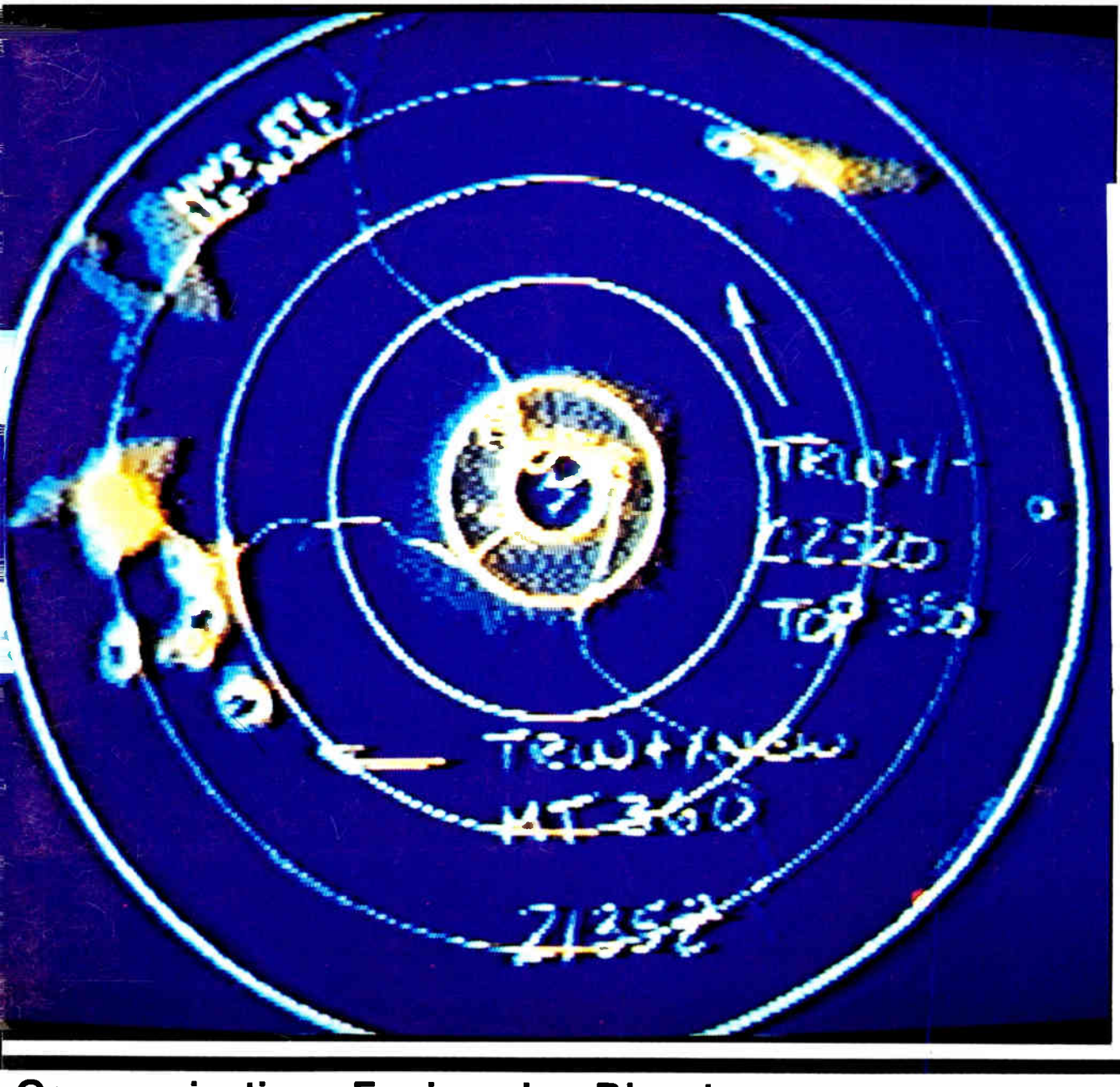
C-ED

Bootlegging
FOC '78 Wrap-Up
Ancillary Services in CATV



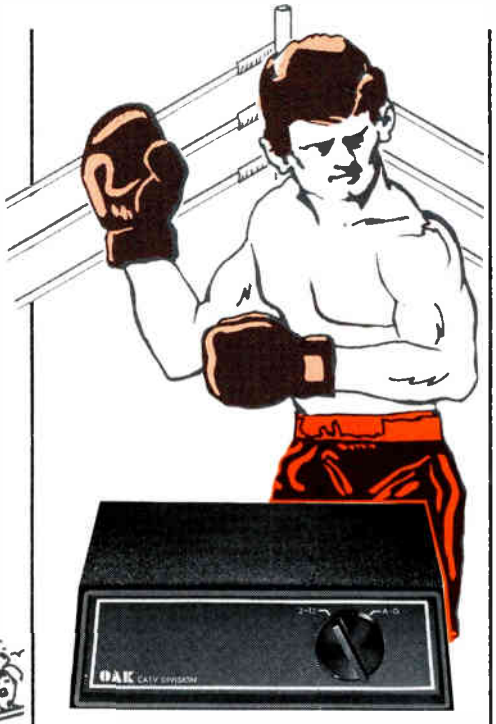
Communications-Engineering Digest
Reporting the Technologies of Broadband Engineering

October 1978
Volume 4, No. 10

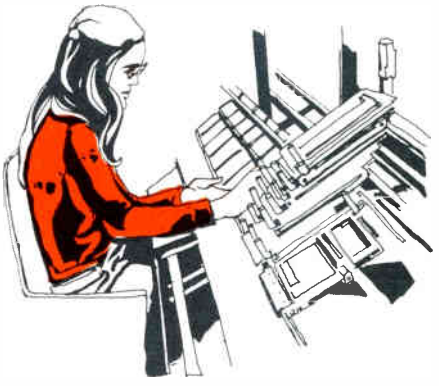
The Oak one-two punch... a knockout for profits!

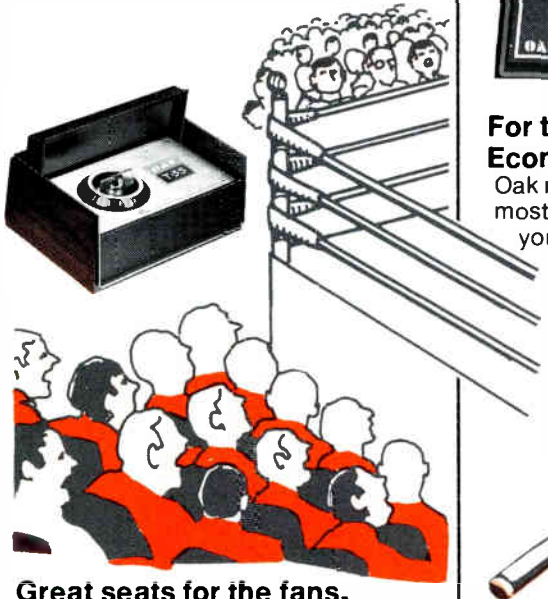
This is the Trimline II— a champion 35-channel AFC converter.

It's a high quality unit with the toughness and versatility to meet the varying operational parameters of cable systems. It has wide dynamic range and high selectivity to defend against such opponents as cross-modulation and adjacent-channel interference—even at high input levels.



We build them in our plants. All Oak CATV products are made in company-owned facilities. We have a commitment to our customers and we back it up with prompt delivery and rapid service turnaround.



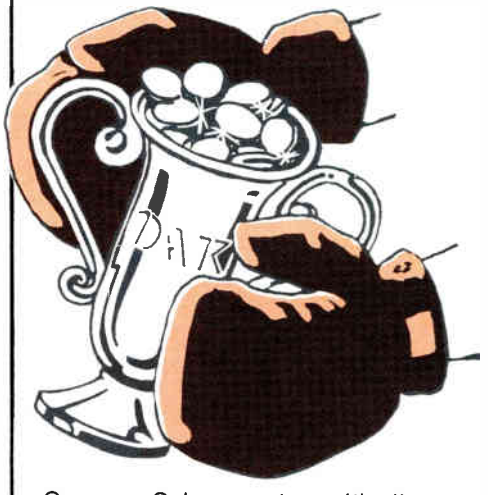


Great seats for the fans. You can offer your fans the convenience of set-top or remote "Jewel Case" operation. In either event, a built-in Automatic Frequency Control eliminates the fine tuning shuffle. The Trimline II is also available with an optional self-contained descrambler for premium programming with unbeatable security.

For the twelve rounders, Econobloc adds seven more. Oak ranks the Econobloc as the most economical way to expand your 12-channel system. Mid-band channels A to G convert to channels 7 to 13. Econobloc converters live up to their name by giving you a block of seven mid-band channels at an economical price.

The initial cost of a converter is only round one. Before you score the totals, ask yourself where and how the product is made, and by whom. Remember, reliability counts. The reliability of the Oak product stems from our control over the total production process.

The winner...Oak!



Compare Oak converters with all other contenders...but remember that there's more to the comparison than just the "black box." Market leadership and technological expertise are your assurance that the Oak Trimline II and Econobloc converters will go the distance. Oak converters are winners and your profit-wise choice.

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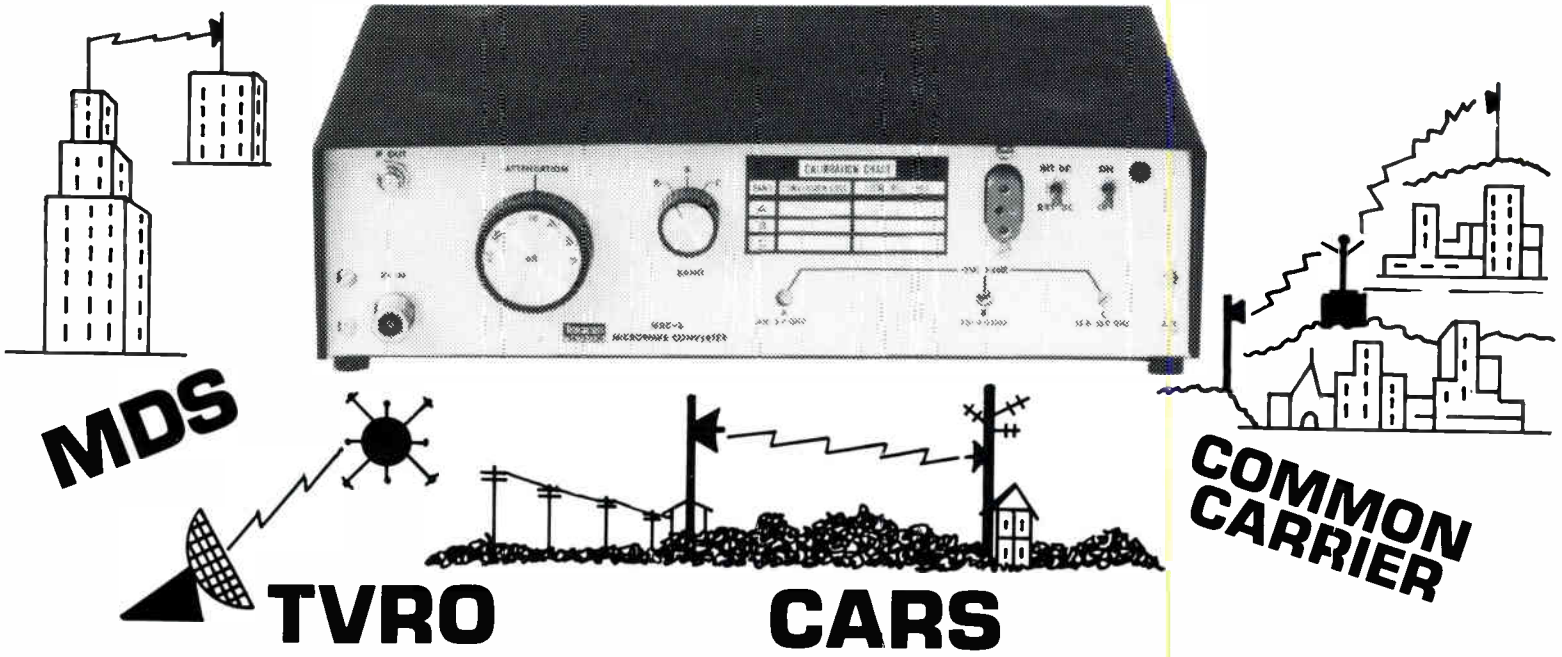

Texscan's microwave down converter permits measurement in the MDS (2.1 GHZ) TVRO (3.7 GHZ) and CARS (12.7 GHZ) band with existing VHF test equipment. Spectrum analysis, signal strength and even microwave sweeping are possible with the MDC-3.

Available as an option are three bandpass filters which speed and simplify the measurement process. The filter kit is required for sweep operation. The MDC-3 has a calibrated insertion loss and adjustable local oscillator for each band. Other frequencies are available.

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Introducing the 6601 video receiver.

From the 411 Video Receiver came the 414 Video Receiver. And from the 414 now comes the fixed frequency 6601 —perhaps the industry's first third generation video receiver.

If you manage a CATV system, it means you get the advantage of dual conversion from a manufacturer with long experience in building receivers with dual conversion. You get threshold extension demodulation that's been field proven in other models. And you get a whole list of options to make this video receiver into something more than a no frills unit.

The receiver baseband output can be made compatible with microwave systems by including an optional 4.5 MHz subcarrier card. And for more audio services, you'll find provisions for the addition of 3 more audio demodulators built right in.

Today there are many video receivers with a low price. But for one that has a lot more going for it than merely a low price, call Mike Smith or Pat Wolfer at (404) 449-2000. Or write us.

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Europe: 1-7 Sunbury Cross Centre, Staines Road West, Sunbury on Thames, Middlesex TW16 7BB, England,
Telephone Sunbury on Thames 89751, Telex 896015

C-ED News at a Glance

BRONX, NEW YORK—**RMS Electronics has issued an open challenge to all competitors to a comparative analysis of 75-300 ohm matching transformers "specmanship"** this fall. RMS will be using its CA-2500 as its weapon.

CATJ laboratories will conduct the tests and the results will be reported in *C-ED* and *CATJ* magazines in the same publication month. (See page 16 for further details.)

PISCATAWAY, NEW JERSEY—**RCA American Communications is calling the shots in the bidding war of who will get that company's remaining transponders.** Potential customers must sign up immediately and begin paying in October for the five available transponders on Satcom I.

Current and potential users of satellite transmission have two alternatives: getting into the bidding war and if awarded one of the few available transponders, paying handsomely until they are ready to launch a service; or betting that RCA is bluffing and will be able to free up additional transponders as they are needed.

RCA is expected to award transponders on a first-come, first-served basis. The bidding war ends on September 29 and the winners will be announced the first of October. (For an in-depth report, see the September 25 issue of *CableVision*, page 8.)

OAKLAND, NEW JERSEY—UA-Columbia Cablevision, Inc. has announced that the **anticipated change for transmission of Madison Square Garden Sports and Calliope on SatCom I from transponder 20 to transponder 9 has been rescheduled for November 1, 1978.** The original changeover date had been set for September 15.

WASHINGTON, D.C.—**Cable certification, EEO, ARTEC signal carriage and common carrier tariffs are among the cable items slated for consideration at the FCC** on Wednesday, September 27. The **cable-broadcast economic inquiry and syndicated exclusivity** questions are now **on the back burners** in the wake of postponement of consideration of those issues at the commission.

WASHINGTON, D.C.—In a major policy statment on the proposed rewrite legislation, **FCC Chairman Charles D. Ferris** stated that he **concurs with the bill's judgment that the cable television industry has been overregulated at the federal level.** He stated that he is not aware of economic or technical factors justifying the heavy regulation that has been imposed on cable.

WASHINGTON, D.C.—The **NCTA** has **filed** a **petition for reconsideration with the FCC pursuant to the adoption of procedural rules for the regulation of cable television pole attachments.**

In the petition, the NCTA noted that while it generally agreed with most of the rules adopted by the commission, it also believes that the commission should reconsider and clarify its order in two respects.

First, NCTA maintained the FCC should require that state certification must be by final and appealable order of the regulatory agency setting forth the basis of jurisdiction. Second, NCTA stated that the FCC should retain jurisdiction over pending matters pursuant to certification matters. NCTA described the proposal that any affected certification case should be forwarded to the state regulatory authority as "unwise and unwarranted."

Communication-Engineering Digest is published monthly for the Society of Cable Television Engineers by Titsch Publishing, Inc., 1139 Delaware Plaza, P.O. Box 4305, Denver, CO 80204©. October 1978. Subscription price: 1 year, $14.00. Canada and Mexico add $3.00, and foreign subscribers add $5.00 per year. Controlled circulation paid at Denver, Colorado.

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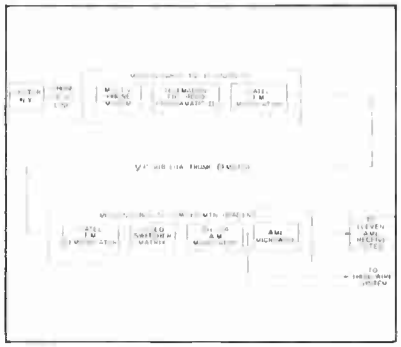

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Cover: The photograph of the local weather and radar map near St. Louis, Missouri illustrates incipient tornado cells (dark areas.) The photograph was supplied courtesy of Arvin Systems Inc.

Titsch Publishing, Inc.
1139 Delaware Street
-or- P.O. Box 4305
Denver, Colorado 80204
(303) 573-1433

Washington Bureau
P.O. Box 19268
Washington, D.C. 20036
(202) 892-4200

New York Bureau
4 Duncan Road
Hohokus, New Jersey 07423
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Editor's Letter

Some weeks ago we received a phone call from RMS' Don Edelman. The purpose of the call was to see if we would be interested in a story relating to a challenge Edelman would shortly deliver to those competing manufacturers with 75-300 ohm matching transformers. In short, RMS, as reported on page 16 of this issue, wanted to put its product line up against any and all comers in a test that would be conducted *at* and *by* CATA/CATJ Laboratories.

Frankly, we didn't know what to think of the idea. But then it wasn't really our job to think well or ill of such a challenge and of the subsequent undertaking, should those respective manufacturers take up the RMS' "offer." For we are neither a judge nor a participant in this test. Rather, our job is simply to report the facts, which we will do in this instance (whenever the test takes place) and in all other news related happenings. So stay tuned for further details.

This issue features various ancillary services cable provides to its subscribers. In addition, contributing editor Raleigh Stelle and his cohort at Texscan, Bill Dawson, have supplied us with an article on illegal theft-of-service we think you'll find useful.

Paul A. FitzPatrick

Ready for '79 Reliability Conference?

By Glenn Chambers
SCTE Eastern Vice President
American Television and
Communications Corp.
Englewood, Colorado

February 27 and 28, 1979 seem like far distant dates to most of us, but it is not too early to start making your plans to attend the joint SCTE/IEEE Reliability Conference in Denver.

System reliability, or the lack thereof, is rightfully of major concern to the people who are daily involved in CATV. A highly reliable system, along with well trained technical and management personnel to maintain it properly, automatically means smaller operating costs, more and happier subscribers and less work and headaches for everyone concerned. System reliability also improves something close to any manager's heart, the bottom line—assuming such a thing exists.

Our conference this year will be aimed more at system design, construction, maintenance and operation than at the individual components of which it is constructed. We are planning to have speakers who will primarily be engineers and technicians that are involved in the daily struggle and who can speak from their experience. Some of the panelists we are inviting are people you may never have heard speak but who have knowledge to share. Some of the other names are household words in CATV.

We will be trying to make this conference one which will provide something of interest to nearly everyone in any segment of the industry and with the widest possible diversity. Selecting topics to be covered from among the many which have been suggested can get to be quite a chore. We would appreciate any help or suggestions that anyone would care to offer. Some of the topics which have been proposed to date are as follows:

a) System reliability through proper system design.
b) Increasing system life through improved construction standards.
c) Improved reliability through technical training.
d) Does preventive maintenance really save money?
e) Increasing reliability and acceptance of fiberoptics.
f) Can commercial data be reliably carried on your systems?
g) Improving the reliability and quality of satellite reception.
h) Are converters a liability or an asset?
i) Increasing microwave reliability.
j) Improved test equipment and test procedures.
k) Major improvements in standby powering reliability.
l) Keeping records of maintenance can save you money.
m) Is available equipment becoming more reliable?

As you can see, interest has been shown in a great number of subject areas. We would like to select the ones in which the most interest is shown, so, if you have a favorite or two, let us know as soon as possible.

W. Sherwood (Bud) Campbell, director of Development Projects for ATC, has been selected as co-chairman to represent the IEEE, and I will be serving as co-chairman for the SCTE. We are now hard at work trying to select the appropriate topics, set up the panels and arrange for speakers and moderators. Since we both work in the same office, communication between us or between you and us should be greatly simplified this year.

Some people have already volunteered their talents. Jerry Bahr, vice president of Mission Cable (Cox) in El Cajon, California, has tentatively agreed to head up a panel on technical training and education. Jerry has overall responsibility for one of the very few really comprehensive in-house technical training schools that exists today. He, in turn, will be recruiting other speakers who are knowledgeable in technical education to serve as his panel members.

This year we are trying to get some of the women who work in CATV to be on the panels. Two of them now have also tentatively agreed to participate on panels on system design. Judy Scharf is manager of system design for TCI and Barb Lukens fills the same position for ATC. Both are experts in their fields and are also good at public speaking. We will add others who are equally good to the panel.

Overall responsibility for handling the million and one big and little details necessary to a successful conference will again be in Judy Baer's very capable hands. Without Judy, putting on a meeting of this size and scope would be extremely difficult, if not impossible, for this year's chairmen.

Bud and I are actively seeking suggestions on the subjects to be covered and for volunteer panelists and moderators. If any of you would like to volunteer to share your expertise on any or all subjects pertaining to reliability, or have preferences on topics to be covered, please give Bud or me a call at (303) 773-3411 or write to us at: American Television and Communications Corporation, 20 Inverness Place East, Englewood, Colorado 80112.

But first of all, write down the dates of the conference and start making plans to join us here in Denver on February 27 and 28, 1979. Without you, it won't be much of a conference.

Governor Shapp Named First SCTE Honorary Member During NJCTA Meeting

ATLANTIC CITY, NEW JERSEY—The Honorable Milton J. Shapp, governor of the state of Pennsylvania, was presented with the first Honorary Membership in the Society of Cable Television Engineers during a meeting of the New Jersey Cable Television Association in Atlantic City, New Jersey, August 10, 1978.

Shapp, a CATV industry pioneer, founder of Jerrold Electronics Corp., and an engineer, received the first Honorary Membership in SCTE from a delegation that included Robert Bilodeau, president of SCTE and vice-president of the NJCTA; Frank Scarpa, president of the NJCTA, a member of SCTE and a director of the National Cable Television Association; pioneer Pennsylvania CATV system operator Joseph Gans, a charter member of SCTE and past director of NCTA; SCTE member Marty Moran of Toner Cable Equipment Co., Inc., NJCTA associate director; and Edward Horowitz, treasurer of SCTE and president of the Mid-Atlantic SCTE Chapter.

Governor Shapp spoke at a luncheon August 10 to honor his long-time friend Hugh McGinty, another CATV industry pioneer. NCTA director Bill Strange of Sammons Communications presented Suburban Cablevision with a programming award during the crowded program. Bilodeau is vice president and a director of Suburban. Immediately after the formal luncheon meeting the SCTE delegation made the presentation to Governor Shapp. A group, led by Scarpa and Gans, will visit the Governor's office during the Pennsylvania CATV Association meeting in late September to present him with a special plaque.

SCTE Conference on CATV Construction

WASHINGTON, D.C.—The Society of Cable Television Engineers has scheduled a Southcentral SCTE regional technical conference centering on cable television system construction, October 23-24, 1978 at the Hilton Airport Inn in Nashville, Tennessee. The two-day program will feature sessions on new construction, re-build and extensions, make-ready, scheduling, grounding and bonding and balancing. This Southcentral regional conference will be the first in a series of seven programs sponsored by SCTE throughout 1978-79 in Melbourne, Florida; Phoenix, Arizona; Portland, Oregon; Madison, Wisconsin; New England and Washington, D.C. Each conference has been developed around a specific aspect of cable television plant operations.

Advance registration for the conference is $50 to Society members. Registration includes the two-day program, lunches, admission to table-top exhibits and a hospitality event. Certificates of Completion will be awarded those participants attending the entire program. Non-members may attend for a $75 registration fee.

For further information, please contact the Society of Cable Television Engineers, 1100 Seventeenth Street Northwest, Washington, D.C. 20036, (202) 659-2131.

SCTE Cable TV Engineers Set 1978-79 Conference Series Schedule

WASHINGTON, D.C.—Robert Bilodeau, president of the SCTE, has announced a program of eight CATV technical meetings sponsored by SCTE beginning in October 1978 and running through September of 1979. The program includes seven SCTE regional technical conferences and the Fourth Annual SCTE/IEEE CATV Reliability Conference.

The SCTE regional technical conferences begin in **Nashville, Tennessee** on **October 23-24, 1978.** The following dates and locations are **Melbourne, Florida** on **January 8-9, 1979; Phoenix, Arizona March 5-6, 1979; Portland, Oregon April 23-24, 1979; St. Paul, Minnesota June 18-19, 1979; Boston, Massachusetts August 20-21, 1979;** and **Washington, D.C. September 10-11, 1979.** The conferences will include table-top exhibits at each meeting. Registration for the individual conferences is set at $50 for each two-day program, including luncheons, hospitality and exhibits.

The 1979 SCTE/IEEE CATV Reliability Conference, a meeting co-sponsored by SCTE and the Broadcast, Cable, and Consumer Electronics Society of the Institute of Electrical and Electronic Engineers will be held in Denver, Colorado on February 27-28, 1979. Co-chairmen of the meeting are Glenn Chambers, CATV project engineer and W. Sherwood (Bud) Campbell, director of development projects, both with American Television and Communications in the Denver area. Chambers is a charter member of SCTE; member of IEEE and past winner of the SCTE Member of the Year award. Campbell is a member of IEEE, serves as an observer to the IEEE/BCCES Cable Administrative Committee and is a member of SCTE. In keeping with the successful conference atmosphere of the past three annual CATV Reliability Conferences, there will be no exhibits at the meeting in Denver. Numerous manufacturing representatives, however, will present important technical papers through the course of the event. SCTE will also hold its 1979 Annual Membership Meeting, introduce new officers and directors and announce a number of members who will be elected to senior member grade.

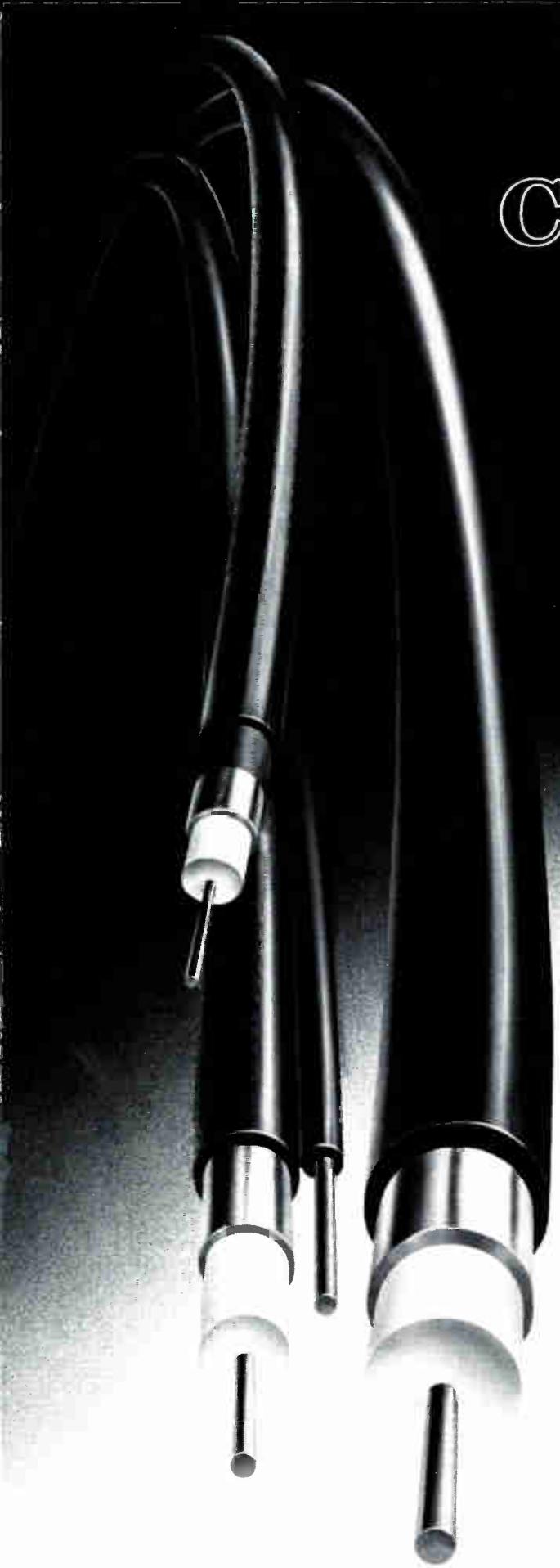
SCTE Joins National Safety Council

WASHINGTON, D.C.—The Society of Cable Television Engineers has joined the National Safety Council in order to be able to distribute safety information to the cable industry and take advantage of numerous safety consulting services provided by the Council.

As a member of the NSC, SCTE will be able to introduce awards programs recognized by NSC, have access to statistical information and records maintained by NSC and purchase materials at discount prices.

Luff on Training And Education

WASHINGTON, D.C.—Robert Luff, SCTE member and NCTA's vice president of engineering, has been traveling throughout the country speaking at SCTE industry technical meetings. The thrust of his message is that CATV technicians and engineers have an increasing responsibility to themselves and the cable industry to seek out training and education resources.



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the BOOTLEGGER

By Raleigh B. Stelle, III and
William P. Dawson
Texscan Corporation
Indianapolis, Indiana

In the parlance of cable TV, a bootlegger is a thief! He may or may not recognize the seriousness of his illegal hookup. In fact, the state in which he lives determines the extent of his criminality. But more and more states are passing the "theft of service" provision as related to cable TV. The situation in that respect is improving.

In the August 1 issue of *Variety* magazine, there appeared an article about the Newburgh, New York, Teleprompter system and the approach they took to cure their bootleg problems. The discoverer of this technique was Ron Simon of Teleprompter. It is one of those things which is so obvious (once you see it), everyone says, "Now why didn't I think of that?" Congratulations, Ron!

The technique is the application of swept return loss measurement to the "tap end" of a drop cable. With practice, a technician can tell a great deal about what is connected to the far end of a drop.

The characteristic return loss signature of an open drop is shown in Figure 1. This display was obtained with the sweep generator and scope setup shown in Figure 8.

Another approach which works well is a broadband noise source, an RF bridge and a spectrum analyzer, Figure 1A. The hookup is shown in Figure 9. The only difference encountered is the log display as opposed to a linear display.

In Figure 1, notice the closely spaced ripple pattern appearing in a "lossy" type curve. If the velocity of propagation of the drop cable is known, the length of the drop cable can be calculated fairly accurately by the equation:

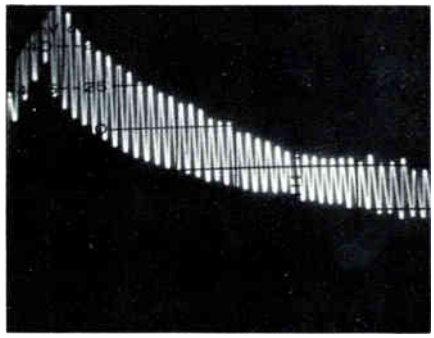

Figure 1: sweep response—open drop.

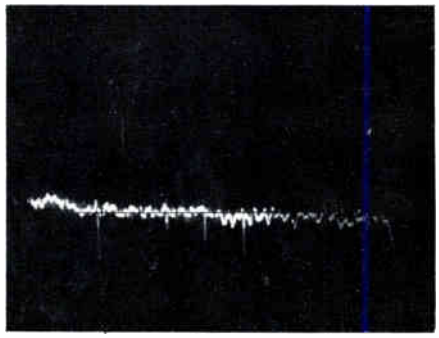

Figure 1A: analyzer response—open drop.

$$L = \frac{492 \times Vp \times N \text{ cycles}}{\text{MHz spacing}}$$

492 = Constant
Vp = Velocity of Propagation
N = Number of cycles between markers
MHz_S = Frequency spacing of markers
L = Length of drop in feet

This technique will also allow the location of a short or open to be determined when sweeping a span of cable or spool of cable.

In Figures 2 and 2A we see a response with low return loss at certain frequencies. Note particularly the lack of return signal (good match) occurring at channel 3. This photograph was made with a TV set connected to our typical drop. Here is a key point! Not only can the operator tell that some device is connected to the far end of the drop, he can tell where it is tuned! And the TV set need not be "on" at the time!

Figures 3, 3A, 4 and 4A are photos of a trace showing a good match in the midband. This suggests the presence in the circuit of a converter and may indicate an effort to bypass the "pay" security. This technique does not work if the converter is turned off! Fortunately, most converters simply plug into the AC supply and remain "on" continually. Some converter designs may show multiple responses, as shown in Figures 4 and 4A.

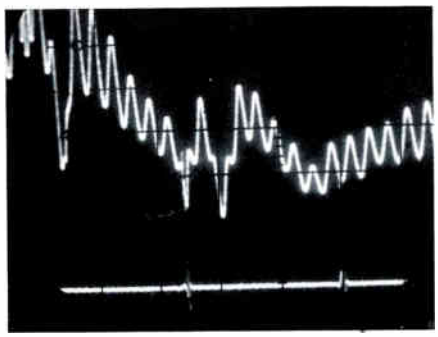

Figure 2: sweep response—TV set on channel 3. Note additional response at 50 MHz, a quirk of the tuner.

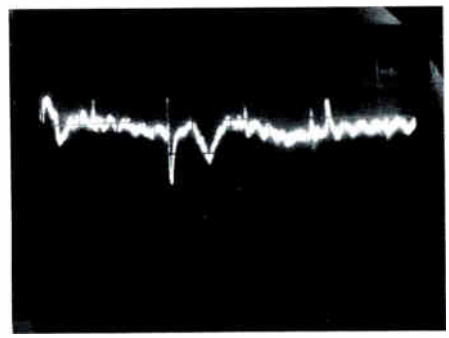

Figure 2A: analyzer response—TV set on channel 3. Note additional response at 50 MHz, and TV local oscillator.

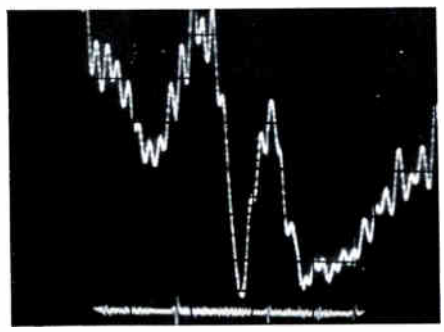

Figure 3: sweep response—converter brand Q turned to channel H (midband).

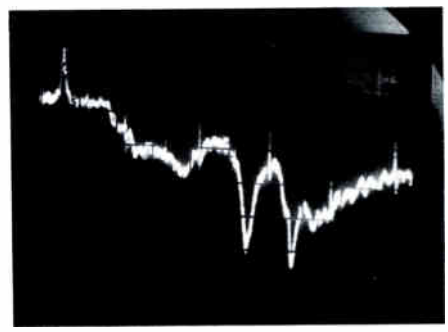

Figure 3A: analyzer response—converter brand Z tuned to channel H (midband).

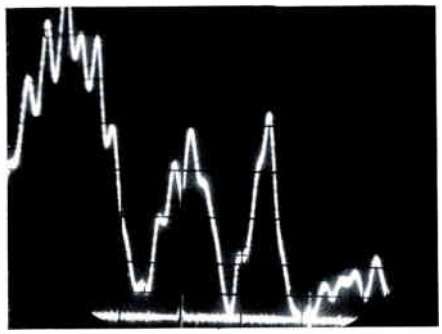

Figure 4: sweep response—converter brand X. Note multiple response pattern.

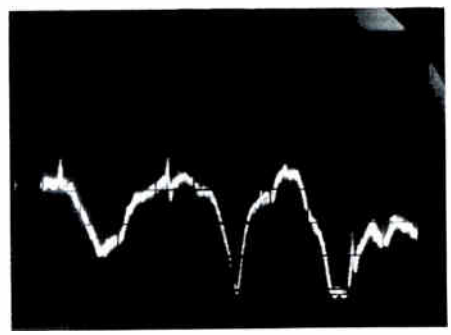

Figure 4A: analyzer response—converter brand X. Note multiple response pattern.

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Loop through systems choose IT-1

Wall mounted IT-1s each have a unique address, programmed prior to installation, enabling the service to be controlled from one central location. Each IT-1 can be monitored to verify correct operation, allowing detection of units which have been removed or tampered with. Mechanical security is offered using tamper proof screws. One cable carries signal, power and control signals.

- **Requires only one cable for operation**
- **Individual control on loop system without access problems**
- **Fits any single gang electrical box**
- **Stainless steel plate**
- **Tamper detection circuitry**
- **Compatible with pay services**
- **3 remote control options to suit any operational requirement**
- **Standby memory power maintains system conditions during AC power outages**

Pay only systems choose IT-1G

These tap offs provide switching of one pay channel within a wall plate. Basic service is passed uninterrupted. The IT-1G is ideal for MDS, hotels and motels, where basic service is optional. Other features are identical to those of the IT-1.

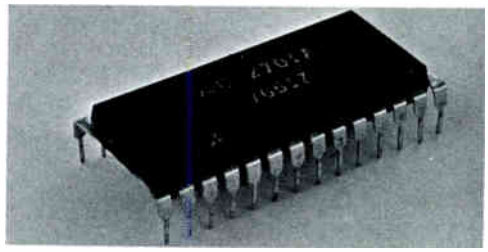
- **Requires only one cable for operation**
- **Designed for hotel and motel loop through systems**
- **Basic service uninterrupted**
- **One switchable pay channel**
- **Other features similar to our field proven IT-1**

Home run systems choose IT-6

The IT-6 provides six independtently switchable outputs from one common input. Multi-input options are available. Designed for home run apartment distribution and pay systems. Each port has a unique address. Combine IT-6s to provide an unlimited number of pay channels or multi-tier services. Control existing home run systems by installing our IT6-6 in series with existing wiring. Contol two services to one customer with our IT6-3.

- **Remote or local control of multi-tier systems**
- **Each output fully addressable**
- **Pay service options**
- **Lowpower consumption**
- **Combine units to provide unlimited pay or multi-tier service**
- **Standby memory power maintains system condition during AC power outages**

The brain of our intelligent tap is our unique custom PMOS LSI logic control chip



Call Dave Fear and find out how our intelligent addressables can increase your revenue!

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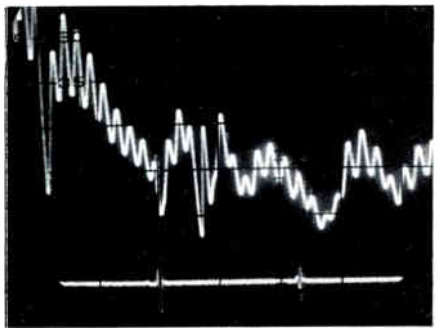


Figure 5: sweep response—channel 4 with "TEST" type trap.

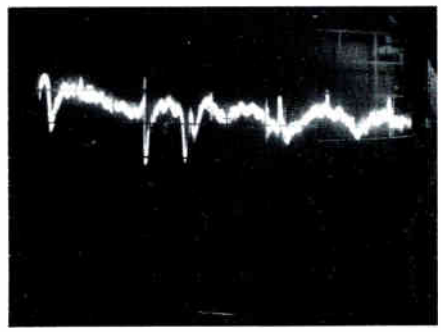


Figure 5A: analyzer response—channel 4 with trap.

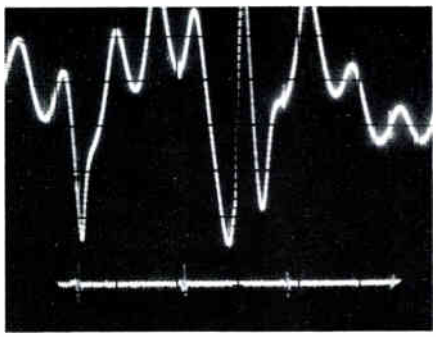


Figure 6: magnified sweep response—with "TEST" type trap. Note narrowed sweep width.

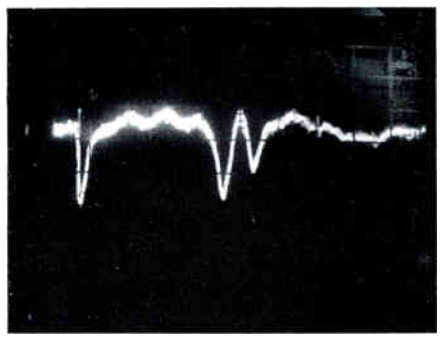


Figure 6A: magnified analyzer response—with trap - narrow sweep width.

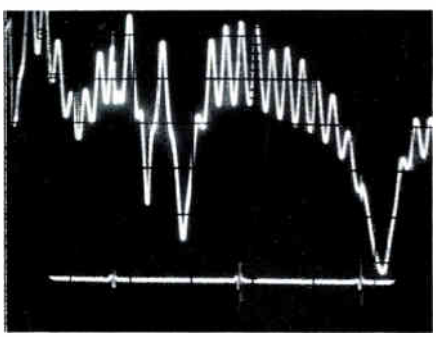


Figure 7: sweep response—TV on channel 4 antenna connected to transformer resonant at 160 MHz.

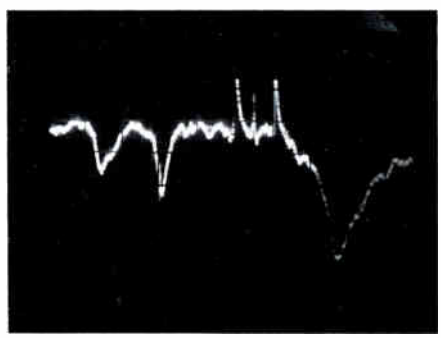


Figure 7A. analyzer response—TV channel 4 and antenna resonant at 160 MHz.

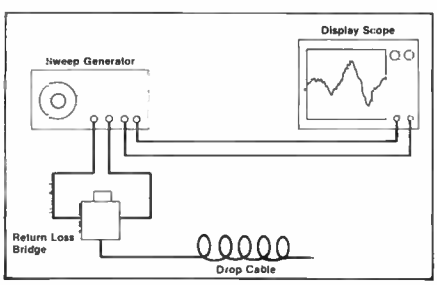


Figure 8: equipment setup for swept return loss measurement.

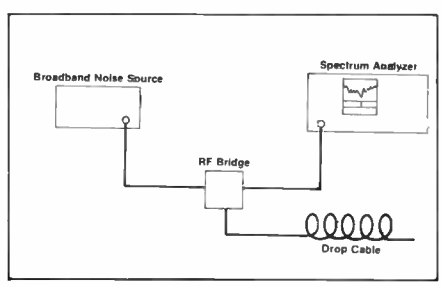


Figure 9: alternate setup using noise sound and spectrum analyzer.

Figures 5, 5A, 6 and 6A depict the presence of a trap in the drop circuit. This trace is perhaps the most difficult to interpret due to its narrow bandwidth.

Figures 7 and 7A depict a TV set with external antenna connected. The frequency of the notch will indicate where the antenna is resonant.

The equipment required is common enough and your system may already possess it. You need a sweep generator, scope and return loss bridge connected in the normal fashion. Merely connect the bridge output to the suspected drop and check. Yes, you have to disconnect the cable from the drop. If you're quick, you will see the channel responses jump across the screen as your bootlegger tries to find a watchable channel. Presently, the equipment for this test is large and cumbersome and certainly not suitable for bucket operation, but smaller and lighter gear is on the horizon.

Some systems contacted have ventured the opinion that the effort to discover bootleggers is not worth the return. Perhaps this would be true if you had to catch and prosecute every offender. Fortunately, this is not the case! Teleprompter was very sharp in the way they handled their PR in this case. They first ran articles in the local papers with headlines like . . . "purchases equipment to detect illegal hookups" and appropriate photos. They announced an amnesty period during which any illegal hookups could become "legal" with no further action. At the end of that time, anyone caught with an illegal connection would be prosecuted under state law . . . with penalties of . . . According to the *Variety* article, the Newburgh system was swamped with calls for "hookups"!

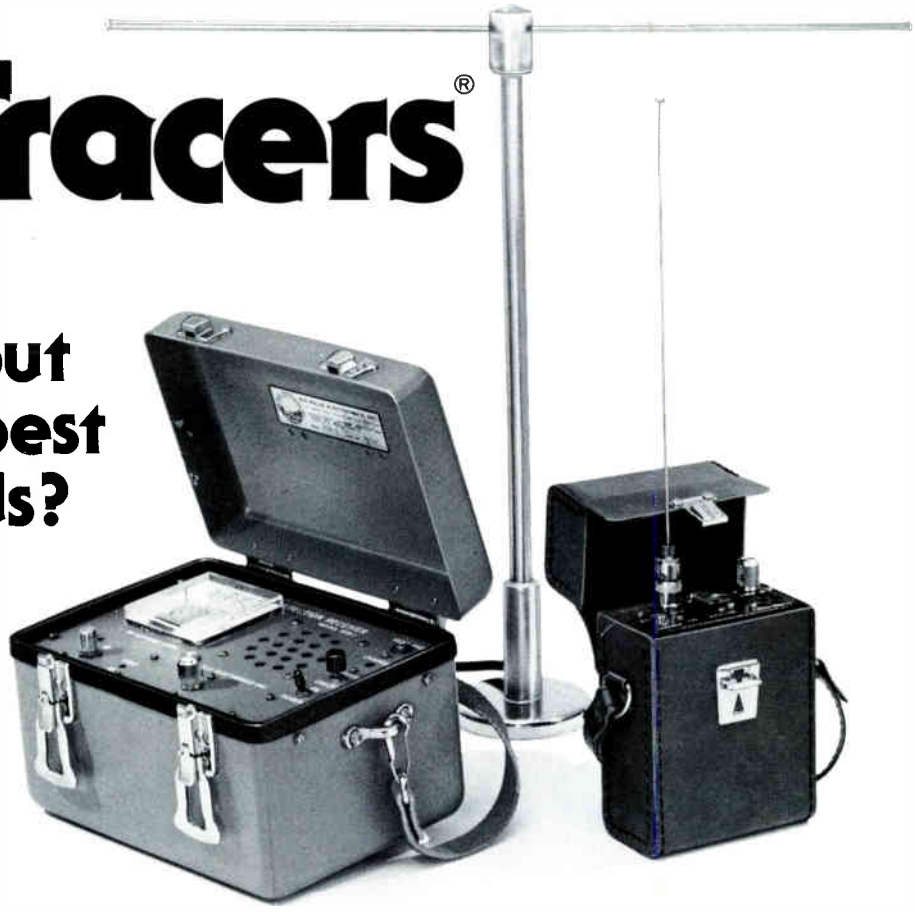
How many bootleggers do you have in your system? That depends on many factors, but it seems that the percentage of bootleggers versus paid subscribers must vary with your percent penetration. If you have 95 percent penetration, you have few, if any, illegals. But, if your penetration is only 20-30 percent, you have a very high probability for many, many bootleggers.

The CATV industry owes Ron Simon and Teleprompter a vote of thanks for this insight!

Ed. Note: If you or your system have any techniques which will benefit the industry, don't be bashful, let C/ED know! C·ED

The Tracers®

Both detect RF leakage, but which one is best for your needs?



Is RF leakage in your CATV cable system exceeding FCC limits? Is it an indication of present or potential mechanical failure which could result in costly repairs or FCC violations?

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

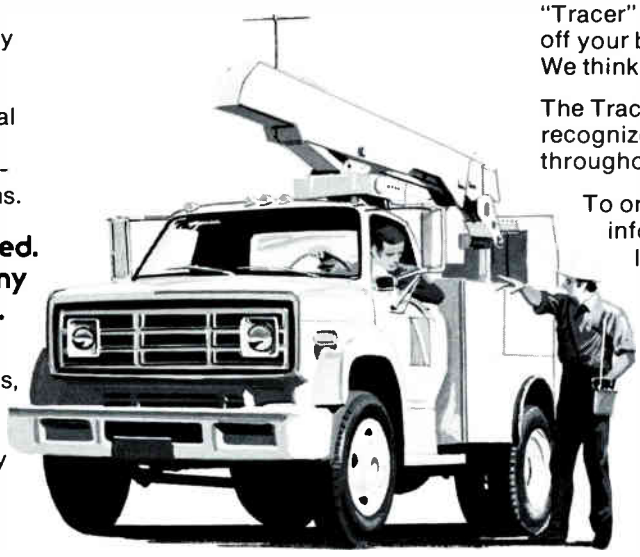
No separate transmitter required. Both receivers operate with any cable TV video or pilot carrier.

Both are rugged, self-contained, powered by rechargeable batteries, offer a crystal controlled local oscillator with front panel frequency trim adjustment and many other features.

The "Tracer" Model TR-1

is a calibrated receiver system which assures absolute compliance with FCC regulated radiation limits. Its 40 dB logged scale is accurate to ±1 dB.

The system includes tuned dipole antenna with magnetic base, head phones and AC adapter/charger. Gell Cell batteries provide up to 50 hours of operation on a single charge. Weight: only 5 lbs.



The "Tracer" Model TR-2

is an economical field unit that can detect and locate RF leakage and can measure radiation with sufficient accuracy for general trouble shooting. Ni-Cad batteries provide up to 15 hours of use on a single charge. Includes AC adapter/charger. Weighs only 1.5 lbs.

"Tracer" TR-2 . . . for locating RF leaks **Only $300 ea.**
"Tracer" TR-1 . . . to keep the FCC off your back. **Only $550 ea.**
We think you'll want them both.

The Tracers are built by VITEK, recognized for quality and reliability throughout the industry.

To order or for additional information, call or write:
Instruments Division,
VITEK Electronics, Inc.
200 Wood Avenue,
Middlesex, N.J. 08846
(201) 469-9400

VITEK

*The Tracer is a trademark of Vitek Electronics, Inc.

An Open Challenge

BRONX, NEW YORK—Don Edelman, vice president of RMS Electronics, Inc., is promoting a challenge to all competitors to a comparative analysis of 75-300 ohm matching transformer "specmanship" this fall. This open challenge was sent to every company on RMS' full mailing list.

Edelman stated, "We have the best matching transformer and we openly challenge anyone to prove they have a better one than ours." RMS is using its CA-2500 as its weapon for this test.

CATJ laboratories will conduct the tests and the results will be reported in *C-ED* and *CATJ* magazines. The tests will be monitored by a number of non-involved participants and observers.

The transformers will be tested on an equivalent sampling basis. Competitors have been asked to ship 10,000 unopened, off-the-shelf transformers to the CATA/CATJ lab within seven days of receipt of the challenge letter, in order to ensure that no one will attempt to "hand pick" any transformers. At the CATJ lab the cartons will be opened under impartial observer inspection and a small quantity of these transformers will be randomly selected for the actual tests.

All sampled transformers will be placed into individual envelopes, marked with a sample number and the envelopes sealed. This will all be done with impartial cable personnel rounded up by CATA/CATJ.

The testing will include electrical and mechanical specifications, quality of construction, mechanical durability and user convenience.

When the results are in, *C-ED* and *CATJ* magazines will publish the findings in the same publication month.

Cable Industry Supports Expanding CARS Frequency

WASHINGTON, D.C.—In response to the FCC's Notice of Proposed Rulemaking and Notice of Inquiry, NCTA and thirteen other parties filed initial comments in this proceeding. The comments can be separated into two distinct groups—cable and broadcast. The cable interests overwhelmingly support the commission's basic proposals to expand the CARS frequency allocations and most approve of the commission's concept to improve spectrum efficiency but disagree with the specific commission scheme and suggest other attractive alternatives. Those parties associated with the broadcast industry oppose the commission's proposals at every turn on emotional basis.

In its initial comments, NCTA supported the majority of the commission's notice to expand the existing Cable Television Relay Service (CARS) frequency allocation from 12.7-12.95 GHz to 12.7-13.2 GHz. However, NCTA felt the proceeding was seriously flawed from a technical, spectrum management and overall policy standpoint by considering as separate, instead of as a whole, the private, television microwave services intended for public use—be they cable, translator or broadcast. In this light, NCTA urged that the commission adopt the instant proposed expansion of the 12 GHz CARS band and issue a Further Notice of Rulemaking considering CARS eligibility on a similar co-equal basis in the other broadcast auxillary bands at 1900-2100, 2450-2500 MHz (Band A) and 6875-7125 MHz (Band B).

NCTA supported the commission's intent to more efficiently use the 12 GHz band by exploring the possible revision of certain technical rules. However, they opposed the specific commission plan to reduce across-the-board the maximum CARS bandwidth from the present 25 MHz to 12.5 MHz.

Short Course Seminars from Integrated Computer Systems

SANTA MONICA, CALIFORNIA—Integrated Computer Systems is an organization whose purpose is continuing education in high technology fields. The following intensive short courses offered are:

Modern Methods of Digital Signal Processing — #412, four days, $695.

- Washington, D.C. Oct. 10-13
- Philadelphia, Pa. Oct. 31-Nov. 3
- Boston, Ma. Dec. 5-8
- Los Angeles, Ca. Dec. 12-15
- Washington, D.C. Jan. 16-19
- New York, N.Y. Feb. 20-23

Fiberoptic Communication Systems — #440, four days, $695 • San Diego, Ca. Oct. 3-6

Fees include lectures, extensive course materials, luncheons and coffee breaks. Team/group discounts are available for three or more attendees from the same company if invoiced at the same time.

For additional information and free brochures, contact Kim K. Sanson, program manager, Integrated Computer Systems, Inc., 3304 Pico Blvd., Santa Monica, California 90405, (213) 450-2060.

Texscan Training Seminars

INDIANAPOLIS, INDIANA—Texscan Corporation continues its schedule of technical seminars. These seminars are five days each and cover all facets of CATV system operation as well as tests and measurements.

Tuition is $150.00 per enrollee. Location and dates: • October 9-13, Dallas; 16-19, Atlanta • November 6-10, Los Angeles area; 13-17, Seattle • December 4-8, Western Canada; 11-15, Eastern Canada.

Lunch is provided from 12:15 to 1:15 PM each day. There are two coffee breaks and the sessions close at 5:00 PM.

For additional information, contact Raleigh Stelle, Texscan Corporation, 2446 N. Shadeland Avenue, Indianapolis, Indiana 46219, (317) 357-8781.

George Washington University Offers Communications Courses

WASHINGTON, D.C.—The George Washington University is offering courses to meet the needs of the communications systems engineer and the supervisory level engineer.

A seminar entitled, "Phase Locked Loops" is scheduled for February 12-13, 1979. This course is targeted for engineers involved in the design of communications systems. The presentation will cover the design of phase locked loop systems and in-depth discussions of its operations. Although there is no prerequisite for the course, an undergraduate course in electronics, communications or field experience would be helpful. The fee for the course is $300.

"Digital Encoding and Processing

(Cont'd on page 21)

(Cont'd from page 16)

of Voice and Video" is a three-day course slated for February 27-March 1, 1979. This seminar is structured to meet the needs of engineers involved in processing digitally encoded voice and video signals. The objective is to provide the engineer with an understanding of the concepts employed, the techniques used and future developments. Topics include a comparison of PCM adaptive delta modulation linear predictive coding to encode voice signals. The fee for the seminar is $395.

For further information, write to the Director, Continuing Engineering Education, George Washington University, Washington, D.C. 20052, or call (202) 676-6106.

NCTA Urges Immediate FCC Action on Huge Certification Backlog

WASHINGTON, D.C.—In a petition filed recently, the National Cable Television Association urged that the Federal Communications Commission take immediate action on a backlog of over 1,500 certificate of compliance applications pending in the FCC Cable Television Bureau.

"In apparent anticipation of the elimination of the entire certification process, the Certificate of Compliance Division staff has been cut from 25 attorneys to only seven," NCTA president Robert L. Schmidt said, "so cable systems which filed months or even years ago are still waiting for action.

"A simple administrative backlog is delaying expanded services to consumers and imposing revenue losses on cable operators across the country," Schmidt noted.

Cable systems must be granted certificates of compliance with FCC rules before commencing operations or adding new broadcast television signals to their services.

NCTA Supports Elimination of Certificate of Compliance Process

WASHINGTON, D.C.—NCTA strongly supports the FCC's proposed elimination of the Certificate of Compliance process. This process, according to NCTA, is an administrative burden on both the cable industry and the FCC. It is not necessary for purposes of federal regulation.

In place of the certification process, NCTA supports a registration system such as that which now applies to a cable television system with less than 1,000 subscribers. Systems commencing operation would file a registration statement containing the basic information now filed pursuant to 47 C.F.R. §76.10. If service is extended into a new franchise area, then at that time the registration would be updated so as to notify the commission.

Service of the registration should be required to be made only on television broadcast stations whose signals must be carried ("must-carries") by the cable operator. There is no need to require service on local government entities. It is the local government which franchises the cable system.

There is a useful purpose served by the commission's receiving and compiling current data and statistics on cable television operations. Such information would be submitted to the commission by updated registration and through the filing of FCC annual forms, as is now the case. Thus, the means for obtaining information on cable operations are already in place.

Video Weather Radar by Telephone

By J. Cauldwell, General Manager; R. Richards, Sales Manager; and R. Weaver, Chief Engineer
Arvin/CATV an Arvin Company
Carroll, Ohio

Up-to-the minute radar information of precipitation is available from the U.S. Government, NOAA, and the National Weather Service by dial-up telephone. This new development by the CATV Division of Arvin converts the telephone signal directly to NTSC video. Radar information is available from 37 NOAA radar sites. The Arvin TW-1 Tel-Weather gives colorized output which displays the location and intensity of rain, hail, snow, thunderstorms, hurricanes and potential tornado cells.

The National Oceanographic and Atmospheric Administration (NOAA) maintains 37 long-range systems distributed throughout 26 states. (Table 1). The output from these radars has been available on a dial-up basis for several years; however, the equipment available for reception of the information has not met the requirements of video distributors. The available facsimile receivers gave poor output, required mechanical maintenance, and used special chemically treated paper to obtain printed copy. The copy had to be set up and camera scanned to obtain video output. The CATV Division of Arvin in Carroll, Ohio has produced a scan converter which receives the facsimile signal, enters it into a solid state memory bank, and then reads the memory at video rates. The output is colorized and has a rotating radial line to provide animation.

TABLE I
Table of NOAA National Weather Service WBRR radar sites.

State	Location
Alabama	Centreville
Colorado	Limon
Florida	Miami
	Apalachicola
	Pensacola
Georgia	Athens
	Waycross
Illinois	Marseilles
Iowa	Des Moines
Kansas	Wichita
	Garden City
Louisiana	Slidell
Maine	Brunswick
Maryland	Patuxent River
Massachusetts	Chatham
Michigan	Detroit
Missouri	Kansas City
	St. Louis
	Monett
Nebraska	Alliance
New Jersey	Atlantic City
New York	New York
	Buffalo
North Carolina	Cape Hatteras
Ohio	Cincinnati
Oklahoma	Oklahoma City
Pennsylvania	Pittsburgh
South Carolina	Charleston
South Dakota	Huron
Tennessee	Bristol
	Nashville
	Memphis
Texas	Galveston
	Stephenville
	Hondo
	Brownsville
Wisconsin	Neenah

NOAA and the National Weather Service (NWS) make available weather information to non-government users. This is referred to as the Extension Service. In order to qualify for this free service, potential users are required to sign no-cost agreements covering the use of the service. Copies of agreements are obtained from National Weather Service, Grammax Building, Silver Spring, Maryland.

To make weather radar readily available without excessive line costs, NWS has developed a system which reduces the information to a 3 kHz signal. This signal can be accessed from a remote point by dialing an appropriate phone number. The system is designated "WBRR" - Weather Bureau Remote Radar.

At the radar station, live radar is obtained on a CRT. NWS meterologists place a plastic overlay on the CRT and make notations on the weather systems observed. The overlay contains geographical outlines to identify the location of precipitation and storms. The radar contains an electronic range marking system which produces rings every 25 miles on the radar scope centered on the radar site. The range of observation is 125 nautical miles (145 statute miles) in all directions from the radar site and the type of information added to the overlay by the NWS meterologists is shown in the inset. The live radar scope, with its range markers and overlay, is continuously observed by a slow-scan camera. The camera scans at 480 lines per minute, 800 lines per frame. (15 lines retrace included). The output from the slow scan camera is processed in an NWS facsimile signal generator. Output from the signal generator is AM and is designed for dedicated phone line connection. Users who require continuously updated information may obtain permission to connect to this output via a dedicated line.

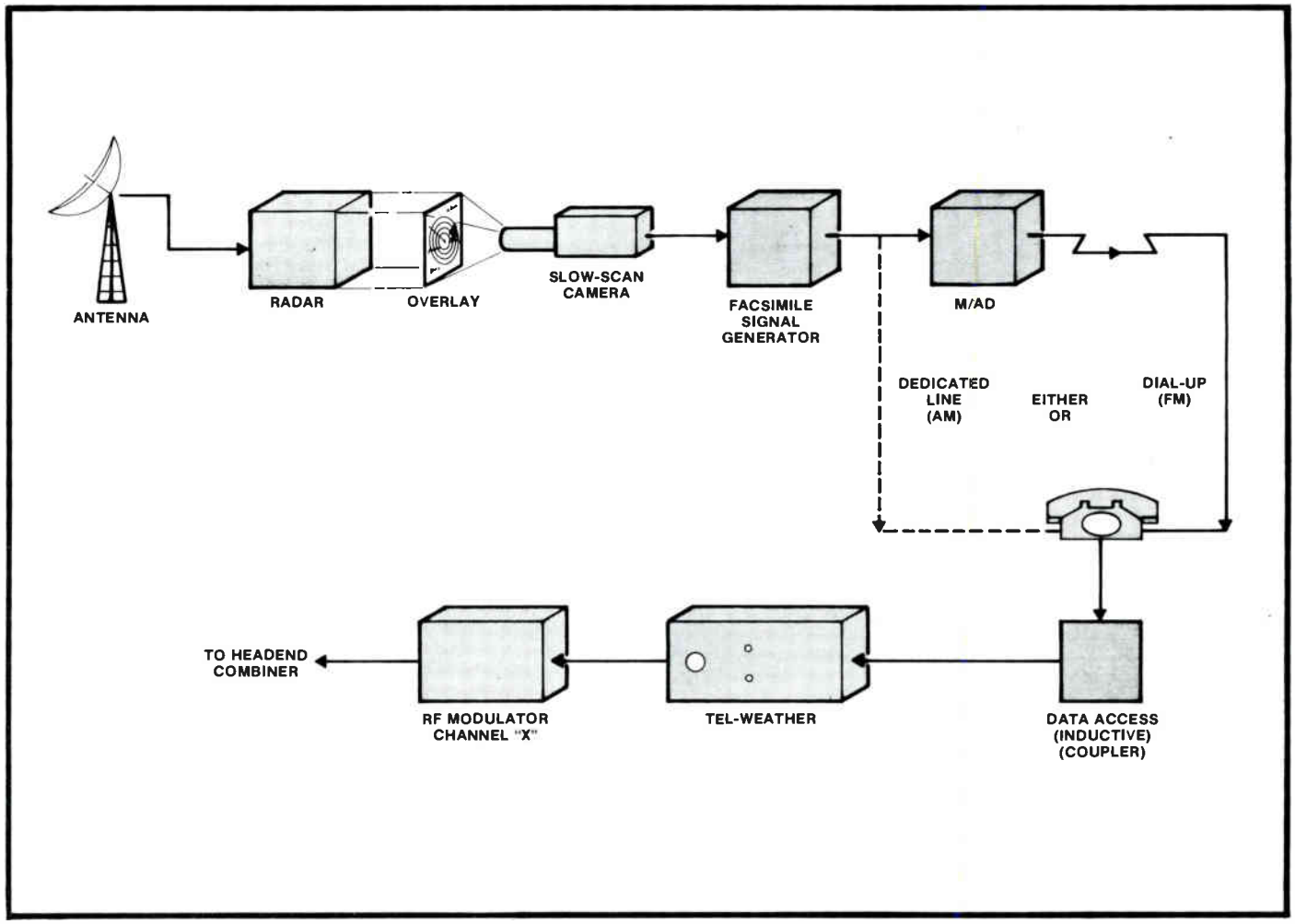
The output from the facsimile signal generator is also fed to a Multiple Access Device (MAD) which converts the signal to FM. The MAD may be addressed by a dial-up phone call and will automatically disconnect the phone call after two complete pictures have been transmitted.

At the receiving point a telephone is connected to the Arvin TW-1 Tel-Weather by a data access modem or an inductive coupler. Presence of a line signal activates the Tel-Weather memory which collects the new information and erases its prior memory. The memory output is continuously scanned to provide video signal. The video signal is colorized so that the background is blue and radar echoes are shown as orange-yellow. Intensity of precipitation, which is transmitted as shades of gray, appears as shading of the orange-yellow.

To provide animation a radial rotating scan line is artificially generated as part of the output video signal. The output of the unit is composite color video (NTSC format) which can be connected directly to a video monitor or TV modulator.

The Arvin Tel-Weather will accept either AM or FM signals. With AM signals via a dedicated line, the memory of the Tel-Weather is updated continuously line-by-line. At all times, the Tel-Weather gives a complete radar picture. Time for complete input scan is 100 seconds. Output is at the standard NTSC 60 frames per second. Changes in information are immediately visible to the viewer.

For dial-up operation the incoming signal is entered into the memory and all entered information is immediately available. After one complete frame the phone line will be disconnected automatically by the NWS to keep users from tying up the system. During heavy storms the user is always assured of gaining access to the radar. The last received frame remains in the Tel-Weather memory and is continously converted to video.



Access to NOAA WBRR Radar via Tel-Weather.

Rain and Snow Patterns

Precipitation such as rain, hail, and snow appear as gray or yellow spots (echoes) on the radarscope picture. Lightest precipitation appears as light yellow; heavier is brighter; and still heavier is unshaded (may appear as a hole in the yellow echo). This sequence of shades repeats itself for three levels of still heavier precipitation.

Map Overlay

The radar station is in the center of the screen. Rings drawn around the radar station are range markers spaced 25 nautical miles apart. When there are five rings, the radar beam is scanning a distance of 125 nautical miles from the station. Sometimes the radar operator will switch to 250 miles radius (ten rings) to track distant storms which may affect the area. Rivers, coastlines, and other prominent geographical features are outlined on the map. State boundaries are usually shown as dotted lines.

Weather Notes

The radar station meteorologist writes notes on the map periodically to explain weather conditions and trends. These notes are abbreviated into a code to save space on the screen.

Ground Clutter

There will always be reflections of the radar beam from ground level objects such as buildings, trees and hillsides. This creates an echo pattern close to the transmitter which looks the same as a storm. The "radar watcher" should become familiar with this pattern to distinguish it from precipitation.

Typical Weather Symbols

Character of Echoes

	Code
Single Echo (cell of precipitation)	C
Area (group of echoes)	AREA
Line (string of echoes forming a line as a squall line)	LN
Layer of precipitation above ground	LYR

Precipitation Symbols

Ice pellets	IP
Drizzle	L
Rain Showers	RW
Rain	R
Snow Showers	SW
Thunderstorms	T
Snow	S
Hail	A
Freezing rain	ZR
Freezing drizzle	ZL

Movement

Movement of cells or areas of cells are noted to nearest 10 degrees from which the storm is moving. Speed is in nautical miles per hour. Individual cells often move from a slightly different direction than the entire area of cells. 2715 C 2325 means that the area is moving from 270 degrees at 15 nautical miles per hour (knots) and the cells within are traveling from 230 degrees at 25 knots. For example, a squall line may be moving from west to east, but it may also be moving north as the cells within the line move north.

Echo Tops

Maximum height of detectable moisture in hundreds of feet above mean sea level. MT 550 means maximum tops at 55,000 feet altitude.

Anomalous Propagation

This means that the echo is not caused by a storm cell.

Intensity of Rain

Light	-
Moderate	(No sign)
Heavy	+
Very Heavy	+ +
Intense	X
Extreme	XX
Unknown	U

Intensity Trend

This indicates whether the storm intensity is increasing or decreasing.

Increasing	/+
Unchanging	/NC
Decreasing	/-
New	New

Time of Report

The radar picture is updated every 90 seconds, but notes (reports) on the radarscope are made as needed. The time of report is noted in Greenwich Mean Time (in England) on a 24-hour clock. 0000Z is midnight. 1440Z means the report was made at 2:40 P.M., Greenwich Mean Time (Z).

To Convert from Greenwich to Local Time:

Daylight	Subtract	Standard Time	Subtract
Eastern	4 Hours	Eastern	5 Hours
Central	5 Hours	Central	6 Hours
Mountain	6 Hours	Mountain	7 Hours
Pacific	7 Hours	Pacific	8 Hours

Example: 1430Z = 1030 Eastern Daylight Time, or 10:30 A.M.

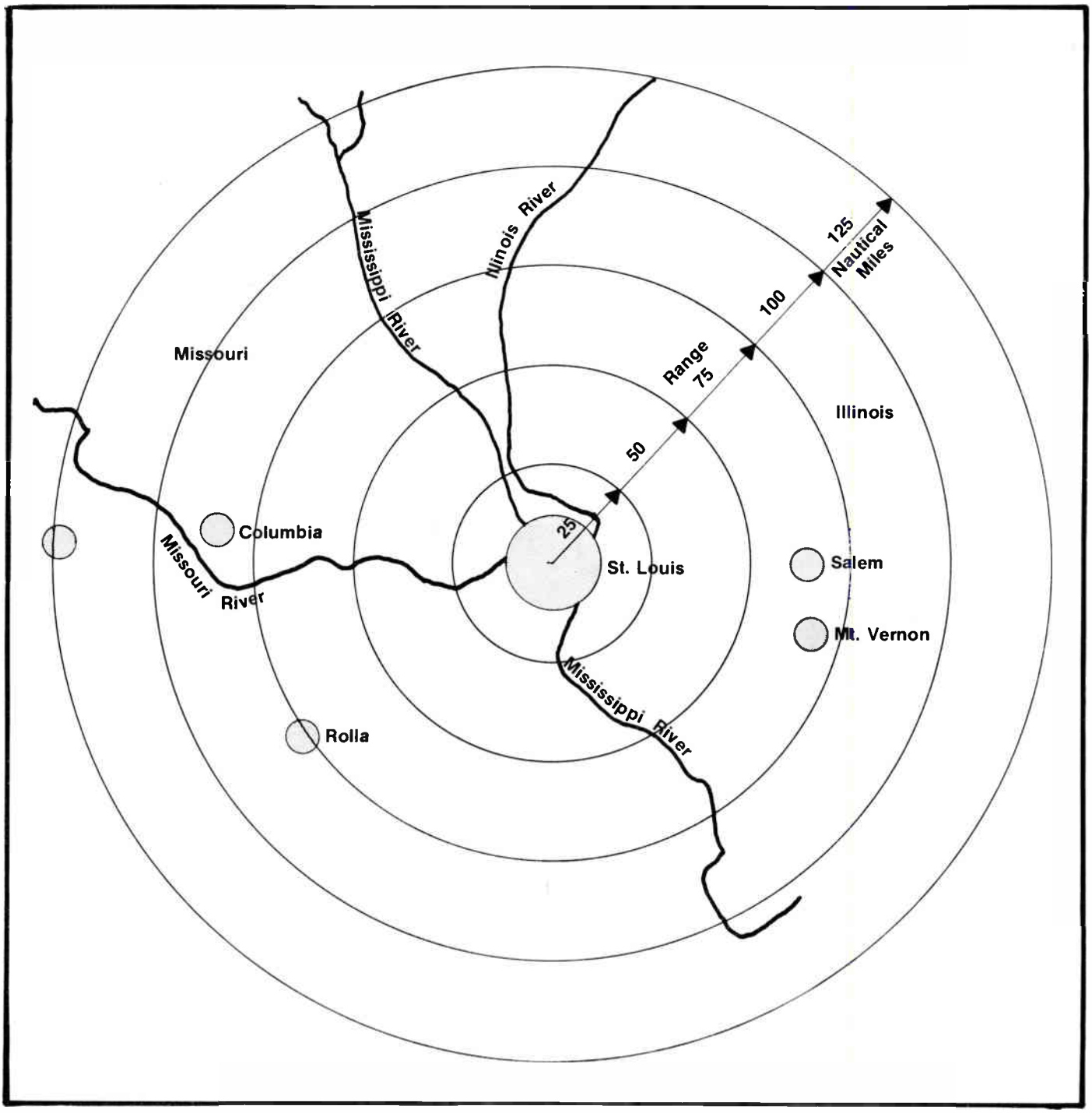
Compass Points:
Compass points are not plotted on the television radar picture. They are shown here for you to use in interpreting weather codes.

TRW+A/+:
Thunder and rain showers (TRW), heavy (+), with hail (A), increasing in intensity (/+).

C2825:
The cell is moving from 280 degrees (from the west) at 25 knots.

MT270:
Maximum tops of cell are 27,000 feet.

0430Z:
Report written at 4:30 A.M. Greenwich Mean Time.



The Radar echo around St. Louis is "ground clutter" caused by local radar reflection from buildings. Other echoes are precipitation.

Serving Audiences with Special Needs Through CATV

By Cliff Schrock
Tektronix, Inc.
Beaverton, Oregon

During the last century, we have witnessed a technical revolution of sight and sound: movies, movies with sound, radio, television, and of course, cable television. The impact of television alone encompasses 70 million homes in the U.S., with 100 million TV sets, over 75 percent of which are color.

But where does TV and the other visual media leave those less fortunate: the deaf, the blind, and the handicapped? It may seem hard to believe, but many portions of the revolution have bypassed or even negatively influenced these special audiences.

Largely through the efforts of the Public Broadcasting System (PBS), the feasibility of captioning, and closed captioning (not visible to viewers without special devices) has been proven with programs such as "The Captioned ABC News"; "The French Chef"; and scores of specials. However, TV, with a limited number of outlets in each market, has a difficult time justifying a large percentage of time to any minority.

Cable TV provides the media, both video and audio, to satisfy the needs for full time minority channels. The missing ingredient at this time is a commitment to program and a source of programs.

Over four percent of the population in the United States (some 13 million) are hearing impaired or deaf. "Out of sight, out of mind" is an old axiom that is all too true regarding these minorities. The deaf, the blind, and the handicapped are, with some exceptions, cut off from today's cultures, styles and fads. Television and aural services could provide the necessary link.

The blind and severely visually impaired population in the U.S. is about 4 million or 1.5 percent. The communications media do a better job serving this special audience but more diversity and educational programs are lacking.

The physically and mentally handicapped number more than the deaf and the blind combined and have many individually different needs. However, education is a major area that TV could satisfy. Many physically handicapped people have excellent minds but cannot handle books and are not mobile enough to attend classes. A common problem with the present TV mix of shows, drama and sports is that we tend to depict only the nonspecial people. Seldom does a handicapped or deaf hero appear. Metro Cable in Canada televised the wheelchair Olympics last year. The response from the nonspecial viewers was high and the morale of the participants was boosted.

It may be important to consider whether one can justify serving a specialty audience in a community relative to the total population. Statistics show that approximately 80 percent of CATV viewers will be tuned to network presentations. Another 15 percent will be tuned to independents. Of the remaining channels, 1.8 percent will watch the news wire service and 1 percent the local origination programs.

Considering the deaf dilemma, an average adult watches over six hours of TV per day, and a deaf channel could count on a solid four percent viewing six hours of the day. Begin to include families of the deaf, and other general curious viewers, and a strong justification could be made for special audience programming.

Visual presentations for deaf programming appear in two forms, signing inserted on the screen or as part of the program, and captions or words imposed across the screen. Many in the deaf community will debate the merits of signing vs. captions. There are at least three distinct languages of signs plus many dialects. Many feel that only full screen presentations of signs are legible.

Captions are also controversial since many of the deaf do not read well. The hearing community has the same reading problem, but for the deaf, following fast captions requires medium reading skills that a hearing person doesn't require.

Captions can take two basic forms, verbatim, (word for word), or edited (usually condensed). Experts now feel that different types of shows require custom treatment. Fast dialog or news stories can be done in edited captions. Slower stories or educational sequences look better with verbatim captions that follow the speaker's mouth movements.

The presentation of captions can be either open, where all viewers see the words, or closed, using a special decoder. Open captioning has been used quite successfully on foreign films and TV specials. Surveys by HRB/Singer done in 1971 showed that over 75 percent of the viewers would not object to occasional open captions.

A closed captioning system was developed by the National Bureau of Standards (NBS) and implemented by PBS, that uses a line in the vertical interval (line 21) to send a coded message. A box at the TV set generates a caption that appears on the deaf viewer's set.

With the wide diversity of options for serving the deaf, no single method provides a single solution. A mix of all techniques—signing, verbatim, edited, open and closed captioning are all viable methods.

The technical hardware necessary to serve all of the techniques is available as "off-the-shelf" components.

In January 1972, the PBS, in cooperation with the major commercial television networks, participated in a National Association of Broadcasters' (NAB) sponsored committee to examine the technical feasibility of providing a "TV for the Deaf" service. The final report of the NAB committee concluded that the "TV for the Deaf" technique proposed by NBS was technically feasible. (Figure 1) The committee did point out that for "TV for the Deaf" to become a reality the following must be accomplished:

- An inexpensive decoder/caption

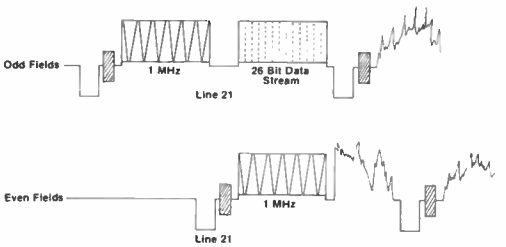


Figure 1: NBS proposed signal format.

unit suitable for use with the home receiver must be developed.

- A single system for accommodating the caption information associated with film program material must be developed.
- Extensive field tests of the entire system, including receivers equipped with decoders, are necessary.

The NBS signal format as shown would be transmitted on line 21 of the vertical blanking interval. On odd fields, the signal would consist of a 1 MHz sine wave followed by a 26-bit data stream. On even fields the 1 MHz sine wave only would be transmitted (Figure 2). The 1 MHz sine wave would

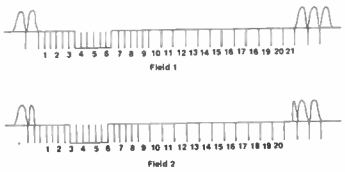


Figure 2: 525-line television waveform showing field blanking interval.

last approximately 16 microseconds and would be derived from an atomic frequency standard. Broadcasters radiating the signal after a videotape record/reproduction cycle would delete the 1 MHz appearing on even fields, thereby indicating that the signal was no longer a valid frequency/time reference. The 26-bit data streams would be maintained on odd fields as it would contain the caption information. Similarly, the odd field 1 MHz would also be maintained to simplify the home receiver decoder/caption unit design. The 1 MHz would always be transmitted coherent with one data stream.

The 26-bit data stream would transmit a maximum of two ASCII (American Standard Code for Information Interchange) characters per odd field. Each character would use eight bits including a parity checking bit for error detection. The remaining bits in each field would be used for other applications. Caption identification could be used to send discrete messages from a network center to other broadcasters, and channel identification could be used to simplify home receiver tuning.

The digital modulation technique used by NBS for the transmission of the caption data is a simple return-to-zero code with a "one" bit being represented by a +50 IRE pulse and a "zero" bit by no pulse or picture black level being transmitted. NBS predicts that, even with an inferior video signal-to-random noise ratio, the error rate of the caption data will not exceed about one in a thousand. However, information on the effects of other types of distortions such as impulsive noise and signal multipathing is unavailable at the present time.

At a rate of two characters per odd field it would be possible to transmit 3,600 characters per minute or about 600 words per minute (wpm). Currently available to the deaf community are films that have been captioned at about 150 wpm. Radio news readers read at an average rate of about 100-125 wpm. Clearly the capacity of the NBS system would satisfy even the highest captioning rates.

The design of an inexpensive decoder/caption unit that can be installed in the home receiver is of paramount importance in the development of a viable "TV for the Deaf" system. The NAB committee devoted much of its time and efforts attempting to define the major characteristics of such a unit and agreed on the following:

- The minimum height of the characters should be 20 television lines and the character generator matrix should be 7 × 10. Also, upper case characters only should be used.
- Two rows of captions should be displayed within the lower one third of the picture area with a maximum of 25 characters per row displayed within the safe title area.

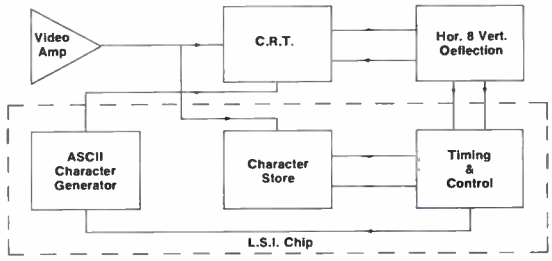


Figure 3: functional block diagram of home receiver modified to provide captioning for the hearing impaired.

- Left to right edging of the characters should be provided.
- Horizontal crawl need not be considered.

The best estimates available to the NAB committee indicated that the decoder/caption unit built into future new home receivers, probably in the form of an LSI chip (see Figure 3), would raise the cost of the receiver by about $70 to $110. A totally external "black box" decoder/caption unit (see Figure 4) that could be connected to existing home receivers would cost $100 to $200.

At PBS an inexpensive way of providing captioning using an external black box is to interrupt the RF signal at the home receiver antenna terminals coincident with the detection of a character. An advantage of this approach would be that the black box need not have a modulator and RF stage, as would the previous type of black box. (See Figure 4.)

The role of CATV in serving the deaf could make use of a single line 21 decoder at the headend to produce a separate deaf channel for the system. Decoders are available today that can

be connected between an all channel demod and a modulator.

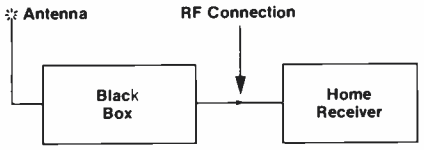


Figure 4: functional block diagram of home receiver with external black box for caption insertion.

One of the major factors holding back the broadcasters from producing extensive (line 21) captioned material is the unavailability of the low cost home decoder. CATV, however, could utilize the more expensive baseband decoders available today and, with only a few of the larger systems connected, reach a significant portion of the deaf population.

The ultimate setup for (line 21) captioning by CATV systems will probably include an electronic (varactor) tuned demod so that the unit can be programmed to draw on all channels and funnel them through the decoder to add captions, then place them on a deaf channel. (Figure 5.)

The local origination studio that you have been using as a tax loss write-off might be an excellent facility to dust off and start programming. Opportunities exist for at least one-half hour a week of locally generated programming using pure sign with the program stars being local members of the deaf community.

The addition of a second camera gen-locked to existing material is an excellent way to generate programs with sign language inserts in one corner of the program. Different presentation methods include a diagonal insert or a circle.

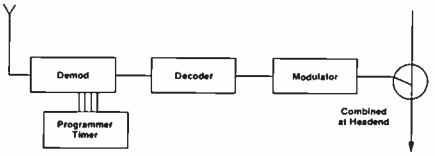


Figure 5

Obviously, the blind citizen gains nothing from the visual portion of television. Cable operators often forget that these people also control a vast audio resource. Audio is one of a blind person's strongest communication links with the world. Dedicated FM channels can and should be made for special blind presentations. The simple addition of a microphone to a classroom, church, or roundtable discussion can provide meaningful blind programming.

Talking Books for the blind is a national service that uses FM radio subcarriers and special receivers for the blind. Much of the material is specially prepared and general release to the public via an open FM cable channel would not be permitted. However, other portions of Talking Books are produced locally from newspapers and local events which can also be put on cable.

Local origination by cable can be considered. Many of the blind want short stories and periodical type information on special subjects such as science, business or government. Local and national magazines can be read by local talent.

A system (AUDIO 96) was proposed in the 1975 NCTA converter transcript that generated 96 audio channels in one six MHz TV band. A decoder could be used to select any one of 96 audio or data services. Future cable systems might see such systems providing multitudes of audio tracks in different languages plus blind programs.

The handicapped audience is difficult to target for specific programming. A strong case can be made for general educational programming, from kindergarten to college level courses.

A second area is coverage of the activities of the handicapped. The benefit is two-fold. The public becomes aware of the handicapped and accepts them, and the handicapped themselves benefit by seeing their own activities on television.

Some important arguments for more intensive programming is that the handicapped audience spends more time in closed surroundings and will watch more TV if proper material is available.

The future of cable serving special audiences goes much farther than just TV programs. The capacity of a single cable is so great that scores of specialized programs can take place simultaneously. Large scale information systems are being developed to enable subscribers to "dial up" a multitude of information. The needs of special audiences must also be programmed into these systems.

Finally, devices like picture telephones and braille writers are possible on cable systems.

The challenge is clear. The special audience such as the deaf, the blind, and the handicapped can best be served by cable TV systems. Cable has the capability and, therefore, must address this humanitarian need.

Now is the time for action. All the hardware exists. Monies, resources, and people power are available, both through the special audiences themselves, and through agencies such as HEW, PBS and local associations. If cable is to reach its full potential, it must provide for the needs of these disabled minorities. **C-ED**

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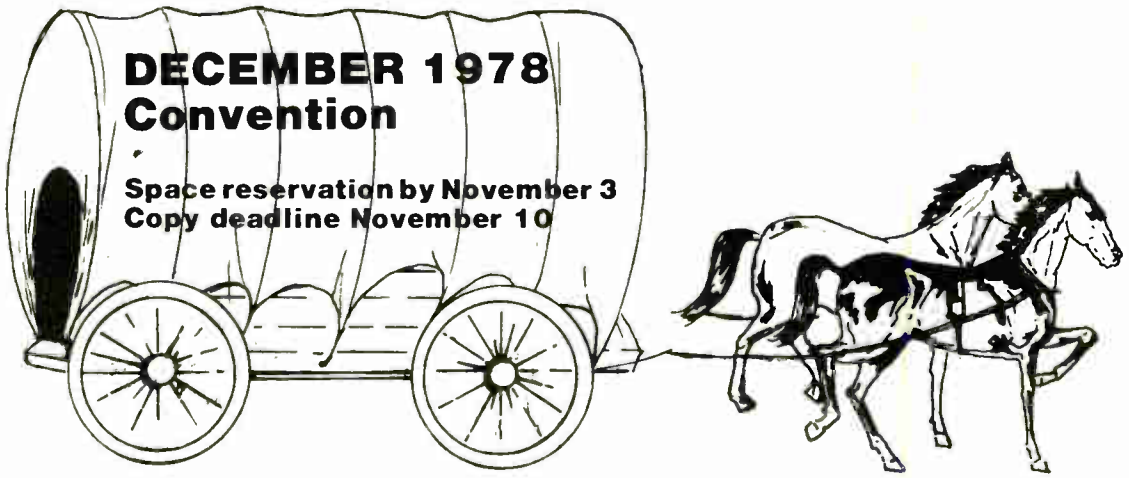

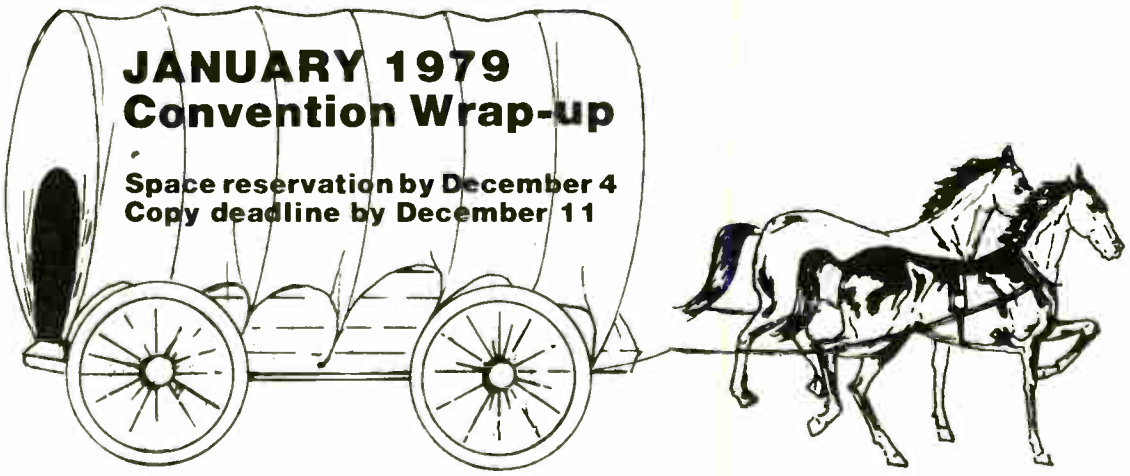

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Wrap-Up of FOC '78

The Impact of Fiberoptics on CATV

By Paul Polishuk, President
Information Gatekeepers, Inc.
Brookline, Massachusetts

The first Fiberoptics and Communications Exposition was held in the United States at the Hyatt-Regency O'Hare Hotel in Chicago, Sept. 6-8, 1978. This unique exposition revealed a number of policy, regulatory, technical and economic impacts of fiberoptics on CATV. Over a thousand attendees representing various industries were treated to a wide range of applications-oriented papers in some eighteen sessions. Over thirty-five manufacturers (see table 1 for list) showed their wares. The exhibits, according to the show manager and decorator Andrew Bartlett, were some of the best he has seen. It also represented the largest collection of suppliers of fiberoptic equipment ever assembled in one location. Firms from the U.S., Canada and Japan were represented. A last-minute entry was an exhibit by Bell Laboratories.

Representatives from the various industries were able to find something that addressed their own specific needs. An indication that the fiberoptics industry had arrived was the introduction of the first Fiberoptics Handbook and Market Guide by Information Gatekeepers, Inc., sponsor of the exposition. Another indication that people were serious about the application of fiberoptics was the keen interest shown in splicing, connectors and couplers, both in the technical program and in the exhibits.

Specific questions of interest to the CATV industry were addressed in the keynote session, technical program and exhibits. It is not possible to cover every aspect pertinent to the CATV industry, but the following are some highlights.

Keynote Session:

Speakers in this session included Dr. C. Kao of ITT, one of the pioneers in the fiber business, who first postulated the feasibility of using dialectric fiber as a waveguide for the transmission of data at optical frequencies in 1966. Dr. Kao reviewed the progress of fiberoptics and pointed out the future growth and areas where further research was still needed.

Paul Bortz, deputy assistant secretary designate of the new National Telecommunications and Information Administration outlined that agency's goals:

1) To contribute to the development or evolution of a telecommunications and information industry that is efficient, innovative, economically sound and responsive to public needs.

2) To stimulate and assist government, private institutions, and individual users to more effectively apply telecommunications and information technology and service to meet their needs.

3) To conserve, develop and more effectively use spectrum and technological resources that make telecommunications services possible.

Bortz reviewed some of the basic policy issues related or introduced by fiberoptics:

- Given development of relatively low cost, broadband transmission systems: should there be one or a number of telecommunication services into the home, and can they be served by one input port or by separate inputs as in the case of CATV and the phone systems today. This is of fundamental concern in

Peter Hankin (left) of General Optronics discusses his company's latest innovations.

Over thirty-four firms had booths or exhibited their products including:

Bell Laboratories	Comm/Scope Co.
Times Wire and Cable Co.	Telephony Publishing Corp.
General Optronics Corp.	Optical Communications Corp.
Electro-Optics Devices Corp.	Conventures, Inc.
Nippon Electric Co., Ltd.	ITT Electro-Optics Products Div.
NEC America, Inc.	ITT Cannon
General Cable Corp.	ITT-Telecommunications
Quartz Products Corp.	Northern Telecom
Corning Products Corp.	Canstar Communications
Corning Glass Works	Laser Focus
Communications Fiberoptics Div./Valtec Corp.	Optical Spectra
	Naval Ocean Systems Center
Laser Diode Labs, Inc.	Belden
Industrial Fiberoptics Div./Valtec Corp.	Siecor
	Dupont
Byron-Ellis	Orionics
Mitsubishi	Telemet
Times Fiber Communications, Inc.	Thomas and Betts

Table I

shaping the regulation of common carriers, e.g., the issue of cross-ownership;

- What should be the nature, extent and timing of the development of performance standards? Too early and restrictive an approach can choke off innovation; a laissez-faire approach might not allow smaller firms a chance to participate in this new industry, could introduce problems of interoperability, and might weaken our position in international markets;
- Privacy of telecommunications may be more readily implemented with the bandwidth capability provided by fiberoptic cable, allowing for example, the use of digitally-based encoding techniques. The rate of introduction of such technology might therefore be a factor in developing national policy in this area;
- What would be the implications of a requirement that new buildings under construction—after a certain date—be equipped with broadband wiring (such as fiberoptics) which can be interconnected to a T-1 (1.54 MB/s) port supplied by the telephone company (such a policy was suggested at the Airlie House Policy Research Conference, 1976). I could construct strong arguments that this would be an important stimulus to the CATV industry—and equally strong arguments that it could be stifling;

Charles Jackson, senior staff engineer of the House Subcommittee on Communications, reviewed the potential impact of the rewrite of the Communications Act of 1978 on the introduction of fiberoptics. He felt that the introduction of competition and structuring of the new bill was directed towards aiding the introduction of new technologies such as fiberoptics.

Irving Kahn, president of Broadband Communications, Inc., pioneer in the CATV industry and an innovator himself, presented a paper entitled, "Fiber Optics: A Paradox." He pointed out that 99 percent of the research in the fiber industry today has gone into the development of low loss fibers and a scant 1 percent into sources, connectors and other devices. If fibers are to deliver all the services that they are inherently capable of, then stricter attention must be paid to all areas to insure each segment of the industry keeps pace with the other.

Remarking on the role of government, Kahn took exception with Mssrs. Bortz and Jackson. The government regulation and policies could tend to hinder innovation through the political system. And Bell, he stated, had perfected the technology of politics which might be substituted for real technological advances.

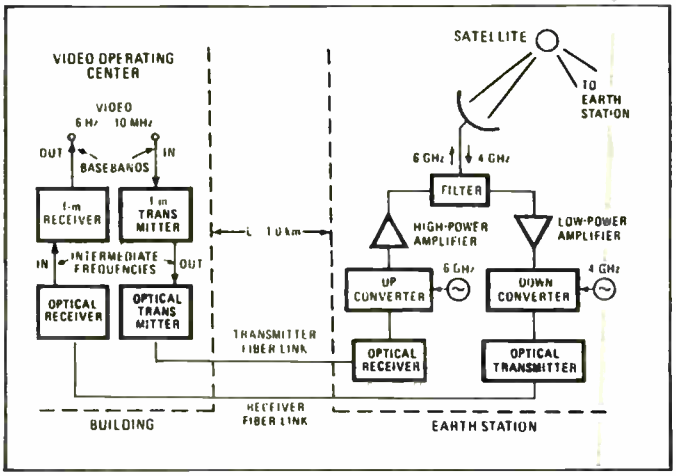


Figure 1. Transmitter/receiver system in Bell's test can interchange the fiberoptics links (shown) with coaxial cable for comparing transmission and reception characteristics.

Irving Kahn stated in reference to the new Communications Act: "This same proposed act, by calling for a lifting of all federal regulation of cable television, would also make the existing CATV industry fair game for massive regulation at the state and local levels, thereby handcuffing that industry at the very time it needs its full resources to compete against so formidable and so politically-entrenched a foe as Bell. The CATV industry is very near and dear to me, and I oppose such legislation from both a business and an emotional point of view. But primarily, I cite this example to indicate the potential victories of which Bell is capable through its immense and costly lobbying efforts.

"Furthermore, the plight of an industry such as cable television in this case is not an isolated problem about which others can merely tsk-tsk and then move on. Those cable systems are your future customers. If Bell knocks them out of the box with the aid of Uncle Sam, then a potentially huge independent market for fiberoptic communications gets knocked out, too.

Dr. Ira Jacobs, director of the Broadband Laboratory at Bell Labs, reviewed the application of fiberoptics in the telephone industry. Although he reviewed much of what had been said or published before, he outlined widespread application of fiberoptics throughout the Bell System, including satellite to headend links, interconnection within the main frame of electronic switches, undersea cables, and future potential of integrated optical switching, modulation conversion, etc.

Researchers at Bell Laboratories in Holmdel, New Jersey are studying the ability of fiberoptics to carry television quality signals. They have developed two systems. The first is a one-kilometer link at Holmdel which runs parallel to a coaxial cable from a ten meter satellite earth station to a headend. The coaxial cable and 12 fiber ribbon cables are laid side by side in a duct and have been functioning since February 1978. The fiber cable is identical to the cable used in the Chicago trials.

Figure 1 shows the link being used. The optical transmitter is modulated with a 70 megahertz intermediate-frequency signal that is FM modulated by the video signal. Results indicate that a color video channel can be transmitted with a 68 dB signal-to-noise ratio, 0.1 dB differential gain, and 0.5 degree differential phase over a link 4.1 km long. This exceeds the noise figure for studio quality requirements by a wide margin.

Frequency modulation at 70 megahertz was chosen instead of other modulation techniques because it uses existing FM terminals and is compatible with existing video equipment. Moreover, this FM technique relaxes the linearity requirement on the transmitter and receiver.

At the same time, the fiberoptic transmission line has been shown in

the Bell tests to be superior to the coaxial cable in that no equalization circuits are needed and it is immune to electromagnetic interference. As an added and important bonus, the fiber cable is smaller than the coaxial cable and was easily run into an almost filled cable duct.

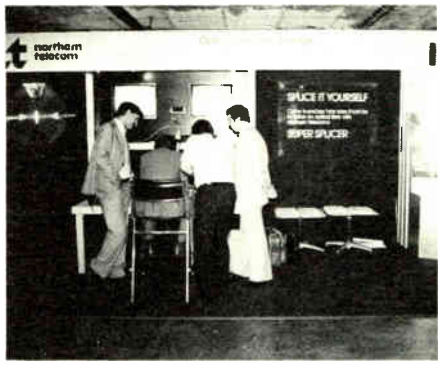
The one km link at Holmdel has been supplemented since July with a 0.5 km link at Bell's nearby Indian Hill site. The Indian Hill tests use only a fiberoptic link with a light-emitting-diode source, whereas the Holmdel facility has both a diode and a laser, as well as the coax system. However, the new site will test more equipment combinations.

So far, results at Holmdel show a 25 dB link loss for the laser transmitter and 12 dB for the LED. For a signal-to-noise ratio of 68 dB/km, the maximum link length is 4.1 km for the LED. But if the S/N ratio is lowered to 53 (still a usable figure), the lengths are 6.3 km and 4.2 km, respectively. The S/N figure needed varies according to the system application and noise budget.

More work is planned in the coming months with different transmitters and receivers as well as modulation schemes at both sites. But for now, the Bell researchers are happy.

Irving Kahn (right), president of Broadband Communications, discusses research in the fiber industry with Phil Leigh of First Boston Corporation.

The final speaker in the keynote session was Dr. Robert Allio, former president of Canstar Communications and now a consultant with Arthur D. Little, Inc. Dr. Allio reviewed the potential applications of fiberoptics to a number of industries and CATV in Canada in particular. It was interesting to note the active programs within Canada to demonstrate the application of fiberoptic technology for CATV with several experiments now being planned. Compared to the U.S., Canada has a well organized and planned program to introduce fiberoptics into CATV systems. This involves joint cooperation between the government, industry and CATV operators.



"Splice it yourself" was one of the biggest hits at the show.

Technical Program

In the other part of the technical program, a number of papers directed towards the interests of the CATV industry included a paper by Philip Leigh of the First Boston Corporation which discussed "Potential Business Opportunities in the Emerging Optical Transmission Industry." In this paper he points out the economic advantage of fiber over coaxial cable for various CATV applications assuming various fiber costs. This is shown in Table 2. There was also a session on CATV Communications, chaired by Bill Lynch of Times Fiber Communications, which included the following papers:

- "An 8 km, 15 Channel Digital CATV Fiber Optic Transmission System." by Whitworth Cotten, Harris Corporation.
- "Optical Components for an Optical Fiber Video Transmission System," by Dr. A. Takeuchi and others from Sumitomo Electric Industries.
- "Bi-Directional Transmission Through a Single Fiber," by U. Koyama, et al, of Nippon Electric.
- "A Fiber Optic Network for an Integrated Public Service Communication System," by A.M. Bell of Canstar Communications.
- "8 km, 12 Channel Fiber Optic Link in California," by Sol Yager, Times Fiber Communications.

An interesting broadband applications paper was presented by J. Paul Warnecke of the Commonwealth of Kentucky on "Fiber Optics for Broadcast Television STC: Kentucky Emergency Warning System, a Management Case Study." In this paper, he explains the comparisons made between microwaves, balanced video pairs, coaxial cable and fiberoptics for relatively short haul applications. The paper also describes the engineering study and cost effective evaluation parameters applied to the case and the applicable decision processes.

Fiber Optic Wired City

Dr. H. Elion of Arthur D. Little chaired a session which dealt with a number of papers dealing with future forecasts into the use of fiberoptic systems and also the fiberoptic wired city and nation concept.

Dr. J. Martino reported on the results of a forecast of the use of optical fibers in telecommunications. Under various assumptions and scenarios, he projected the penetration of fiberoptics into CATV systems. Prof. Marion Finley discussed the problems in the implementation of a nationwide public broadband computer and communications facility. Such a facility would permit all the services of the Hi-Ovis prototype but on a nationwide level.

Dr. Elion reviewed the Hi-Ovis program and its future plans as well as its extension to a complete city. The present program at Arthur D. Little for four fiberoptic demonstration programs was also discussed. A final paper of interest was presented by Jeff Adams of Commonwealth Telephone who reviewed the planned fiberoptic link for a rural telephone application.

Other sessions in the program dealt with fibers, cables, connectors, couplers, splicing, sources, detectors, data communications, process control, test and measurement, markets, integrated optics and longer wavelength optics.

A short course on "Optical Communications via Glass Fiber Waveguide" was presented by Dr. R. Gallawa of the Institute of Telecommunications Sciences, U.S. Department of Commerce.

Copies of the proceedings of the technical program and short course notes are available from Information Gatekeepers, Inc., 167 Corey Road, Brookline, Maryland 02146, (617) 739-2022. Audio tapes of the technical program are available from Butterfly Media Dimensions, 8817 Shirley Avenue, Northridge, California 91342.

Based on the outstanding success of FOC '78, FOC '79 is now being planned for the same location September 5-7, 1979. Session recommendations and papers for the technical program at FOC '79 are now being solicited by Information Gatekeepers, Inc. C-ED

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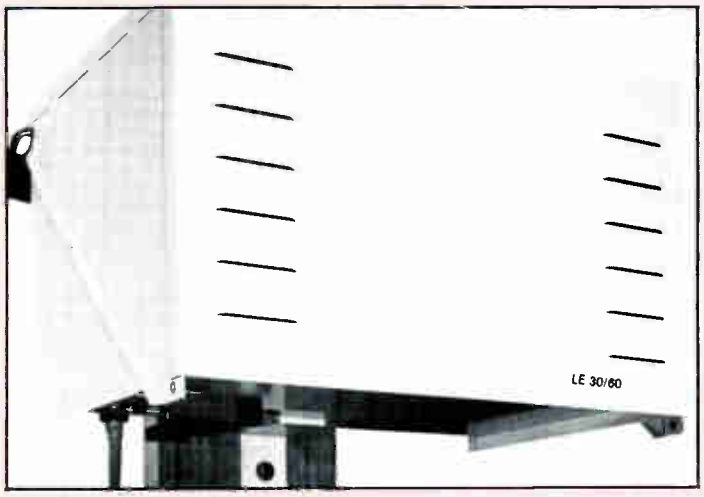

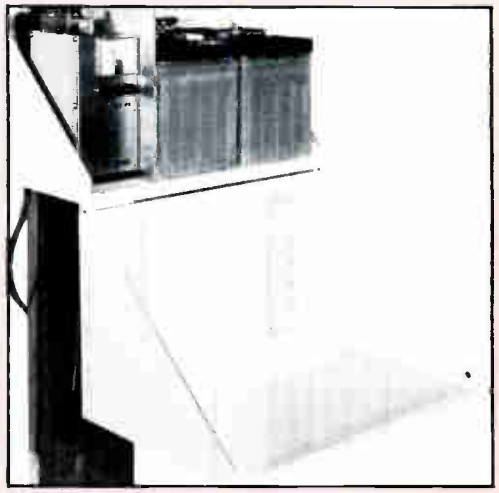

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TOCOM: A Secure Investment

By Toni Barnett, Managing Editor

TOCOM: Pioneers of Bi-directional Cable

In the early 1970's, several major CATV companies jumped on the bandwagon to develop two-way interactive, bi-directional cable services. Many manufacturing leaders believed the time was ripe for a viable "Orwellian" world of push-button control from the home: comparative shopping, summoning police or firemen, playing electronic games and punching up a first-rate movie.

Then in 1973-74—disaster struck. The advent of the economic decline and its impact on many manufacturers was reminescent of an ostrich with its head in the sand. Companies like Scientific-Atlanta, Jerrold Electronics, EIE and Hughes quickly scrapped ongoing projects and designs and were ecstatic that they hadn't invested more in experimental projects.

The CATV industry today would possibly still be experimenting with two-way cable services had it not been for a small company in Irving, Texas. This small company called TOCOM (for "Total Communications") persisted in its philosophy that if cable communications, including good signal reception and pay-TV, were ever going to be successful, then two-way had to be the way to go. And more services would have to be offered to subscribers to make two-way really pay off, such as security, medical and fire alerts.

The two executives heading up this small Irving company were notables in the business field. Michael R. Corboy, TOCOM's president and CEO, is an ex-Texas Instruments executive. He successfully operated TI's European operations. TOCOM's chairman and founder is John Campbell, one of CATV's pioneers. In 1951 he installed the first cable system in the Southwest at Mineral Springs, Texas. In 1955, Campbell invented the first transistorized amplifier for CATV and formed TOCOM, Inc.

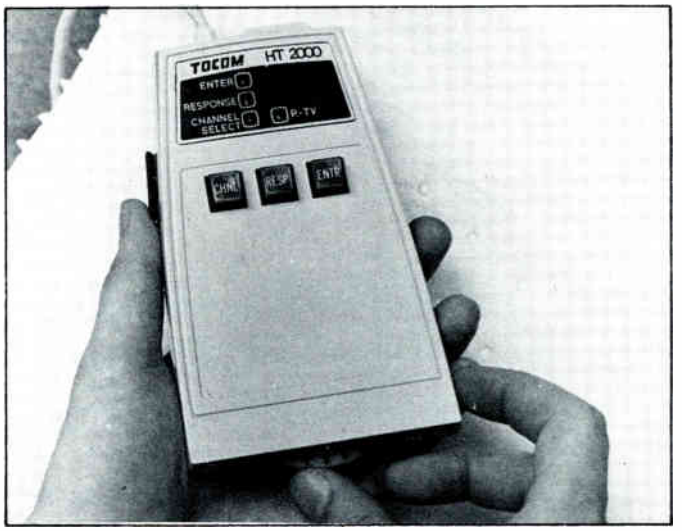
In the latter part of 1974 the picture became a little brighter for TOCOM. The "New Cities Act of 1970" was a federal decree providing inexpensive loans for developers of totally new towns. TOCOM was off and running. And then it hit—again. Money was tight and not many companies were willing to gamble on an untried system.

At that time one of TOCOM's ongoing experiments was a 20,000-acre project 25 miles northwest of Houston that would eventually house 15,000 people. The Woodlands was a new town that not only bought TOCOM's two-way cable system, but the town developer also hired the company to manage it.

It was probably The Woodlands project that saved TOCOM. In this "new town" TOCOM has combined cable television, home security systems and computer control into an economically feasible security program which is proving to be a powerful sales tool.

The Woodlands' major attraction, besides cable and pay-TV, is the security/surveillance system provided by the TOCOM II system. Unlike most towns where conventional security systems offering 24-hour-a-day central-station monitoring are too expensive for most residential applications, every house and apartment in The Woodlands is wired for cable and surveillance before the residents move in. Each new home is outfitted with a microcomputer-controlled monitoring station plus several fire and smoke detectors. Two manual alarms, to summon paramedics and police, are also provided.

The $300 installation cost for the home terminal has been added by builders to the cost of the home. Burglar alarms can be added for an extra charge.



TOCOM's remote unit allows viewers to respond to questions while at home.

What Makes The Woodlands Tick

The Woodlands' security system demonstrates the practicality of two-way cable. Every six seconds the central station computer checks in with the terminal unit in a subscriber's home. If an alarm has been triggered since the last check (six seconds), the computer's printer types out the name, address, telephone number and the particular information (type of alarm, medical history, etc.).

Simultaneously, a teleprinter alerts The Woodlands' fire department, which also operates the town's emergency medical service. The dispatcher can contact patrol cars immediately. He also verifies police, fire and medical alarms and recalls emergency units in case of false alarms.

With this automatic detection system, individual reaction time and possible communications delays are eliminated. In case of a fire, medical or police emergency, there is no need for verbal communications. A forced-open lock will automatically bring police in about 90 seconds. A smoky attic will instantly alert the fire department, with response time about two minutes. If a medical emergency should arise, the fire department/medical emergency team will arrive two minutes after the medical emergency switch is activated.

The Equipment: TOCOM II

The equipment which eliminates the "blue-sky" approach to interactive two-way CATV belongs to the TOCOM II system. This unique system consists of three primary elements: varying numbers of remote units; a computer-controlled central data terminal; and a bi-directional cable distribution system.

The remote unit is a combination of a 26-channel TV converter and a digital transmitter/receiver housed in one cabinet. Each remote unit has its own unique identification, and it responds with a digitally-coded signal when interrogated by the central data terminal. The remote unit automatically relays data pertaining to electronic inquiries from the central data terminal (i.e., does an alarm condition exist?; what is your opinion?; etc.).

The central data terminal (CDT) can interrogate, receive responses and act on the responses from 60,000 remote units every six seconds. The CDT utilizes a mini-computer with bulk memory, a control and display panel, data receivers/transmitters and teleprinters.

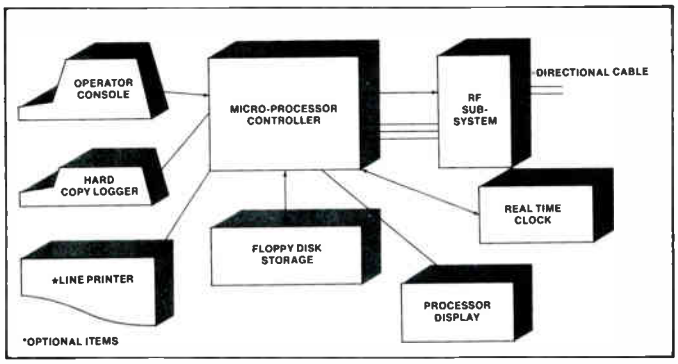
The bi-directional cable distribution system uses dual trunk configurations incorporating one-way amplifiers with a 5-300 MHz response. The bi-directional cable plant exhibits a forward transmission bandwidth to allow for 30 channels of TV reception and also exhibits a reverse transmission bandwidth in the 5-25 MHz frequency range.

In addition to the security/surveillance system (which includes opinion polling), residents of The Woodlands have the option of receiving high quality TV reception, locally-originated TV programs and pay-TV. The services and entertainment features cost from $8 to $25 per month.

According to Donald T. Rozak, the system's manager, "Of our 1,100 subscribers, 98 percent take television service, 65 percent take the alarm service and 43 percent subscribe to our pay-TV channel."

To date, results from The Woodlands' security/surveillance system have been astounding. The manual medical emergency alert has saved numerous lives; only one fire resulted in structural damage (the owner rewired parts of the house); only one successful burglary due to the resident leaving his key in the control panel; no violent acts at all and amazingly few prowlers.

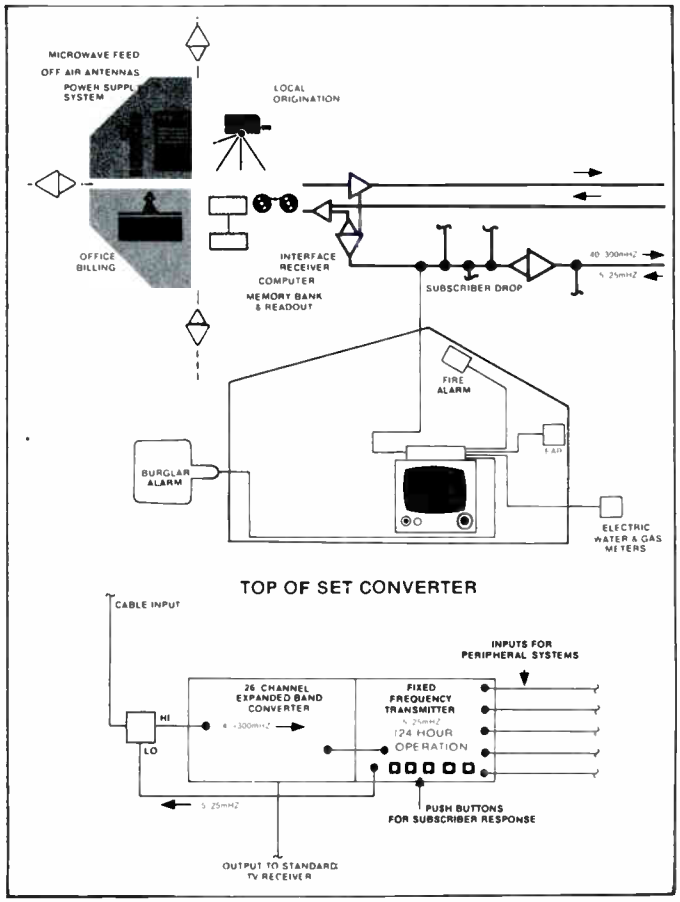
The effectiveness of the protection afforded by TOCOM's system provides an additional benefit to subscribers. So far, two insurance companies are providing security subscribers with a 25 percent discount.



The TOCOM III-A Central Data System.

TOCOM Systems Expand

The company interactive system (TOCOM II) was first successfully installed in The Woodlands community in 1974.



The TOCOM II system.

By 1977, however, the tide had again turned in favor of the boys from Texas. Armed with impressive statistics from The Woodlands, TOCOM sold five of its two-way systems to builders of "new town" communities and condominiums from coast-to-coast. The TOCOM II system has been installed in Wynmoor Village in Coconut Creek, Florida; Albany, California; Harbison, South Carolina; St. Charles, Maryland, and San Antonio Ranch, Texas.

TOCOM III

The company's latest technological development is the TOCOM III security/surveillance system. TOCOM, through its marketing affiliate, Cableguard of Dayton, Inc., has marketed and installed this new security system for Viacom's Ohio subsidiary, Viacom Cablevision of Dayton. The TOCOM III system offers instant and automatic fire, smoke and burglary alarm protection to the residents of Dayton. Perhaps just as significant as the two-way surveillance, the Dayton arrangement is the first time a major cable operator (Viacom International) has added two-way to a system activated only as one-way.

The new system utilizes the TOCOM III-A central data system (CDS) that can monitor and control as many as 2,000 HT-3A or HT-3B home terminals through miles of coaxial cable plant. It can store up to 64 characters of demographic information for each home terminal, which the system operator logs into the CDS with an easy to learn English type command structure. Usually the information consists of the subscriber's name, address, medical history, and other emergency-related facts.

TOCOM's III-A CDS recognizes fire, medical emergency,

intrusion, assault (panic), supervisor fault and battery-low conditions. It also monitors the operating condition of each home terminal. If a failure occurs, or a terminal responds with erroneous data, the system operator receives a monitor alarm.

Every few seconds, the III-A CDS requests the alarm status of each of the possible 2,000 home terminals. If a change is detected, the operator's CRT console and a hard copy logger receive the demographic information that has been stored for that particular home terminal. The result is a faster and more efficient response to the emergency.

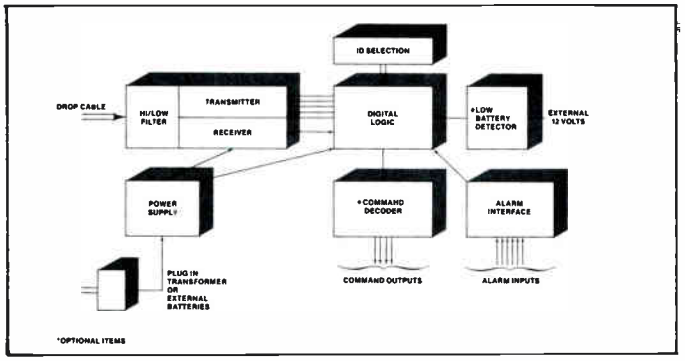
Communication occurs as a result of a combination of time and frequency division multiplexing. The CDS communicates downstream on the cable plant, utilizing an FSK mode of modulation in the 100-160 MHz frequency range. Home terminals respond on separate channels called groups, using an FSK mode of modulation in the 5-30 MHz range. The maximum number of home terminals assigned to a group is 1,000.

TOCOM's HT-3A home terminal is an alarm-only reporting terminal designed to communicate from remote locations through a coaxial cable system with the TOCOM III-A or TOCOM III-B central data system. Each HT-3A has a unique address which allows the CDS to request the status of alarm monitoring data every few seconds. Inputs are provided for the monitoring of external fire, medical emergency, intrusion, assault, supervisor fault and battery-low conditions.

Signals from two outputs can drive external system active indicators and remote alarm annunciators. Each alarm input can be individually configured to activate the remote annunciator output, and to be a normally open or normally closed circuit.

When an HT-3A terminal is in communication with a CDS, it is visually indicated by an LED mounted on the unit.

The TOCOM III-A system is completely self-contained with automatic start on power up, automatic program restart on system failure, and redundant data storage on two floppy disk drives.



TOCOM's HT-3A Home Terminal.

Cableguard of Dayton: Good Marketing Strategy

Cableguard of Dayton was awarded exclusive rights to monitor TOCOM-protected homes in Dayton, Ohio. Cableguard, which is funded by TOCOM, can offer its services without having to involve itself in marketing, installation and maintenance. According to TOCOM president Michael Corboy, "Unlike such widely publicized tests of the two-way capacity as are currently going on in places like Columbus, Ohio, TOCOM's Dayton system will not be an experiment but a for-profit, operating system. We have several years of operating experience in Texas, Florida, California, South Carolina, Ohio and Maryland," Corboy added. "This was important to Viacom, which is the first major U.S. cable television system operator to offer security services over its existing cable plant. For this reason alone," he emphasized, "I think every major cable television system operator in America will be watching what happens in Dayton."

TOCOM's Latest Coup

The recent franchise battle in Oakland Park and Fort Lauderdale is quite a turnaround in lieu of city manager Dick Anderson's former plea for two-way services for his residents. Initially, Anderson wanted to provide two-way security for his residents but was completely snubbed by almost all cable operators. The major operators felt that two-way services were still in the experimental stages and were without strong subscriber support.

Enter TOCOM and two affiliated companies. Broward County Cable is a wholly-owned subsidiary of Selkirk Holdings Ltd., a Canadian company. Selkirk Holdings, in turn, owns one-third of TOCOM. With the aid of Corboy and his staff, Broward County Cable entered the bidding for the franchise for Fort Lauderdale.

Intensive lobbying was conducted between Broward County's largest cable company, American Video Corporation, and Broward County Cable. American Video took out full-page newspaper advertising to sway the Oakland Park City Commission, while Selkirk offered to fly city officials to the company's base in Canada to view operations. Eventually, two Oakland Park officials visited the Canadian installation on city money. Based on Selkirk's vast corporate holdings, and the guarantee of successful two-way services, the Oakland Commission was swayed and the local company, American Video, lost the franchise bid.

The television set has long been an object of worship in the American household. In addition to regular programming, subscribers can (for a small fee), watch hours of premium movies and sports packages. It is now time for the TV set to reciprocate that loyalty by providing practical services to its viewers.

At the 1978 NCTA convention, Charles Ferris, chairman of the Federal Communications Commission, stated, "I come here today not to praise you for your past perseverence and innovation, but to warn you that if cable does not show more foresight in designing new services and facilities, it may be bypassed in the marketplace by those who do."

Companies like TOCOM seem to be a direct response to the concerns of regulators such as Ferris and his cronies at the FCC. Certain areas of the country today already have such services as security/surveillance, medical and fire protection, at-home polling and at-home comparison shopping. Admittedly it's just a start, but the next few years promise even greater benefits for cable operators, manufacturers and subscribers: utility meter reading, energy management, home education with on-the-spot testing, home banking, electronic mail delivery and perhaps even electronic newspaper delivery.

The two-way "blue sky" theory has rapidly approached reality. The television set is no longer just a medium of entertainment but a practical, life-saving device. With the way already forged by companies such as TOCOM, the avenues of benefits with bi-directional cable services are virtually unlimited. C-ED

Consumer Shopping At Home

By Gerald L. Bahr
Vice President of Engineering
Mission Cable TV, Inc.

During August of 1975 Mission Cable TV began providing Vector Service, better known as "Consumer Shopping Guide," to its 150,000-plus subscribers.

To provide this service, it was first necessary to look at the broad picture of present and future service. We mainly wanted to accomplish two things: to provide additional services to our subscribers; and to eliminate many of the problems that we were experiencing with our tone switching system with regard to non-duplication protection at our headend. After some investigation it was decided a consumer shopping guide might prove to be of some benefit, along with several other character-generated channels.

To solve our switching problems, it was determined that there were several advantages to providing non-duplication protection by switching at baseband video. Among others, some of the most prominent points were:

- Less cross-talk problems.
- Less outside RF interference.
- Baseband enhancement capabilities, if needed.
- Greater switching versatility; any channel switched to any one or all channels simultaneously.
- Video matrix switching equipment readily available.
- Video switcher can be easily controlled by a computer.

This decision led us to the conclusion that a small computer was necessary to accomplish our goals. We finally settled on a Telemation Programatic II computer/character generator system, with a Diablo floppy disc for memory, which presently provides six character-generated channels and our non-duplication switching requirements.

To initiate the consumer shopping guide service, Mission personnel must call the Vector Service in New York once a week so that the information that has been previously gathered and entered into Vector's computer can be transferred digitally on standard telephone lines, using the standard RS-232C format at a 300 baud rate. Once the connection is made, the information is transferred automatically, and will automatically disconnect once the transfer of information has been completed.

After the Programatic II converts the stored data to baseband video information, it is passed through a video filter to reduce the rise time. The video information is then sent to our headend location on top of Cowles Mountain via a Catel FM system, and to one of two four-mile-long, sub-low trunk systems, which are also used to transport our public access, local origination, pay-TV, signaling and other character-generated channels. Altogether a total of 11 video FM channels are processed from the El Cajon office to the headend.

At the headend "Consumer Shopping Guide" is fed to the video matrix switcher which is controlled by the computer. As mentioned earlier, this arrangement allows us to switch any of the channels that are fed to the switcher (to be programmed up to a week in advance at a remote location) to be turned off or switched to one or more channels simultaneously.

Channel 24 is shared with "Consumer Shopping Guide" and public access; however, with the video matrix switcher, we also use "Consumer Shopping Guide," as well as other video sources as a replacement for the channels that are blanked out during non-duplication.

After modulation, the signal is split, with one leg being combined with the other signals to provide service to the hard-wired system near the base of Cowles Mountain, and the other leg feeding the AML transmitter that provides a signal to 11 AML receive sites. Via this method, the signal is received by the subscribers connected to the 1,600 miles of 27-to-35 channel system. The subscribers that are presently connected to the older 12-channel system receive the service when the "Consumer Shopping Guide" is switched to a channel that has been blanked out for non-duplication protection. This temporary inconvenience will be corrected when this 400-mile portion of the system is rebuilt by 1981.

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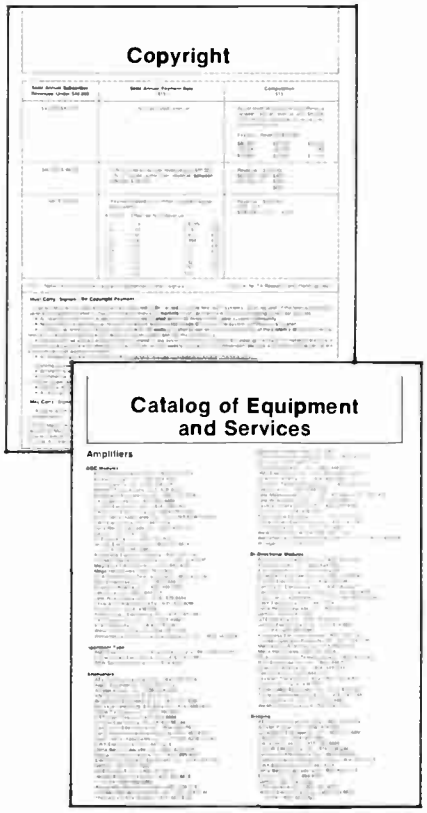

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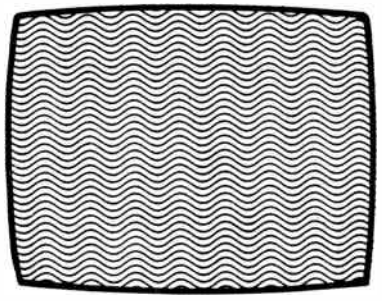
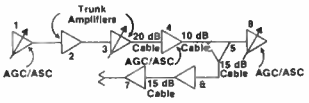


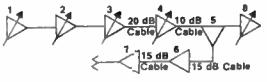
Q I have heard many pros and cons to the idea of using AGC/ASC at every trunk amplifier in a system. Why all the controversy?

A The controversy arises when one considers the different problems that arise from such an approach. First of all, the additional AGC/ASC adds cost to the system. In a typical system, assuming a feeder-to-trunk ratio of 5:1 and an AGC/ASC module cost of approximately $100.00, the additional cost per mile of plant is about $17-$20 over the cost of AGC/ASC at every other trunk amplifier. The second consideration is that not all equipment will operate in this manner without instability due to "hunting"; that is, the inability of the AGC/ASC circuitry to accurately track the instantaneous level of the pilot tone or TV signal.

On the other side, however, there are several advantages to such an approach. The first is that because the compensation range of the AGC/ASC has been shortened to typically 20-22 dB of cable instead of the 40-44 dB of cable where AGC/ASC is used at every other location, less reserve gain is needed in the individual amplifier and less distortion and signal to noise level degradation is generated due to level fluctuation caused by temperature. This means that in a typical system a trunk amplifier can be spaced from 0.5 dB to 1.0 dB further from the last amplifer with no loss of performance. Perhaps even more importantly, the bridger output levels can be raised because they are no longer limited by the 20-22 dB of cable where attenuation changes due to temperature must be taken into account.



As you can see in Figure 1, the intermediate bridger (#5) sees 30 dB of cable between it and the last AGC/ASC station. Line extender #7 sees a total of 60 dB. Over the range of temperatures encountered in the typical system, say 0 degrees F to 120 degrees F, levels at the output of amplifier #7 can fluctuate up to + 4.5 dB, an obviously intolerable situation. By going to the configurations in Figure 2, the total amount of cable between amplifier # 5 and the last AGC/ASC is reduced to 10 dB and # 7 is reduced to 40 dB. This translates to a total fluctuation +3 dB, a sizable improvement.



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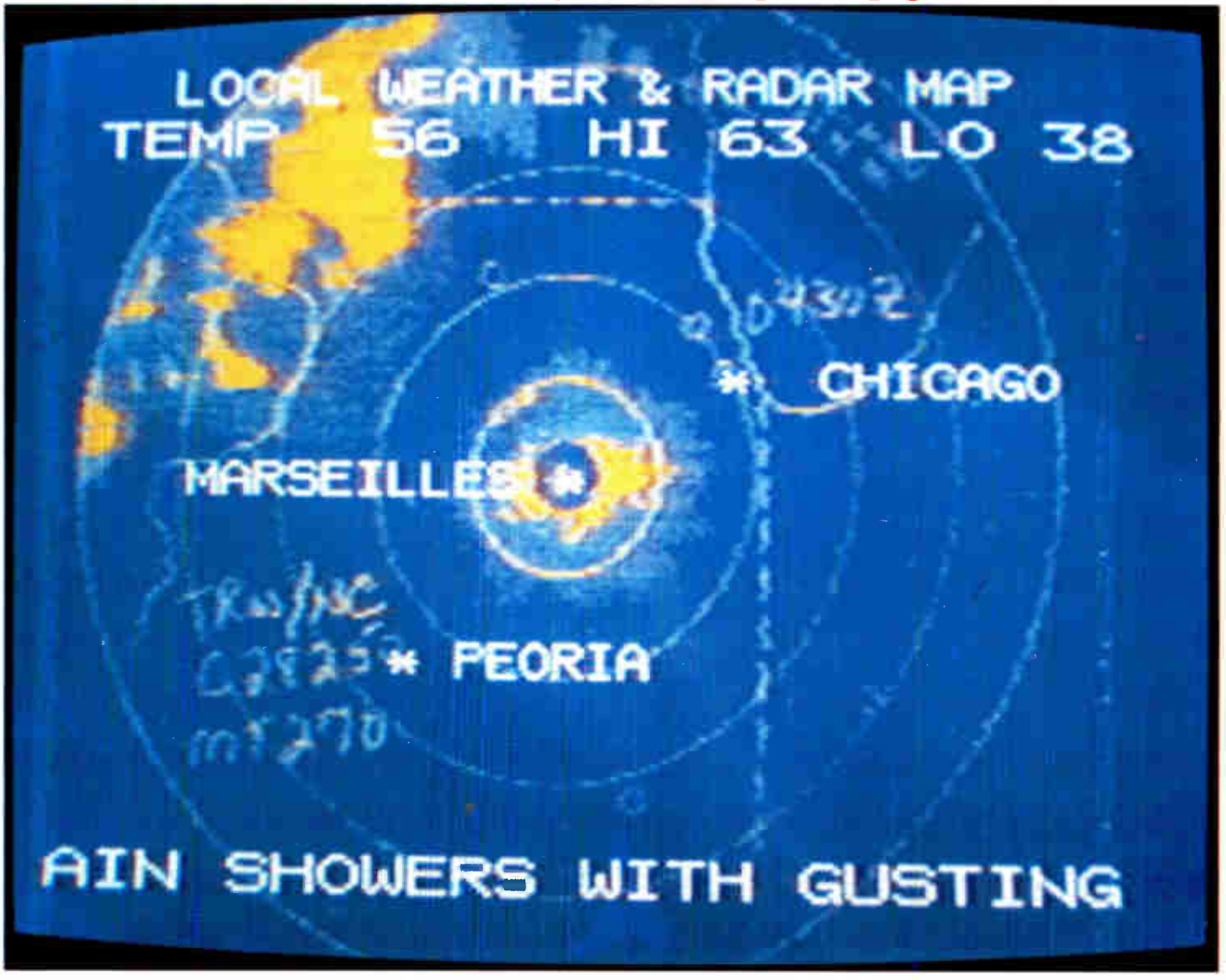

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Radiation Monitoring — Progress in Canada

By Kenneth Hancock, director of engineering, CCTA

On August 23rd of this year, the CCTA received a message from the FCC stating "signal leakage tests are starting today with aircraft flights and will continue for two weeks." This rather terse message was the culmination of a great deal of work and planning by the FCC to investigate, in-depth, the possible problems of radiation leakage from U.S. cable systems.

The FCC is mounting a major effort into the investigation of the interfering effect of cable system leakages on aircraft navigational instruments and radios, specifically those operating on the frequencies equivalent to midband channels A, B and C. Concurrent with the aerial measurements a comprehensive program of ground measurements will be carried out.

The object of these tests is to find correlation between ground measurement and air measurement, and to define requirements for radiation monitoring for U.S. licenses. The program is extensive. Some 60 systems will be overflown, including at least one with known pseudo leakages. Ground measurements will be carried out by normal mobile monitoring methods plus "hot spot" detailed calibrated measurements where high radiation levels are found.

In Canada, the approach was somewhat different. Concern over radiation was felt as early as 1973. In April of 1974, the Canadian Department of Communications issued a document entitled "Study of Potential RF Interference to Aeronautical Radio Navigation Aids," and made a number of recommendations. These recommendations resulted, in March 1976, in a document that with certain restraints, permitted the use of channels A, B and C by cable television operators. This document, "Notice to Broadcast Consultants No. 47, Use of the Frequency Band 108 to 138 MHz by Cable Television Systems" prohibited the use of the frequency bands 108 to 118 MHz because of the potential hazard to aeronautical safety. It did, however, permit the use of channels A, B and C providing video and audio carriers are offset by at least 7 kHz, (plus the frequency stability of the equipment used,) from any VHF communications frequencies used by aircraft in the same general area.

About this time, radiation monitoring on a routine basis was required by the Canadian Department of Communications for all systems operating expanded channel capacity. Radiation monitoring was also recommended, but not made mandatory for all other systems.

In the two and a half years since this took place much information has been gathered by Canadian cable TV companies and the Canadian Department of Communications on the usefulness and effectiveness of radiation monitoring. The two years of radiation monitoring reports have been analyzed by the Department of Communications. During that period some 5,500 faults on 4,000 miles of cable television plant have been reported.

It was found that the low level or "D" related faults were very predominant, being some 85 percent of the total number reported. The other low level faults related to subscriber premises were some 5 percent. High level faults made up the other 10 percent. To develop a measure of comparison between the systems over the time involved, a "fault index" was devised by dividing the total number of faults by the number of months over which fault reporting was carried out and then once again dividing by the number of system miles.

From the 15 systems from which there was significant historical data, the fault index varied from a low of .047 to a high of .798.

Detailed analysis of the report showed that, in terms of subscriber viewing quality and barring the rare occurrence of the complete break, the high level cable fault probably does not affect the subscriber significantly. This is due to the fact that complete breaks will be immediately rectified so only small leaks remain undetected. Hence, no significant signal level drop occurs. The ingress level is small compared with signal level carried and the fault is localized into a small cable section since matching on trunk and feeder is in well-defined bounds over the cable frequency spectrum. The major problem with a high level fault is expected to be egress or radiation and interference to other services. With offsetting and the other preventive measures in force, and taking into account the high rate of detection of these high level faults, the Canadian Department of Communications feels that the probability of interference from this type of fault is very small.

Low level faults, mainly from drops, are a very serious concern in terms of overall subscriber quality. Ingress of signals is of the same order as the signals carried. The fault area, i.e., the effective pick-up length due to the impossibility of matching on all frequencies, can be very long, thus drop cables act as a long line receiving (or transmitting) antenna. This all points to subscriber quality problems. Ingress has been the major problem, not interference to other services. At the same time drop faults are much more difficult to detect due to their low signal level, and the fact that back lot construction has been carried out with subsequent difficulty of detection by patrolling on-road vehicles. In addition, it must be considered that the number of miles of drop cable equals or exceeds that of the trunk and feeder cable combined. This all combines to increase the probability of occurrence, and this of course is supported by the reported distribution figures.

Subscriber drop faults are caused mainly by leakages from "F" type connectors due to their either working loose or becoming corroded, and to loose plates on multi-taps. It has also been found that the drop cable will be changed due to heavy corrosion and frequently the fault will be reported as a drop cable fault. However, further investigation has shown that often these faults originated as connector faults allowing moisture to get at the screening of the drop cable which in turn corroded, often for several feet.

A number of Canadian cable TV companies have found that their attitude on radiation monitoring is changing from one of a "necessary nuisance" to that of finding it a useful and sometimes profitable maintenance tool. It cuts down on maintenance calls, detects illegal connections rapidly and aids in providing higher quality service.

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