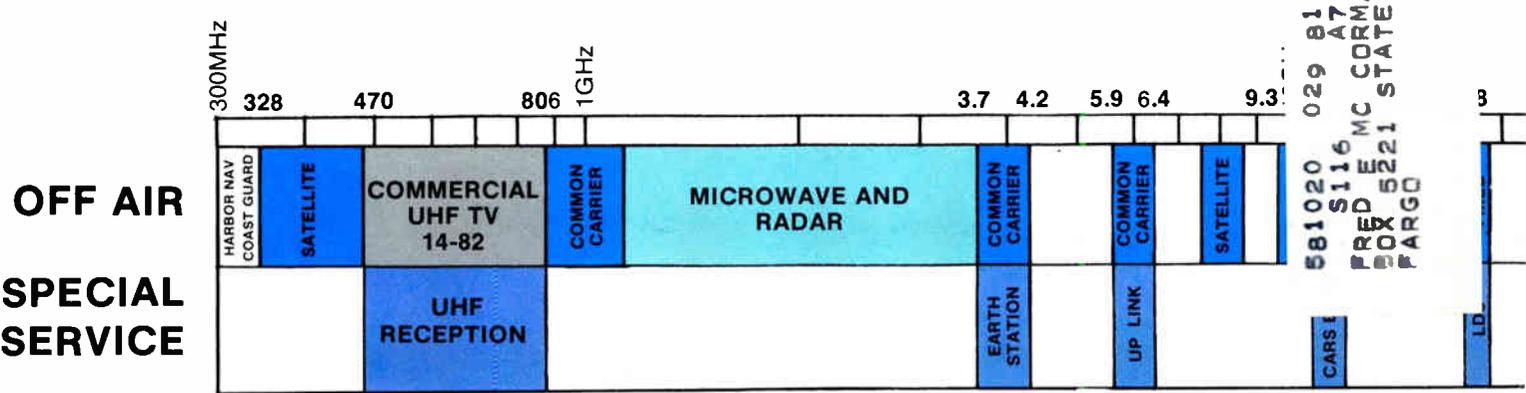
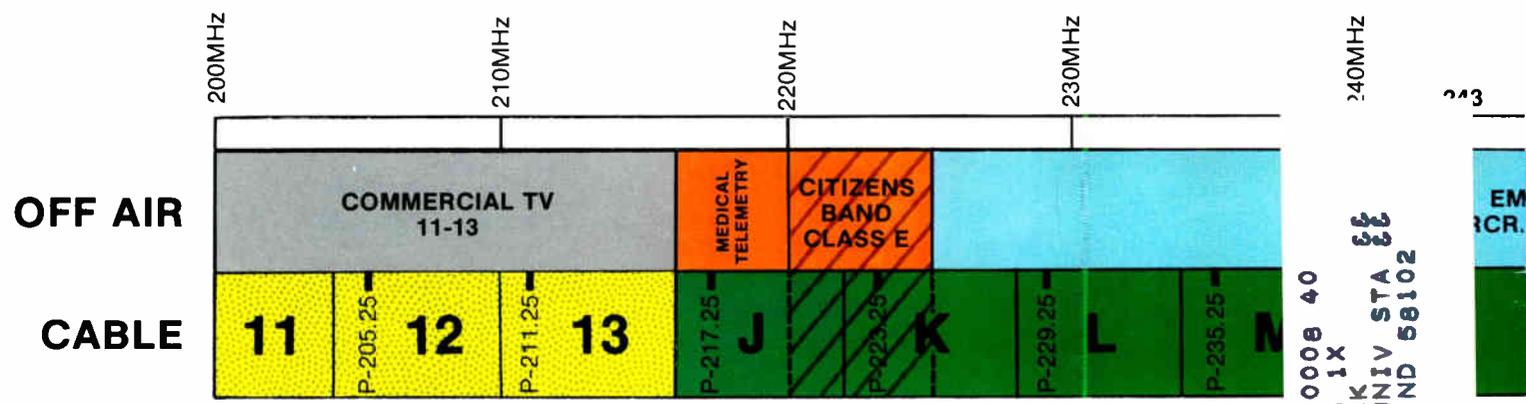
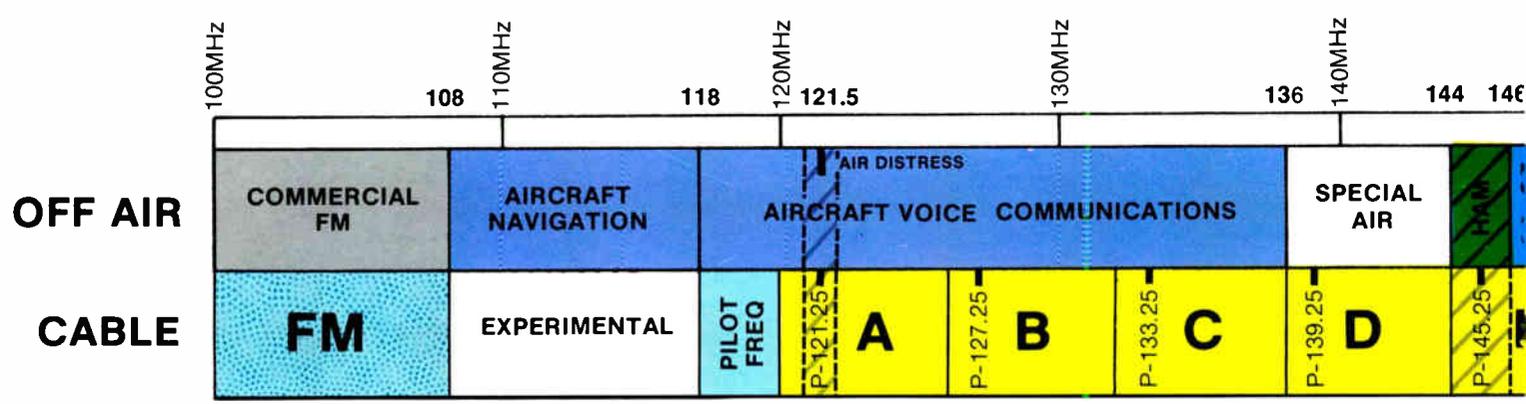
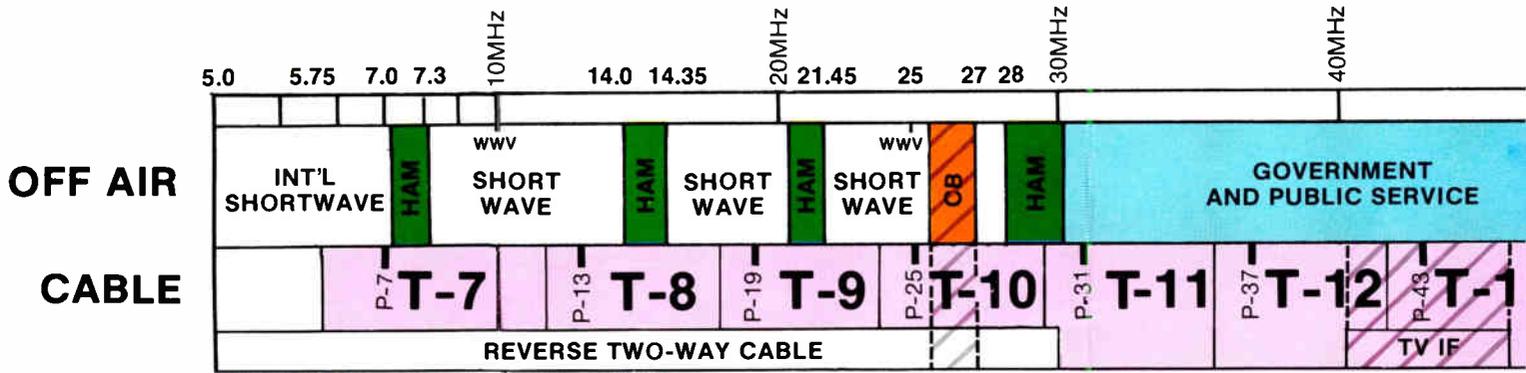


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december, 1976  
volume 2, no. 12

# communications/engineering digest

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Cover: The cover is a section of *C/Ed's* exclusive Off Air Interference Chart. The controversial overlap between the aircraft radio services and the CATV midband channels is shown clearly.

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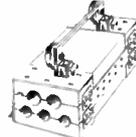
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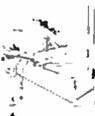
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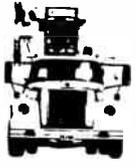
That's drawn by the 

That rests on the  That's pulled by the 

Around the  That fits on the 

That's stopped by the 

That's wrapped on the 

That fit on the  That followed the 

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## "A Public Hearing, On Public Hearings"

As readers of *C/Ed* know, Canadian CATV and broadcasting is regulated by the Television and Telecommunications Commission (CRTC). Until recently, the regulatory body for Bell Canada and other federally regulated telecommunications was the Canadian Transport Commission (CTC). On the 1st of April 1976, CRTC acquired jurisdiction over all federally regulated telecommunications carriers in Canada.

In regulating Canadian cable television and off-air broadcasting industries, CRTC uses a fairly informal public hearing process. Written applications are called for prior to the Hearing, and any interested person may intervene in writing against the application. At the Public Hearing, CRTC hears the applicant and any intervener it wishes to call. The hearings are informal. Evidence is not taken under oath and applicants and interveners are seldom represented by counsel. Decisions are made after the hearings, taking into account all information received, both written and oral and normal rules of evidence are not applied. In other words, the hearings are administrative.

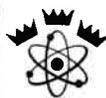
On the other hand, CTC has, in the past, organized its telecommunications hearings on a strict pseudo juridical basis. All evidence was given under oath, both applicants

and interveners were normally represented by counsel, cross-examination could be undertaken by opposing counsel and the decision was made strictly upon the evidence and solely by the Commissioners at the hearing.

Now that telecommunications regulation is in the hands of the CRTC, they face a problem on how to integrate these quite different forms of public hearing. What better method of resolving this than to have a public hearing on how they should have public hearings for the federally regulated telecommunications carriers. This somewhat Alice-in-Wonderland approach to government regulation took place in Ottawa, Canada on the 25th of October, with a four-day public hearing.

As might be expected, the interveners split into two very distinct parties. Bell Canada and the other common carriers turned up in force with their counsel and debated in a very legal manner. Their position was that all hearings should have a strictly legal format. On the other hand, the CCTA, for the cable TV industry, together with the Canadian Association of Broadcasters and a number of public interest groups, argued in an informal manner and without the aid of counsel that the hearings would best serve the public interest if everybody, including subscribers and public interest groups, were able to present their positions at hearings. As the public and many public interest groups did not have the resources for a legal style of hearing, their voice would be essentially eliminated if the CRTC continued with the legal format.

We in Canada await with interest to see the result of these hearings and while we do not always support the regulator's position, we do feel it is in the general interest for everybody to have a voice at public hearings. □



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55	0.25	0.26
83	0.32	0.33
100	0.35	0.36
175	0.47	0.49
211	0.53	0.55
250	0.57	0.59
270	0.60	0.62
300	0.63	0.65

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## The Harrisburg Affair

The struggle for spectrum occupation continues. Pre-WARC conference forces are at work, with various interests either moving or not moving as it suits their particular position in the overall struggle.

There is an ancillary issue involving the electromagnetic spectrum in a special way. This is the use by Air Navigation and CATV coaxial cable systems. Commercial and domestic air navigation is regulated by the Federal Aviation Administration (FAA) and CATV is under the jurisdiction of the FCC. The FAA has been expressing a concern about the use of frequencies on coaxial cable systems otherwise licensed to air navigation and communication. Their concern has been expressed in the proposition that if coincident band frequencies are allowed to be used by cable systems that under certain conditions of breakdown, malfunction, or lack of maintenance by the cable operator, sufficient radiation from the cable system could cause disruption to communication or in the worst case, interference of a sufficient nature to disrupt instrument landing systems resulting in the loss of ground control or aircraft. The critical ILS frequencies fall in the band 108 to 120 MHz. This is the area where attention should be focused if and when a reasonable case is established that the special conditions of frequency proximity, modulation mode and RF power energy have a probability degree of interference that is realistic.

In a reasonable process, involving all parties, it should be likewise established that FAA's concern for potential CATV interference is not magnified out of proportion with the interference conditions that already prevail from properly licensed facilities such as TV and FM stations, and other "type accepted" equipment. Cable must, of course, always be aware of any politically motivated raids on spectrum from any direction. *CableVision's* Fall Technical Review contains a full color frequency chart indicating the

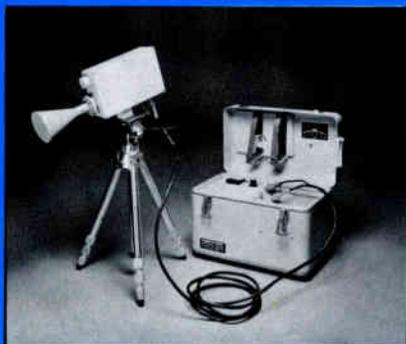
areas of concern that cable should have vis-a-vis aircraft uses of the spectrum.

In Harrisburg, a special set of circumstances existed that, while they had no adverse results, should open our eyes in terms of the ultimate impact on cable operations. The Harrisburg "round" went to the FAA. Through a fortuitous set of circumstances, they were the first party to document the interference to their facilities frequency of 118.25 MHz. The Harrisburg CATV system used equipment requiring an AGC control carrier of 118.25 MHz and by design, introduced this control carrier at a number of points through the service area. This resulted in a family of 118.25 MHz potential sources which, coupled with ineffective shielding, caused a variety of beat patterns to appear in the cockpits of aircraft flying overhead.

We are fortunate that; a) It was discovered; and b) No accidents occurred as a result. I like to think of it as a welcome *early warning signal* instead of an interference signal. It is interesting (almost humorous) to note that the system passed a three point radiation measurement test—it has been reported!

The cable industry should respond to this *early warning signal* before the cancer of the Harrisburg incident spreads to preclude cable utilization of the frequencies of 74.8 - 75.2, 108 - 136, 225 - 400, and 156.8 MHz. This would reduce our net carriage to approximately 19 channels!

Cable should also recognize this *early warning signal* as positive proof that system radiation is not an innocuous occurrence and needs to be contained with the proper use of known shielding techniques—even at the expense of changing out connectors, cable, etc. The Harrisburg incident further demonstrates the efficacy of the three point FCC measurement technique and supports the argument for system radiation scanning. Perhaps the threat of spectrum loss or the spectre of an air accident caused by cable radiation will spring loose the necessary funding to implement effective shielding programs.



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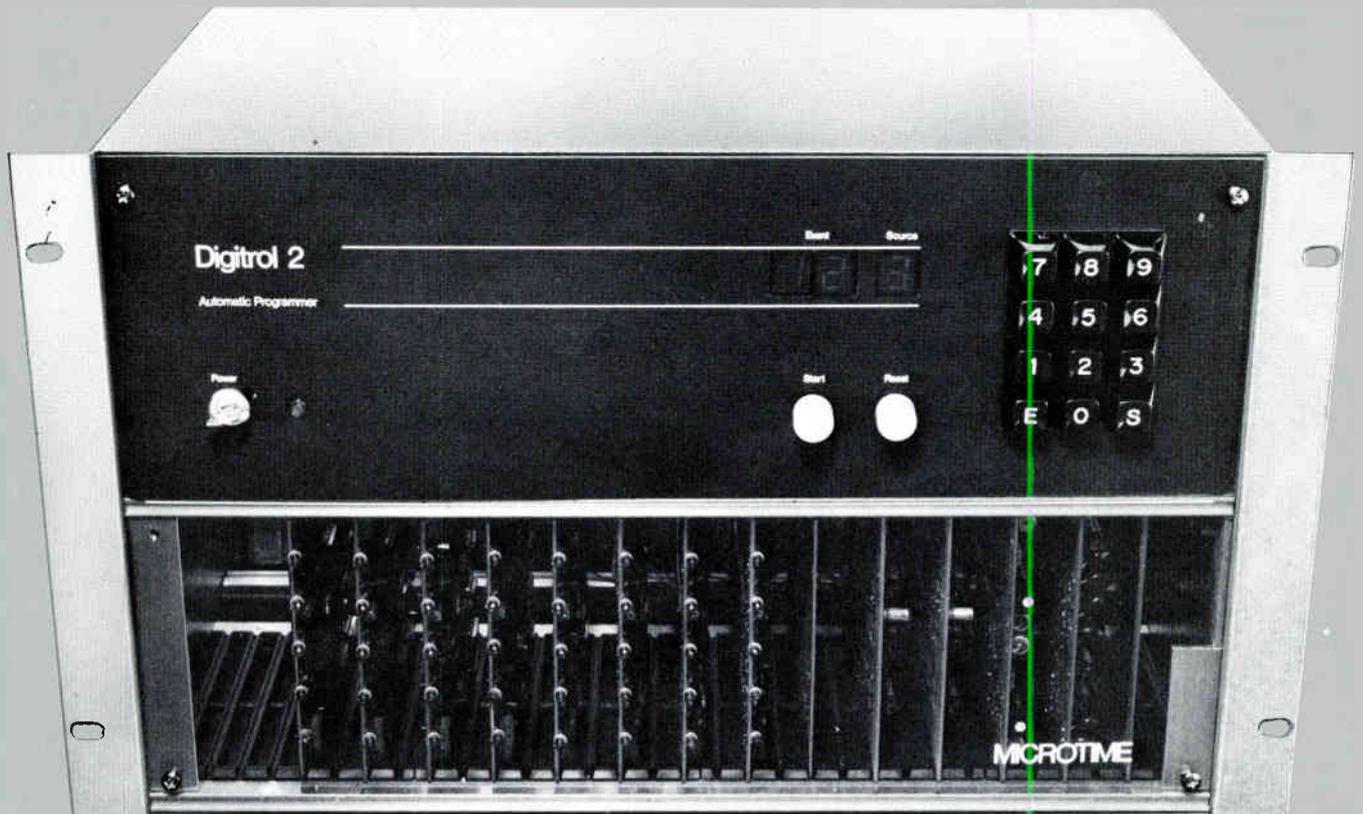
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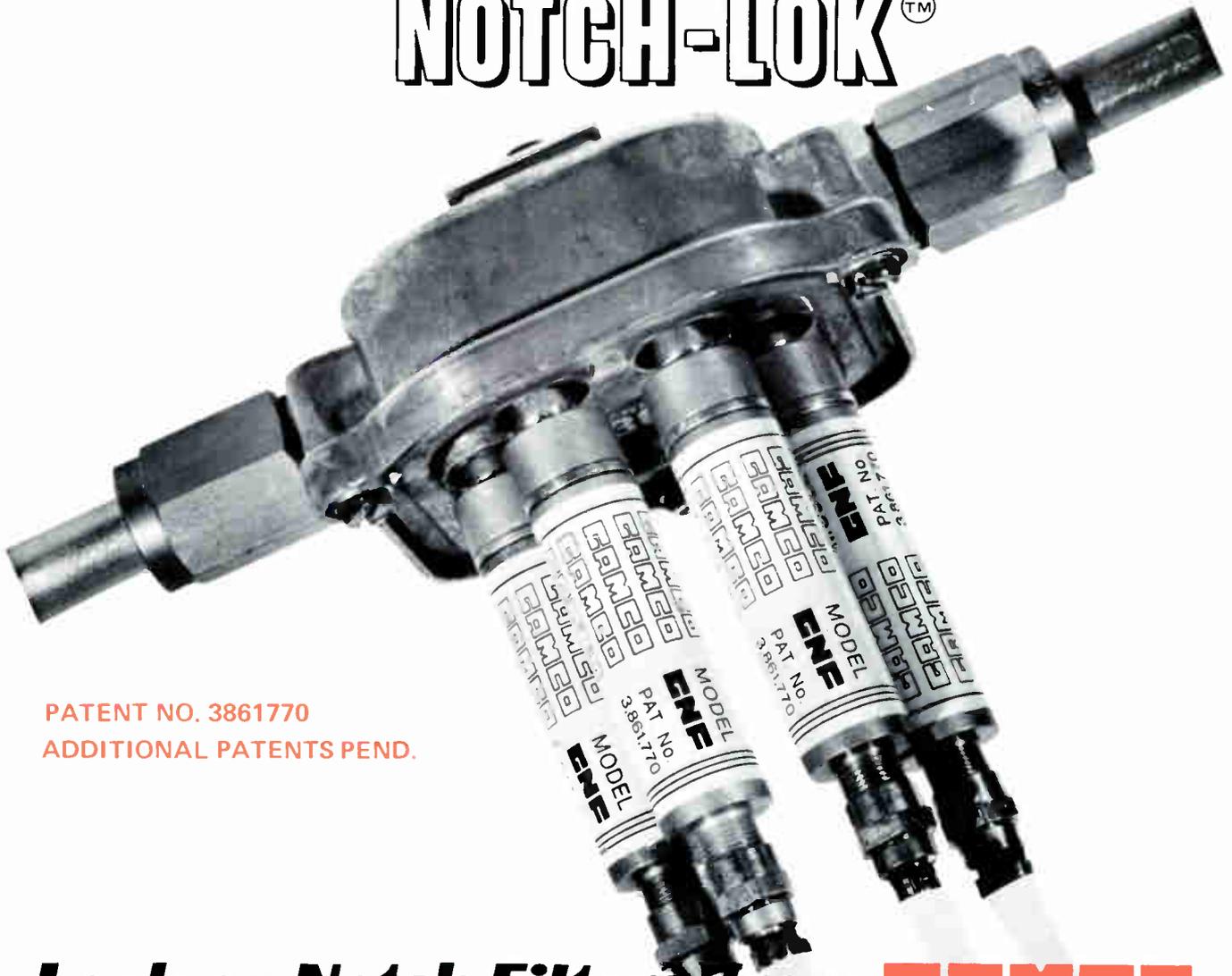
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# Technical News at a Glance

... SCTE's second annual CATV reliability conference will be coordinated by James Farmer of Scientific Atlanta. Site will be Atlanta, Georgia, in February. More details to follow.

... Commissioner Benjamin Hooks of the FCC will soon be able to divert more of his energy to his favorite subject—equal rights for minorities. Sometime early next year Hooks will vacate his post at the Commission to become executive director of the NAACP.

... Commissioner Lee, at the recent SBE conference in New York, discouraged proposals to drop in 96 extra VHF TV allocations on the basis that it would result in interference to existing stations.

... NCTA is now soliciting nominations for their annual technical and engineering awards. If you are interested in nominating someone, send a short personal profile and your reasons for nomination to Delmer Ports, NCTA.

... The latest episode in the FAA/Cable controversy will take place in Anaheim early next month when a six minute melodramatic tape prepared by the FAA will be played for the NCTA board and other interested parties. The tape depicts the Harrisburg incident with actual recordings of the interference produced in such a manner as to bring tears to the eyes of the strongest men. For more details, see our special report beginning on page 19.

... SCTE will host an informal panel on optical cable at the Western Cable Show in Anaheim, the first week in December.

... Industry experts are estimating a 70 percent chance of positive action on CATA petition on small earth terminals, scheduled before the FCC on December 7. Best action would be "declaratory ruling" (tantamount to "go ahead and do it!") but "proposed rulemaking" route is most likely, calling for studies and comments. As WARC '77 and '79 meetings grow near, they become an excuse for "wait and see" attitude pushed by broadcasters and telcos.

... At press time, the FCC had proposed amendments to its Cable Compliance Rules, stayed the March 1977 Deadline and announced Interim Procedures under Docket 20012. However, all actions had to do with Section 76.13 and Section 76.31 of the Rules, with regard to franchise standards. Technical standards, pay cable, access and signal carriage rules and policies are not suspended.

# THE CABLE-80 TEAM



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**Ginny Wedra** is a graduate of Boise State University. Background includes extensive experience in the design of instructional systems for a consulting firm, and a member of our Customer Service Group. She is responsible for CABLE-80 documentation and User's Manuals.

**Karl Klopsch**, a principal programmer at CableData for six years, helping keep our programs abreast of the needs of the clients we serve. Karl's past experience was as d-p manager of a consulting firm, and a major life insurance company.

**Ralph Delano** was business manager of TCI's Bay Cablevision before joining CableData. His responsibilities here have included Customer Service, Computer Operations, and Terminal Programming. Ralph is developing the CABLE-80 Datashare Report program.

**Larry Ryan** earned his degree in Mathematics at the University of California. Before joining CableData he was Senior Systems Rep for Honeywell Information Systems. His experience includes inventory, management, payroll, and government data processing systems.

**Ken Giese**, Vice-President of Programming, has been with CableData since its inception. He and President Bob Mathews created the original CATV Systems, and have kept our programs responsive to the cable system's needs. With a background rich in accounting and computer applications, Ken is primarily responsible for the CABLE-80 development.

**Dave H. Williams** came from IBM's London, England office four years ago. He traveled extensively training and assisting our customers, was active in CableData's Pay-TV development, and in technical support for the Customer Services Group. David's responsibility is Test and Certification of the CABLE-80 program.

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## opinion/editorial

Judith Baer, Associate Publisher

As 1976 was indeed "The Year of the Earth Station," 1977 may well be "The Year of Optical Cable." Don't tear down existing plant and don't hold off on placing current requirements with your local friendly cable manufacturer. Do however, learn as much as you can about this innovation in cable technology. It may not be here right at this very moment in practical terms of day-to-day system operation, but as every cable supplier interviewed for this issue of *C/Ed* says, "It's developing faster than we thought it would."

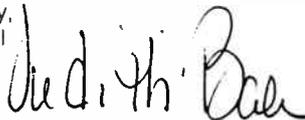
Contrary to some industry scuttle, optical cable is not in any manner a "blue sky" idea for cable television distribution systems. CATV did not invent it. The industry didn't ask for it. Optical cable is a product of the chemical industry and a hope for the telephone companies. It is the telephone companies who have invested the millions of dollars in research and development, along with the military communications arm of the U.S. government. Cable television is in the fortunate position, for once, of being the recipient of the technology developed by others. It does mean a lot to our industry, but we weren't the ones pushing it, and whatever publicity the CATV industry receives that says we're up on the state-of-the-art, so much for the better.

Make no promises to cities or counties when developing franchises about optical cable. It remains in the experimental laboratory and is still far too expensive to use in construction or rebuild. Optical cable requires more than thought about the cabling technique used, it will require a whole new thought process about system design. Electronics will change, and nobody has answers to any questions about how much. It is not a revolution that's going on. The use of optical cable will evolve through the next five or more years.

Even though "the cable is wearing out," as one industry spokesman has observed, operators must use a great deal of judgment when thinking about rebuild considerations into the 1980's, if you're thinking of holding out for optical cable. There is no insurance that its use will be practical by the time you need to build a new plant. Don't gamble on it—make your plans now, be flexible and stay up-to-date on what's going on. Don't be snowed by all the proclamations you'll be hearing. It's not a new toy to be used without discretion, since there is little experience with the product. It could shatter on you in a minute.

Do, if you've the money and the time, spend some amount of both by experimenting with optical fiber cable. Buy a small piece and make it work for you, either in the system or in the laboratory. That's how you'll learn about it, and that will also be a constant reminder for you to learn more. Work with one, or all of the suppliers available and let them know what you find out. Communicate with the rest of the industry and share your experiences. As an operator, you owe that to yourself and to the suppliers. They learn from you and your requirements. And, let us know what you're doing and what the results are so we can share that information with the rest of the more than 3,500 cable operators in this industry.

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# FAA/Cable Controversy

*CableVision's* October 25 NEWS REPORT covered new concerns over **cable television system signals interfering with Air Traffic Control** frequencies. OTP Director Tom Houser wrote a letter to FCC Chairman Dick Wiley asking that **use of certain mid-band frequencies** (those used mostly for subscription programming) **be excluded from use by CATV systems**. Houser's letter included mention of the Harrisburg, Pennsylvania "near miss" of two aircraft this spring. The FAA and the FCC (and the system operator) agreed that the incident is **a direct result of interference caused by the cable system**. As of this time, the FAA, FCC, OTP and the Department of Defense have all become concerned with the problem, and **cable television is the "bad guy."**

We have heard a six minute cassette tape that the FAA is circulating to other groups interested in this matter. It vividly and dramatically describes the incident over Harrisburg. It includes some dialog between the pilots and ATC, a scenario by an FAA official and interspersed sound of the interfering signal, produced by the system's pilot carrier. The tape has been played before groups of private aircraft owners and pilots, IRAC, and most recently before the influential Washington Section of the Electromagnetic Engineers. The IEEE EMC covers the effect, control and measurement of radio frequency interference. They are recognized experts and effective persuaders.

The tape includes inference that the interfering signal from the cable system "produces an hypnotic effect" on the aircraft pilot and reports that such interference from CATV systems is probably not uncommon, but just hasn't been properly traced and reported. And, luckily, such interference has not caused a major air disaster or killed anyone. The tape causes us to think that the possibility of such a disaster is great. The group we listened to it with was left with chills.

The NCTA Board of Directors will hear the tape at the November 29 meeting in Anaheim. Their reaction will probably be the same as ours. They will be moved by the sense of drama that the tape produces and they will have to admit that signal leakage and interference is a real problem in this industry. They will have to begin to determine how to insure their systems against signal leakage (meeting the FCC's "three-point" requirement is not enough!) and consider the greater responsibility of protecting their companies against major law suits should a disaster occur and their system be blamed. "**That damn cable system . . .**" as the last words on the aircraft's black-box plus sounds of the interfering cable system leaking signal will probably stand up in court.

Even though all parties concerned in the Harrisburg incident have been very cooperative, and it was a fluke that the incident happened on the very first day that the Air Traffic Control center changed to a 118.25 MHz frequency (one the cable system was using), the overall problem is greater than this one incident. Out-of-date installation practices, out-of-date connectors, breaks in cable, insufficient test equipment and poor training are the real problem. They are all the responsibility of the cable system owner/operator. It will cost money to get the systems in shape, but it's cheaper than killing someone. **If you think that copyright or poles are industry problems, you'd better think long and hard about this one.** It goes farther and is, in the long run, much more expensive.



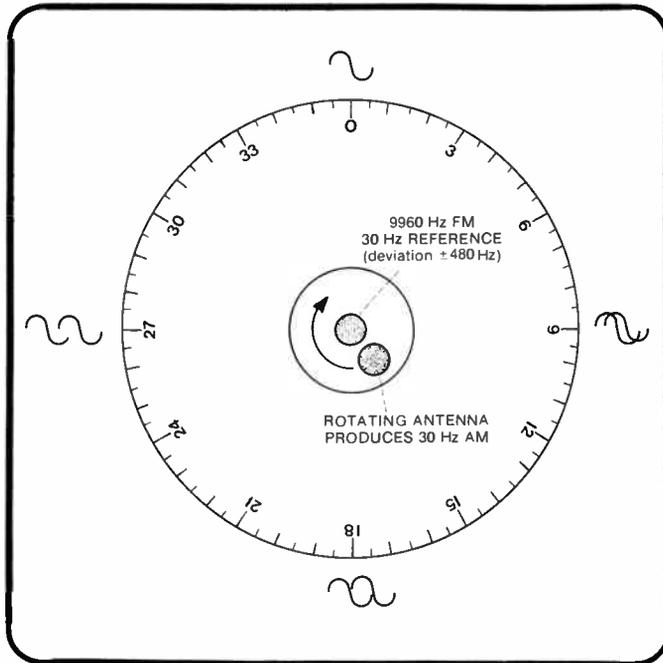
# Can Cable Interfere with Aircraft?

By Cliff Schrock  
Technical Editor

The idea of a cable system interfering with an aircraft is an emotional subject. Leakage messing up somebody's radio or TV is one problem, but the thought of interfering with aircraft navigation or voice communications is another thing.

We're not the only ones, in CATV, but we were the first to use coax systems on a large scale in the aircraft frequency ranges. The phone company is right behind with L systems operating in coax. Computers, as speeds get higher, will routinely use frequencies in the aircraft band. Off-air transmitter harmonics and beats as well as man made and natural interference can also end

Figure 1 — OMNI station transmits continuous navigation signals so that aircraft can determine position relative to said station.



up in the aircraft bands. Powerline harmonics, arcs, lightning and welding are a few more interfering sources.

Careful design of the navigation systems and instruments protects against false readings during adverse conditions, and if the interference is severe enough, the instrument will tell you "I can no longer give an accurate reading," rather than give a false reading.

The most susceptible areas of communications in aircraft are the voice transmissions. Intelligibility due to interference comes well before the navigation instruments fail.

This article is not a plea for cable saying: "We didn't do anything wrong." Instead, it is a technical analysis of the problem and includes the author's recommendations. You don't have to agree with the recommendations, but the rest is required reading. In other words, "Know thine enemy." In this case it is cable leakage.

## OMNI

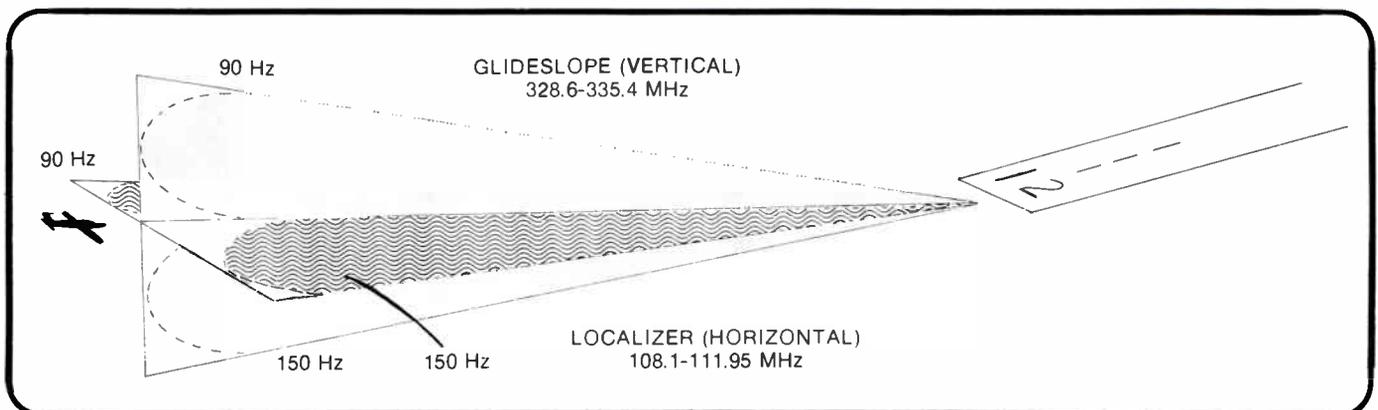
**Fact:** Omni is the most popular radio air navigation system used today. It is actually quite simple, yet effective and uses the 108.0 to 117.95 MHz band.

The signals are generated by transmitting a 30 Hz AM signal and a 9960 Hz subcarrier FM modulated with 30 Hz. The 30 Hz AM signal is transmitted on a mechanically rotating antenna. In the airplane, both the 30 Hz AM and 30 Hz FM signal are recovered along with voice and code identification of the OMNI station. By comparing the phase of the two 30 Hz signals, direction from the station can be determined.

The indicating instrument consists of a needle showing deviation to the left or right of course as selected in degrees on a dial. Flags will also appear on the instrument showing TO or FROM the navigation facility, and a red flag appears if the signal becomes unusable.

**Comments:** The OMNI navigation band from 108 to 118 MHz falls in a region of the CATV spectrum that has been traditionally allocated as experimental by cable people. No midband channels

Figure 2 — Glideslope-localizer uses directional lobes to give aircraft descent information to end of runway.



allocated in this region.

If erroneous signals were present, an OMNI receiver would have a high tolerance to interference to the point that voice identification could be covered up; yet, the navigation indicators would continue to function. In the event of a total interference situation, the navigation portion would *not* give false indications; rather, the warning flag would appear.

Since the OMNI system is used in a radius up to 80 or 100 miles from the transmitter site, and a cable operation occupies a much smaller area, interference, if encountered, would only be momentary.

## GLIDESLOPE - LOCALIZER

**Definition:** The glideslope-localizer system is a close proximity landing system intended to aid instrument landings under less than ideal atmospheric conditions.

The localizer and glideslope are actually two independent systems that work together to keep the pilot on course during an approach. Both vertical position and deviation to the left or right of the glide path are provided.

The glideslope portion of the system works in the 328.6-335.4 MHz band and uses 90 and 150 Hz modulation in two lobes to give indications of vertical position on the glide path. If the plane is on the center of the glide path, the 90 and 150 Hz signals will be of equal amplitude, and a horizontal indicator in the airplane will be centered. The localizer portion of the system operates in the 108.1-111.95 MHz portion of the band. Some airports use *only* a localizer and do not have glideslope equipment. The localizer also uses 90 and 150 Hz modulation on two lobes, to indicate position to the left or right of the desired glidepath.

In the aircraft, the localizer and glideslope are contained in the same indicating instrument with two crossed needles. The horizontal needle indicates position vertically relative to the glidepath and the vertical needle indicates position to the left or right of the glidepath.

**Comments:** The glideslope portion of the landing navigation system should present no problems since it operates above 300 feet.

The localizer is a critical system for landing, however, it operates in the experimental portion of the cable band from 108 to 111.95. If interfering signals were present, they would have to contain significant 90 and 150 Hz information to cause a problem. Severe interference will shut down the localizer system and produce a warning flag on the indicating instrument in the aircraft. Normal procedure at that point for the pilot would be to initiate a missed approach and begin an immediate climb out.

Figure 3 — Glideslope-localizer indicator uses two needles to indicate position of aircraft relative to glidepath. This meter is indicating that aircraft (round dot) is below and to the right of the glide path. Vertical needle and compass dial is also used for OMNI indicator.

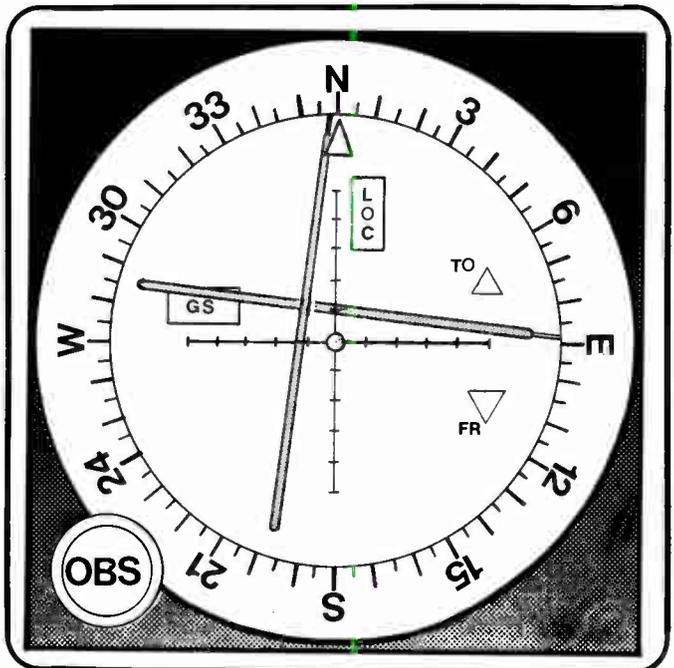
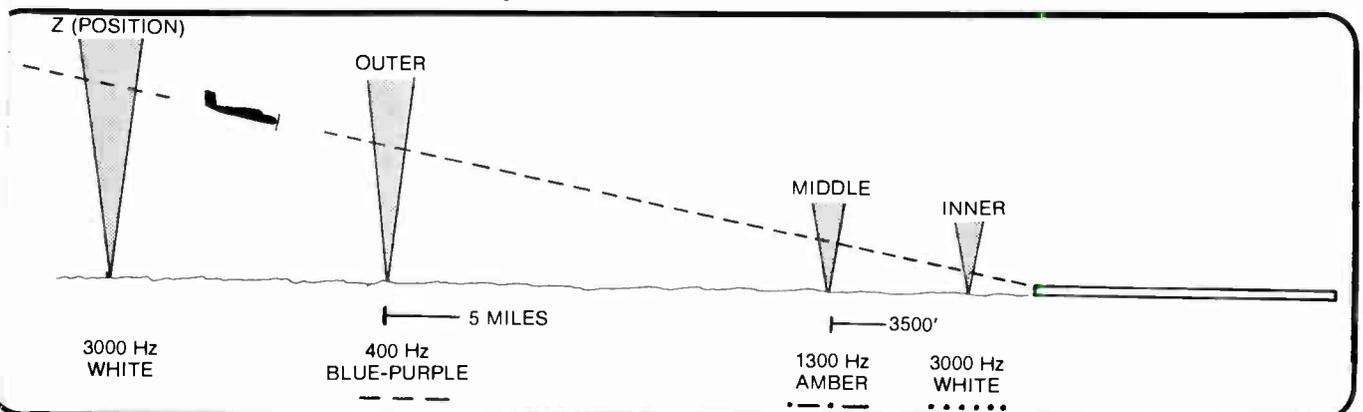


Figure 4 — Marker system used for approach to landing.



## MARKER SYSTEM

**Fact:** The marker or fan marker system operates at 75 MHz with modulation to give the pilot indications of position relative to the glidepath. There are four marker possibilities, the Z or position, outer, middle and inner or threshold marker.

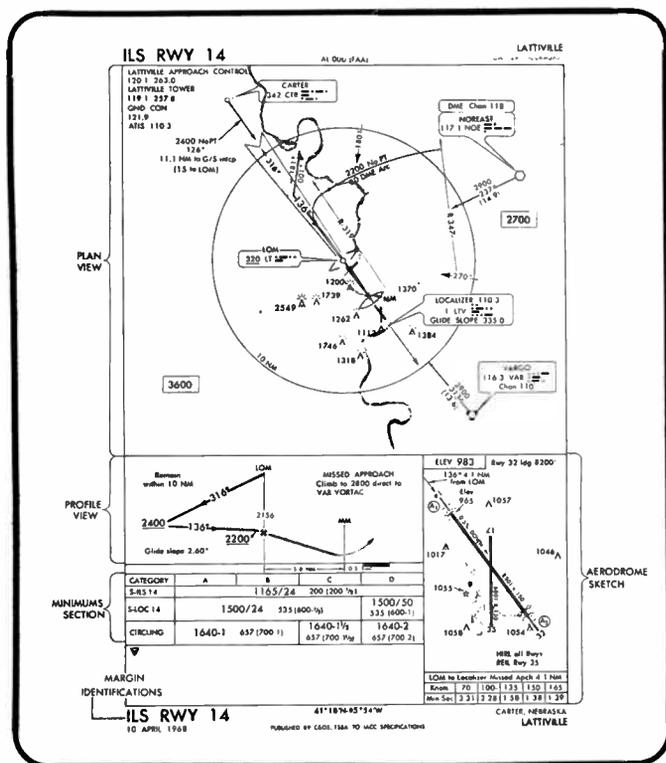
The markers are low powered transmitters with a pattern that radiates upward in a cone shape. The modulation is an audio tone plus a dot-dash code. The Z or position marker is modulated with 3000 Hz and will light a white lamp in the airplane. The outer marker is generally about five miles from the end of the runway and emits a 400 Hz tone and two dashes per second. This will light a blue or purple lamp in the plane. The middle marker is about 3500' from the runway and emits a 1300 Hz tone and a dot-dash sequence which lights an amber lamp. The inner marker indicates the end of the runway with a 3000 Hz tone and a dot-dot sequence (6 per second). In the aircraft the pilot can see the colored indicator lamps and hear both the tones and the code pulses.

**Comments:** The marker system transmitters are very directional and contain distinct information. Interference from a signal around 75 MHz is possible since the bandpass of many marker receivers is quite wide. This means that cable system pilot carriers along with other Fixed Operational services such as Rural Radio Services could be received by a marker receiver. However, the code and tones would not all be present. In addition, the markers cones are very small and could probably be separated from a broad interference source. *It would be very poor pilot procedure to hear something and take that to be a marker without codes or a light confirmation.*

## VOICE COMMUNICATIONS

**Fact:** Voice communications are an important part of piloting since all clearances to land and takeoff, enter pattern, aircraft spacing, etc. are given by voice. The voice band is from 118 to 136 MHz. This is further divided into Tower operations 118 to 121.4 MHz, ground control 121.6 to 121.975 MHz, private aircraft 122.0 to 123.075 MHz, aircraft manufacturers 123.1 to 123.575 MHz, with

Figure 5 — Example of Approach Plate for an airport. An airport can have many Approach Plates for different runways and types of navigation equipment.



Commercial Air Traffic and Center operations taking place from 124 to 136 MHz.

**Comments:** The voice bands are important, however, every pilot is taught to rely upon visual contact during all normal periods of visibility. In many urban areas, location of other aircraft in the vicinity is given by Approach Control or Center during slack periods as a convenience, however, during rush hour no aircraft positions are given except to Instrument filed flights. *The onus is on the pilot to maintain spacing during visual conditions (VFR).* Under instrument conditions, voice contact is vitally important, but it is continually supported by instrument readings within the aircraft. Other frequency choices are also available so that if a pilot were handed off from Center to Approach on 118.25 (for instance) and could not make contact, he would immediately return to Center frequency.

## OTHER RADIO NAVIGATION AIDS

Many other devices exist to help the instrument pilot. These include the DME which measures the distance to a navigation facility (OMNI). The DME operates in the 960-1215 MHz band. Forms of RADAR including surveillance (ASR) and precision approach (PAR) can aid landings. An old system (ADF) using low frequency transmitters from 90 to 3000 kHz comprise yet another navigation system.

All of the above mentioned systems exist outside the CATV spectrum and will not be considered in this article *other than to reinforce the fact* that many systems do exist and should cross check during an instrument approach.

## TYPICAL USE OF FACILITIES

During a normal visual approach (VFR), the pilot uses only voice contact for clearance into the traffic pattern and landing instructions. Smaller airports often use UNICOM which is a *free-for-all frequency* that planes can use to notify others of their position *if they feel like it!* Traffic patterns are well established and the pilot is *entirely* responsible for visually entering the pattern and using the airport without collision with other aircraft.

Larger airports under VFR conditions demand contact be established at the 5 mile point, and then the tower will provide information as to runway in use, how to enter pattern, when to land, etc. However, the pilot is still entirely responsible for VISUAL CONTACT. Assuming a radio failure at some point, the pilot has three choices, either to find another frequency, depart pattern and execute a pattern that indicates that he is without radio, or the tower may use lights—red or green to indicate that the pilot should continue the approach or abort. In the case of receiver interference in the aircraft, the pilot could still talk to the tower and would probably receive light commands in response.

Instrument (IFR) approaches are entirely dependent upon radio contact for voice and navigation purposes. Each airport has specific approaches under instruments documented on an Approach Plate or chart. These contain all the necessary approach information and note the descent points, navigation aids, missed approach point, etc. A typical approach uses two or more electronic navigation aids in addition to a cross check with the airspeed, altimeter, rate of descent, and gyro-compass within the airplane.

During a typical ILS (Instrument Landing System) approach, the aircraft would be handed off to Approach control. By radar vector or vector off an OMNI, the aircraft would approach the localizer. The exact intersection might also be indicated with a Z marker as a cross check. The pilot would begin descent on the glideslope-localizer path, timing the descent, noting the crossing of the outer and middle markers to verify timing, altitude, airspeed, and making sure this all corresponds with the glideslope-localizer indicator. Any point where the different instruments cease to agree *dictates the execution of a missed approach.* The pilot would climb out and begin the approach again. Other simpler instrument landing systems are also used, some implement only a single radio facility such as an OMNI or a low frequency beacon.

## CONCLUSIONS

It is very difficult to say whether a cable system could cause an air mishap.

*It is virtually impossible for a cable system to cause a needle to point the wrong direction.* It is improbable that a cable system, because of its power level could even disable a navigation system, but in the event that this did occur, the indicating instruments would "flag" (display a warning flag) rather than give wrong readings.

A real hazard could exist in loss of voice communications. Under normal (VFR) conditions, however, the pilot is still in control visually. This brings up the Harrisburg incident where it should be determined whether conditions were VFR (normal visibility). *If a near miss occurred in VFR conditions, then pilot error is indicated.*

Under instrument flight conditions (IFR) loss of voice contact or a flagged instrument could cause a moment of panic, and could cause a mishap, although most instrument pilots would agree that it should not cause anything more than a change in procedure.

Can we safeguard a pilot against every conceivable hazard? A pilot encounters rough air, ice, engine failures, radio failures as well as fatigue and nervousness. We cannot regulate these things.

## RECOMMENDATIONS

I am an instrument pilot, and I am nervous about the whole idea of trusting instruments. I keep current with 1 hour per month of actual instrument flying on the average, and yet I avoid flying in instrument conditions. My whole reason for having a current instrument rating is for that one time when I can't get down any other way.

For me, *the idea of something interfering with the navigation instruments is a little terrifying.* Yet things do happen. The radio fails, the navigation facility shuts off, lightning interferes, somebody's mike gets left open, and through it all, the instrument pilot is trained with specific responses.

If I thought that everything would get better if CATV got off our (aircraft) frequencies, I would want them off. But it just isn't so.

Everything possible should be done to protect aircraft frequencies. I am upset with the Harrisburg situation. We have radiation standards and they *must be met!*

I have presented the basic theories for all the navigation systems within the CATV spectrum and must leave the decision up to you. It is certain that CATV will be forced to give up valuable spectrum real estate if more instances occur.

Yet, I do not feel that CATV sharing frequencies is fundamentally wrong. *What is wrong is misusing the privilege.*

On the other side of the fence, FAA over-reaction is not going to help either. Midair collisions and losses of hundreds of lives are not the result of one isolated misreading—but, generally, result from a breakdown by the pilot in a number of areas. Granted, the interfering radio may be the last straw, but . . .

*Pandering to sensationalism is not conducive to the solution of what is basically a technical problem.* We need some answers—and here are some recommendations.

1) Assume that a coax system (CATV, Telephone Company L System, wideband computer trunk, etc.) is within tolerance. *Is 20 $\mu$ V per meter low enough?* Perhaps the criss-cross system acts as a grant antenna producing the effect of more power at 3000' than on the ground. *Find this out first!*

2) Perhaps we need to have any cable system using the 72 to 76 and 108 to 136 MHz band file a notice with the FAA much like an antenna notice is filed. *This should apply to other coax services beside CATV.*

3) Fly over radiation checks might be the answer. Equip an airplane with a recording signal level meter and fly over the system in a distinct pattern. Consultants could hire out like crop dusters or barn stormers of early days. (The FAA will love this one.)

4) The final recommendation should really be the first. We have got to get our signal leakage act together. Check your system religiously. Keep those millivolts in your cables. *We have a lot more to lose than spectrum if we can't keep our systems contained.* □

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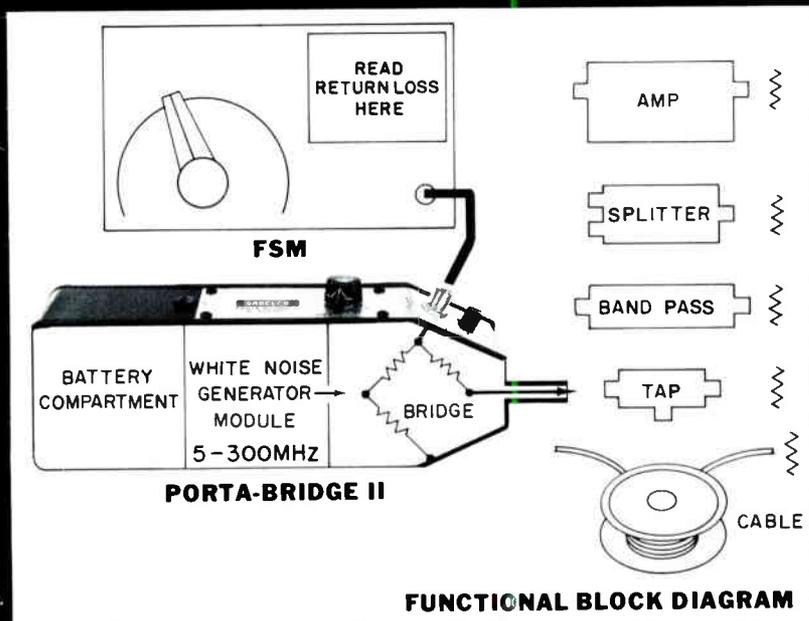
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## news

### FCC Rules on Cable Channel I.D.

WASHINGTON, D.C.—The FCC has ruled that identification of cablecast channels would not serve the public interest. The Commission based its decision on comments received answering a proposed rulemaking issued in October 1971. The FCC asked whether cablecast channels should be identified by call signs or some appropriate form to distinguish them from broadcasting channels. Stating that one attraction of cable service is the absence of artificial interruptions, broadcasters generally urged against the use of call letter identifiers. A number of cable system operators opposed, altogether, adoption of any rules on cable cast channel identification.

The Commission states that "no evidence exists which indicates that there is a widespread confusion between cablecast and broadcast

programming," and that it would not at this time, adopt any identification rules. The proceeding has been terminated, with all commissioners participating except Commissioner White.

### Industry Employment Statistics

COMMUNICATIONS/ENGINEERING DIGEST, as the official publication of SCTE, recently surveyed a number of cable operating companies. Employees included in the the survey total more than 2,500, or ten percent of estimated industry employment. Size of the companies surveyed varies from 1,000 to 45 employees. The purpose of the survey was to determine percentages of engineering and technical personnel in the CATV industry.

C/ED's survey shows that a little over 45 percent of CATV total employment is engineering or technical in nature, including clerical support personnel. Of the total sample, only 30 employees are reported as degreed engineers and only eight are reported as certified

Professional Engineers. Eighteen women are employed in nonclerical technical or engineering job classifications in the companies surveyed, while they report 107 other minorities in technical/engineering, but nonclerical positions.

Companies reporting state that nearly 12,500 hours of manpower training and development was offered to over 450 technical employees within the last twelve months. The companies do not state what percentage of the total hours includes attendance at industry trade shows and meetings outside the company. Eighty percent of the 12,500 hours was reported by one company.

Average engineering and technical department growth estimated by the companies surveyed is 12.5 percent by 1980 and 23 percent by 1985.

### Optical Cable Report by SCTE

ANAHEIM, CA.—Optical cable was the topic of an SCTE hosted panel staged December 3, at the Western Cable Television Convention. SCTE

## A New Idea For Radiation Testing



An ST-1 signal transmitter bolts into your headend, and produces an easily identifiable signal at any frequency from 86 to 110 MHz. The signal can be either FM modulated at 1 KHz or FM warbled, like a cuckoo clock. The cuckoo signal can be easily recognized even in a noisy environment. A standard FM radio is then used as a receiver. The sensitivity of the system depends on the quality of the radio you purchase.

The unique part of the ST-1 is the AM modulation. FM receivers have been used effectively before, but they had trouble locating the exact break or leak because the FM receiver went into limiting. The ST-1 automatically steps 25 dB in 5 dB steps. When you are away from the trouble spot, you hear only the higher levels. The closer you get, the more levels you hear, and the louder the signal gets.

Using FM radios lets you equip several vehicles for leakage patrolling at a relatively low cost. This is a field proven system that is fantastically effective. The best part is that the ST-1 **costs only \$295.00**, and delivery is **two weeks**.

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hosted the five participant panel at 10:30 a.m. at the Disneyland Hotel.

Speakers included Ron Simon, Teleprompter Manhattan CATV in NYC; Bob Bilodeau, Suburban Cablevision, East Orange, NJ; Frank Dabby, Fiber Communications, Orange, NJ; Herb Lubars, General Cable Colonia, NJ; and James O'Brien, RCA, Lancaster, PA. The program provided views of current and future users of optical cable and suppliers.

Warren Reihs, RCA-CTS, served as resident SCTE host engineer and Bill Schiller, technical vice president of the California Cable Television Association, provided brief remarks. The panel was moderated by Judith Baer, executive director of SCTE and associate publisher of *C/Ed*.

### Technical Award Nominations Due

WASHINGTON, D.C.—Nominations for the NCTA Technical Achievement Award are being solicited by Delmer Ports, vice president of engineering. Two awards are presented each year, one for outstanding industry contribution in

system operations and one in engineering development. The 1977 convention will mark the fifth year the awards have honored individuals who have made a lasting contribution to the CATV industry. SCTE will review the nominations and select the winners.

The winners will be announced at the NCTA 26th Annual Convention, April 17-20, 1977, in Chicago, Illinois. Nominations, accompanied by a brief biography and comments on the nominees' contributions, should be sent to Ports' attention at NCTA, 918 16th Street NW, Washington, D.C. 20006, no later than January 17, 1977.

### Texscan/Theta-Com Holds Seminars

INDIANAPOLIS, IN—Texscan Corp. announced a series of five day seminars at various locations throughout the country. The programs will include topics of CATV system design, construction, headend operations, antenna theory and site operations. System failures, grounding, beat analysis, cross-modulation, hum, co-channel and

ingress will also be covered. Hands-on instruction in day-to-day measurements and FCC compliance testing will occupy 40 percent of classroom time. Speakers include Raleigh Stelle and Bob Daniel of Texscan, Bob O'Hara of Texscan's Theta-Com Division and various other guest instructors. Information is available from Texscan Corp., (317) 357-8781.

### CARS Violations Cited, Fines To Be Imposed

WASHINGTON, D.C.—While recently processing approximately 400 applications for renewal of license in the Cable Television Relay Service (CARS), the FCC staff has noted numerous violations of the Communications Act and Commission Rules in construction and operation of CARS facilities. The Commission cites examples of Delaware Cable TV Co., Continental Cablevision of Ohio, Inc., Coastal Cable TV Company and Mid-Hudson Cablevision, Inc.

Construction and/or operation of CARS facilities without appropriate authorization or "contrary to an

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existing authorization," are violations that are "considered serious matters warranting . . . imposition of forfeitures or revocation of licenses," according to the FCC. The FCC Rules were amended in October to authorized the Chief of the Cable Television bureau to impose forfeitures of up to \$500 against CARS operators who violate either the Communications Act or the Commission's Rules. The action became effective November 4.

### FAA Stirring Things Up

WASHINGTON, D.C.—Office of Telecommunications Policy Director Tom Houser wrote a letter to FCC Chairman Richard E. Wiley in late October, asking that certain frequencies, particularly in the mid-band, be excluded from use by cable systems. Houser asked that the frequencies be protected "until such time as adequate discipline, standards, enforcement and equipmnt have been provided to ensure that interference is not caused to safety of life services." The letter is believed to be the result of an

incident described as "near-miss" between two aircraft over Harrisburg, PA, several months ago. The FAA and the FCC said that event was a direct result of interference generated by a cable television system. The charge has been disputed, but a push is being made by the FAA, the Interdepartment Radio Advisory Committee and now OTP for quick action on the part of the Commission. At question should these discussions come to a head, is the future status of as many as half of the channels now used by cable systems for delivery of programming and other services, with the most frequent use on the mid-band, being subscription programming.

### CATA Stages "Mini-CCOS"

OKLAHOMA CITY, OK—The Community Antenna Television Association is staging eight "Mini-CCOS" meetings around the country to assist cable operators in "getting cable systems into form for some type of compliance by March 31, 1977." Registration for the two-day meetings is \$45 per person and

includes a workbook. Registration information and locations are available from CATA, 4209 NW 23rd St., Oklahoma City, OK 73107.

### SCTE/NCTA Supplier Film Library

WASHINGTON, D.C.—SCTE, co-operating with NCTA's Engineering Advisory Committee, is establishing a library listing of films produced by industry suppliers. The listing will be published to assist system operators in training and management development. Cable system operators with available films or tapes used for training purposes are encouraged to also take part.

Format, costs, titles, date of production, shipping weight and cost, along with brief descriptions of the film, will be included in the listing. Programs in hardware, measurement, training, OSHA, management and technical topics will be listed.

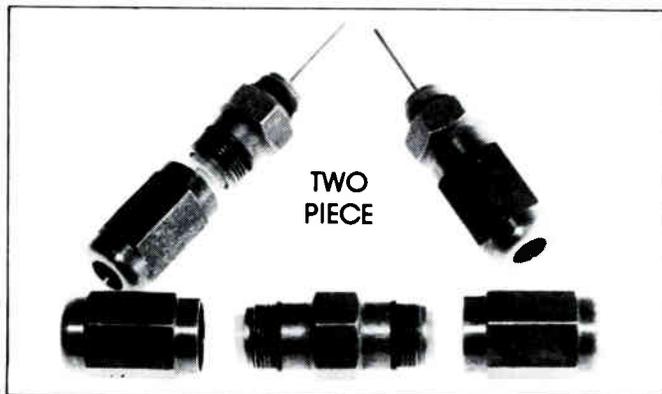
Detailed information must be forwarded to the Society of Cable Television Engineers, P.O. Box 2665, Arlington, VA 22202. Publication of the listing of films is scheduled for February, 1977.



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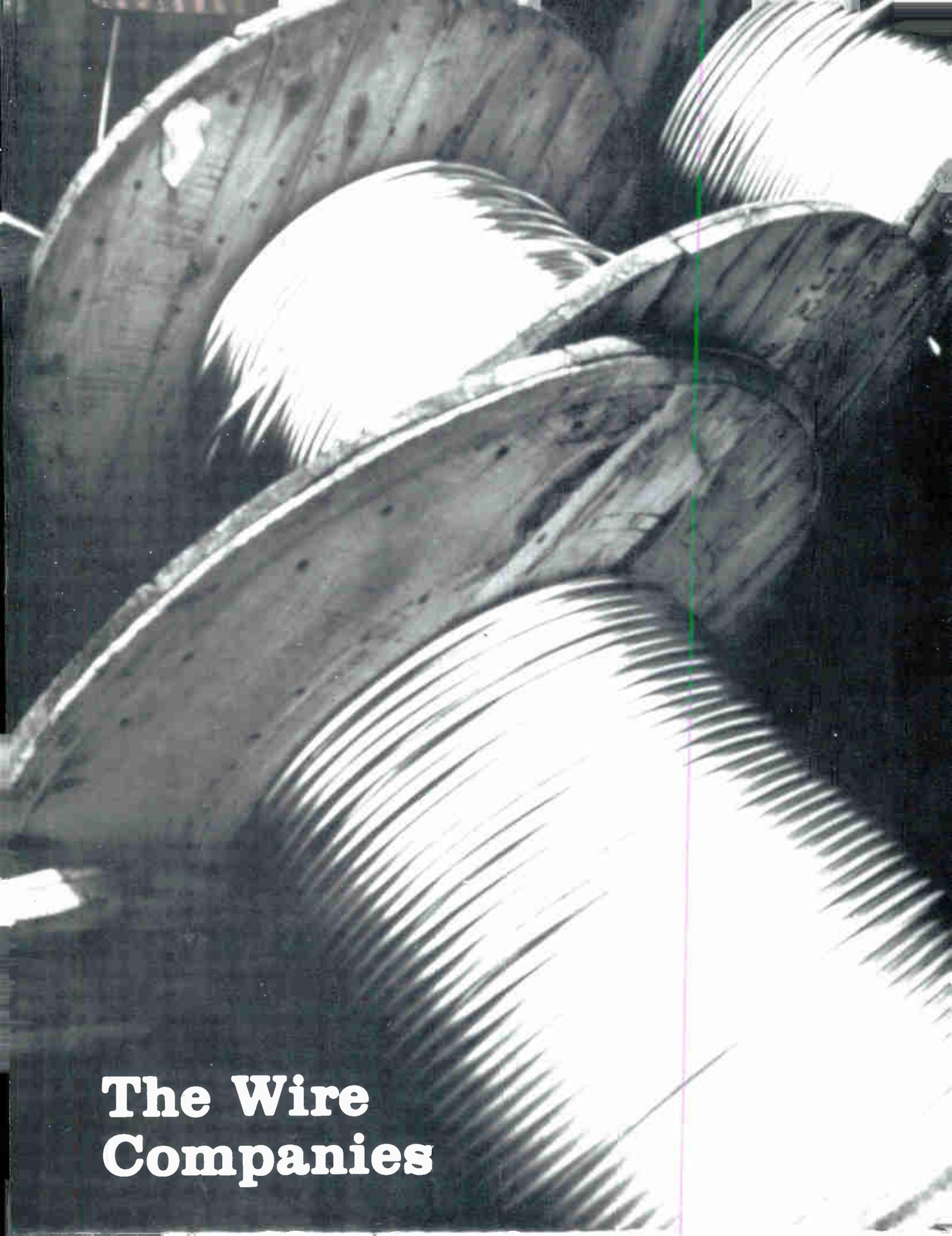


- 1st Prize \$500. Cash
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**The Wire  
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# The Big Seven

Ronald Stier, marketing manager of Belden Corporation's Electronic Division, says that wire and cable can be called the world's "umbilical." Stier's observation is correct.

Consider the pieces of cabling in your life. Telephone and power lines across the country. They are the most obvious. Consider cords with appliances, office machines, lighting fixtures, radio and television and CB sets. Consider cords in your headend and the ones on your bench test set up. With slightly less than 160 million telephones in use, more than 200 million nonportable radios listened to and about 122 million televisions watched, each with standard electrical cord between seven and ten feet long, figures on length of wire and cable and cord boggle the mind and far surpass our calculator's capacity. It would seem a conservative estimate that the average American home has about 100 feet of electrical cord just to support casually used appliances. We've been a wired nation all along!

The cable television industry has slightly less than 200,000 miles of cable in plant already. A considerable amount of new construction has been announced recently, always in terms of "miles of plant." Two major builds in the Dayton, Ohio, area will immediately add another 1,200 miles to the industry tally with Viacom's 500 mile system and Continental's 700 mile installation. The health and growth of the industry is judged on statistics of miles of cable built, rebuilt, extended, sold, financed, etc. It is an important item to monitor.

There are seven companies supplying trunk, distribution and drop cable to CATV operators. The point of this article is to show you what the companies are like, let you in on some intriguing insights and share the experience of visiting each company. The purpose of this article is to talk about the companies and the people directly involved in the CATV industry. Some personalities will be familiar to you, some will not. There is no conclusion drawn as to which product is best. Every one of these suppliers obviously believes that his product is best.

Our observation is that each of them contributes a special line, product, technique or personality to the industry. They are all good, and they all believe in the future success of the industry. They are the "cable" part of cable television. Each in its own manner, is best.

## One of the Oldest

There are some very old companies in the list of suppliers. Belden Corporation is the oldest. A visit to their Richmond, Indiana, facility included conversation with Bill Wilmot, Len Cebol, Ramesh Sheth and Ron Stier. The Richmond plant is the largest of seven Belden plants, in five states and Canada. Production space exceeds one million square feet and Richmond covers 603,000 of the total. The company has committed production exclusively to drop cable in the CATV market and sells a familiar line called *Duobond*. Belden also offers *SEED* to the CATV industry as a method of evaluating shield effectiveness.

They entered the MATV market in 1967 by introducing *Duofoil* RG 59 cable. The product, sold through distributors, was quickly picked up and used by CATV operators. Belden's CATV/MATV catalog lists nine categories of cable and 53 variations within the nine category line.

*SEED* was developed in the company's Technical Research Center in Geneva, Illinois. The facility opened in 1968 and covers 26,000 square feet on a 17 acre site. Ramesh Sheth, product development manager at the Richmond plant, told us that there are about 108 people directly involved in research at the TRC that might benefit the CATV industry. The *Shielding Effectiveness Evaluation Device* was developed when Belden engineers were after a more effective shielding method to reduce signal radiation from drop cable used in urban areas. The company feels that *SEED* is important to CATV in two ways. The system enables Belden to develop cable products with new shielding designs that they feel are superior, and *SEED* is available as a tool to cable operators in selecting cost effective optimum cable configurations.

Belden's product line covers 14,000 items. Only 50 percent are classified as stock items. The balance are manufactured to varying customer specifications. Chances are good that the magnet wire used in the coils in your modulator came from Belden. Chances are high that the concrete reinforcing wire in a nearby wall, plastic marine rope on a boat in a nearby marina, plastic clothesline in your neighbor's back yard, the vinyl needles on your artificial Christmas tree and bristles of your paint brushes or broom have been made by Belden, through a Canadian manufacturing facility.

Working with Fiber Communications in Orange, New Jersey, Belden solved the problem of protecting fragile glass fiber so that Teleprompter Manhattan CATV could install a test program using the new technology. Belden used experience gained in other products in developing the process. Belden's scientists and engineers have been exploring the technology for years, according to James D. Eaton, vice-president, Research and Development, for the company.



Len Cebol



Bill Wilmott

## A Businessman's Business

Cerro is a division of Cerro-Marmon Corporation, a huge business entity with sales in excess of a billion and a quarter dollars annually. Cerro's interests range from metal products, wire and cable products, metals trading, real estate and trucking to mining. The Cerro manufacturing divisions are involved with varied products from forgings and plumbing tubing to aerospace and marine cable. Cerro Com manufactures coaxial cable and passive devices for the CATV industry.

Sussman is a familiar personality to the industry. A member of the NCTA Associates Committee, which represents more than 200 industry suppliers, he was responsible for the success of the associates' programs held for the first time in Dallas at the national convention. He has been in the industry a rather short time, but has made a name for himself and for his company. Along with Sussman, Frank Spexarth, who sells, and Neil Gallagher, who engineers, we spent an afternoon talking about Cerro and the CATV industry.

The Freehold plant covers 130,000 square feet, houses about 180 people and is growing. In October, Cerro integrated the Anniston, Alabama, device manufacturing operation into the Freehold site. The building was originally built by Vikoa. Cerro took it over in 1971, and in doing so, inherited some CATV industry Vikoa folklore.

Cerro's plant is vertical. That's vertical with regard to the number of spools and bobbins that inhabit any cable manufacturing facility. Technically called "accumulators," we'll keep it simple and call them spools and bobbins. They're required in all cable production to maintain constant tension as the wire goes through steps on its way to becoming cable. We noticed bobbins laid out horizontally, taking up a great deal of floor space in other plants we visited. Cerro uses structures built up from the floor with three or four bobbins at different levels in frames. The observation has nothing to do with the quality of one company's product over another, but it appears to be a very efficient use of floor space.

Enthusiastic about the CATV industry, Sussman is pleased with Cerro's position, established in a short time. "We'd like Cerro to be known as the 'Dependables'" he says.

Sussman sees a "very good future" for optical cable and says "Our division will make an appropriate commitment toward participating in the, as yet, unrealized potential of fiber optics." Steps in that direction have already been taken. Cerro feels good about its current and future position in the marketplace. Sussman, along with Spexarth and Gallagher, have a very businesslike attitude in a very businesslike company.



Frank Spexarth



Neil Gallagher

## Commitment to Engineering

Frank Drendel is one of those people everybody in the industry knows. In CATV for more than a third of his life, (if you're in your early thirties, that's an accomplishment) he started in MATV, then joined Anaconda and learned about manufacturing management. He moved into system operations and served as vice-president of Operations for Cypress Communications. He then became president of Comm/Scope, one of the older continuous suppliers to the CATV industry, when it was part of Superior Continental Corporation. That is history. It is the current and new business known as Comm/Scope that we visited.

Sherrill's Ford is outside of Hickory, North Carolina, and Comm/Scope has a plant on a 44-acre site in a beautiful area. We visited shortly after Drendel and a group of Hickory businessmen had closed the purchase of Comm/Scope from Superior Continental. Superior had decided to withdraw from the manufacturing business and Drendel set out to purchase the Comm/Scope entity. Hutton-Drendel Associates closed the negotiations for approximately \$5 million. Drendel is president of the new company and starts on a new adventure.

Comm/Scope's 170,000 square foot facility houses the "largest coaxial manufacturing facility under one roof in the United States," according to Drendel. Engineering is blessed with 20,000 square feet to host new product development and continuing work on Parameter II, the company's new gas-expanded, low-loss coaxial cable. The company employs nearly 150 people and has succeeded in making this recent transition without interrupting production, delivery or customer service.

Fred Wilkenoh, vice-president of engineering, is responsible for Comm/Scope's research program. Wilkenoh is a degreed chemical engineer and has been with the company for some time. He is held in high regard in CATV and is well respected by other cable manufacturing engineers. Drendel has provided him with all the tools necessary to do his job properly in new product development and engineering.

Comm/Scope believes that outside of limited use, optical fiber technology is five to eight years away. Drendel feels it is possible as "a compliment to MDS and point-to-point" transmission but, "the final distribution will still be coax for a long time."

With Comm/Scope's dedication to engineering and willingness to spend a considerable sum of money of R&D, they might be among the first to solve problems of optical cable transmission of television images. Drendel told us to look for an important announcement from Comm/Scope about optical cable within the next six months.



Frank Drendel



## One of the Largest

General Cable Corporation's 1975 sales were more than \$326 million. Twenty domestic operating facilities, ten distribution centers, twenty-seven sales offices and a multitude of associated foreign companies and subsidiaries make it one of the largest independent wire and cable producers in this country.

The Communications Products Operations Office in Colonia, New Jersey, is where we visited with Irving Kolodny, director of application engineering, Al Torpie, marketing manager, and Mike Thornton, market analyst. Herb Lubars, assistant chief applications engineer, had been called out of town, but left us in good hands.

General sells to widespread markets and more than 7,000 customers. A primary supplier to telephone companies, 1975 sales to subsidiaries of General Telephone & Electronics represented about 27 percent of total sales. Sales to Western Electric were about 5 percent of General Cable's sales. The company's major markets are communications, electric utilities, industrial and transportation, construction and extractive industries.

The company's prominent role in the wire and cable industry is pursued largely as a research-oriented company. In the 1975 Annual Report, Robert P. Jensen, president and chief executive office of General Cable, told shareholders, "Spending on research and development continued at an annual rate of approximately \$3 million." Jensen also stated, "Optical fiber systems is another development which some experts feel will one day become the backbone of the country's long-distance communications network."

At General's R&D Center in Union, NJ, the company has been making and ovaluating optical fiber cable prototypes using fibers produced in their laboratory since 1974.

Kolodny told us that he feels optical cable technology is a "jeweler's art." He agrees with other industry engineers that its most practical immediate use is for point-to-point transmission. Al Torpie adds that until cost of the fiber becomes competitive, the technology will stay in experimental projects. Torpie adds that, "A major portion of General's R&D laboratory is devoted to communications cable."

General entered CATV in the mid 1960's, designing for "sophisticated and demanding systems engineers." The air-dielectric *FUSED DISC* cable was introduced in 1971 and is known to have the lowest loss of any cable currently on the market, with the same mechanical characteristics as other aluminum sheath cables. General started selling to the industry to provide "an opportunity to expand" out of the telephone industry. Torpie told us that the industry has committed to CATV "for the long haul" and feels the industry has "potential and growth."



Dr. Yung-Yien Huang

SCTE Tour

## Selling to CATV Since 1951

Times Wire & Cable Company is a part of the Commercial Products Division of INSILCO, a corporation with 1975 sales of \$332 million. Other parts of INSILCO include a unique supplier of plans and materials for do-it-yourself home builders; paint companies; publishing companies; office supplies and specialty desk accessories; products of the International Silver Company, from flatware to decorative homewares; automotive parts; miniaturized electronic components; exotic dies and tooling; and coin blanks for South American countries. Times Wire has been selling to CATV since 1951, according to Ray Schneider, vice-president of CATV Products. We asked how many miles of cable they'd sold to the industry and the answer was "a staggering amount." Schneider's been in CATV for a long time, both in system operation and as a manufacturer. He remembers when, in 1951, "we were buying 11/U type 'cable' with amplifiers every 750 feet."

Schneider is also a member of the RCTA Associates Committee, and Times has supported many industry groups, such as the Cable Television Technical Advisory Committee, to the FCC and the Society of Cable Television Engineers.

The company has three facilities and nearly 500 employees in Chatham, Virginia; Phoenix, Arizona; and Wallingford, Connecticut. Times manufactures cable for citizens' band, aerospace and military markets and supplies a full line of cable for CATV. Many of the company's products have been innovative.

The chief cable engineer at Times Wire is Jack Arbuthnott. He joined the company in 1969 from Phelps Dodge. Starting in electronics in 1945 in radar service, he studied electrical and mechanical engineering and has an E.E. degree. We asked what he thought was the most significant engineering event in CATV. He told us he thinks there were two: "The broadband all-channel amplifier and aluminum sheath cable." He says that optical cable "is a fascinating area, it may come faster than people realize." Arbuthnott feels the breakthroughs are coming. Times Wire is also working on optical cable.

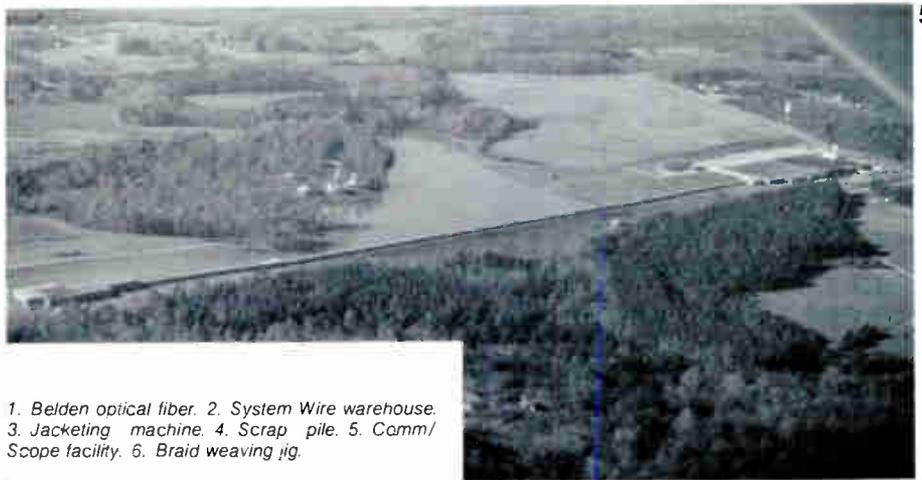
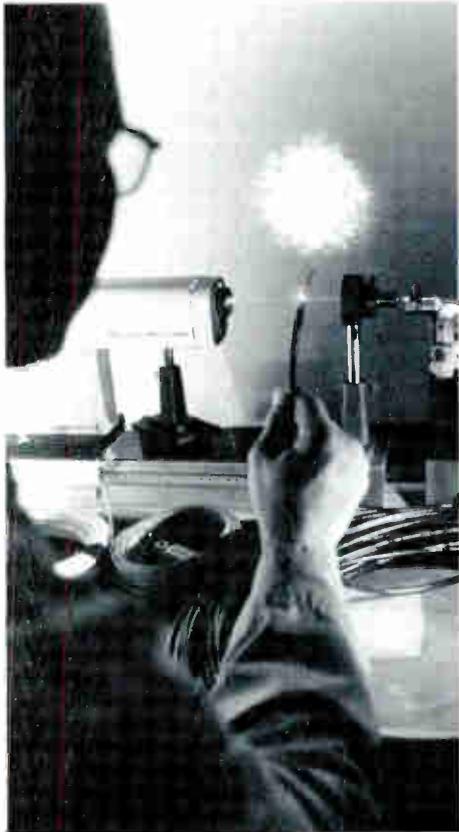
Times cooperates with a local university program to develop young engineering talent. While a student is working toward a degree, he joins the company for a few months of on-the-job training and experience. He returns to school full-time and then comes back to Times Wire for more in-house development. Many stay with the company and the program works out very well, according to Arbuthnott. He says, "The young people work very hard with a great deal of interest. They're interested in everything." Times Wire sponsors graduate education and encourages employees to increase their skills and knowledge. The company also has an active program in Value Engineering.



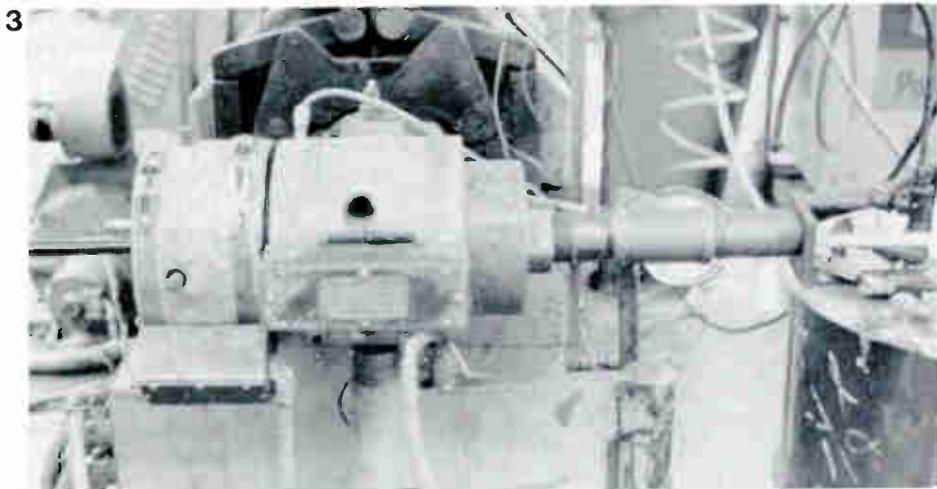
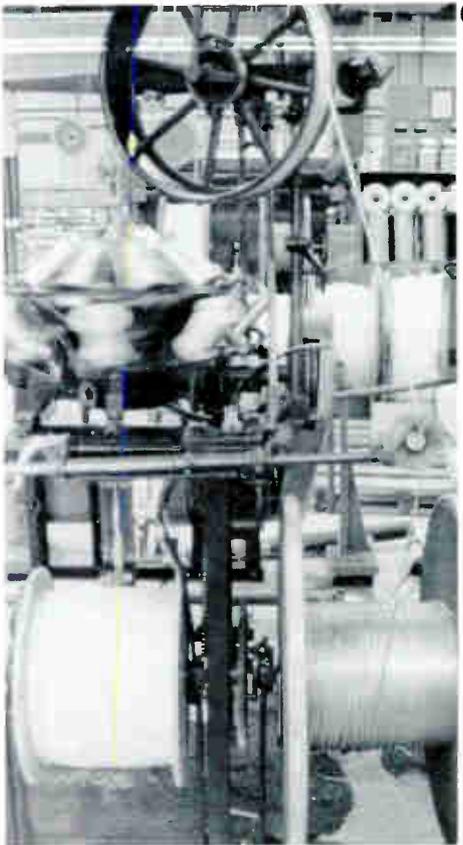
Ray Schneider



Jack Arbuthnott



1. Belden optical fiber. 2. System Wire warehouse. 3. Jacketing machine. 4. Scrap pile. 5. Comm/Scope facility. 6. Braid weaving jig.



## Men in the Yellow Trucks

We're not too sure who owns Systems Wire & Cable at press time, but we are sure who runs it, and who has run it since its beginnings in 1969.

Nat Marshall and Jack Woods are the men in the yellow trucks that first set out from Phoenix, Arizona, in June of '69. In 1972-1973 winter, Nat and Jack sold out to giant Anaconda, famous for copper and holes in the ground in out of the way places like Montana and Chile.

At this year's Western Cable Show in Anaheim, Nat and Jack hope to be "free again!"

We'll see, and be hoping for good news at any minute. At press time, no one knew . . . except that the Federal Trade Commission has to approve Anaconda's divestiture of Systems Wire & Cable . . . and that Anaconda is mired in FTC and Justice Department questions involving its proposed merger into Atlantic-Richfield (ARCO). So we're hoping, we know they want to be free. And, Nat said "never again!" The definitive buy-back agreement, by the way, was signed in August of this year. The papers went to the FTC on the 30th of September. Systems hopes to be at the show as a Rhode Island corporation all under their own auspices again.

Back in January of 1969, when Nat and Jack took their high flyer, the industry wasn't in its best shape. But they had faith. Jack Woods had worked with Ameco and Rohn before. Nat Marshall had been in broadcasting and CCTV and with Ampex. They had a good idea; and besides, in the beginning, the American Express credit manager was Nat's neighbor and golfing partner.

They built the System's plant from scratch (it's in an impossible to find place, two stones throw from a freeway that has no exit!) It is a \$10m industry and Nat sees a 15% annual growth rate for his sales to the industry. He is, he says "bullish". In fact, Nat says that 1977 will be a 25,000 mile year (including rebuilds, extensions and new construction). In this cable world of giant companies, and soon to be without the corporate shield called Anaconda, Nat sees Systems Wire & Cable, as well as Comm/Scope, as having a distinct advantage. Smaller companies, he thinks, "can be more flexible . . . can respond more quickly to industry needs."

Optical cable, Nat thinks, will certainly come someday. As he stood in front of the "scrapbook" of Systems' news items on the bulletin board in his office, Nat said Systems has played with some optical fibers and seen a few more . . . but it will be five years, being "realistic," before its used for trunk cable.

C/Ed visited with Nat in sunny Phoenix last month. Our tour of the plant left us wondering how they really manage to test every single roll before it's shipped . . . after walking all around the place we were ready to be put on one of those yellow trucks by one of those yellow fork lifts!



Nat Marshall

## Just Across Town

While Nat Marshall and Jack Woods were building that plant by the freeway in 1969, Bob Behringer and Kaiser CATV were building their plant way across Phoenix town. One Richard R. MacMillan was there with Kaiser . . . he's still there. Only now he's with CCS Hatfield, a company big in building wire and based across the continent in Cranford, New Jersey.

Mac is the plant manager. He's the man responsible for producing all of the CATV cable Hatfield ships . . . about 8-10%, according to Brian Kasper who is sales supervisor of the CATV division.

CCS Hatfield got the plant and got into the cable TV supply business in 1974. Hatfield bought the plant from Theta Com, the successor to Kaiser CATV. In the plant offices are placques for plant design made out for Kaiser CATV and a number of space pictures from Hughes Aircraft.

It's tough to enter a new business, even if your company is 50-years old and has been a big deal in a number of wire-related industries. Hatfield Wire is based in Cranford, New Jersey. Other parts of the company are in Utah (Hanover Wire which makes screening; Building Wire in Lyndon and the Telco Wire division in Hillside, New Jersey). But CCS Hatfield has been aggressively marketing its line of cable. Drop cables, foam dielectric (chema-foam), low loss coaxial and cables are manufactured by Hatfield.



Hatfield Warehouse

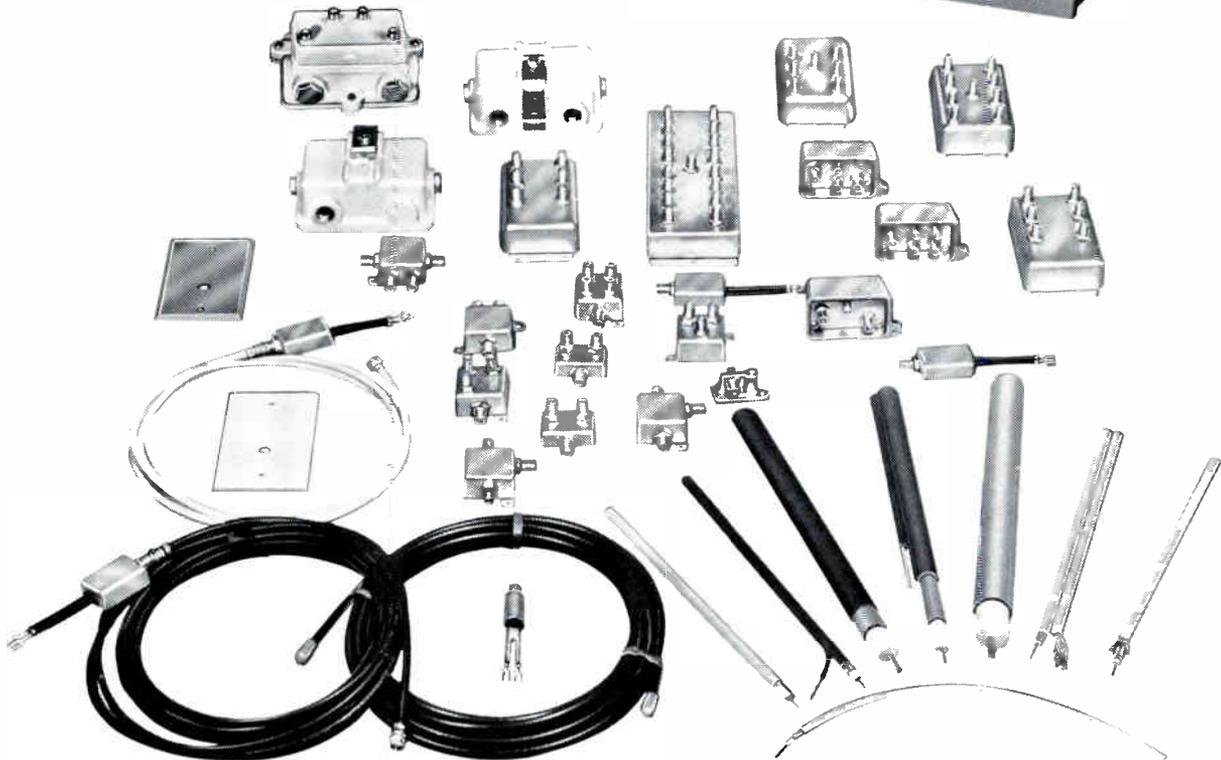
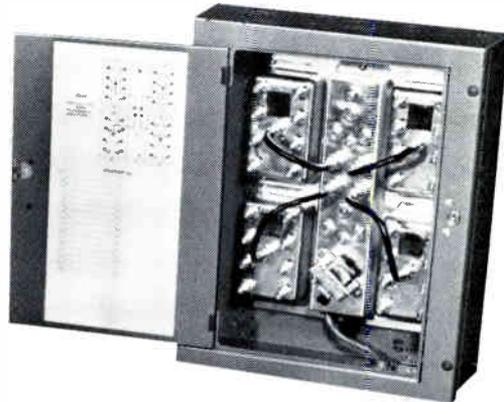


Brian Kasper

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(602) 944-4411

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P.O. Box 2999, Torrance, Calif. 90509  
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# Drop Cable Comparison

**Times Wire and Cable** offers drop cables in RG-59, 6, and 11 sizes, both with foam or solid dielectric. The Alumifoil® family of drop cable uses an aluminum foil shield covered with a woven aluminum braid. Cable can be ordered standard, dual, messengered, or dual messengered. Times also produces a special RG-59 double copper braid cable for headend and other high shield requirement environments.

**Comm/Scope** can provide either RG-59 or 6 in solid or foam dielectric. The shields can be foil tape, aluminum braid and foil, bonded foil, copper braid, and flooding compound is optional. Either RG-6 or 59 is available with a messenger and RG-59 can be ordered as a dual cable. Black, white, or beige jacket can be specified.

**General Cable** supplies either RG-59 or 6 for house drop use. The cable is foil with a 60% braid coverage. Bonded drop cable is also available. Figure 8 messengered drop cable can also be ordered with the same characteristics as their regular RG-59 and 6.

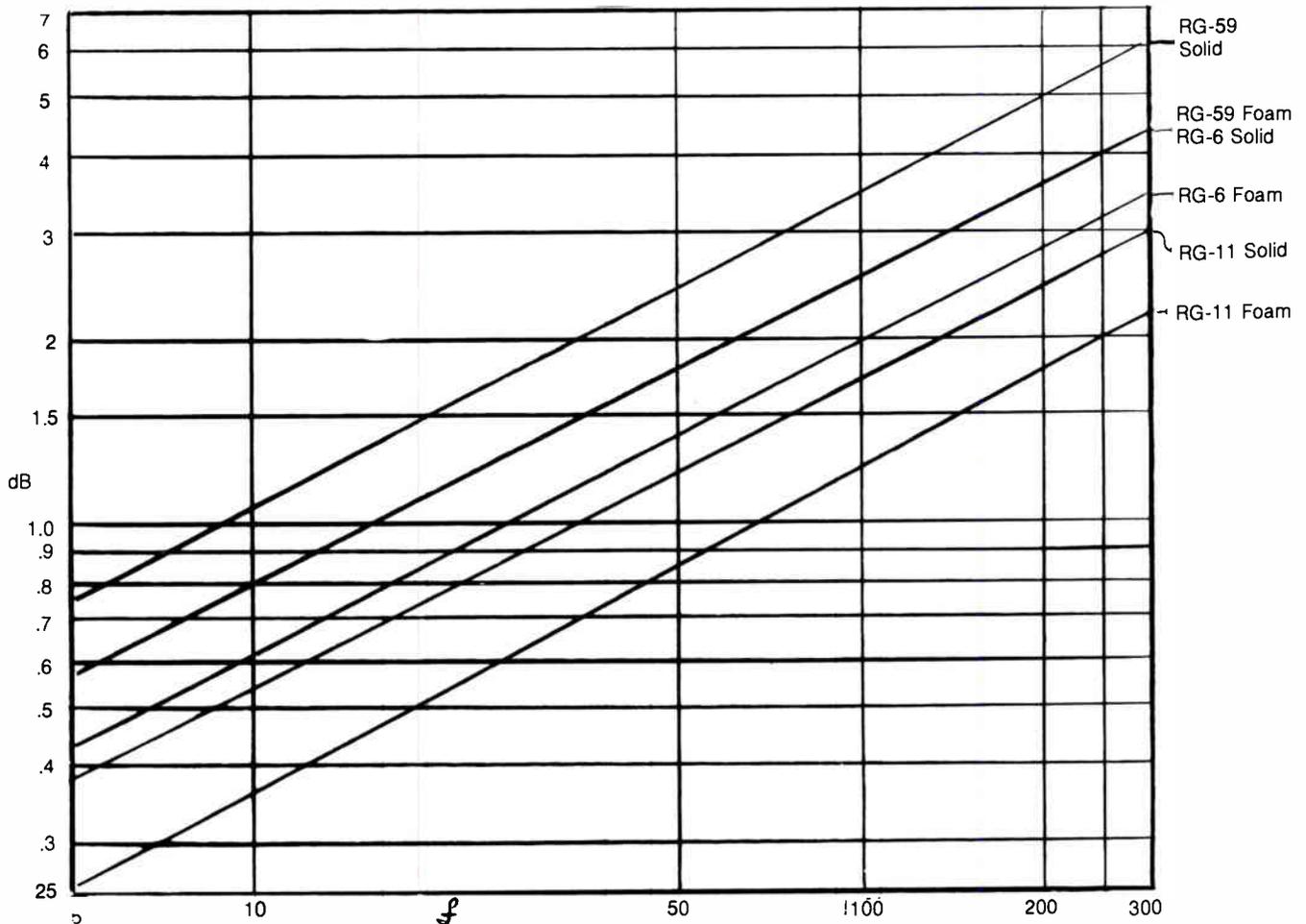
**CCS Hatfield** offers a complete line of RG-59 and 6 drop cable with either solid or foam dielectrics. The cable is available in a variety of shields: aluminum braid and foil 50%, 66% and 96%, as well as copper braid.

Cable can be ordered with messenger, and flooded. Bonded and dual cables are also available.

**Belden** offers many variations of their Duofoil® and Duobond® drop cables. Duofoil is foil plus aluminum braid, available in 40%, 53%, 67% and 95%, plus tinned copper braid in 61% shielding. Duobond is a bonded shield cable available in the same shields as Duofoil. Belden also offers combinations of Duobond and Duofoil. Cables are available in RG-59 and 6, and can be ordered flooded for direct burial purposes.

**Cerro** can provide standard tape and braid drop cables in RG-6, 11 and 59. These are available with messenger, bonded, or flooded. In addition, Cerro offers Metro-Shield™, a special drop cable for high ambient signal areas that uses foil bonded to both sides of a thin plastic film for a shield. Cerro also makes miniature drop cable for in-house subscriber hookups.

**Systems Wire** makes RG-59, 6 and 11 drop cables in a variety of shield configurations. These include 1 and 2 copper braids, aluminum foil bonded with braid 40%, 61% and 95%, and aluminum tape bonded 100%. The wire is available in either foam or solid dielectric, and with messenger. 59 types can be ordered in dual configurations.

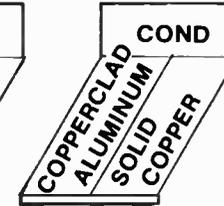
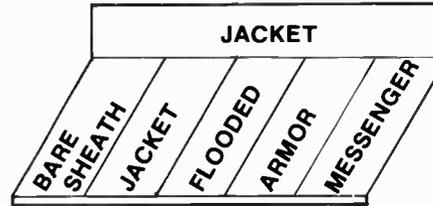


# Trunk and Feeder Cable Comparison Chart

Every attempt has been made to insure the accuracy of this chart, however we recommend you check with manufacturer for final specifications and options.

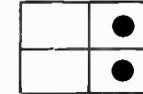
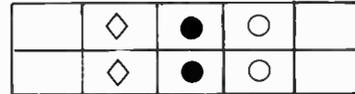
MANUFACTURE	NUMBER <sup>1</sup>	NAME
-------------	---------------------	------

1. NUMBER SHOWN FOR BARE, COPPER CLAD.



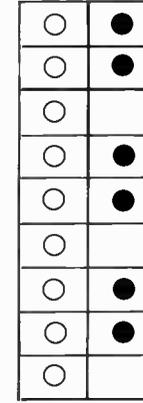
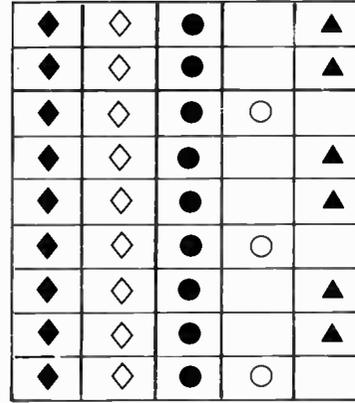
MAX. LOSS PER 100' (dB)					
10	50	100	200	250	300

SOLID POLY	N.A.	COMM/SCOPE	6020	COPPERGUARD®
	N.A.	COMM/SCOPE	6030	COPPERGUARD®



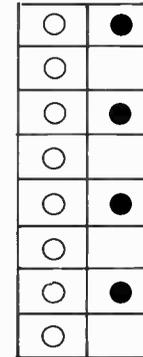
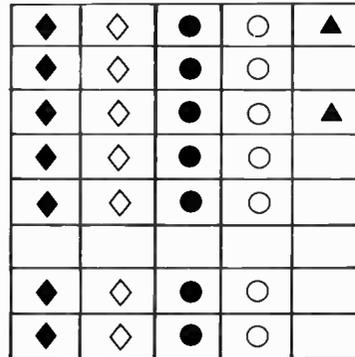
.28	.69	1.00	1.50	1.70	1.90
.21	.52	.77	1.15	1.30	1.43

FOAM POLYETHYLENE	412	CERRO	1412	ALUM SHEATH
		CCS HATFIELD	42200	CHEMA FOAM
		TIMES WIRE	JT-1412	ALUMIFOAM®
	500	CERRO	1500	ALUM SHEATH
		CCS HATFIELD	52200	CHEMA FOAM
		TIMES WIRE	JT-1500	ALUMIFOAM®
	750	CERRO	1750	ALUM SHEATH
		CCS HATFIELD	72200	CHEMA FOAM
		TIMES WIRE	JT-1750	ALUMIFOAM®



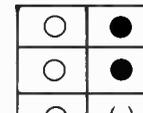
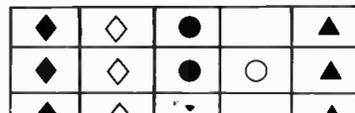
.32	.76	1.11	1.60	1.80	2.00
.33	.76	1.10	1.61	1.84	2.03
.32	.75	1.10	1.60	1.81	2.00
.28	.64	.91	1.30	1.47	1.60
.27	.63	.90	1.31	1.48	1.66
.26	.60	.90	1.30	1.48	1.63
.21	.46	.64	.93	1.03	1.12
.18	.41	.60	.91	1.02	1.13
.18	.40	.62	.91	1.03	1.15

POLY STYRENE	412	CERRO	2412	CERROFOAM®
		TIMES	JT2412	DYNAPLUS™
	500	CERRO	2500	CERROFOAM®
		TIMES	JT-2500	DYNAPLUS®
	750	CERRO	2750	CERROFOAM®
		TIMES	JT-2750	DYNAPLUS®
	1000	CERRO	2100	CERROFOAM®
		TIMES	JT-21000	DYNAPLUS



.27	.63	.90	1.31	1.46	1.61
.27	.62	.90	1.30	1.45	1.63
.22	.50	.71	1.06	1.19	1.32
.22	.50	.72	1.05	1.19	1.32
.15	.34	.49	.72	.81	.89
.14	.34	.49	.70	.80	.895
.11	.265	.38	.56	.64	.70
.11	.26	.39	.57	.64	.720

		CERRO	3412	CERRO GX™
		COMM/SCOPE	PL-75-412	PARAMETER I®
				LOW LOSS



.32	.72	1.05	1.47	1.65	1.81
.33	.74	1.05	1.47	1.65	1.81
.30	.70	1.00	1.45	1.61	1.81

<b>GAS INJECTED</b>	412	CCS HATFIELD	47200	LOW LOSS
		SYSTEM WIRE <sup>2</sup>	22-412	GID*
		TIMES WIRE	JT 3412	ALUMIFOAM II®
	500	CERRO	3500	CERRO GX™
		COMM/SCOPE	PL-75-500	PARAMETER I®
		CCS HATFIELD	54200	LOW LOSS
		SYSTEM WIRE <sup>2</sup>	22-500*	GID
		TIMES WIRE	JT 3500	ALUMIFOAM II®
	750	CERRO	3750	CERRO GX™
		COMM/SCOPE	PL-75-750	PARAMETER I®
		CCS HATFIELD	74200	LOW LOSS
		SYSTEM WIRE <sup>2</sup>	22.750	GID
		TIMES WIRE	JT 3750	ALUMIFOAM II®
	875	SYSTEM WIRE <sup>2</sup>	22-875	GID
	1000	COMM/SCOPE	PL-75-1000	PARAMETER I®

2. ALSO AVAILABLE IN SEALMATIC™

◆	◇	●	○	▲
◆	◇	●	○	
◆	◇	●		▲
◆	◇	●	○	▲
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◆	◇	●	○	▲
◆	◇	●		▲
◆	◇	●	○	
◆	◇	●	○	▲
◆	◇	●		
◆	◇	●	○	▲
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.30	.71	1.01	1.47	1.64	1.81
.31	.71	1.05	1.45	1.62	1.81
.24	.57	.82	1.19	1.33	1.49
.23	.56	.81	1.18	1.32	1.49
.23	.56	.81	1.18	1.32	1.49
.23	.56	.81	1.17	1.32	1.49
.24	.56	.81	1.18	1.31	1.49
.165	.38	.55	.84	.93	1.05
.17	.39	.55	.83	.92	1.05
.17	.39	.56	.82	.92	1.05
.17	.39	.46	.84	.93	1.05
.17	.39	.58	.84	.95	1.05
.13	.34	.49	.72	.82	.90
.14	.34	.44	.69	.79	.90

<b>2nd GENERATION GAS INJECTED</b>	412	CERRO	4412	CERRO GXX
		COMM/SCOPE	P2-75-412	PARAMETER II®
		SYSTEM WIRE	32-412	GID-2
		TIMES WIRE	JT 4412	LUMAFOAM
	500	CERRO	4500	CERRO GXX
		COMM/SCOPE	P2-75-500	PARAMETER II®
		SYSTEM WIRE	32-500	GID-2
		TIMES WIRE	JT 4500	LUMAFOAM
	750	CERRO	4750	CERRO GXX
		COMM/SCOPE	P2-75-750	PARAMETER II®
		SYSTEM WIRE	32-750	GID-2
		TIMES WIRE	JT 4750	LUMAFOAM
	875	SYSTEM WIRE	32-875	GID-2

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.28	.62	.91	1.30	1.45	1.59
.28	.64	.92	1.30	1.46	1.63
.28	.63	.91	1.31	1.45	1.63
.27	.62	.90	1.30	1.50	1.63
.22	.50	.74	1.04	1.20	1.31
.23	.51	.74	1.05	1.20	1.31
.23	.51	.73	1.04	1.19	1.32
.21	.50	.70	1.02	1.15	1.32
.14	.34	.50	.71	.82	.91
.15	.35	.50	.72	.82	.91
.14	.34	.50	.71	.82	.91
.14	.34	.48	.70	.80	.895
.13	.30	.44	.64	.73	.81

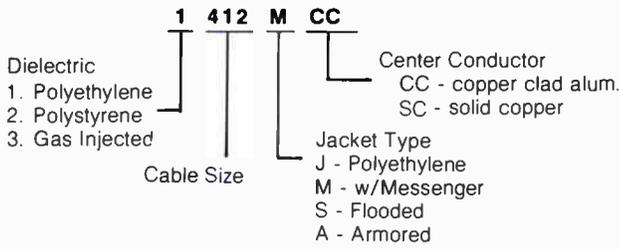
<b>AIR DIELECTRIC</b>	412	GEN. CABLE	4308	FUSED DISC
	500	GEN. CABLE	4309	FUSED DISC
	750	GEN. CABLE	4310	FUSED DISC
	1000	GEN. CABLE	4311	FUSED DISC

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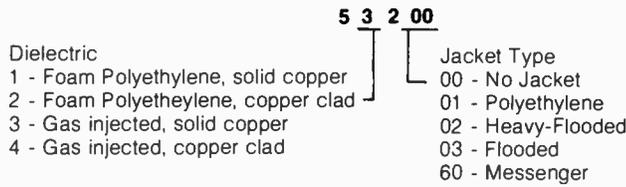
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.26	.60	.85	1.22	1.40	1.53
.21	.50	.73	1.05	1.15	1.27
.14	.33	.47	.68	.76	.84
.10	.25	.36	.52	.59	.65

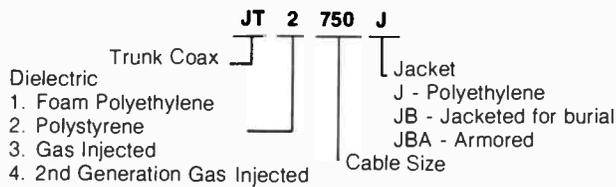
### CERRO COMMUNICATION PRODUCTS



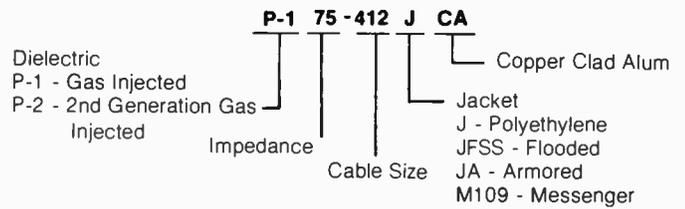
### CCS HATFIELD



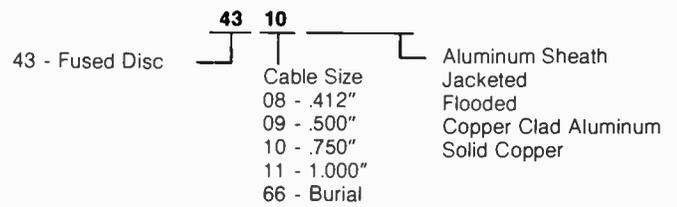
### TIMES WIRE AND CABLE CO.



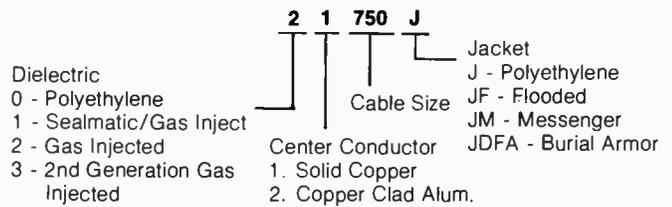
### COMM/SCOPE



### GENERAL CABLE



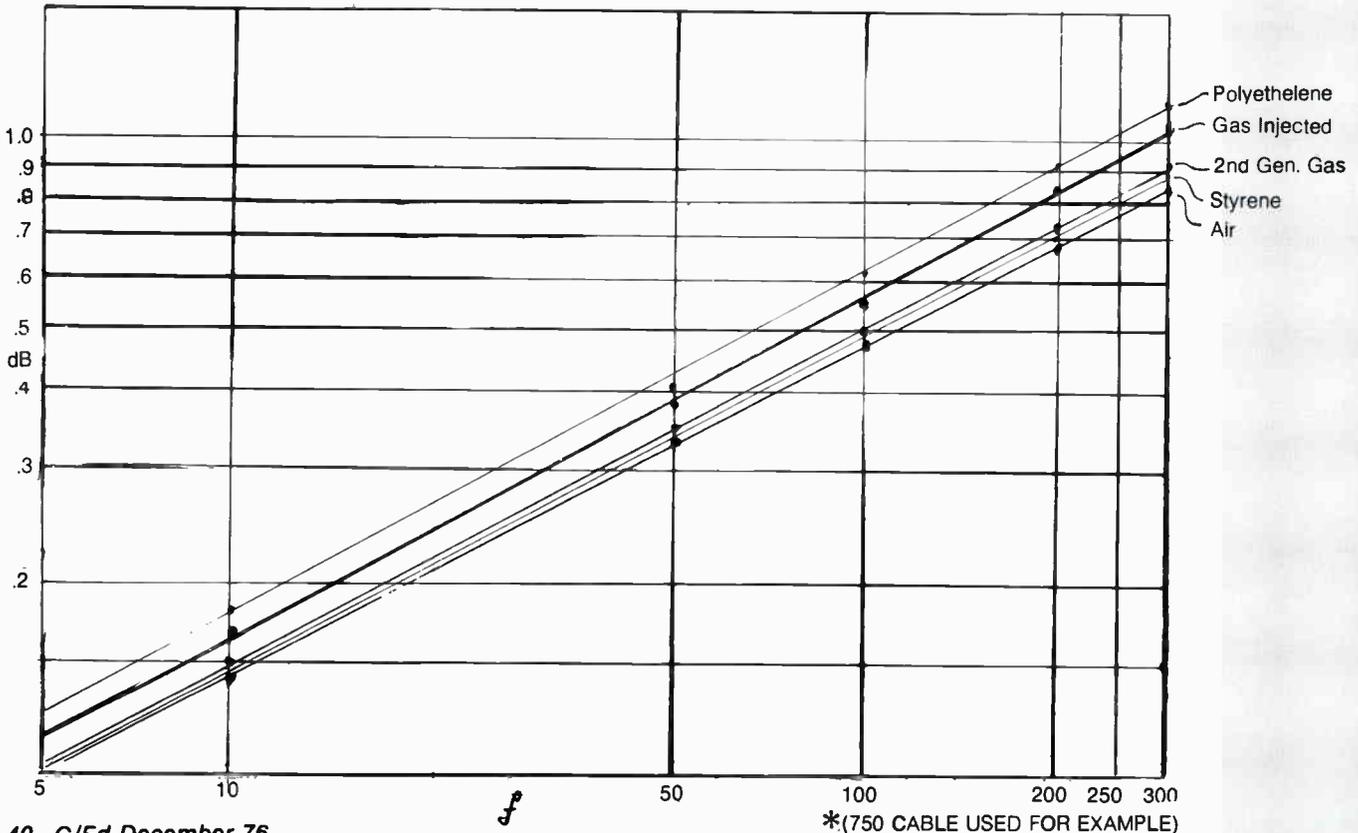
### SYSTEM WIRE AND CABLE

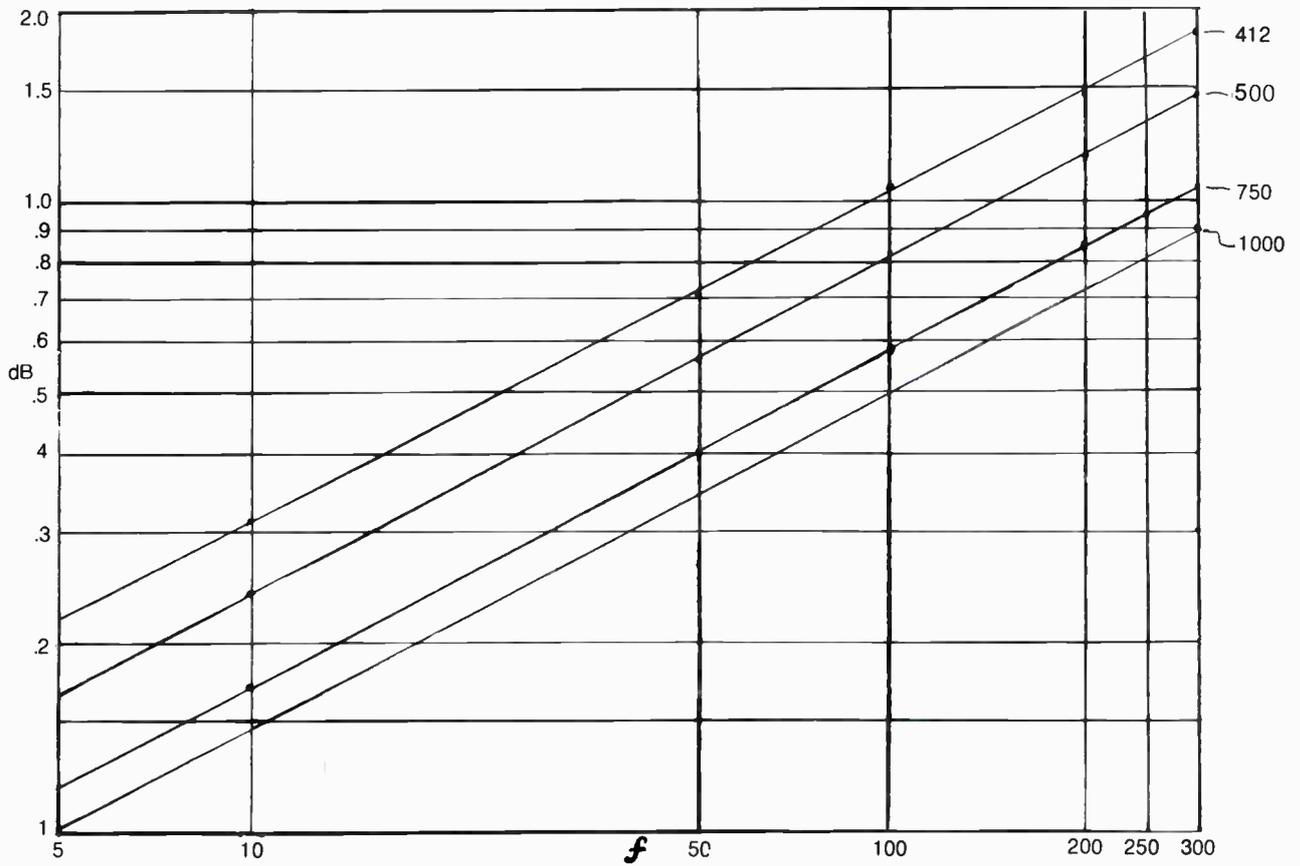


### Cable designations

# Cable Facts — Trunk and Feeder

### Attenuation for Various Types of Dielectrics\*



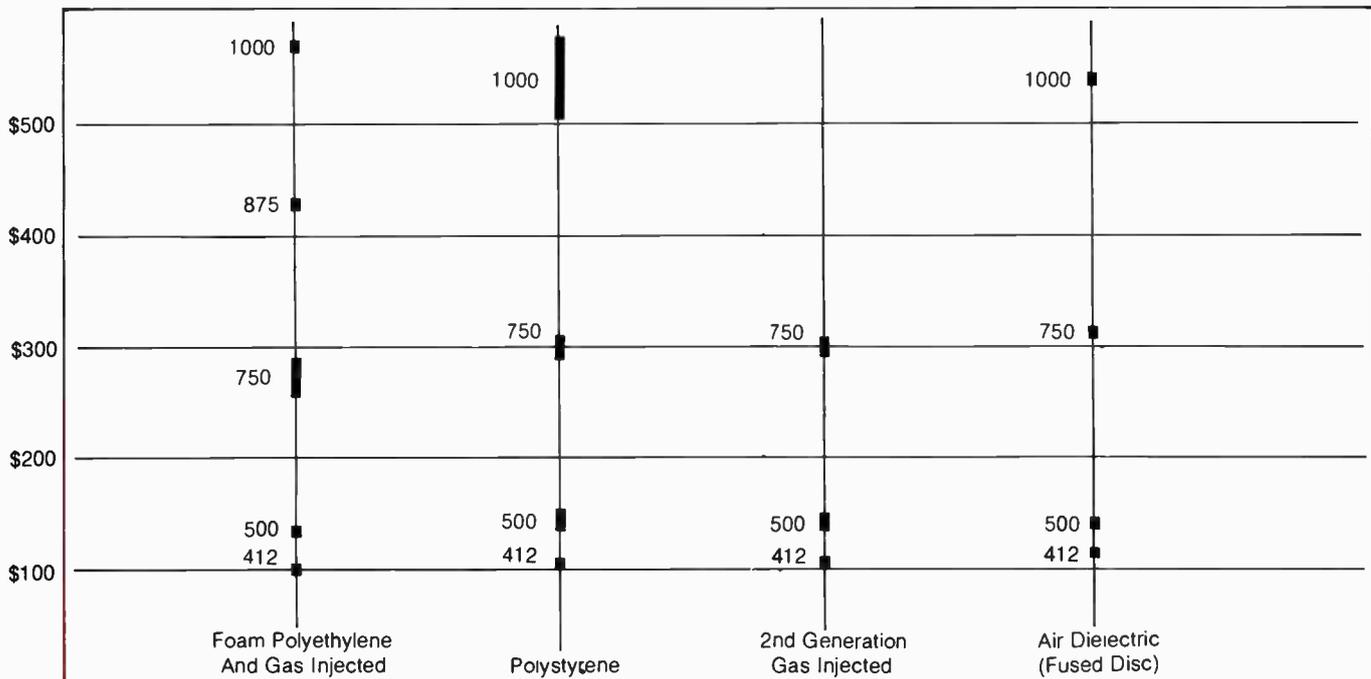


**Attenuation Differences versus size of cables**  
(Polyethelene foam was used for example)

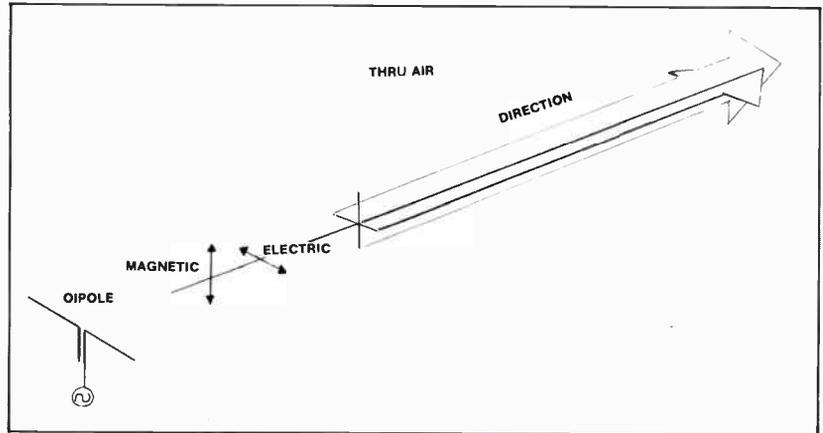
**Average List Price Per 1000' of Cable**

(As of September 1st, 1976.) Note that cable is a

commodity product and price is dependent upon current copper and aluminum prices. Average prices shown in table *do not* take into account any quantity or volume discounts. Prices shown only for illustrative purposes.



# How Radio Signals Move



**T**here are many misconceptions about the manner in which signals move through cable. Some people think the signals travel through the center conductor. Others feel the signal travels on the surface of the center conductor (that's why it is copper plated—right?). For DC, they are correct and the electrons move on the surface of a conductor. However, at radio frequencies, the signals travel in the space between the center conductor and the outer shield, much like radio signals move through the air.

## Signals Through Air

There are always two components to an electric signal, the magnetic or H, and the electric or E. These components try to remain at right angles to each other and travel at a speed close to the speed of light

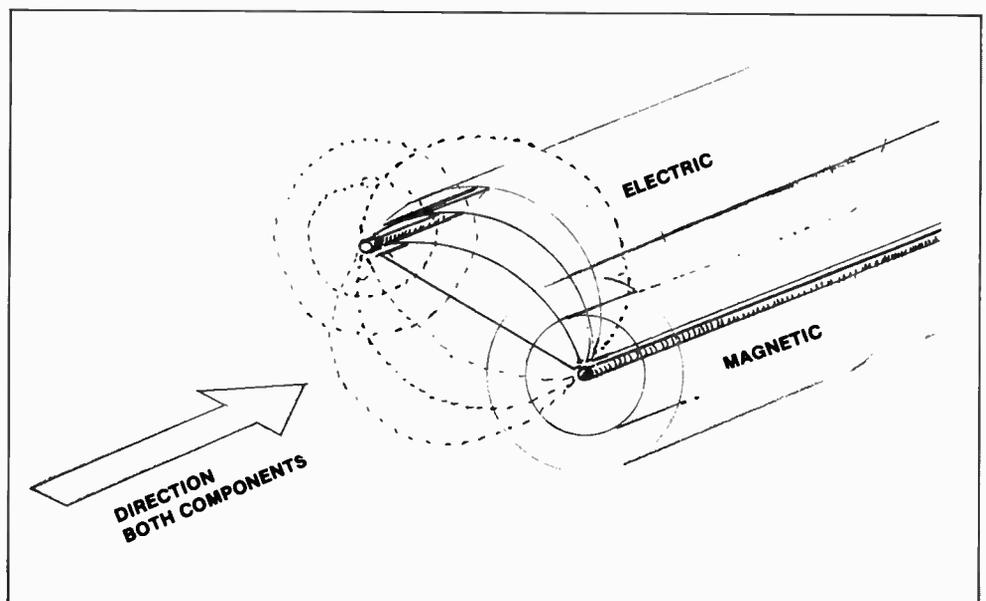
(186,000 miles per second).

When a signal (radio wave) is launched from a dipole, the electric component is produced across the dipole and the magnetic component is perpendicular to the dipole as shown in the figure.

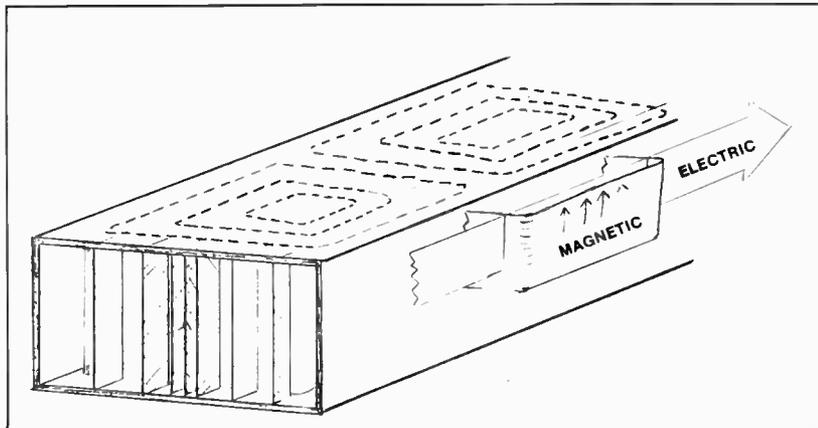
## Signals Through Coax

Signals inside a coax are confined by the walls or shield as it is called. The electric component occurs between the center conductor and the outside wall. The magnetic component attempts to remain perpendicular to the electric component, hence, it is circular.

The E field represents voltage and is the limiting factor in the power-handling capacity of the cable. Depending upon the dielectric, the substance that fills the gap between the center conductor and the



# Frequency Through Cable



shield, the voltage can be increased only to a certain point before an arc will occur.

The speed at which the signal passes through the cable is determined by the dielectric. In a vacuum, the speed would be equal to the speed of light; but more typically, the dielectric is air, polyethylene, styrene or a foam substance. All of these substances reduce the speed of the signals. Propagation speed is specified as a percentage of the speed through an air dielectric.

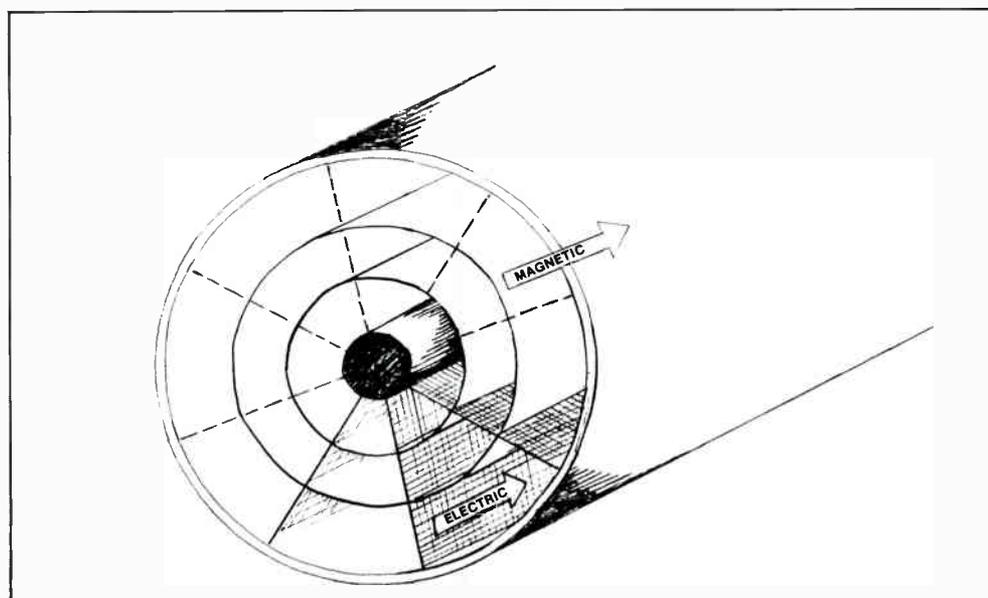
## Open Wire Cables

In open wire cables, the E field is between the wires, and the H field encircles the conductors. Notice that even on a small scale, E and H fields always intersect each other at right angles, although they are slightly curved. Open wire has air or a thin

polyethylene dielectric between the conductors, consequently its propagation speed is quite fast. The higher the propagation speed, the better the loss characteristics will be. Since open wire cables are simple and inexpensive and offer good loss characteristics, many early cable systems used it.

## Waveguide

Waveguide can have the most complicated signal carrying patterns. Depending upon how the signal is launched into the waveguide, it may take many different paths. The most common mode is designated  $TE_{1,0}$  in which the E field lies between the narrow walls of the guide and the H field lies between the wide walls. In this simple mode, the signal travels as if passing through free space; however, the walls confine the signal to a specific path.



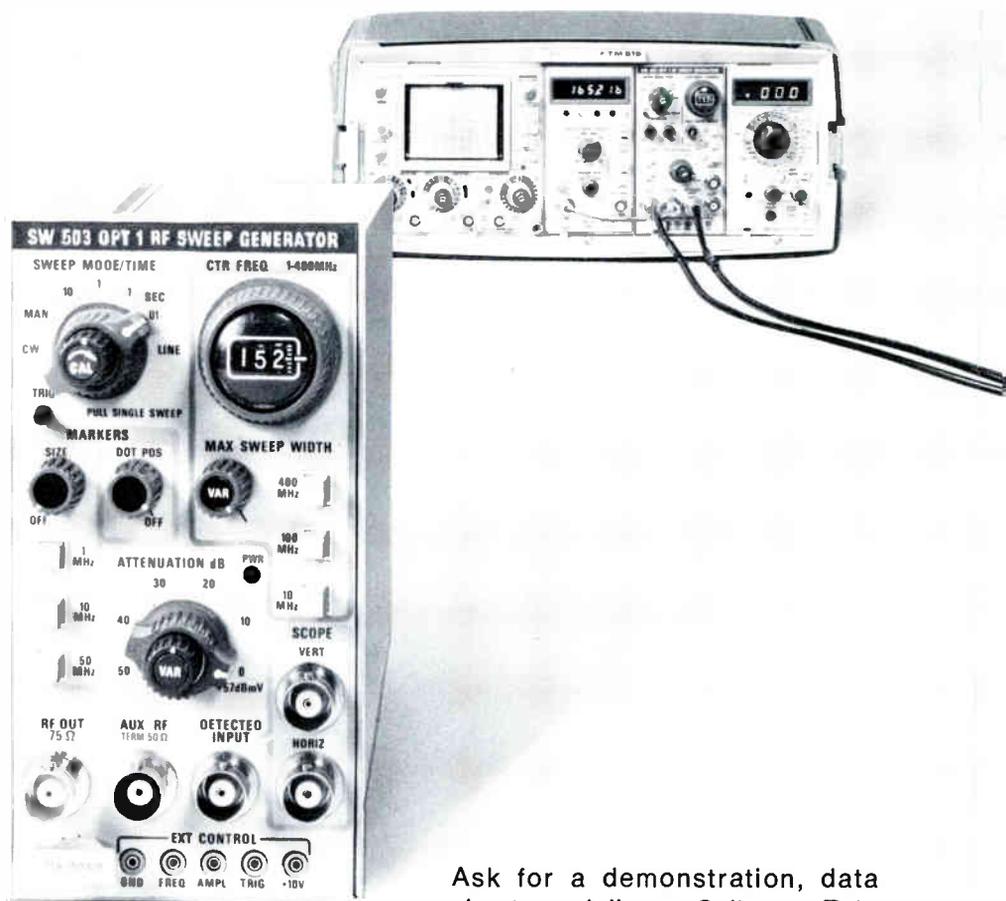
# Shopping for a Sweep Generator? You may need a Sweep System...

... Funny things start happening when you interconnect this new sweep generator with a frequency counter, scope, and other instruments in the TM 500 system:

**You get complete test system flexibility.** Use the sweeper and other instruments with freedom from extra cabling, thanks to the TM 500 modular concept with rear busing. Use the sweep generator with an oscilloscope for a complete rf sweep system to check characteristics of many devices: rf and if amplifiers, filters, broadband amplifiers (such as MATV and CATV units), transmission line, and others.

**You get complete external controllability.** Use bus or bnc's and your own analog controlling gear to remote-control your sweeper. Control generator frequency and output amplitude; modulate the generator, am or fm; use remote sweep triggering.

**You get two built-in marker systems.** Choose between crystal-controlled comb markers at 1-, 10-, and 50-MHz, and the variable dot marker function. The marker function (when used with a DC 502 Opt. 7) provides a frequency marker dot anywhere from 1 to 400 MHz. The frequency of the dot marker is read directly on the frequency counter.



**You get a lightweight, compact 1-400 MHz sweeper at an affordable price.** Choose a 50Ω or 75Ω model. Each has variable sweep rate and sweep width, and calibrated variable output level with 50-dB step attenuator (10-dB step) and 20-dB vernier.

- SW 503 RF Sweep Generator (50-Ω) .....\$1450
- SW 503 Option 1 RF Sweep Generator (75-Ω) .....\$1450
- TM 515 Option 7 Power Module .....\$ 350
- DC 502 Option 7 550 MHz Freq. Counter .....\$1195
- DM 502 Digital Multimeter ..\$ 375
- SC 502 15 MHz Dual Trace Oscilloscope .....\$1200

Ask for a demonstration, data sheet, or delivery. Call your Tektronix Field Engineer or Representative and tell him you're ready.

Tektronix, Inc., Box 500A, Beaverton, OR 97077. In Europe, Tektronix Limited, P.O. Box 36, St. Peter Port, Guernsey, Channel Islands.



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EARTH STATIONS ARE SYSTEM  
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SIGNAL MARGIN YOU  
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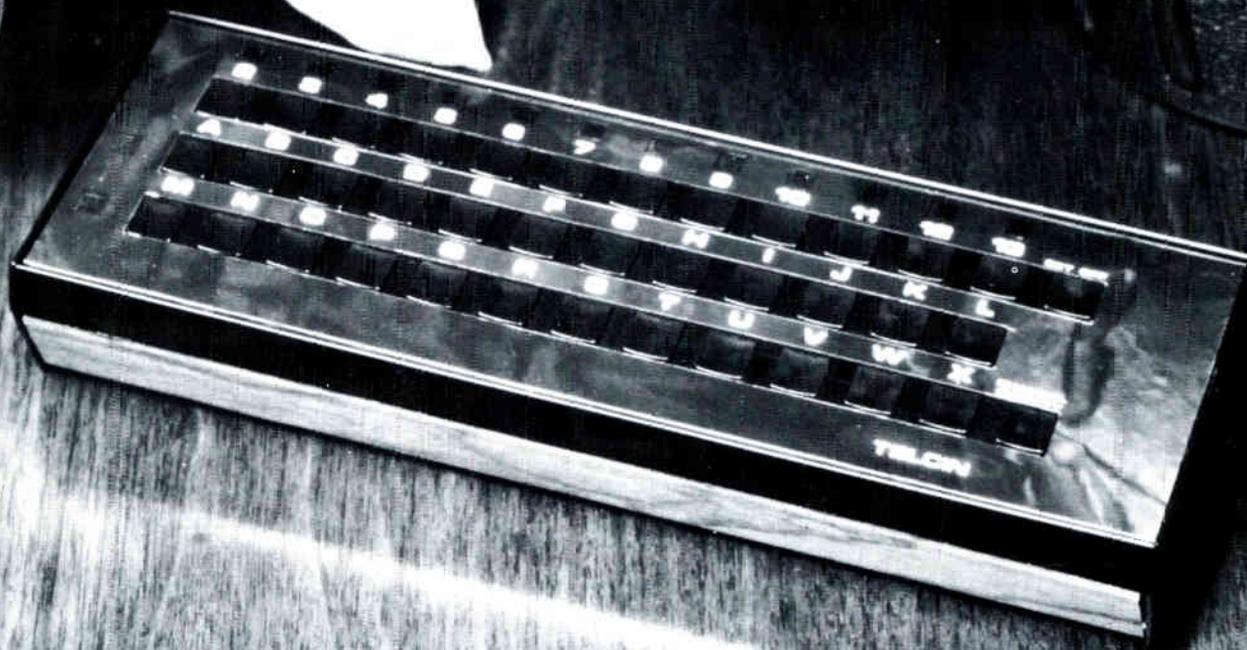
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# What's new?



A cordless remote, digital converter that's economical, and looks good too?

## The Telcin Remote Digitally Tuned Converter System.

You will find that RDTC Systems are totally reliable with none of the mechanical problems prevalent in conventional converters which contribute to high failure rate. The keyboard of the Remote Channel Selectors employ quiet pressure keys and contain no noisy mechanical switching devices which give rise to intermittent service after a period of continual use.

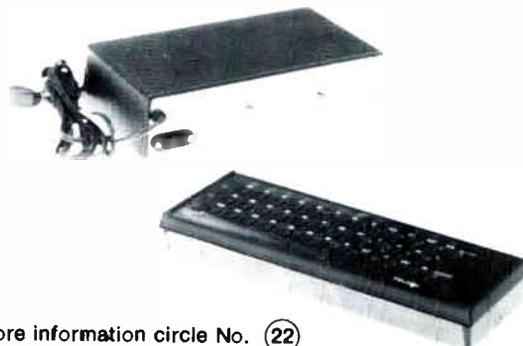
You will find that the TV Receiver is in complete control from the comfort of the armchair by the compact, easy to hold Remote Channel Selector. The TV receiver can be turned on and off, channels instantly and quietly switched, and there is never the need to fine tune. Built-in AFC in the Console does this for you each time a channel is selected.

You will find that the RDTC Console can be installed just about anywhere around the TV receiver. Place it

on the set top, under the set, or on any adjacent wall. The omni-directional transmission of control signals from the cordless Remote Channel Selector will reach the Console without the inconvenience of "aiming it" toward a critical area.

For more information, write or phone Telcin, Inc.,  
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# Digital Converters

Cordless Remote Set top

For more information circle No. 22

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EXECUTIVE

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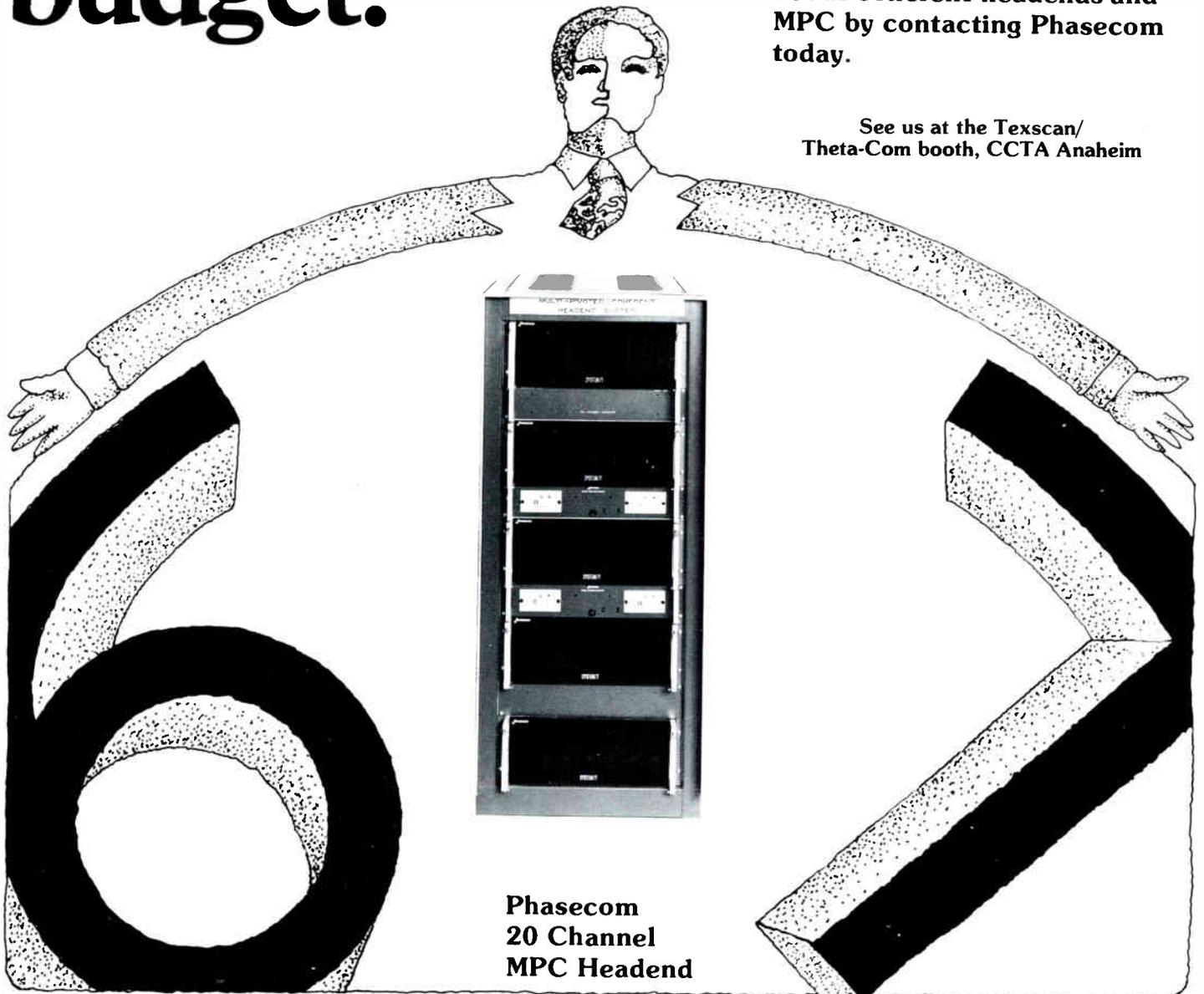


**Newsable**

# Fatten up your mid-band... on a skinny budget.

There's lots of room in the mid-band for additional channels even if there's no room in your budget for changing out your existing single ended equipment. Phasecom's Multi-Pivoted Coherent Carrier Headend does the job—it lets you deliver crisp, beat free pictures *without hard to maintain phaselock loops*. Phasecom MPC Headends are now installed and operating in many locations—learn more about coherent headends and MPC by contacting Phasecom today.

See us at the Texscan/  
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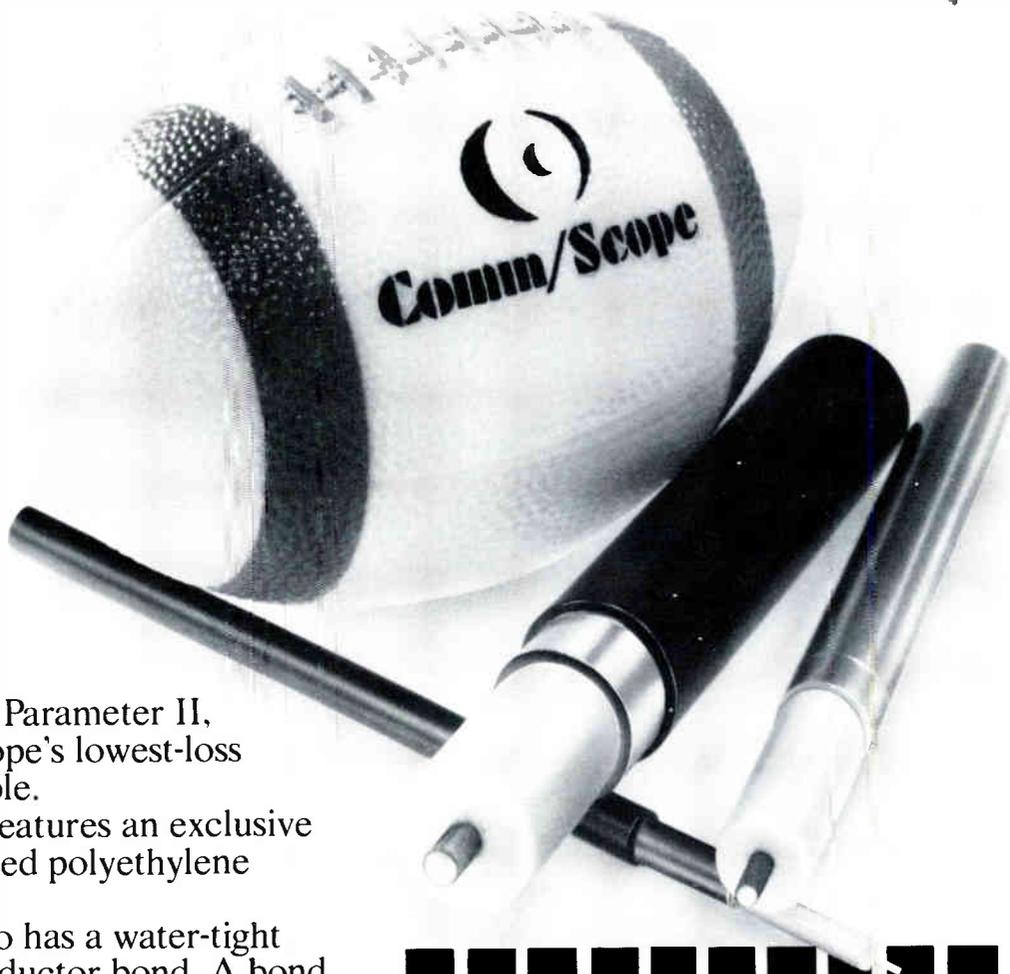
Phasecom  
20 Channel  
MPC Headend

For more information circle No. (24)

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# MAKE EXTRA YARDS EVERY CARRY.



With Parameter II, Comm/Scope's lowest-loss coaxial cable.

P-II features an exclusive gas-expanded polyethylene dielectric.

It also has a water-tight center conductor bond. A bond which prevents moisture migration.

Together, they add up to a longer, stronger signal. Transmission which carries for the extra yards. And that's what the game is all about.

For complete specifications, write Comm/Scope Co., Rt. 1, Box 199-A, Catawba, N.C., 28609, Telephone (704) 241-3142. Or come by our booth (#180) at the Western Cable TV Show and Convention, December 1-3.

 **Drop us a coupon . . . we'll drop-kick you a free mini football.**

Missed out on your baseball offer. I'm not about to fumble this one.

Crazy about my autographed horsehide. Now I've got pigskins on my mind.

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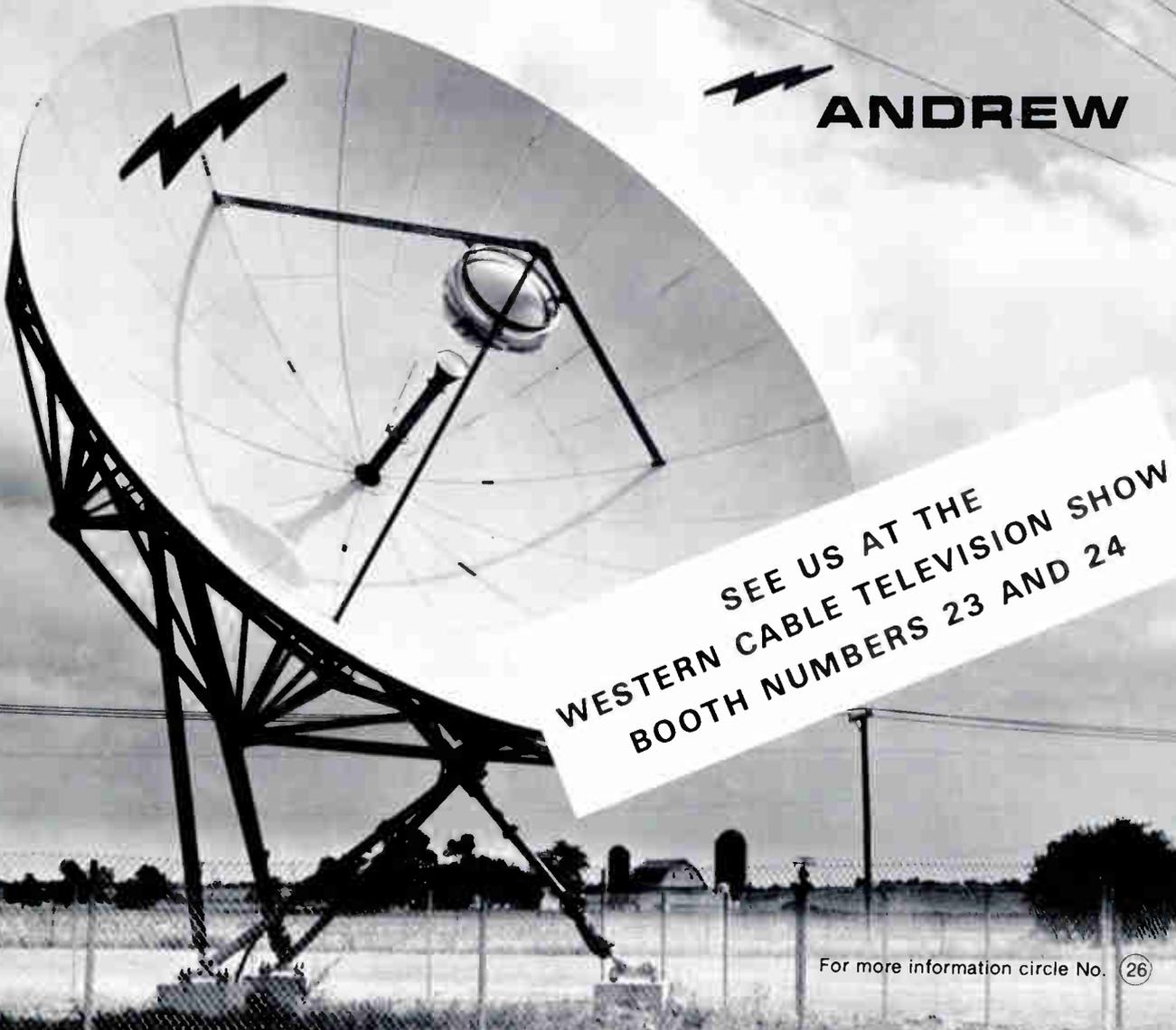
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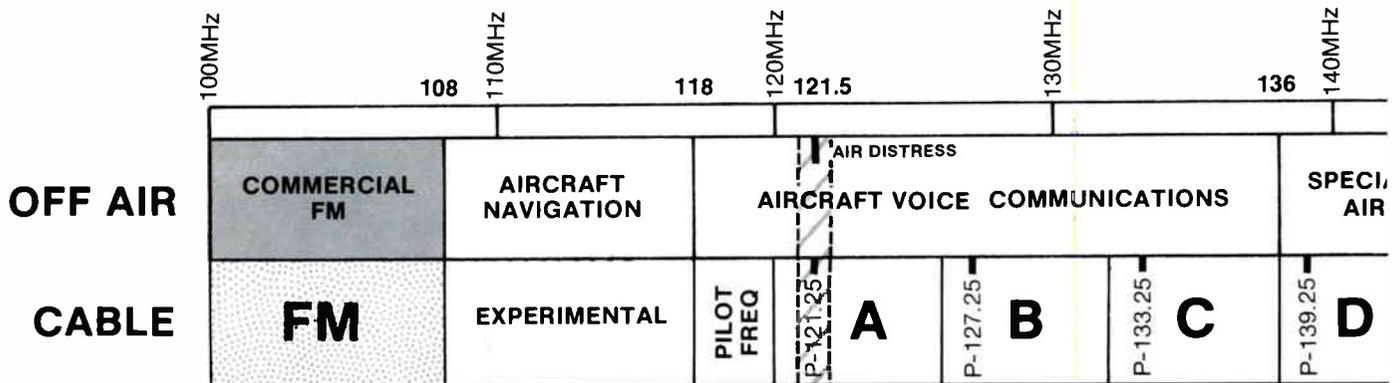
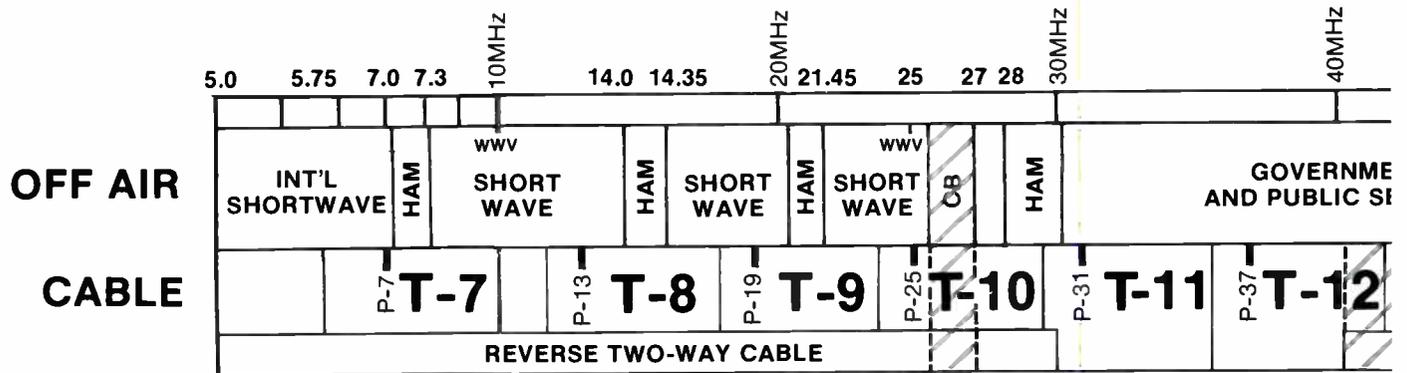
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## LINE EQUIPMENT/AMPLIFIERS

### ComSonics/ Surge Protection

A newly developed unit designed for remote, unmanned locations provides double protection and automatic operation. The ARMOR Mark IV provides normal double pole circuit breaker operation up to 35 amperes per pole. Additionally, over-voltage sensing forces a double line fault, causing the breaker to open. Automatic breaker reset is initiated after a line stabilizing period.



Circle Reader Service #51

### C-COR/Extended Warranty

A two-year warranty on all products manufactured by C-COR Electronics has been announced. The two-year warranty is effective December 1, 1976 on C-COR's products from single amplifiers to C-COR equipment for full turnkey systems.

C-COR is one of the few companies who has offered a one-year product warranty irrespective of the type of contract involved. Other companies frequently have offered one-year warranties only with turnkey contracts, but have not offered such warranty with single unit purchases or bill-of-material sales. C-COR warranty costs are currently running less than 0.2% of sales dollars, which is an unbelievably low figure for the cable television industry and quite low for the electronics industry as a whole. "Existing customers are not expected to be impressed with the two-year warranty offer, since they already know about C-COR's reliability," theorized Palmer, president of C-COR.

Circle Reader Service #52

### TRW/CATV Amplifiers

TRW RF Semiconductors has a new 22 dB gain CATV hybrid amplifier pair.

All the CATV modules feature gold metalization and emitter ballasted transistors in push-pull circuit configurations for low second order distortion and high output capability.

The new CA2300 and CA2301 amplifiers have 22 dB gain at 50 MHz with a frequency response of 40 to 300 Mhz. The output capability for the CA2300 is 49.5 dBmV; the CA2301 is 52.0 dBmV. Both units have an operating temperature range of -20°C to +90°C.

Available from stock, the CA2300, in quantities of 1,000 pieces, is priced at \$26.15 each and the CA2301 is priced at \$29.10 each.

For the 5 to 150 MHz band, TRW offers the CA2418 as an 18 dB gain block. The unit features all gold construction and electrical performance similar to the standard CA418. It is priced at \$24.80 in 1,000 piece quantities.

Circle Reader Service #53

# Your subscribers couldn't care less how you sweep your system. Until they get a bad picture. Or no picture. Or a good picture with interference.

So we built a CATV test system that lets you locate and isolate problems before your subscriber even realizes that you're checking. We use high-level sweep signals—typically 17 dB above the carrier—to eliminate the masking that can occur at lower levels. And we use a short sweep time—1.5 milliseconds—to minimize subscriber interference.

Our SSG-400 Simultaneous Sweep Gener-



ator installed at the system head-end provides 1-400 MHz output, flat to within  $\pm 0.25$  dB. Your engineer or technician can control sweep start and rate remotely from his recovery point.

Your system or regional engineers use an SRS-350 Sweep Recovery System to recover sweep information simultaneously with carriers and process it for display on a storage scope. Output bandwidth is extremely broad—

260 KHz—and highly stable with respect to temperature and RF input level for maximum resolution. You can now get the SRS-350 complete



with battery pack.

Your technicians can use the new low-cost, battery-operated TRU-350 Tech Recovery Unit combined with a portable storage scope.

Both ways you recover the information you need to maintain your system...and your subscribers never have to know. They just get a quality picture. Clip and return the coupon for more information. Let us call you before an unhappy subscriber does.

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# LINE/AMPLIFIERS - CONTINUED

## Jerrold/Line Extender

Jerrold Electronics Corporation announces a new family of cable-powered line extenders for two-way CATV feeder systems.

Designated the JLE-series, these new line extenders have been designed to minimize distortion characteristics for highly efficient feeder-gain applications.

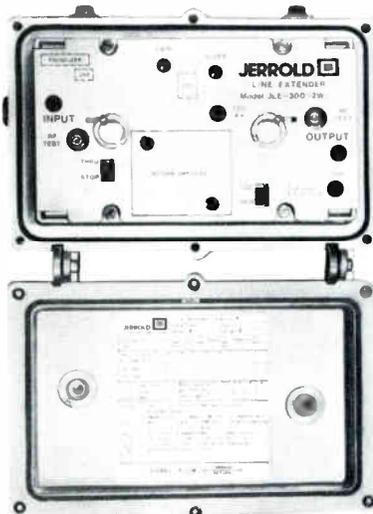
Specifications include: 54 to 300 MHz forward passband, 5 to 30 MHz return with an optional plug-in module;  $\pm 0.5$  dB or better response flatness; and 35 dB recommended operational gain. The noise figure at minimum gain and full slope is 7 dB maximum at Chs. 2 thru W

The rated output for 35 channels, Ch. 2 to W with 6-dB slope, is 49 dBmV (at Ch. W) at -57 dB minimum cross-modulation level. The composite triple beat (6-dB slope) is -57 dB for a 51.5 dBmV output at Ch. W.

Each member of the JLE family consists of a reversible, self-contained, plug-in forward and/or return amplifier module and a die-cast aluminum housing with captive center-conductor terminals.

The AC path is applied to the Stop/Thru switch, then to the Local/Remote switch.

A unique automatic shut-off circuit is employed to provide overload protection. Snap-on surge protectors (optional), at either the input or the output terminal, or at both terminals, provide additional protection from the effects of short-term, steep-rise surge voltages.



Circle Reader Service #54

## AEL/Test Probes

The CATV Communications Division of American Electronic Laboratories, Inc. (AEL) has complemented their line of test probes with the development of Model TPA-16.

Model TPA-16 is a 20 dB probe, designed for use with the division's Mark IV series of equipment. Mark IV trunk and extender amplifiers are bidirectional functioning units using push-pull, hybrid circuitry.

In addition to Model TPA-16, AEL's CATV Communications Division also offers a 10 dB probe, Model TPA-15, also for use with the Mark IV series of equipment.



Circle Reader Service #55

## Phillips/Power Saver

HDA Power-Master units limit transient voltages and suppress effects of counter EMF (electromotive force) in electric motors and other electrically powered equipment . . . No other device will perform these functions with the efficiency and low cost of the HDA Power-Master.

A specially processed semiconductor material used in certain components of the Power-Master make it possible to suppress or "clamp" transient or surge voltages at a rate faster than any other device.

HDA Power-Masters are designed to suppress transients in excess of 15,000 volts without damage to the Power-Master itself.

The HDA Power-Master's capability to "clean-up" the characteristics of electrical power results in more efficient use of electricity. Actual observed savings in test installations usually exceed 10%.

Circle Reader Service #56

For more information circle No. (28)

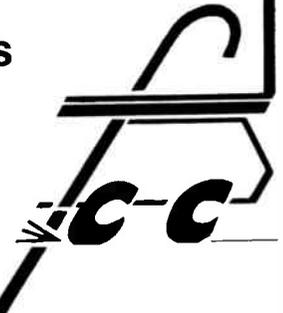
## ferguson communications corporation

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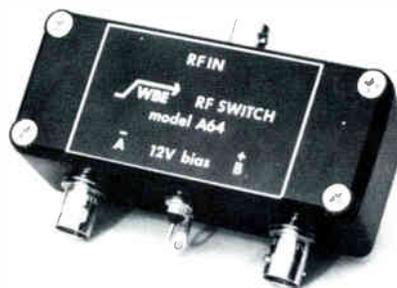
- subscriber installations
- system construction
- turnkey services
- 25 years experience

Mac Ferguson

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MODEL A64 RF SWITCH



FREQUENCY: 1-500 MHz; SWITCH TYPE: SPDT; LOSS: .5 dB max; RESPONSE FLATNESS:  $\pm 1.5$  dB; POWER: passes signal levels to 1 W; SWITCHING TIME: 0-.5 ms; DC BIAS: + and - 12V @ 50 mA.

An ultra wide band, PIN diode, solid state switch for transferring both low and high level signals with negligible distortion, high isolation, and minimum loss.

WBE also manufactures a complete line of 1-500 MHz precision test instruments including:

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| RF Analysers                   | RF Comporators         |
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| Hybrid Power Divider/Combiners |                        |

For full line #76 catalog call or write:

## WIDE BAND ENGINEERING COMPANY, INC.

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Phoenix, Arizona 85036

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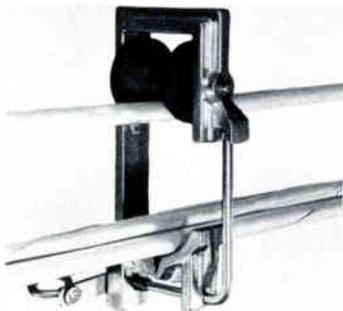
C/Ed December 76 55

# CONSTRUCTION EQUIPMENT

## QEM/Overlash Block

The No. D-376 overlash block will operate to the capacities of "F" cable lashers, lashing groups of cable up to 3¼ inches in diameter. The block can be raised to the messenger and closed with a wire-raising tool (No. WRT-100).

A "V" notch is provided in the bearing surface of the frame for placing the block on strand during normal cable pull-out. The extra-heavy cast aluminum frame is designed to withstand severe falls. All steel parts are zinc-plated, molded rubber sheave.



Circle Reader Service #57

## Davis/Borer

Davis Manufacturing Division of J I Case now has available a horizontal Hydra-Borer attachment for the Mini-Sneaker direct-burial lawn plow. Now total line installation jobs can be completed with minimal disturbance to finished surfaces.

The new Hydra-Borer attachment can be added to existing Mini-Sneakers in the field or to new units as optional equipment.

The attachment is center-mounted on the front of the machine and is driven by a Ross hydraulic torque motor.



Circle Reader Service #58

## Ditch Witch/Plow

A new heavy duty vibratory plow module, the VP-100, is now available from Ditch Witch for use with the Ditch Witch Model R-100 Modularmatic 100 H.P. class vehicle.

This powerful 7½ ton package provides the latest in advanced Ditch Witch engineering design for high capacity underground installation of telephone and electrical cables, as well as other underground services.

The VP-100, with a hydraulically driven vibrator is capable of both in-line and offset plowing at depths to 30 inches. Hydraulic depth adjustment provides up to 12" of depth adjustment during plowing. The plow blade may be angled left or right to act as a "rudder" in changing plow direction.



Circle Reader Service #59

# NEW FROM GILBERT ENGINEERING

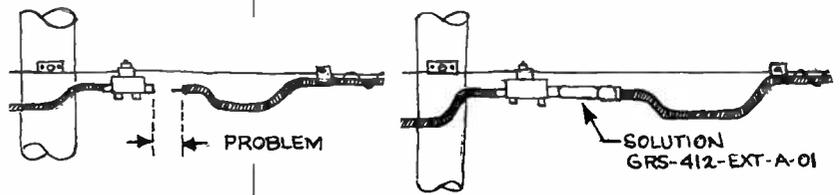
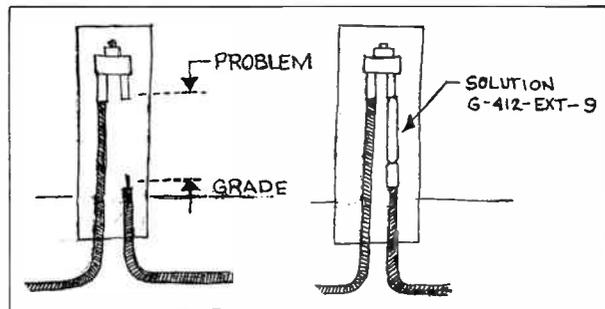


PATENT PENDING

## NEW FAMILY OF CABLE/CONNECTOR EXTENSIONS

How many times have you incurred extra cost and time loss because the cable was a few inches too short or done less than a professional job when the necessary materials were not available? Gilbert can now help solve this problem from a stock of either prestige center seized or integral mandrell GRS series cable extender connectors.

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# EARTH STATIONS

## Microdyne/Satellite TV Receiver

The new Microdyne 1100-*TVR(SYN)* Satellite Television Receiver is equipped with a frequency synthesized RF tuner. Keyboard entry permits selection of any frequency from 3.7 to 4.2 GHz in 1 MHz steps displayed on a six-figure digital counter.

The tuner incorporates a patented voltage tuned, four-pole preselector and L/O multiplier.

The 1100-*TVR(SYN)* is fully EIA and CCIR compatible and can be readily configured for DOMSAT and INTELSAT use. Extremely high synthesizer stability eliminates the need for crystals and ovens. Video response is DC to 8.0 MHz and threshold occurs at approximately 8.0 dB C/N ratio, producing 44 dB video S/N ratio.



Circle Reader Service #60

## Andrew/4.5 Meter Antenna

Andrew Corporation provides a completely versatile, 4.5-meter earth station antenna. The basic unit, designed for use in the 4/6 GHz frequency bands, can be supplied as a transmit/receive unit or a receive-only unit. The antenna also can be supplied in two-piece or four-piece segments to facilitate ease of transport to remote sites or building installations. The antenna depicted in the photograph is mounted on top of a two-story building. A wide variety of accessory items is also available.



Circle Reader Service #61

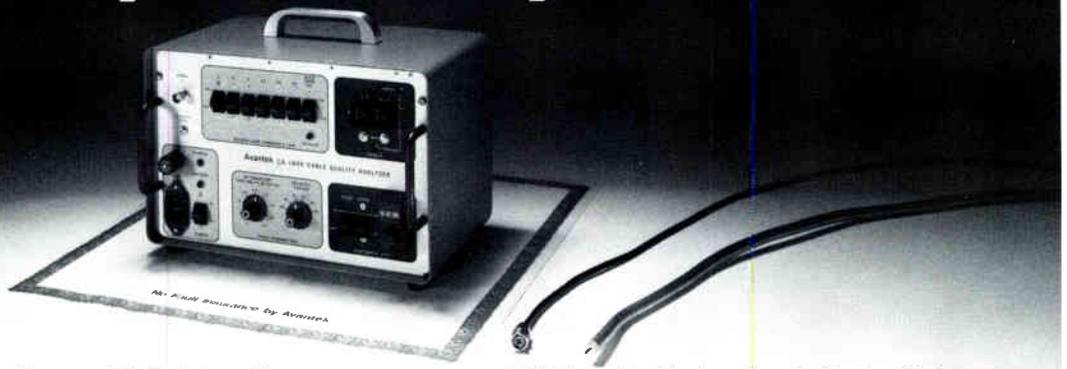
## AIL/Preamplifier

The AIL Model 4060F Satellite Communications Low Noise Amplifier is the culmination of over three decades of AIL involvement in the development of low noise receiving equipment. AIL has over 100 scientific and technical personnel devoted to parametric amplifier development. As a result, every product with the AIL name on it offers the finest in state-of-the-art design and construction.

In contrast to FET type LNAs, the Model 4060F Parametric Amplifier System delivers constant performance characteristics unmatched in the field. The Model 4060F offers to your CATV system: 1) improved signal to noise ratio, 2) increased fade margin, 3) noise temperature—130K—constant over the full range of ambient temperature, and 4) gain stability—+1.0 dB—over the full range of ambient temperature.

Circle Reader Service #62

# Low cost "no fault" insurance for your CATV system.



Now you can quickly and accurately isolate cable faults that might impair your CATV system's performance. Avantek's CA-100A Cable Fault Locator will identify those shorts, opens, crimps and parted center conductors as well as detect unauthorized drops.

No delicate lab instrument, this TDR is ready to be a system maintenance workhorse with its rugged construction, portability and internal batteries that allow over seven hours operation in the field between recharges.

The technician will appreciate the ease of operating the CA-100A. Without requiring time consuming calculations or conversions, the CA-100A will scan

across 4,000 feet of cable, locating faults to within  $\pm 1\%$  accuracy!

But perhaps the best feature of the CA-100A is its low price of \$975. You could pay up to three times more for one-third the accuracy in other TDR's.

Contact Avantek or one of our representatives for a demonstration in your system. The CA-100A could be that "no fault" insurance you have been looking for.

**CALIFORNIA & HAWAII:** B.E. Duval Company, 213/833-0951; **SOUTH-EAST:** John Weeks & Associates, 404/963-7870; **NORTHEAST:** Douglas C. Williamson Associates, 201/337-6330; **NORTHWEST:** Cable Market Specialists, Inc., 206/822-4113.  
All other areas: contact Avantek, 408/249-0700.

**Avantek**

# MISCELLANEOUS

## Instru-Mech/RF Switches

Instru-Mech Inc. is introducing a family of low cost toggle switches specifically designed for high frequency, low energy applications. Offered in two sizes, subminiature and miniature, these switches have been proven reliable over a wide frequency range. This is primarily due to their low internal resistance, low inductance and low capacitance.

**Circle Reader Service #63**

## Magnavox/Filter Balun

Magnavox CATV Division recently introduced the T-30F Matching Transformer with high pass filter for suppression of interference from citizen band transceivers.

Designed to block sub-low interference, the T-30F prevents signals in the 5-30 MHz range from disturbing 50 to 300 MHz TV reception.

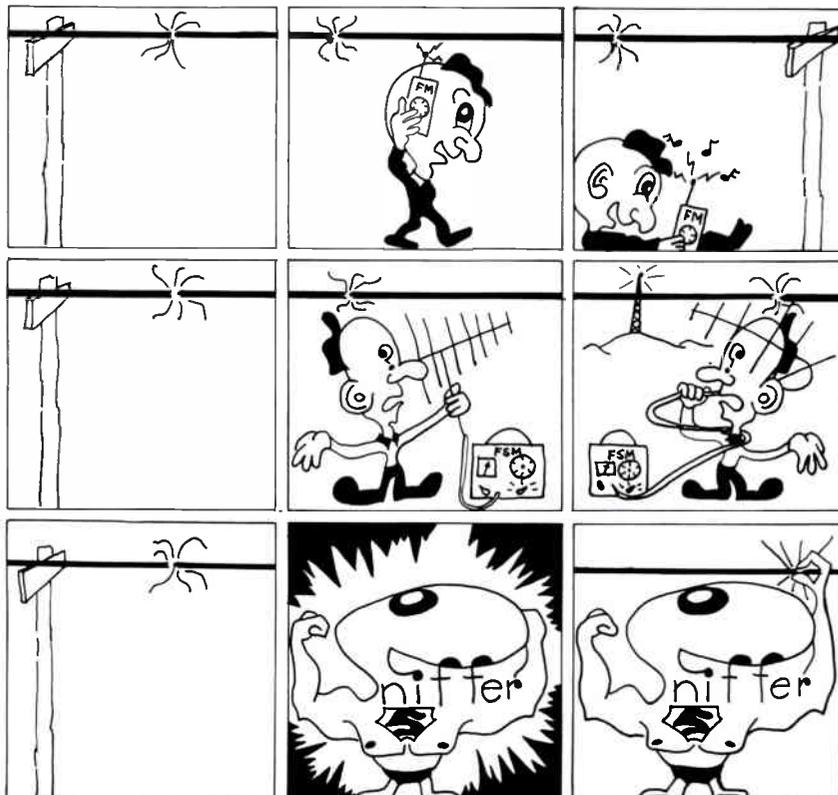
**Circle Reader Service #64**

## CHAFITZ/Time Machine

CHAFITZ, Inc. has introduced a sexagesimal calculator designed to automatically add, subtract, multiply and divide hours, minutes and seconds (and tenths of seconds) without the normal cumbersome conversions. This unique instrument, call the Time Machine, has both manual and automatic modes and results of tests in the field indicate the calculator reduced most calculating times by 50% and in some cases up to 70%. Also converts hours, minutes, seconds to decimal form and vice versa. Other features: memory, constants. Available from stock. \$49.95.



**Circle Reader Service #65**



**THE ONLY COMPLETE  
RF LEAKAGE DETECTION SYSTEM**



- -80 dbmv sensitivity allows vehicle ride through of CATV plant for continuous monitoring of R-F leakage.
- Easily finds breaks, bullet holes, loose connectors, rodent damage and stress fractures in CATV cable, overhead and underground.
- Finds illegal "twin lead" hook ups and any other improperly made connections.
- Useful in finding system outages.
- Locates lost cables behind walls and underground.
- A complete system with an unmistakable distinct tone that cannot be mistuned.
- S-200 (217.25 MHz) \$1,195.00 complete. Delivery two weeks. (Other frequencies available).

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## TeleMation/ Remote Control

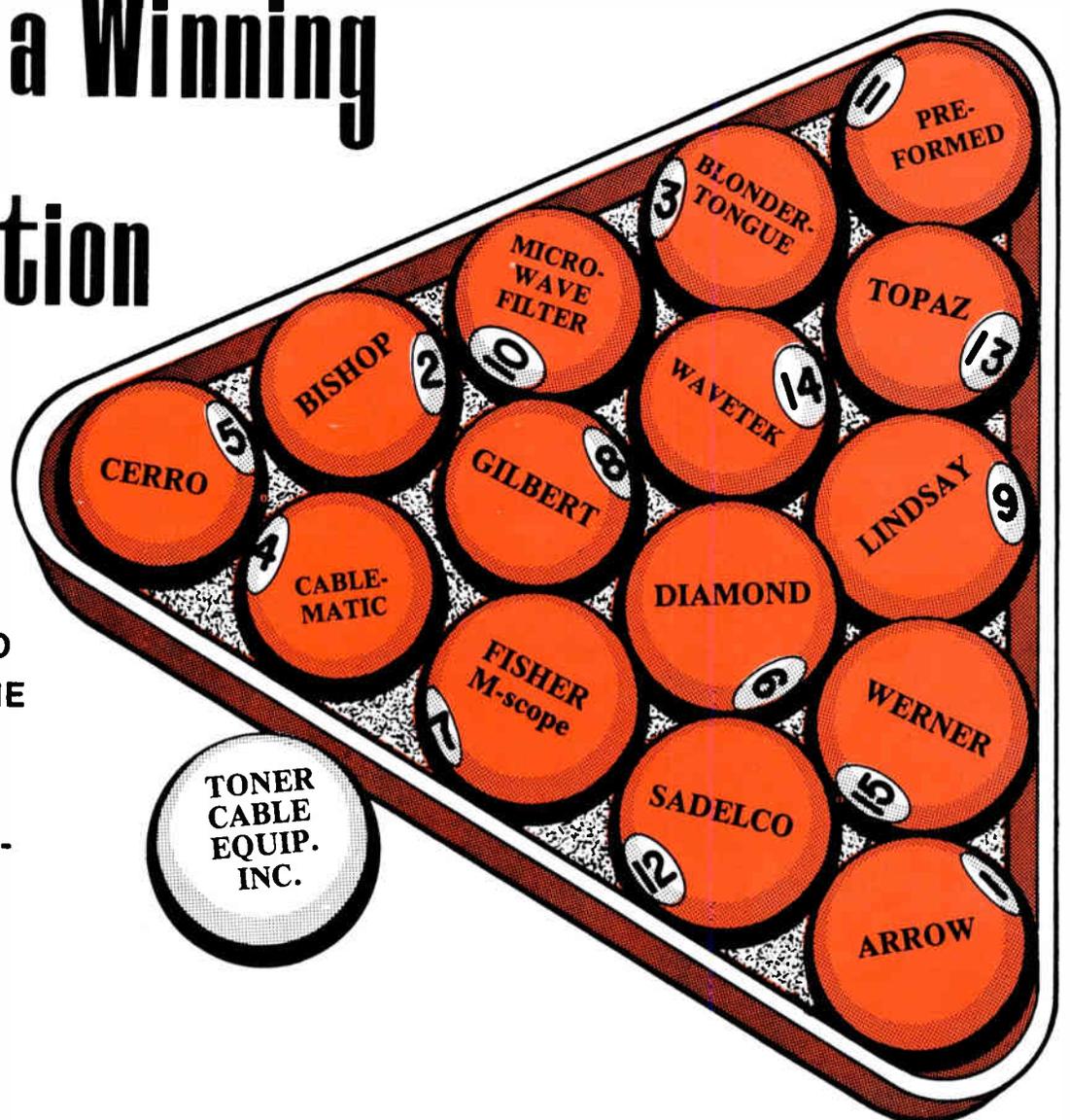
A new digital remote control system, consisting of a TCT-150 Control Transmitter and up to eight TCR-150 Control Receiver(s) is now available from TeleMation, Inc. The system provides on/off or normal/alternate remote control of up to 15 functions at each receiver location. These functions can include operation of switchers (including non-duplication switchers), broadcast transmitters, microwave relays, security system, and other equipment.

The TCT-150 transmitter will accept either front-panel switch commands or TTL logic/contact closure inputs generated by timers or computers. These signals are transmitted via two-conductor cable or telephone circuit to the TCR-150 receiver(s), which in turn are connected to the equipment under remote control. Each TCR-150 can be addressed individually.

**Circle Reader Service #66**

# Rack Up a Winning Combination

WHEN IT COMES TO THE RIGHT COMBINATION OF CATV PRODUCTS FROM HEADEND TO HOUSE DROP, COME TO TONER CABLE EQUIPMENT, INC., STOCKING DISTRIBUTOR FOR OVER 35 QUALITY CATV MANUFACTURERS.



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6. DIAMOND — Construction and Subscriber Hardware
7. FISHER M-scope — Underground Cable Locators

8. GILBERT — Coaxial Connectors and Fittings
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13. TOPAZ — 12V to 110AC Inverters
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For more information circle No. 33

# LOCAL ORINATION/STUDIO

## 3M/Time-Temp Generator

A video, automatic time- and temperature display for use by broadcast TV stations and CATV facilities has been introduced by 3M Company. It may also be used for public information displays and by scientific, military or industrial installations.

The new Datavision Model TT-1 generator provides a one-row presentation of time and temperature information in any one of six switch-selectable sizes from 18 to 144 scan lines, superimposed on the existing video display. Information may be positioned anywhere on the screen by the TT-1 panel control.

The Model TT-1 generator accepts a variety of sync or video sources, and operates with a video bandwidth of 6 MHz +1 dB. Output is 75 ohm, source terminated.



Circle Reader Service #67

## Bretford/ Mobile Production Center

Here's an all-in-one concept from Bretford. This Model PRO-4 production center accommodates camera, video player, lights and accessories. Heavy-duty camera mount complete with counter-balance spring. Roomy drawer accommodates accessories or tapes while large lock-up cabinet secures camera and equipment. Easily mobile on heavy-duty ball bearing casters. Constructed of heavy gauge steel electrically welded for safest support. This "studio on wheels" makes on-location taping most convenient. Six models available.



Circle Reader Service #68

## 3M/Video Tape

SJC color video cartridges, first introduced by 3M Company in 10 and 20-minute lengths in 1975, are now available in all three standard cartridge sizes. Added are EIAJ standard one-reel cartridges in 30-minute lengths.

The cartridges are loaded with top-quality "Scotch" brand helical-scan video tape with low-noise oxide, providing a minimal signal-to-noise ratio of 46 dB. The tape is treated with permanent lubrication and features an improved binder system for reduced abrasiveness and long oxide life. Magnetic properties exceed established RF output standards for good performance by 1 dB or more over the entire recording range. SJC cartridges are compatible with all standard EIAJ 1/2-inch cartridge recorders.



Circle Reader Service #69

## Sony/TBC

Sony Broadcast announces the availability of its new BVT-1000 Digital Time Base Corrector. The unit employs a newly developed A/D system and is designed for both high band and helical video tape recorders.

The BVT-1000 is sold in a no-options configuration and includes velocity and drop-out compensators, full processing and full NTSC advanced sync. It combines a wide window of  $\pm 2H$  with a moving window concept to help hold picture lock, even with wide error excursions.

The BVT-1000 will handle both direct and processed heterodyne modes and includes anti-gyro circuitry helpful in time base correcting portable recorders.



Circle Reader Service #70

## Visionary/ Psychedelic Generator

The Visionary Electronics Video Graphics Generator generates video-graphics that respond to a musical (audio) input. The size, shape, and colors of the digitally generated patterns all change to the music to give the viewer a multi-media entertainment experience. The standard color video output signal can be gen-locked to another video signal for mixing and/or broadcasting.

Cable stations can broadcast a light concert to music that either originates at the cable studios, or originates at a local popular radio station. It can also be used for televised rock concerts with the video alternating between the normal video picture and a dynamic, visually exciting light concert.

Price: \$725.00.



Circle Reader Service #71

## Microtime/New Products

Microtime has two new products to add to their expanding line of TV studio type products. They have a remote synchronizer that generates advanced timing information from an off-air station to generate a remote signal with station sync. This permits live remote broadcasts to be switched and keyed with no undesired closed loop effects.

The other new product is called Image-Ex and improves the TV picture by improving sharpness, signal to noise ratio, and eliminating residual subcarrier and other modulation products. Chroma delay can also be compensated. This product is intended primarily to improve the performance of lower cost helical VTR's.



Circle Reader Service #72

# SECURITY/TRAPS - CONVERTERS

## Supra/Key Control

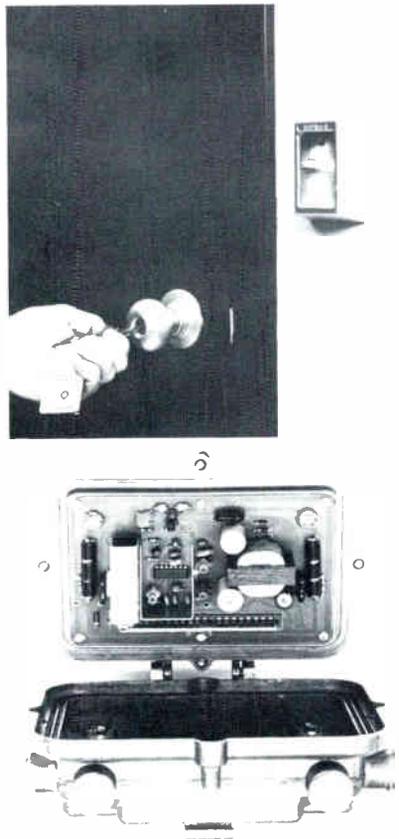
Supra's "One Key" System—new from Supra Products—eliminates service time wasted in gaining access to locked apartment locations.

Mount a Supra Key Safe near the locked entryway of your customer's facility and place the customer's key inside. Then with one master key, Supra's Title key, technicians have immediate access to the customer's key and his facilities.

The Supra System allows cable systems to leave their equipment *inside* the apartment complex hidden from public view and vandals while still enjoying immediate access to that equipment.

The Supra (master) Title key provides unequalled key control for users. Each key has its own combination cast *inside* the key so that locksmiths are not equipped to duplicate it. As a result, the Supra System maintains unsurpassed *key control* and *security* for the cable system and the customer.

**Circle Reader Service #73**



## Magnavox/ Single Channel Converter

The new Magnavox MX-SCCD Single Channel Converter-Descrambler makes possible convenient and relatively low cost addition of a single channel—which can be scrambled for pay TV—to existing 12-channel CATV systems, without an expensive multi-channel converter.

Available in 44 variations of input and output channels, MX-SCCD is crystal-controlled for extreme stability. Exact sync-to-picture ratio restoration prevents rolling and fluttering. It accepts a 6 MHz mid-band channel input and utilizes channels 2, 3 or 4 for output. In addition, the descrambler is unobtrusive and has low power drain.



**Circle Reader Service #74**

## Magnavox/ Addressable Tap

Perhaps the most sophisticated in the Magnavox line of pay cable products is the new MXSCS computerized addressable tap. With its introduction, computerized instantaneous connect/disconnect of subscriber service will be within the reach of most CATV systems.

The Magnavox system is designed to work with most 4, 8, and 16 bit microprocessors—common systems used for computerized billing.

The Magnavox computerized MXSCS is a universal system that will retrofit existing tap installations where notch filters are used for premium channel security. It offers complete connect/disconnect of basic and premium subscriber services through an improved system of signal interference.

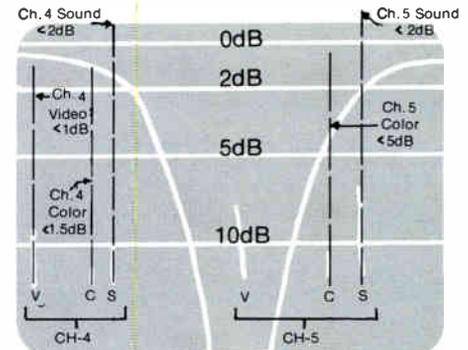
The computer programming of the addressable tap is protected from memory loss during power failure by self-contained storage batteries.

**Circle Reader Service #75**

Just Another Pay TV Trap?

# NO WAY!

## EAGLE has THE Notch-Filter for YOUR System



**TYPICAL EAGLE NOTCH-FILTER  
MODEL 2-NF-5**

**EAGLE WORKS**—guaranteed superior performance & choice of channel 2 thru 7, midband too; tamper-proof security shield optional.

**EAGLE'S TOUGH**—outstanding shock resistance & stability; durable thick-wall brass housing, nickel plated & completely potted.

**EAGLE'S EASY**—threads on & off fast, fit up to 4 on most all taps; special tools for security & speed; machined and interlocked terminals won't pull free.

**EAGLE'S BEST**—low, low adjacent channel loss & deep, temperature stable pay-channel rejection; better electrically and mechanically.

**RE-USABLE TOO**—factory channel-retuneable at little cost for recycling into other areas; why pay more for less anyway?



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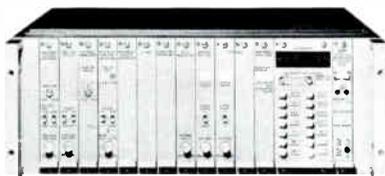
For more information circle No. **34**

# TEST EQUIPMENT

## Rohde & Schwarz/ Vit Analyzer

The importance of VIT Distortion Meters is rapidly growing as more and more companies are seeking continuous and automatic evaluation of the transmission and receiving quality of video signals.

The new Rohde & Schwarz VIT distortion meter UPF has been designed to monitor broadcast signals as well as those generated in laboratories or for general measurements. With its unique modular design, the new VIT meter consists of the basic unit, test parameter plug-in limit monitor and a display unit. A selection of test parameter plug-ins provide great flexibility and prevents obsolescence.



Circle Reader Service #76

## Texscan/X-Y Display

Texscan Corporation announces a new large-screen display oscilloscope. The Model DU-127 was developed for applications requiring a large, easily read display with equal bandwidth in both X and Y axes. This unit is ideal for applications in sweep RF testing with frequency markers and data display requiring Z axis modulation.

The DU-127 features a 12-inch CRT with a 10 x 14 cm graticule. The standard tube phosphor is P-4, with P-7 optional.

The vertical amplifier provides calibrated sensitivities from 1V/div. to 1 mV/div. The vertical and horizontal bandwidths are equal at 30 kHz.

The DU-127 is 17 x 9½ x 15½ inches and weighs 25 pounds.



Circle Reader Service #77

## Kay/Attenuator

Kay's new subminiature rotary attenuators have recently been designed to fill test equipment and aerospace packaging requirements for small light-weight, high-frequency units with high-accuracy, high-attenuation values. Unique assembly techniques and new compactness provide VSWR's of less than 1.3:1 and insertion loss of less than 15 dB over the 2 GHz frequency range. The use of printed circuit techniques and self-cleaning rotary switch action insures positive repeatability over prolonged periods of time. The entire unit utilizes only 2½" of panel depth and weights in at less than 10 oz. Attenuators are available in 0-70 dB, 0-10 dB, and 0-1 dB versions.



Circle Reader Service #78



## Point-to-Point Microwave for Studio-Headend Links and Community-Antenna Relay Service (CARS)

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For more information circle No. (35)

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For more information circle No. (36)

# The proven way to eliminate CB and ham radio interference



See us at the  
Western Convention  
Booth 3 & 4

That's right, the RMS CA-2600F High Pass Filter Matching Transformer eliminates most CB and Ham Radio problems quickly and inexpensively. It features a high quality miniaturized printed circuit that assures you the standard of excellence you always expect from an RMS product.

The network and housing is totally shielded. The CA-2600F has a usable frequency range of 50–300 MHz, rejecting any interference from 0–50 MHz. It has a 0.7 db maximum insertion loss. The return loss is a minimum of 20 db, with a balance ratio of 25 db minimum. The CA-2600F has also become the standard of discriminating two-way cable system operators throughout the industry.

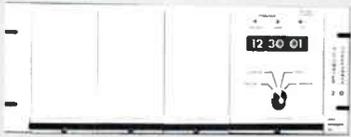
For additional information on this fine product call us collect at 212-892-1000 or write RMS Electronics, Inc./CATV Division—50 Antin Place, Bronx, N.Y., 10462 — Telex #224652 · 24 hour service — Cable Address: "RAMONICS".

Canadian Representatives: Deskin Sales Corp.  
Mexican Representatives: TV Cable de Provincia S.A., Mexico City, Mexico. Worldwide exports, excluding Puerto Rico—Roburn Agencies, Inc.—Cable Address: "ROBURNAGE" — New York. Telex #23574 "ROBR-UR".

**RMS** CATV DIVISION

For more information circle No. 37

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### Kits Available Now:

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# TEST EQUIPMENT- CONTINUED

## Amtron/ 5-Inch Color Monitor

A 5-inch color video monitor is now available from Amtron Corporation, manufacturer of Trinitron-based (™ Sony) video monitors and monitor/receivers.

The AM-5 includes a number of professional features as standard equipment: switchable A/B inputs and internal/external sync, individual RGB gun switches, manual degauss circuit, front-panel primary and secondary controls plus DC restoration. Pulse Cross display is optional.

In addition to portable use, the AM-5 may also be rack-mounted as a companion to popular half-rack video waveform monitors, or may be combined as a dual unit into standard 19-inch rack configuration.



Circle Reader Service #79

## Tektronix/ Tracking Generator

Tektronix announces two new options to expand the versatility of the 7L5 Spectrum Analyzer.

The new L3 plug-in module features a high impedance (1 M /28pF) probe-compatible input with input termination selections of 50 and 600 . It is one of a series of modules used with the 7L5 to provide it with various front end capabilities.

The Option 25 Tracking generator provides the 7L5 with selectable 50 , 75 , and 600 impedance source with calibrated frequency output for swept frequency tests from 10 Hz to 5 MHz.

The output of the Option 25 Tracking Generator can be adjusted so it tracks within 10 Hz of the spectrum analyzer frequency. The frequency span and rates are controlled with the spectrum analyzer. The output level is controlled from the tracking generator. Output level is calibrated and controlled in 10 dB and 1 dB steps over a 63 dB range. An Aux Output may be used to drive a frequency counter.

Circle Reader Service #80

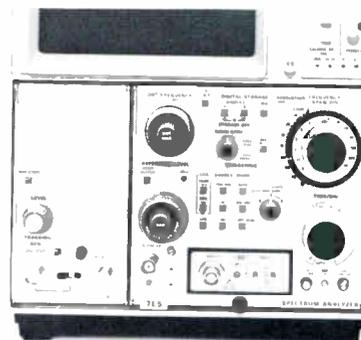
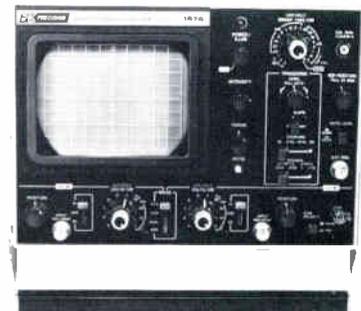
## B&K/Oscilloscope

A new dual-trace scope has just been introduced by B&K-PRECISION, described as the lowest cost 30 MHz delay line scope available. The new scope, Model 1474, is priced at \$820.

Waveforms are displayed with high resolution and brightness on an 8 x 10 cm CRT viewing area. The phosphor used is bright blue P-31—the same phosphor used on many far more expensive scopes. Built-in time-saving features include automatic selection of chopped or alternate mode of display by time base switch, automatic triggering and convenient lever switches. The ten position vertical attenuator covers 5 mV to 5 V per cm at an accuracy of +3%. Internal low- and high-pass filters offer excellent control over triggering range. This feature allows the user to trigger on complex waveforms without waveform jitter. Filters are front panel switch selectable.

The 1474 has a smooth response to well beyond 30 MHz and can trigger on signals up to 50 MHz.

Circle Reader Service #81

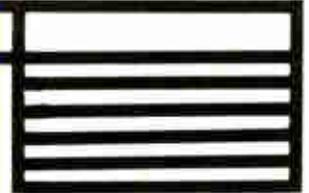


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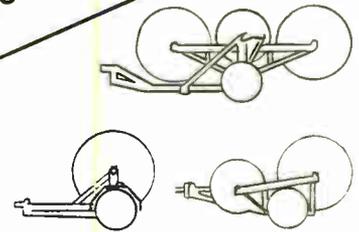
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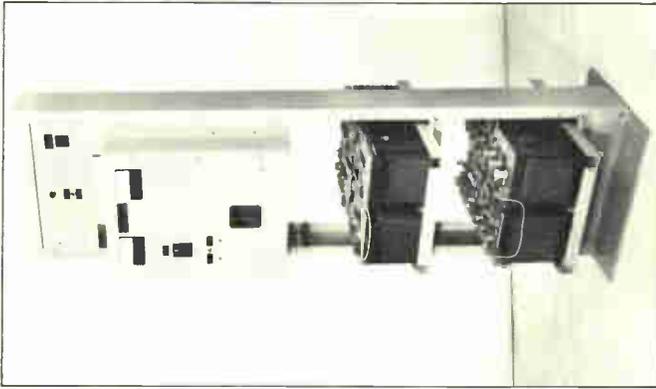
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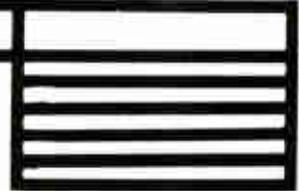
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# CableVision's *Financial Report*

Editor: Michael Gumb

## **Just How Do You Get a Rate Increase?**

**A**s a general rule, each rate request has its particular, peculiar circumstances. Nevertheless, the overall approach usually depends on the franchise authority involved—local or state.

In theory, the best approach to a successful rate increase at the local level is to have the system manager develop a friendly relationship with the city council and for him and his employees to be active in community affairs. Under these favorable public circumstances, rate increases tend to be granted with a minimum of resistance from the council or the community.

In practice, the cable company usually has to make a detailed presentation pointing out how every imaginable cost—except cable rates—has risen since the franchise or last rate increase was granted. The real “trick” is to find a happy medium between baffling the council with statistics and putting them to sleep. During the formal presentation, the best approach appears to be to provide the council with a copy of the significant documents and refer to them on occasion.

**A**more extreme approach was used recently in Gladewater, Texas, (a Communications Properties system). When the city council denied the request to increase the basic rate from \$5.95 to \$7.95, CPI “pulled the plug” on the system. It took the city less than one day to approve the new rate. (A CPI official said the decision to walk away was made easier by the fact Gladewater is such a small system—800 subs with an investment of \$300,000.)

**A**more realistic solution would be to delete the local rate making function—since it is no longer required by the FCC—as a part of the franchise changes required by the March, 1977 deadlines. If not deleted altogether, the local rate-making function could be given a passive voice. Thus cable companies could get rate increases the easy way—by notifying the subscribers to pay more—until they price the service out of the market. (FR 10/1/76 Issue)

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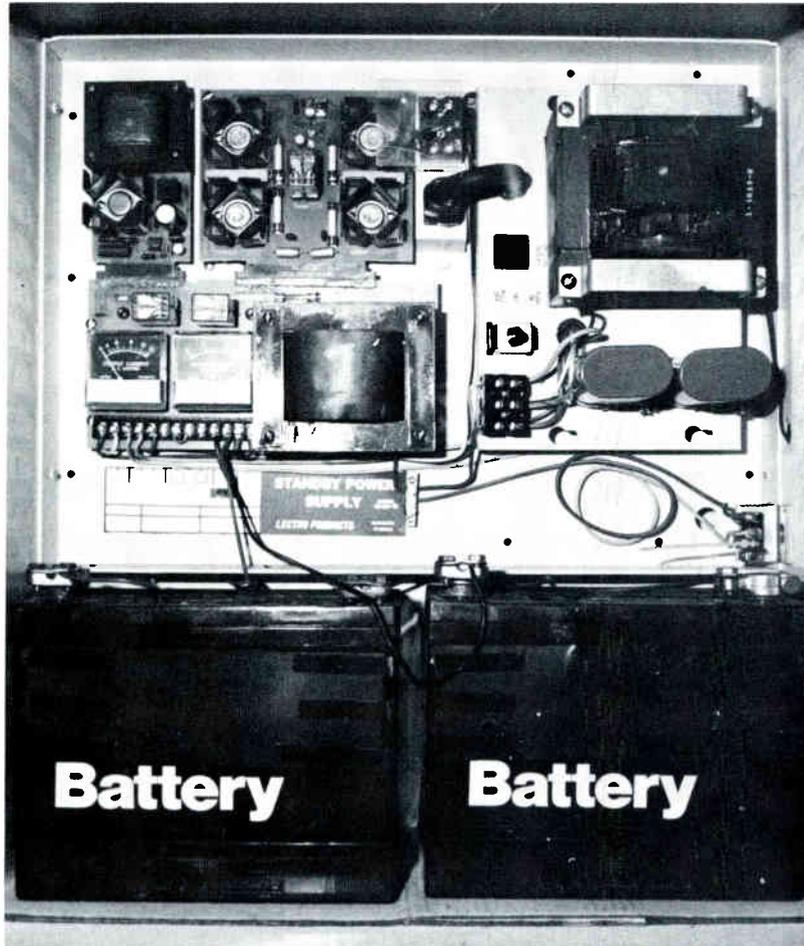
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# BOOKS & LITERATURE

**CABLE TELEVISION** is a brand new paperback written by John E. Cunningham and published by Howard Sams & Co., The Bobs-Merrill Co., Inc. in Indianapolis, Indiana. The book is written to acquaint the electronics technician with the fundamentals of CATV systems. A considerable part of the 352 page text is devoted to maintenance of signal quality and dependability. No mathematics beyond algebra and logarithms are used and the book is illustrated heavily. Cunningham acknowledges the CTAC Committee and SCTE for its cooperation in developing the text, within the preface. It costs \$11.95 a copy from the publisher.

**FEDERAL REGULATORY DEVELOPMENTS IN CABLE TV AND CABLE TV STATE REGULATION** summarizes major rulemaking actions by the FCC since 1972, current rules and regulations and guidelines in FCC processes. It also lists all state regulatory activity for 1975 and 1976 sessions. The text has been accepted as a course book at the University of Wisconsin for a course in CATV. Bound, 112 pages, the book is available from Communications/Engineering Services, P.O. Box 2665, Arlington, VA 22202. Cost is \$8.95 for individual copies, \$6.00 each for ten or more.

**IEEE CABLE TRANSACTIONS**, Volume CATV-1, Number 1 was datelined October 1976, and was mailed to more than 4,500 individuals

and institutions. The Inaugural Issue contains seven technical papers, remarks from IEEE, NCTA and SCTE, and minutes of the Broadcast, Cable & Consumer Electronics Society of IEEE meetings. Copies may be ordered from IEEE, 345 East 47th Street, New York, NY 10017.

**A GUIDE TO TECHNICAL STANDARDS AND MEASUREMENTS FOR CABLE TELEVISION SYSTEMS** is a Technical Memorandum (No. 76-221) from the U.S. Department of Commerce, Office of Telecommunications. It is a fair desk reference piece and contains a good bibliography. It was produced by William Hsaio under a DOC/OT grant. It is available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

**COMMUNICATION SATELLITE SYSTEMS: AN OVERVIEW OF THE TECHNOLOGY** comes from the IEEE Press. The volume has five parts and an Addendum. It describes past, present and future communications satellites and discusses problems faced by system designers. The birds; techniques for expanding communication satellite system capabilities; frequency spectrum and orbital spacing; earth station technology; and interface considerations are all discussed. The hardbound book is available from IEEE, 345 East 47th Street, New York, NY 10017.

**STANDARDS OF GOOD ENGINEERING PRACTICES FOR MEASUREMENTS ON CABLE TELEVISION SYSTEMS** is the title of a series of National Cable

Television Association books to be published in early 1977. The first volume deals with the DISTRIBUTION SYSTEM and contains ten basic system test procedures with alternative methods included in many cases. Other books to be released in the near future include HEADEND, OPERATING PRACTICES, and INSTALLATION PRACTICES. Test equipment set-up diagrams are included as are numerous tables and charts. Contact NCTA, 918 16th Street NW, Washington, D.C. 20006 for more information.

**PRODUCER & CONSUMER, THE CABLE CONNECTION** is the name of the submission of the Canadian Cable Television Association to the Canadian government, on the introduction of pay television to that country. It is a 24 page text that may make the difference as to whether or not Canada devotes its effort to payable, and if they do — how they go about it. It is available from the Canadian Cable Television Association, 85 Albert St., Ottawa, Ontario, Canada K1P 6A4.

**SOCIAL SERVICES AND CABLE TV** is a report prepared for the National Science Foundation by the Cable Television Information Center in Washington, D.C. The publication contains a review of literature relating to delivery of social services via cable from 1968 to 1975 and an overview of experiments, demonstrations and programming. It is available from the U.S. Government Printing Office, Public Documents Department, Washington, D.C. 20402. The cost is \$3.10 a copy. Order No. 038-000-00290-2.

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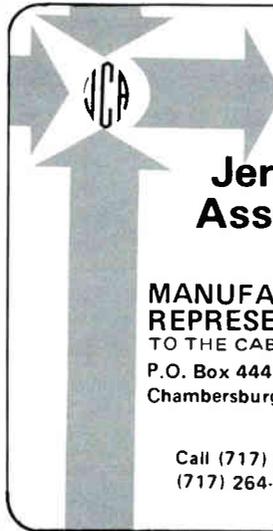
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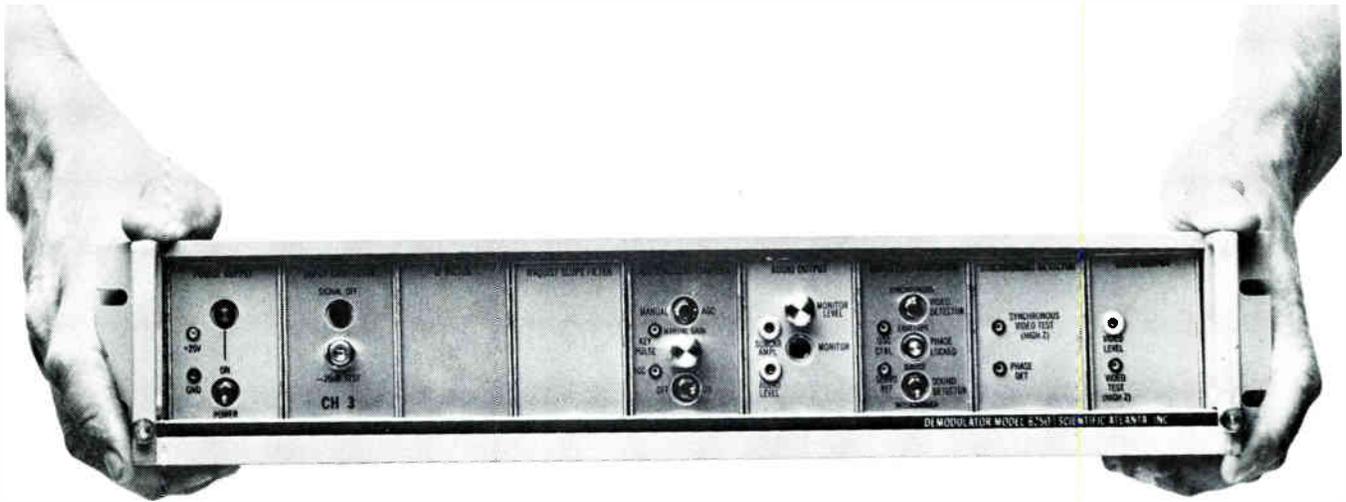
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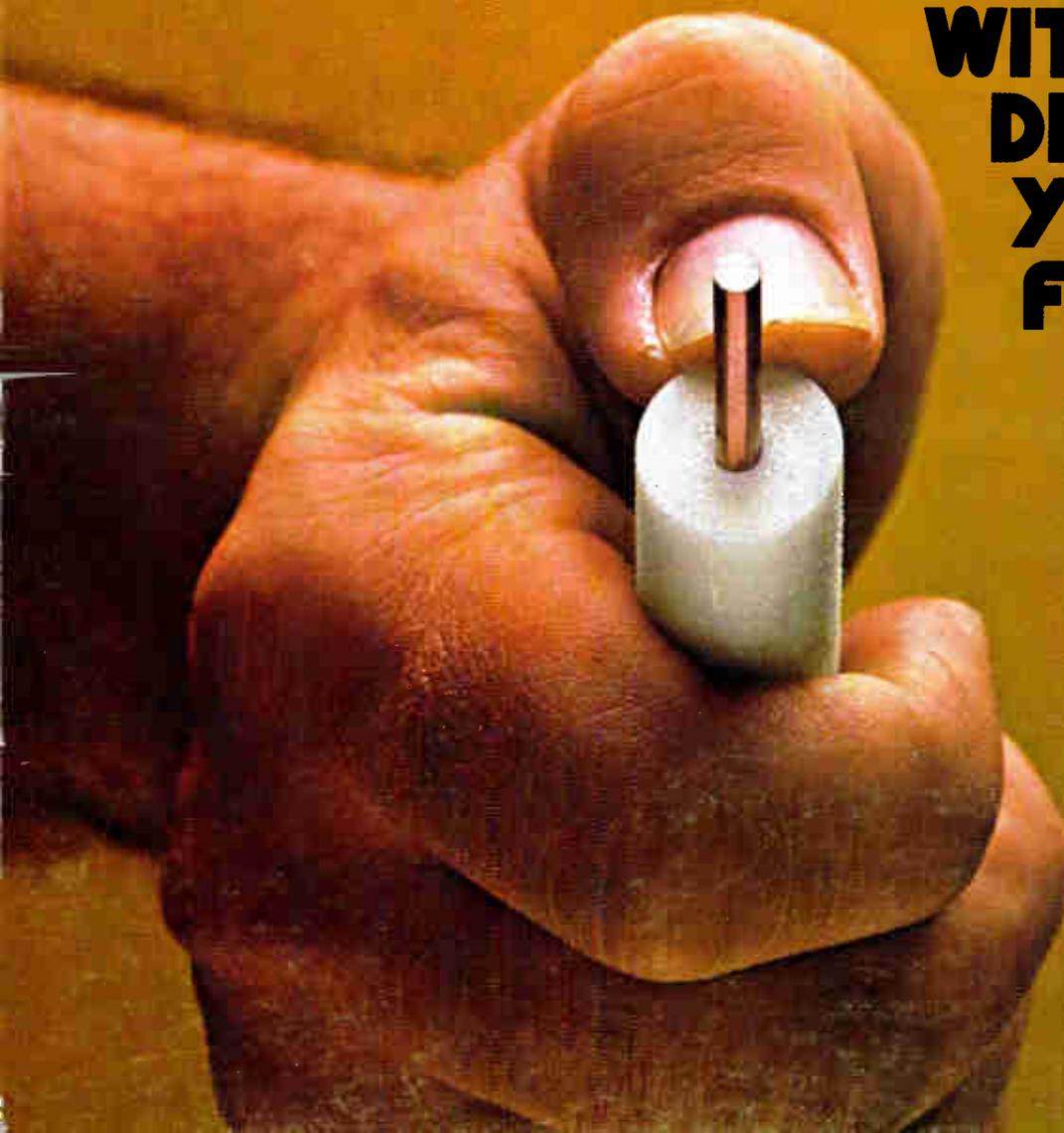
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