 200-mile system that is to serve East Newark and Kearney in West Hudson and North Arlington, Lyndhurst, Rutherford, East Rutherford and Carlstadt in South Bergen.

★ **George F. Benton** has been named manager of BroadCom for **Jerrold Electronics Corporation**, a wholly-owned subsidiary of General Instrument Corporation. Benton will

be responsible for the total business management of the venture. BroadCom communications networks are distribution systems which provide multiple services such as digital data from computer systems, analog signals from instrumentation, audio and video transmission.



George F. Benton

★ The appointment of **William H. Enders** to the newly-created position of vice president/product planning and development for the GTE Consumer Electronics Group, a part of **General**

Telephone & Electronics Corporation, has been announced by the company. Enders will have worldwide responsibility for directing and coordinating all product development activities for the group.

★ **Gordon T. (Pete) Moss** has joined **Communications Properties, Inc.** as project manager of River City Cable TV, Inc. Moss will be responsible for overseeing all phases of the pre-operating system that will serve Louisville, Kentucky.

Prior to joining CPI, Moss worked for American Television and Communications Corp. as a project coordinator based in Orlando, Florida. He has worked in many of the technical areas of cable television, from construction and microwave, to service and field audits.

★ **Cablecom-General, Inc.** has announced that **Ross Moerman**, presently director of marketing for the company's Modesto, California cable-TV system has accepted the position of general manager for their system in Joplin, Missouri.

Radiation Monitoring

Mid State offers two systems that meet new FCC monitoring requirements. The ST-1 "Cuckoo" with its proven reliability is now an industry standard. A low cost FM radio is used as a receiver to patrol for leaks. The ST-1C is a crystal controlled version for use with the new CR-1 crystal controlled receiver. Write or call for complete details.

ST-1 \$295



CR-1 \$100

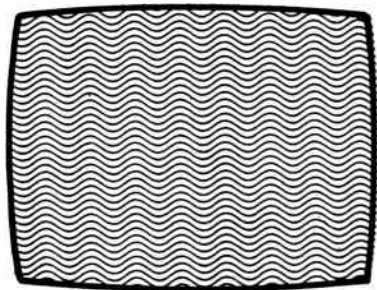


ST-1C \$395

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Q The problem I have is in my two-way sub-low system. When I put on the forward channels I get distortion on the return channels. As I increase the levels of the forward channels, the distortion in the return

channels gets worse. What's my problem?

A The problem is that there are some devices in the system that are common to both the forward path and the return path, acting as a "non-linear diode". The forward channels are causing beat components which fall into the return path and are coming back in the return path as beats. This is called common band beat interference. The type of thing that can cause this problem is a shorted toroid coil in a tap, passive device or feeder. This can even be caused by a loose, corroded connection, particularly where the level of the forward channels is very high. The coil itself could be shorted to the core material, due to poor insulation on the coil wire and poor coil core material.

The correction for this kind of a problem is to isolate the system into segments such that you are dealing with small

segments. Go through and check, in a routine manner, those parts of the system common to both the forward and return paths, starting with those parts of the system that have the highest levels going through them and working down to those parts of the system having the lowest level going through them.

Q What are the differences between a switching power supply and a series pass power supply?

A While they both have good regulation and low ripple, switching supply is basically more efficient. With increasing input voltages, the series pass supply dissipates the excess voltage inside the unit, increasing the internal temperature. The switching supply regulates by changing the duty cycle of the switching device and does not dissipate any more power than at lower voltage.

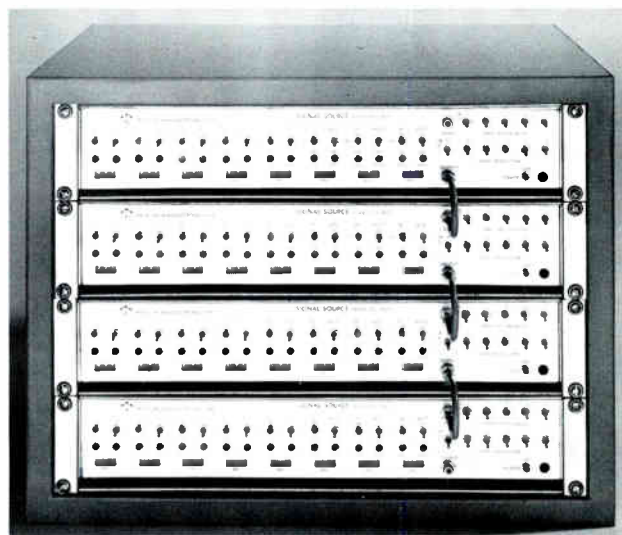
Less power consumption in the switching supply results in lower system power bills. Because of the high switching frequency, the switching supply's filter components are smaller.

The switching supply automatically adjusts for input voltage variations anywhere in the system caused by system characteristics or by temperature changes, day or night or seasonal.

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September 1977



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A unique sample-and-hold detector actually locks onto video sync peaks or CW carrier levels — accurate to ± 1 dB and unaffected by video content.

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Built-In Hum Level Meter

Measures 0.1% to 10% system hum level directly without additional equipment or special set-up — ± 1 dB overall accuracy.

Delivery of the SL-300 is stock to 30 days.

For a technical data sheet and a copy of the TVC staff feature which describes how the SL-300 performed in their actual field tests, write or call AvanteK or your closest representative.

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The SL-300 is a professional instrument packaged in a weatherproof field case and powered from its internal rechargeable battery pack or any external 12 VDC source. To extend the SL-300 capabilities, interchangeable plug-in modules are available, including:

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- Spectrum Analyzer** Displays any portion of the CATV spectrum on a service scope, and includes front-panel sweep width and scan rate controls.
- Stability Monitor** Drives a chart recorder to produce a permanent record of system signal levels. A built-in timer can make unattended periodic measurements at 15 minute to 4 hour intervals.
- UHF Converter** Adds full 470 to 890 MHz coverage, channels 14 through 83.

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TV via Fiberoptics

By Toni Barnett
Managing Editor

A Rediffusion Dial-a-Program system recently installed in Arnhem, Holland, is the first cable TV system anywhere in the world to include the use of glass fiber to carry a television signal directly into a home. This is a new development on an installation which has been in operation since the beginning of 1978 using copper cable to 400 homes.

Dial-a-Program in Arnhem, developed by Rediffusion and now being operated by Delta Kabel B.V., is the prototype of the ultimate in communications systems. It offers almost unlimited channel capacity. Each home has two direct connections to an exchange fed by a primary cable network which can be increased in capacity as the need arises. Access to normal TV services is via a touch button pad without the need for stations selection on the TV set. Included are stereo radio programs. Access to additional services, community TV, etc., will be possible and some, if required, can be on a subscription basis. The twelve programs which can be made available to subscribers in Arnhem currently include five TV programs from Holland and Germany while the remaining channels can be used for other TV programs and information services.

The signal transmitted is on an HF carrier at 8.9 MHz with full lower sideband, taken from the existing Rediffusion Dial-A-Program system which is linked to about 400 homes, and is owned and operated by Delta Kabel B.V., Rediffusion licensees, in Arnhem, Holland.

The emphasis in this installation is not only to prove that optical fibers can be used for the final connection into the home, but also to show that this can be achieved with components and fiberoptic cables only a fraction of the costs of those in most fiberoptics systems currently under evaluation for other purposes.

In this installation, three fiberoptic cables are used: the first in a section of trunk route connecting the aerial site to a DAP exchange; the other two running from this DAP exchange, one to a receiver in a private house and the other for display purposes back up the trunk route to the aerial site where there is a display room. This means that on selected channels the entire route from the aerial site to the subscriber is run in optical fiber cables. Each section is approximately 250m long.

The Routes

During the cable laying operation for the main DAP installation, one-inch polythene ducts were laid in the trenches so that when the fiberoptic cable became available, it was easily drawn in by Delta Kabel technicians. The subscriber's cable is looped through the subscriber's connection posts which serve groups of six or 12 subscribers along the route but otherwise is buried about one meter deep in sandy earth below pavements.

The Transmitters

The transmitters for both trunk and subscriber connections are similar, differing only in the arrangement of

the connections. The optical transmitter is an input voltage to output optical power converter and uses an infra red light emitting diode attached to a short lensed fiber, maximizing output power coupling. At the receiving end, the photon current arriving is converted back to electron flow and is thereby possible to recover the original drive.

The transmitting LED is run at 40 percent of maximum rated power to prolong its life in exposed installations, coupling up to 100NW into the subscriber fibers, and 10NW into the trunk fiber. A short section of fiber with a lensed end is secured in close proximity to the emitting surface and a butt joint to the main fiber is made to this on a grooved copper block using magnetic clamps. The wavelength of the emitted light is 90nm in the near infra-red. Because the FM TV sound signal is also carried, special circuits have been incorporated to compensate for the third order distortion of the LED.

The Cables

- The trunk cable by TCL contains four separate graded index fibers of 50 microns core diameter, overall diameter 120 microns and 0.13NA. The fibers have exceptionally low transmission loss—3 dB/km and high bandwidth—600 MHz/km. The fibers are protected from micro-scratches by a tough varnish and carried in a 2.5mm duct in a 5mm diameter polyethylene sheath. Two 22 SWG hard drawn copper strength members are also included.

- The subscriber cable manufactured by BICC contains two fibers of step index construction with a pure silica core of 120 micron diameter, clad in clear silicone, polymerized in situ to give a theoretical NA of 0.34 and a loss over the 250 meters of about 12 dBs. The fibers are carried in a rectangular duct and protected by two 0.7mm coppered steel strength members to give overall dimensions 6mm x 3mm.

The Optical Receivers

The subscriber and trunk receivers include the same basic detector and electronic circuits but are packaged differently and with different output arrangements. Using a detected current of 2-3NA they produce a good quality picture approaching EBU grade 1. In the receiver a silicon PIN photodiode is used with an FET input stage.

The trunk receiver feeds a distribution amplifier directly while the subscriber receiver output is frequency changed to a VHF channel to feed the normal TV input. The coppered steel conductors are used for line powering of the subscriber's inverter so that the signal can feed a normal TV set, and in the opposite direction, to carry the FSK button the dialer signals to the exchange to initiate program selection.

The Future

Since in this installation all signal paths from the aerial to the subscriber's home use optical fibers, the aim of an "all-glass" installation has been achieved. It is hoped that the growing demand for optical fiber systems will make it possible to obtain these medium technology components or their equivalent at a fraction of their present price. To this end the transmitter assemblies on the transmitter panel in the DAP kiosk are in interchangeable modular form.

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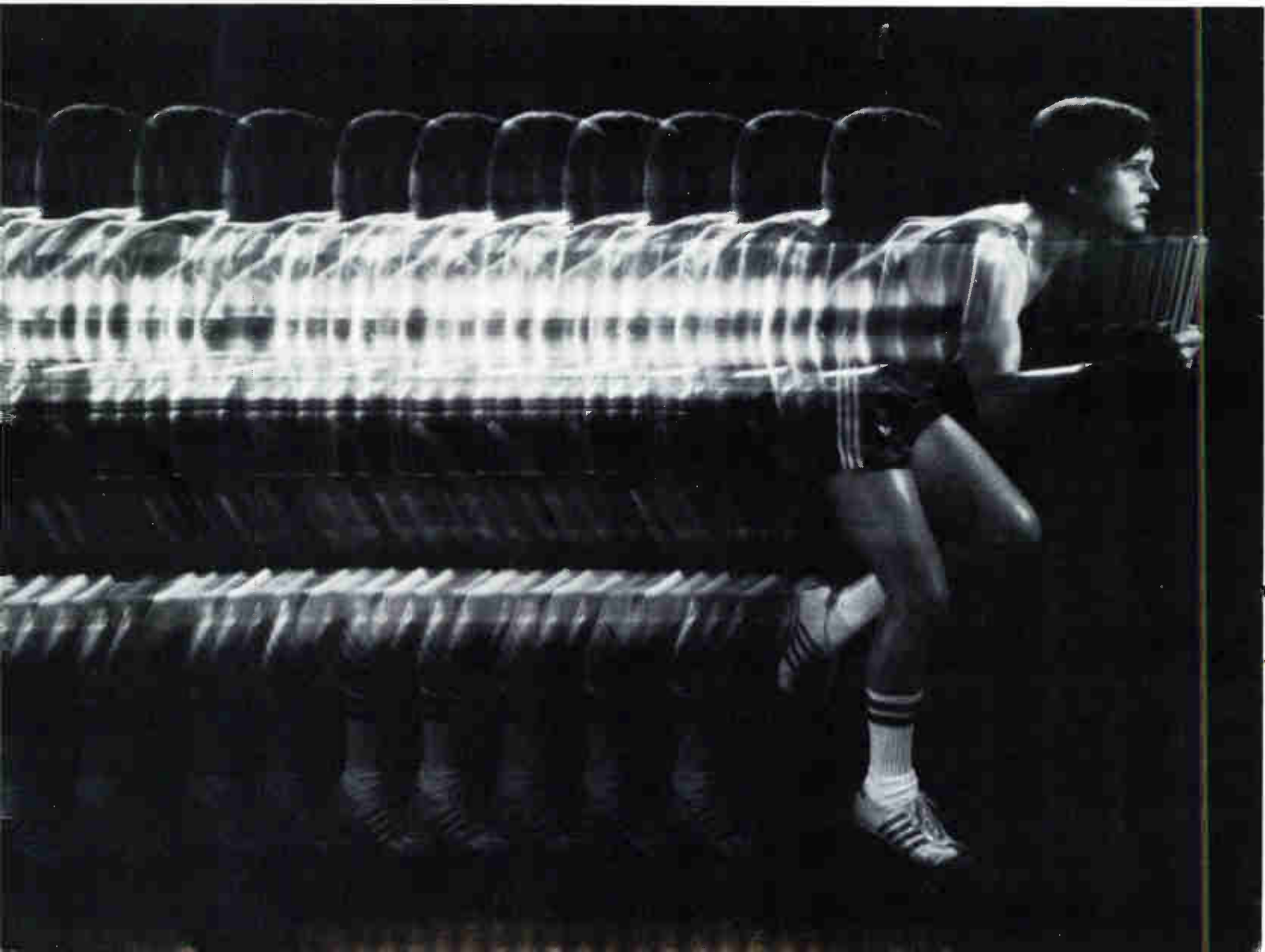
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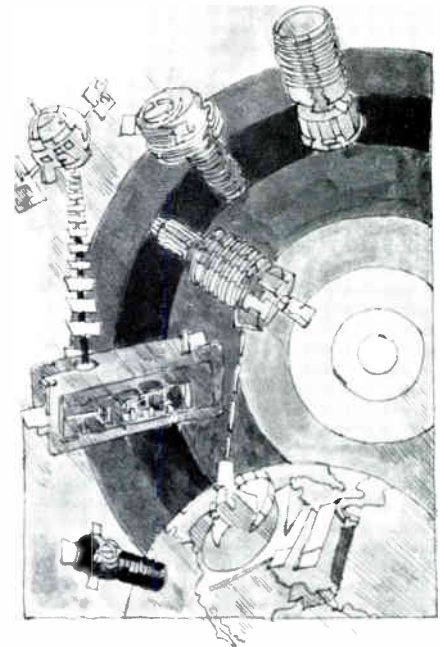
New Brochure Describes Varian's Photodetection Equipment

Varian Associates has published a colorful 12-page brochure describing its wide array of photodetection equipment.

The free booklet, entitled "Excellence in Photodetection" provides up-to-date information on Varian's high speed detectors, low speed tubes, optical receiver systems and photocathode materials. It details the specifications and operation of Varian's static crossed field photomultipliers, all electrostatic field photomultipliers, low dark current photomultipliers, and two newer products for spectroscopy and high speed signal detection: the 18mm GaAs photocathode end window PMT, and the microchannel PMT respectively.

The brochure may be obtained free of charge by contacting: Derek Wilcox, Varian LSE Division, 601 California Avenue, Palo Alto, California 94304, (415) 493-4000.

Excellence in Photodetection
III-V CATHODE AND HIGH SPEED PHOTOMULTIPLIERS



New brochure from Varian Associates.

VIZ Publishes 1978 Test Instruments Catalogs

VIZ test Instruments Group of VIZ Manufacturing Company, has made available two new catalogs.

The eight-page short-form catalog highlights 36 popular VIZ instruments. The 44-page full-line catalog provides complete specifications and technical information on more than 55 VIZ products, including oscilloscopes; probes; testers; and test instrument accessories. Many of the products featured in the catalogs are new and appear in print for the first time.

The catalogs can be requested from Robert Liska, VIZ Test Instruments Group, VIZ Mfg. Company, 335 E. Price Street, Philadelphia, Pennsylvania 19144, (215) 844-2626.



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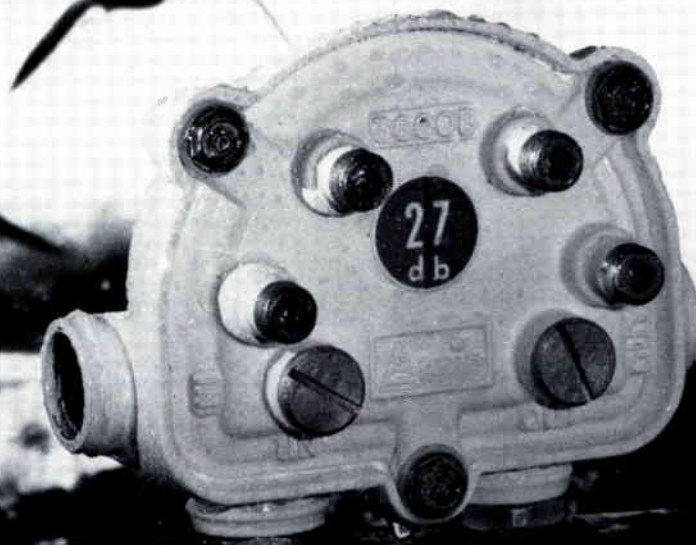
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Cable TV in Europe

The August issue of C-ED brings you a concise roundup of the status of cable TV in Europe. For more information on what's going on abroad, see the July 31 international issue of C-ED's sister publication CableVision.

Austria

North American Philips, in conjunction with the Viennese government, will begin construction in September '78 of what will be one of the largest cable television systems in the world, a \$6 million project to be located in Vienna. The first phase of the system, which is expected to be a five-year project, will begin transmitting programming by December of this year. Plans call for 2,000 miles of CATV plant and the number of subscribers is expected to reach approximately half a million. The mandatory installation will be between \$150-\$200, and the average monthly rate will be \$7 in equivalent American dollars. The system will have a UHF-VHF network and a UHF trunk up to 300 MHz. The system will distribute VHF-UHF with a conversion center throughout the city, the UHF being directly in the set. Trunk lines will be provided by North American Philips' Magnavox equipment and the remaining equipment will come from Philips' European manufacturers. Initially, the system will offer five channels, and upon completion will be capable of bringing in 24 European channels. The system will be 100 percent underground and great importance is being placed on the fact that whatever is dug up will be totally restored so as to not disturb any of the city's historical landmarks or atmosphere.

Belgium

Belgium currently has the most extensive systems in Europe in terms of the number of subscribers served by single companies. Over 40 percent of homes with TV in Belgium are cable subscribers. Most systems vary from 4,500 to 21,000 subscribers. Additional franchises under single companies have been granted for the near future.

The area around Liege is a hilly region where residents could previously receive only one of the two national Belgian television channels. Following the 1968 construction of the "Teledis" cable system, subscribers could choose from ten channels, including two channels each from Germany, France, Netherlands and Luxembourg. One of the largest single cable television companies in Europe is Coditel, located in Brussels, which claims over 100,000 subscribers. The company began operations in 1961 and has since expanded to cities in Switzerland, France and Luxembourg.

Denmark

Denmark revealed its initial thoughts pertaining to CATV in an order issued by the Ministry of Public Works under the General Directorate of Posts and Telegraphs in October 1971. In contrast to the initial decisions of the Belgian PTT and to insure the use of high-grade and well-defined equipment and methods of installation, the Danish PTT introduced strict regulations from the start. Today, there is a

3,000-subscriber MATV-type network in Hillerod, constructed by North American Philips in 1975, as well as an experimental system constructed in conjunction with the telephone company in Jetland to explore the use of cable television in Denmark.

Norway, Sweden and Finland

CATV is still quite limited in the Scandinavian countries. The largest cable system in Scandinavia is a 40,000-subscriber system in Oslo, Norway. Additional programming was a primary reason for the development of CATV in that country. Until the early 1970s, Norway had only one national television station and three radio channels. Cable systems such as "Janco" were established, connecting as many as 25,000 subscribers to a single antenna situated in prime locations. In general, the average wired systems in Norway serve only 1,000-2,000 subscribers.

Switzerland

Switzerland displays one of the highest levels of penetration of CATV in Europe with 16 percent of the nation's TV viewing households with connection rates of 60 to 90 percent in the areas of most systems. There are twelve Swiss systems, however, with more than 5,000 subscribers each. The largest CATV system in Switzerland is Rediffusion's network in Zurich, which serves more than 120,000 subscribers. Plans for Switzerland's largest cable system—and with projections for 500,000 subscribers, one of the largest in the world—are being implemented in Lausanne.

Decentralized organization exists in Switzerland because the country recognizes several official languages (German, French and Italian), and each language group maintains its own production studios and staff to create programs directed toward the needs and interests of its citizens. The various programs are transmitted to the different language areas from separate antennas, though all channels within the country use similar equipment and broadcasting techniques. The individual programs are coordinated under the direction of a recognized central broadcasting administration.

West Germany

Though VHF-only systems were favored in Germany in the early days, VHF/UHF techniques have been adopted in recently constructed private networks. Between 1972 and 1976 a dozen private cable networks were constructed with subscriber counts ranging from 1,800 to 4,800 in cities such as Dusseldorf, Hannover, the Olympic Village in Munich, Wolfsburg and Perlach.

Rather than having a single broadcasting administration, each of the nine German states produces its own programs in separate studios and submits them to a federal coordinating body known as the Arbeitsgemeinschaft der öffentlich-rechtlichen Rundfunkanstalten der Bundesrepublik Deutschland. The German Post Office operates coordinating antennas to avoid duplication of the programs exchanged. The previous experience with centralized government communications under Hitler is the primary reason for the fragmentation of Germany's broadcasting.

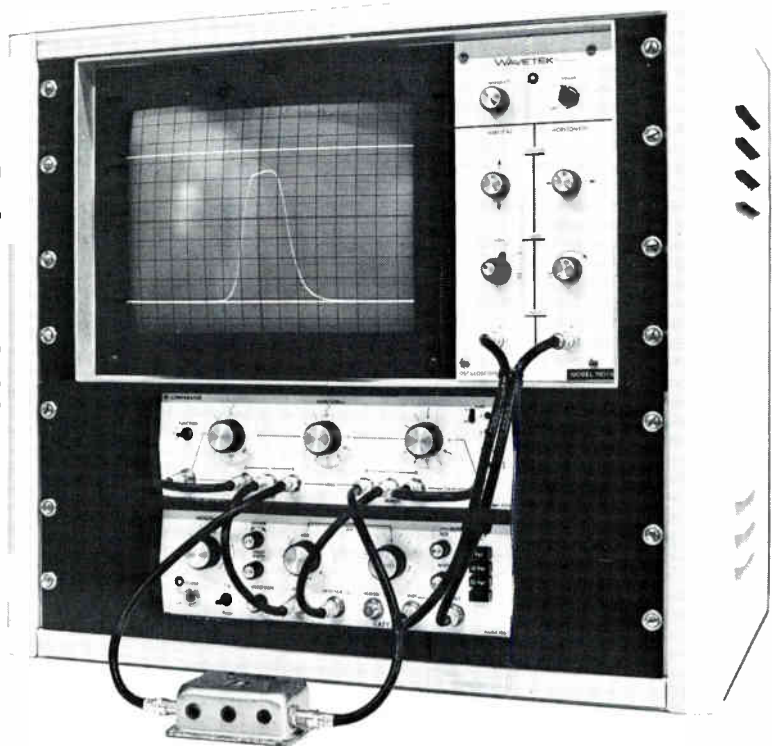
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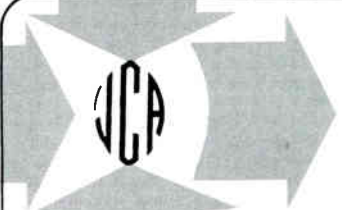
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