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August 1982

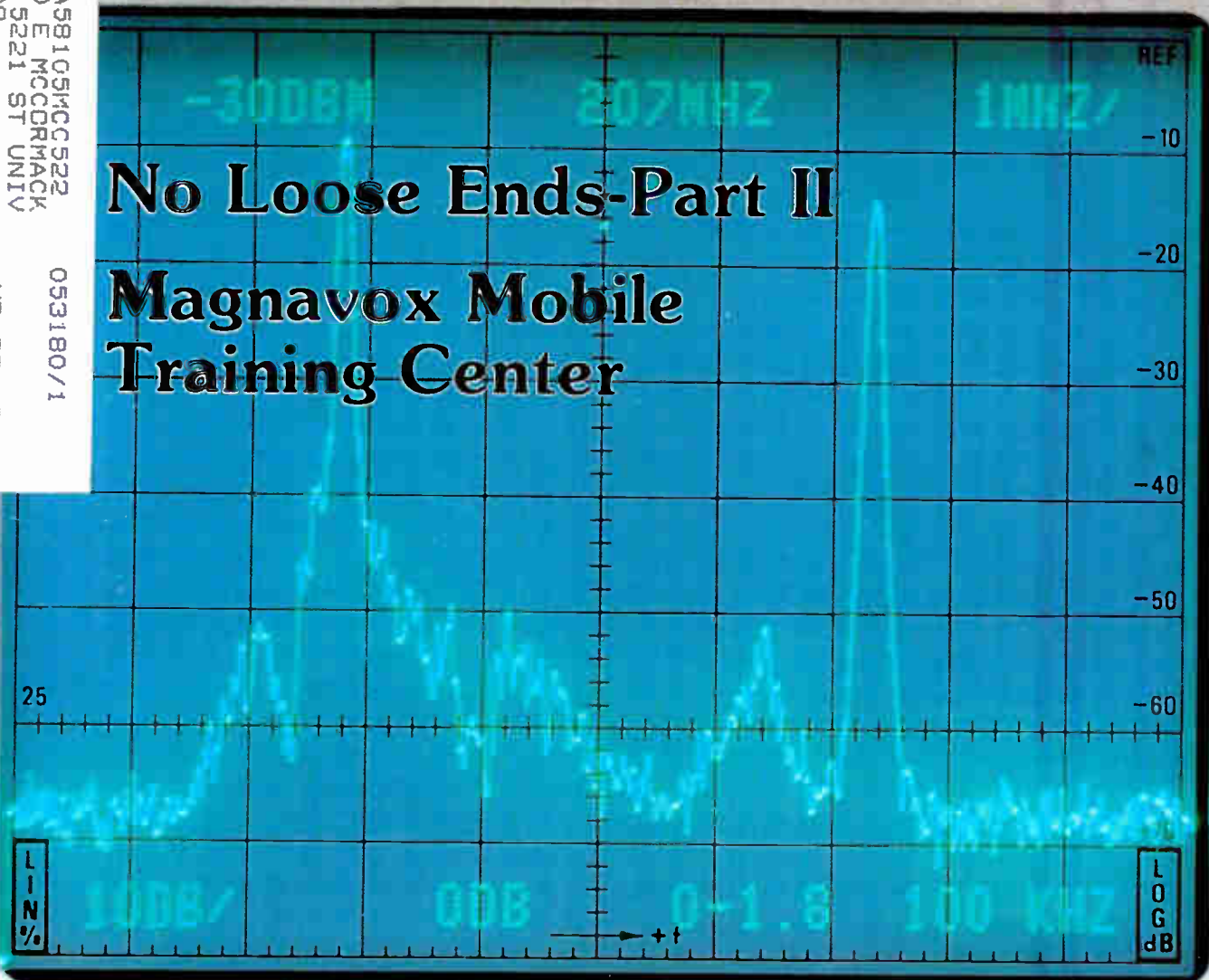
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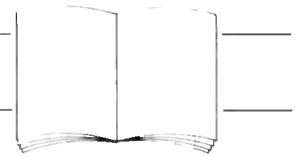
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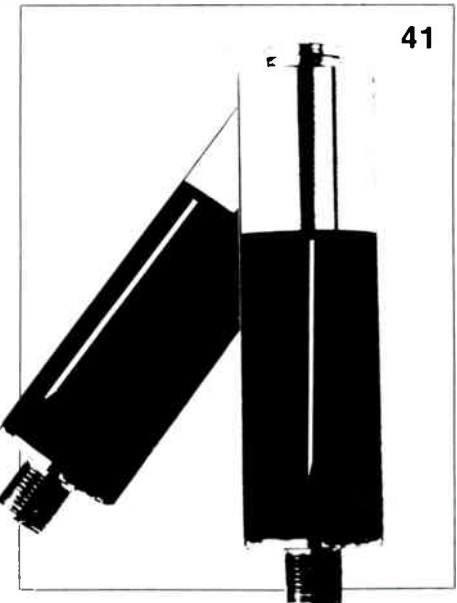
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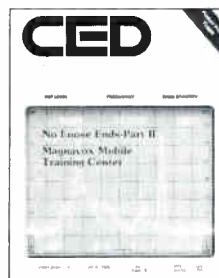
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### About The Cover:

The display represents a television channel signal-to-noise measurement as seen on a Tektronix 492P spectrum analyzer. Photo courtesy of Tektronix Inc.



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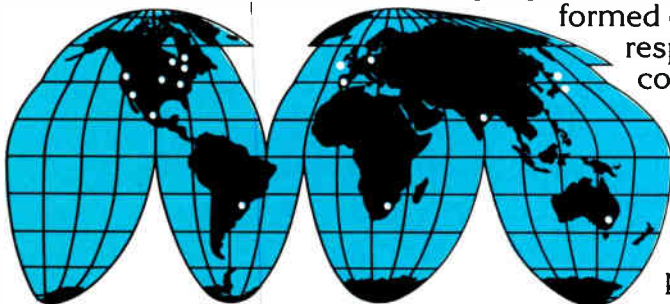
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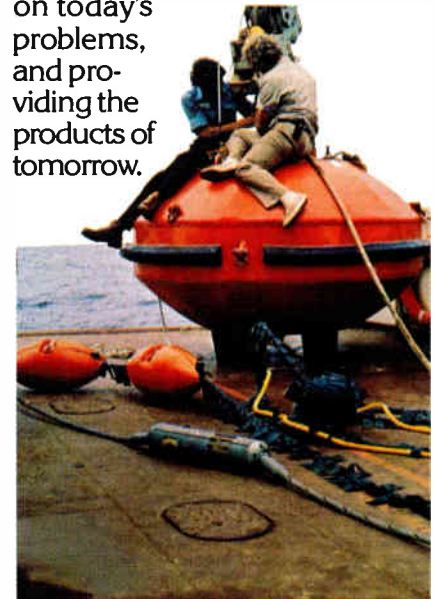
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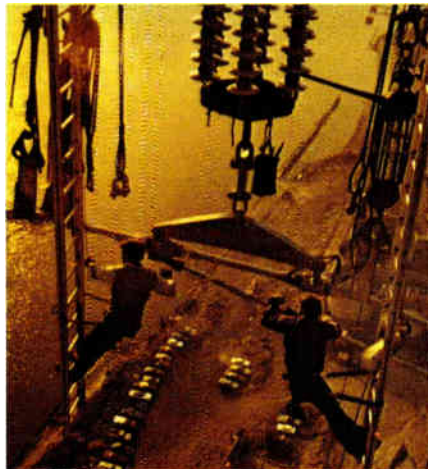


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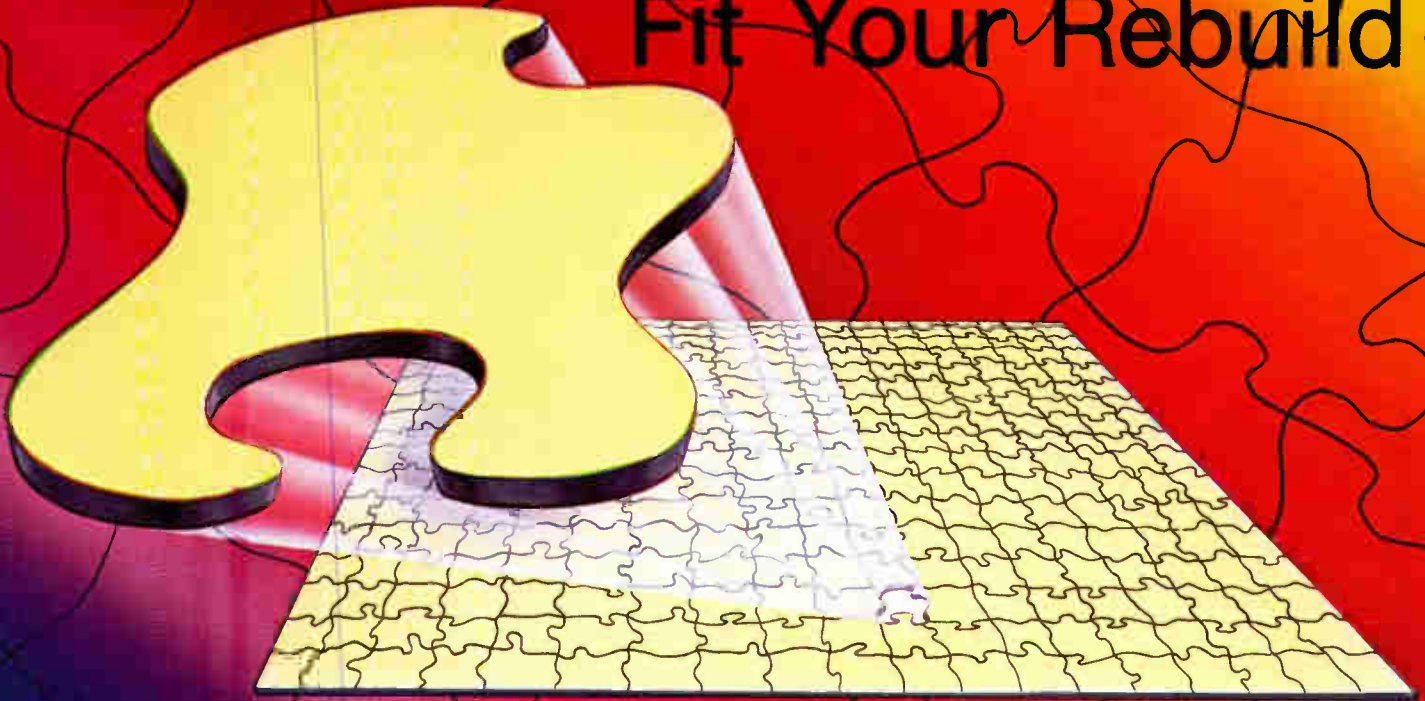
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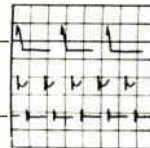
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## Tele-Zap

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## Oregon County Sets Tight Broadcast Radiation Standard

Citizens of Multnomah County, Oregon, apparently think more of the Soviet Union's concern for health than American science. Citing the USSR's broadcast radiation limit of one microwatt per square centimeter of exposed surface as indicating a health peril

unknown to American science, neighborhood spokesmen argued against technical advisers who suggested a radiation limit of 200 microwatts, the limit in Massachusetts. No national standard for non-ionizing radiation exists, but the American National Standards Institute suggests 1,000 microwatts as does the National Institute of Occupational Safety and Health. The Multnomah County law, effective July 31, sets the lowest limit in the nation at 50 microwatts per square centimeter of exposed surface, averaged over a half-hour period at ground level. The current measured average level in the area is one microwatt.

## New Chip From Bell

Bell Labs has come up with a superconducting microchip which they call "the most complex circuit ever built." It employs Josephson junction technology, 600 of them, on a chip the size of a collar button. Josephson junctions (microscopic switches that operate in a supercooled liquid helium environment) provide high-speed, low-power data processing and may eventually be crammed into a supercomputer. But for now, Bell Labs hopes to improve the transmission of commercial broadcast television with chips that multiply an 8-bit number within 30 nanoseconds using less than one milliwatt of power. These will be used in an experiment in video image compression which will reduce the bandwidth required for transmission over Bell wires.

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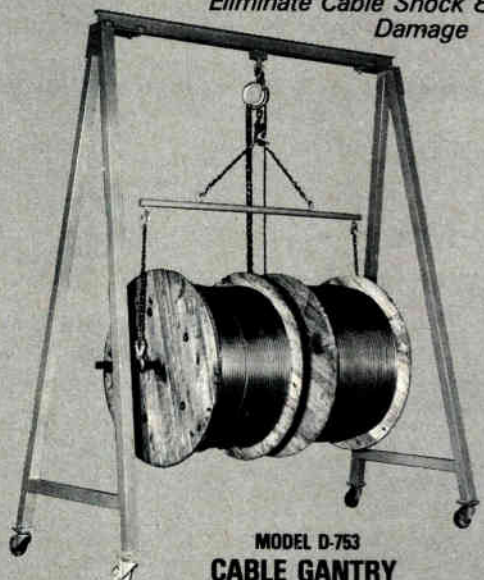
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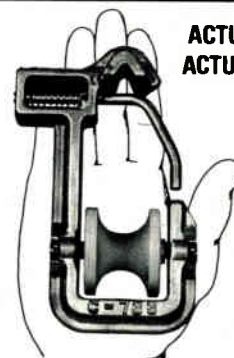
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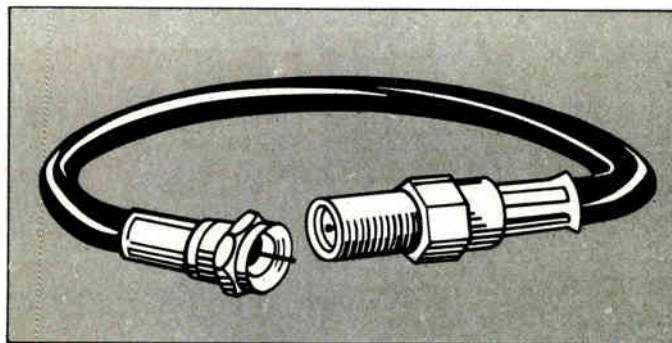
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## Seminars



### August

**4-6: Magnavox CATV Systems** will be conducting a field training seminar with its Mobile Training Center in Syracuse, N.Y. Contact Larry Richards, (315) 682-9105.

**5-7:** The first annual **SPACE** convention and exhibition will be held in Omaha, Neb. Contact Carole Sutter, (202) 887-0605.

**11-13:** The fourth annual Satellite Communications Users Conference, sponsored by **Satellite Communications** magazine, will be held at the Regency Hotel in Denver. Contact Cathy Chalmers, (303) 694-1522.

**8-9: Magnavox CATV Systems** will be conducting a field training seminar with its Mobile Training Center in Syracuse, N.Y. Contact Larry Richards, (315) 682-9105.

**18-20:** The 1982 convention of the **Rocky Mountain Cable Television Association** will be held at the Hilton Inn, Albuquerque, N.J. Contact Oscar Davis, (505) 538-3701; or Ray Polvadore, (505) 867-4444.

**22-24:** The summer conference of the **Michigan Cable Television Association** will be held at the Hilton Hotel in Traverse City. Contact Sandra Applegate, (313) 235-6112.

**30—September 3:** A **Community Antenna Television Association** advanced technical seminar will be held in Phoenix, Arizona. Contact the CATA Engineering Office, (305) 562-7847.

### September

**1, 2, 3:** A **Blonder-Tongue** MATV/CATV/Earth Station Technical Seminar will be held in New Orleans, La. in conjunction with Spivey-LeBoeuf Associates. Contact Glenn Stawicki or Gloria Rothfuss (201) 679-4000.

**9-11:** The annual convention of the **Southern Cable Television Association**, the Eastern Show, will be held at the Georgia World Congress Center in Atlanta. Contact Nancy Horne, (404) 237-8228.

**15-16:** A **Blonder-Tongue** "Satellite TVRO Earth Station" seminar will be held in Lincroft, N.J. Contact George Chingery, (201) 679-4000.

**15-17: Magnavox CATV Systems** will be conducting a field training seminar with its Mobile Training Center in Boston. Contact Larry Richards, (315) 682-9105.

**19-22:** The **Pacific Northwest Cable Communication Association** annual convention will be held at the Sea-Tac Red Lion Inn, Seattle. Contact Douglas Rice, (406) 245-3051.

**20-22: Magnavox CATV Systems** will be conducting a field training seminar with its Mobile Training Center in Boston. Contact Larry Richards, (315) 682-9105.

**20-23:** The annual convention of the **New England Cable Television Association** will be held at Dunfey-Hyannis Hotel in Hyannis, Mass. Contact Gary Cain, (603) 224-3373.

**23-25: Magnavox CATV Systems** will be conducting a field training seminar with its Mobile Training Center in Boston. Contact Larry Richards, (315) 682-9105.

**29-30:** A **Blonder-Tongue** MATV/TVRO Earth Station Seminar will be held in Randolph, Mass., in conjunction with **W.A. Hendrickson Co.** Contact: Bob Hendrickson (617) 545-0652 or Gloria Rothfuss (201) 679-4000.

## Looking ahead

**October 10-12:** SCTE Fall Engineering Conference, Don Caesar Beach Resort Hotel, St. Petersburg, Florida.

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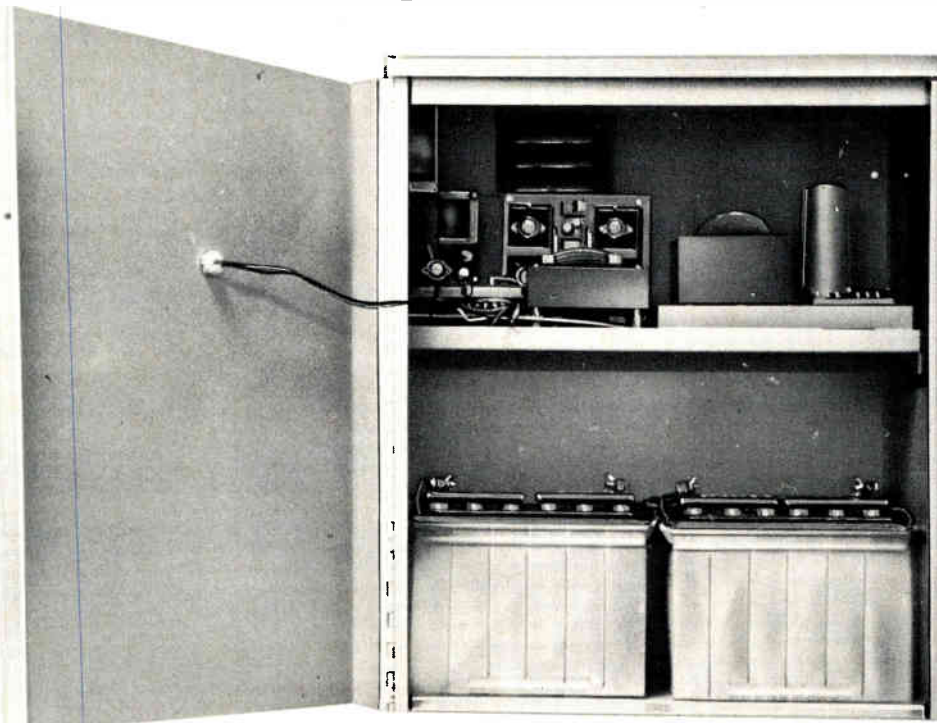
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## SCTE's Cable-Tec Expo: Who Needs Another Trade Show?

What's this I hear? Another annual trade show for cable television? With the NCTA Convention, the Western Show, the Eastern Show, the Atlantic, the Mid-Atlantic, the New England, the Great Lakes and all the other regional conferences, not to mention the State shows, CTAM, CAB, all the meetings and seminars and the SCTE's own Spring and Fall Technical Conferences, is there need for another? Well, perhaps. . . yes!

The Society of Cable Television Engineers (SCTE) has announced it will sponsor an annual Cable-Tec Expo, the first of which will be held in the Dallas Convention Center, May 6-8, 1983. Featuring morning technical sessions and a hardware show on Friday and Saturday afternoons and Sunday morning, the Cable-Tec Expo holds promise of giving cable technology and engineering a needed emphasis, far from the maddening crowd.

SCTE officials are quick to point out that the Cable-Tec Expo is not intended as competition with the other trade shows in the cable industry. Tom Polis, SCTE president, said, "SCTE is hardware-oriented, so this is a natural addition to the Society's schedule." In any case, it's true that amid all the hoopla and hype, glitter and glamor and the show girls and the cigar-smokers at the big annuals, the technology and engineering, which is the true basis of this industry, gets smothered. While there are many more hardware manufacturers exhibiting at the annual conventions than programming services, the programmers are spending a higher percentage of dollars to promote their wares. According to Judith Baer, executive vice-president of the SCTE, the Cable-Tec Expo will be kept simple, low-cost and business-like with no luncheon speakers, no politicians.

But the Cable-Tec Expo will not be without its fun and excitement. Every day, from the floor of the exhibit area, prize drawings will be held. Many hospitality suites are planned, and a Texas-style barbeque is being scheduled for Saturday night at a nearby Dallas ranch. Spouses will be welcomed at all exposition functions with no separate "spouse-programs" offered. In fact, SCTE members' spouses are encouraged to attend and can register for a nominal fee of \$35 per person, with members charged \$50 per person prior to

March 15, 1983 (afterwards the registration for members and spouses will be \$75 per person).

Exhibitors will find no competition for the attention of attendees as there will be no other functions scheduled during the exhibit hours. "Every effort is being made to encourage exhibit booth traffic for the hardware manufacturers and suppliers in the cable industry," says Polis. The technical sessions will be held for four hours each morning. Exhibit space will go for \$500 for a 10 x 10-foot area. Trade Associates Inc. will be managing the exposition and the Trade Show Bureau will audit it.

The SCTE anticipates, at minimum, 1,200 cable technicians and engineers to attend the Cable-Tec Expo 1983 event. With cable techs and engineers acting as either equipment purchasers for multiple system operators and independent system operators or, as those who test, evaluate and recommend to management the hardware to buy, exhibitors can expect excellent booth traffic.

Technicians and engineers will find the technical sessions interesting and useful. It will be back to basics with practical but informal discussions of topics that have staples at many of the SCTE regional meetings. The technical sessions will not be organized around the reading and presentation of formal papers as is the case at the Spring and Fall Technical Conferences (which will continue to be held as well).

So, the SCTE Cable-Tec Expo '83 will take its place among the cable trade shows, with the difference being that this one is "narrow-cast" for the technical community. We'll be there to cover it. But in the meantime, we'll see you at the Eastern Show. . . and the Atlantic Show. . . and the Fall Conference. . . and the Western Show. . .

*George Sell*

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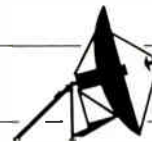
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## Five Companies Get OK From FCC For Computer Communications Service

WASHINGTON—The Federal Communications Commission has authorized five companies to offer a new digital electronic message service that will deliver information between computers in different cities without the use of local telephone lines.

Designed for large business users who need to disseminate information at high speeds, the service will involve five companies, each serving 30 cities. These companies are: ISA Communications Services Inc., Satellite Business Systems, Contemporary Communications Corp., MCI Communications Corp. and Tymnet Inc.

Microwave links will be used for the local portion of the traffic while satellites will be used for long distance transmission. Businesses will be able to configure computer communications to their own needs. That service poses fewer expenses than the currently used nationwide telephone network.

## FCC Loading Report Points To Transponder Glut

WASHINGTON—A Federal Communications Commission quarterly transponder loading report shows that nearly 40 percent of the transponders currently available on U.S. domestic C-band satellites are not being used.

During satellite monitoring in late June, the FCC's field operations bureau in Laurel, Md., found that 81 out of 216 transponders on Comsat, RCA and Western Union birds were inactive.

The study presents the data and does not attempt to make any conclusions. However, the report comes at a time when some observers of the satellite market are saying there is a glut of transponders and that prices for leasing transponders may be prohibitive.

Cable's main bird, Satcom III-R, is the only U.S. C-band satellite in full use, with its 24 transponders loaded for programming. RCA Americom's newer bird, Satcom IV, now has eight customers. Only three cable companies expressed interest in Satcom IV's \$13 million transponders when they were made available for leasing last April.

The following list shows the FCC bureau findings regarding transponder use on each satellite.

- Comstar I/II: 17 inactive transponders; 4 TV/FM; 2 SCPC; 1 FDM/FM

- Comstar III: 5 inactive; 14 FDM/FM; 2 TV/FM; 2 FM (1 MHz dispersion); 1 SCPC
  - Comstar IV: 5 inactive; 19 FDM/FM
  - Satcom I: 8 inactive; 7 FDM/FM; 4 SCPC; 2 TV/FM; 2 digital (wideband); 1 SCPC with TV/FM
  - Satcom II: 13 inactive; 3 TV/FM; 3 FDM/FM; 3 SCPC; 2 FDMA/FDM/FM
  - Satcom III-R: 24 TV/FM
  - Satcom IV: 16 inactive; 7 TV/FM; 1 unmodulated carrier
  - Westar I/IV: 9 inactive; 13 TV/FM; 2 SCPC
  - Westar II: 3 inactive; 3 FDMA/FDM/FM; 3 FDM/FM; 2 SCPC; 1 digital
  - Westar III: 5 inactive; 4 TV/FM; 3 SCPC.
- FDM—frequency division multiplexing; FDMA—frequency division multiple access; SCPC single carrier per channel.

## HAM Radio Operators Seek Ruling On Signal Leakage

WASHINGTON—The National Cable Television Association, Society of Cable Television Engineers and Community Antenna Television Association are encouraging cable operators to be more diligent about preventing signal leakage problems.

The latest plea comes while pressure from the American Radio Relay League is increasing for restrictions on cables' access to certain frequencies.

The ARRL wants the FCC to establish a new rule prohibiting cable companies from using Channel E (144 to 150 MHz) and Channel K (222 to 228 MHz). The ARRL claims signals leaking from improperly maintained cable systems are interfering with ham radio reception. Deadline for comments on the proposed rule is Aug. 1.

A spokesman for the ARRL said the amateur radio operator's association is willing to meet with industry officials in an attempt to find a common ground and perhaps withdraw its FCC petition for a new rule.

The Federal Aviation Administration has also complained that signal leakage from cable companies interferes with aeronautical transmission and reception.

Meanwhile, the FCC is considering another new rule that would relax the leakage standards from 20 to 100 microvolts.

## Jerrold Supplies First 450 MHz System

HATBORO, Pa.—United Cable of Scotts-

dale, Ariz., has received the first shipment of Jerrold 450 MHz equipment in the industry, according to Jerrold officials.

The products—Starline 450 amplifiers, FFT taps, STC splitters, and status monitoring hardware will enable the system to develop what will become one of the most advanced systems in the country, Jerrold vice president Jack Forde said.

Over the next year, the company, a division of General Instrument Corp., will supply United Cable with 500 miles of dual-trunk, single feeder plant serving the entire city, including a two-way institutional loop of the second trunk cable.

## Oak To Supply Addressable Systems In Wisconsin

RANCHO BERNARDO, Calif.—Oak Communications Systems has installed Oak TotalControl addressable systems in a Total TV system covering 12 southeastern Wisconsin Communities. The system will operate through a single headend and connect by means of high power AML microwave transmissions.

The system, passing 32,000 homes, will receive an initial order of 12,000 converters, according to a Total TV spokesman. The company will purchase additional units based on the growth of the system.

## Canada To Aid Telidon With \$10.5 Million

TORONTO, ONTARIO—The Canadian Department of Communications announced recently it would aid 52 Telidon projects in Ontario and Montreal. These grants, part of the Telidon Industry Investment Stimulation Program, to which the government has committed \$10.5 million, will help develop Telidon services throughout the country.

Among the grants, Toronto received \$2.7 million to assist with the development of a public access videotex system, a Telidon-based career guidance system and college-training in videotex. A \$1 million commitment was given to Videopress of London, Ontario. The money will be used to purchase Telidon terminals for the company's shopping mall information systems.

In Montreal, \$1.3 million was awarded to three projects involving the University of Quebec, and two firms providing commercial Telidon services.

The government has also granted the Manitoba Telephone System \$1 million to



expand its agricultural information service and telecommunications monitoring system.

In other Telidon news, Myer Communications of Melbourne, Australia held its first public demonstration of its Telidon-based videotex system for Australian businessmen. It is expected to begin operation shortly.

## SCTE News



### SCTE Moving On Designation Program; Seeks Funds

WASHINGTON—The Society of Cable Television Engineers, having undertaken initial steps to establish its Engineering Designation Project, now seeks industry-wide financial support to defray the start-up cost of this voluntary program, which will result in the title of Principal Cable Television Engineer (PCTE) for those who qualify.

Start up costs of the PCTE program are estimated at \$20,000—a price which includes fees for developing the examination, printing, and other associated expenses. The SCTE is urging members to give cash donations in addition to providing an opportunity for advance

payment of membership dues. There is also the option of extending current membership beyond expiration, in order to offset program costs.

"Every dollar counts and every dollar is needed right now if the SCTE is to accomplish its goal in March 1983," said society president Thomas J. Polis.

The organization is currently involved in developing a study guide, accompanied by a reading list, that will comprise the basis for the exam portion of the program. More than 20 prominent SCTE members met in May to create the guide.

## Business Notes



★ **Arvin/Diamond** is supplying the weather portion of **Satellite News Channels** 24-hour news service with up-to-date color satellite weather pictures via their Sat-Weather receiver. Up to 200 pictures can be recorded and then replayed in sequences showing weather movement.

★ **Texscan Corporation** has announced an agreement with **Cox Cable** of Tucson, Ariz. Construction began June 7th, 1982 and will run for a 30 month period. The Tucson system will provide 108 channels of programming to 130,000 homes, with 150 miles of high-split institutional.

**Texscan Theta-Com** will be supplying active electronics and line passives for the aerial and underground plant. **Byers Communications Corporation** of Atlanta, Georgia will be providing the turnkey for the system.

★ **Toner Cable Equipment** broke ground on June 3, 1982 for an addition to their headquarters in Horsham, Pa. The new wing, which will add 3,000 square feet to Toner's present facilities, will house management offices, and a new computer facility for Toner's CATV computer division. Completion of the project is scheduled for mid-September. Additionally, Toner Cable has recently completed a total turnkey project for **Connections Communications Corp.** in Newark, N.J. The Toner package included a 280-foot tower, 6.1 and 5 meter earth stations, a complete 32 channel headend, and a Toner SMART™ computer system to handle subscriber account processing. The Newark system will pass 120,000 homes and expects to penetrate up to 70,000 households.

★ **Home Box Office Inc.** has selected **Scientific-Atlanta** to provide uplink satellite earth stations for its new satellite communications center. The total value of the Scientific-Atlanta equipment is approximately \$3 million. Installation will be made at the new 60,000 square foot center, on which construction will begin immediately at a site in Hauppauge, Long Island, New York.

# THE STANDARDS OF THE INDUSTRY

## Hiatt Cable Clips for Coaxial Cable Installation.

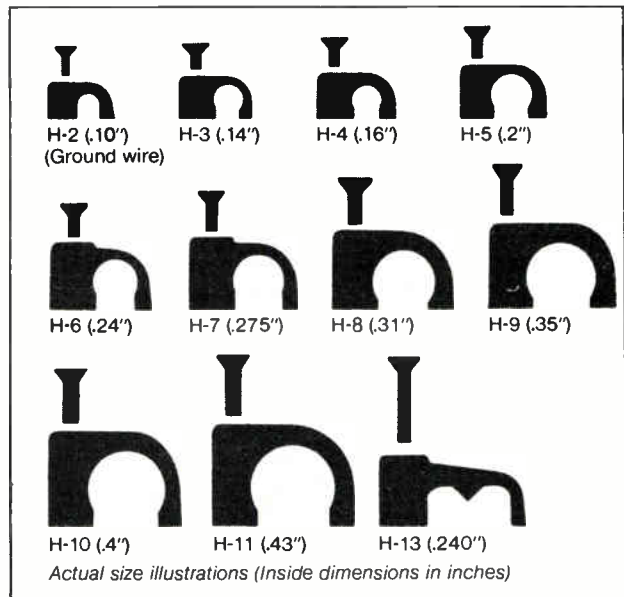
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# Mobile Training Center: Upgrading Field Technician Skills

**The Magnavox traveling CATV training seminar fills the need for improving cable technicians' expertise with advanced systems technology. The first 10 seminars, held in five cities, were attended by 221 students. Each seminar is limited to 35 students, maximum, on a first come, first served basis.**

*By Larry W. Richards, director of technical services, Magnavox CATV*

**W**ith 440 MHz systems up and transmitting over thousands of miles of cable, it's obvious that the trend is set toward expanding bandwidth. Franchise committees are practically unanimous in opting for 440 systems and many rebuilds are updating to that level.

Along with growing community demand for higher frequencies and expanding bandwidths, there has been a corresponding demand by MSOs for more competence in field personnel who must service new systems.

Engineering personnel have entered the industry with proper backgrounds and have kept up with advancing CATV technology, but the skills and competence of technicians in general leaves much to be desired. The truth is, the industry has grown so fast that system operators haven't had the time to train many of the people who have come into the industry—particularly field technicians.

## **CATV Training Seminar**

That's why the Magnavox CATV Training Seminar was developed. We're trying to fill the gap in technical competence before it opens even wider. With the trend to expanding bandwidths, it's clear that systems design, application and installation procedures have become more and more critical—and hence, the need for better-trained technicians.

Accordingly, we departed from conventional seminar approaches and devised a



**A Magnavox instructor helps with problem solving at the spectrum analyzer**

unique seminar featuring classroom/hands-on experience. Our three-day seminar includes classroom sessions plus experience working with operational 440+ MHz equipment and the latest in test instruments in a specially designed mobile training center.

The center, housed in a 45-ft. trailer, is complete with a 16-amplifier cascade and an environmental chamber capable of testing 440+ MHz system components over a wide range of environmental conditions.

In the hands-on experience phase of

our seminar, students are taken to the trailer in small groups and familiarized with sweep equipment, the field strength meter and capabilities of the spectrum analyzer. Visual displays of distortions, as they would appear on both test equipment and TV sets, are set up by the students. This gives them the opportunity to vary the levels and observe the effects.

During a typical session, students are given a number of problems that can occur in a cascade, and they are required to solve them by working with various types of test equipment. With the 16-



**Classroom work covers basic to advanced theory, with emphasis on problem solving. The atmosphere is casual, but work goes on in earnest.**

**Contribution of real-life problems and solutions by students adds an extra dimension.**



**Larry Richards, Magnavox Director of Technical Services, welcomes two seminar students to the Mobile Training Center**

amplifier cascade hooked up and running, students can work on an actual cable system—make adjustments and solve problems—without interrupting subscribers

### **Students Enthusiastic**

We find that seminar participants are universally enthusiastic about actually solving day-to-day technical problems in our mobile center. A typical comment was this observation by Rick Wilkinson, chief technician, Storer Cable, at our first Los Angeles seminar: "I especially liked working with equipment in the trailer, such

as the summation sweep. It helps to see your adjustments on a CRT."

As expressed in our brochure promoting the three-day course, held at prominent hotels in principal cities around the country, "the seminar is designed for CATV personnel with from six months to two years experience in the industry." The syllabus (see below) covers both CATV theory and the day-to-day practical applications necessary for effective system operation. High technology information is also available for more advanced personnel. A certificate, graded according

to performance in a final examination, is forwarded to each student after completion of the course.

The atmosphere in our classroom sessions is informal, but is learning-intensive. Todd Anderson, Corporate Engineer, CommuniCom, who attended the Los Angeles seminar said, "I was challenged by the classroom material. . . . I wish all our technicians could attend."

### **Highly Qualified Teachers**

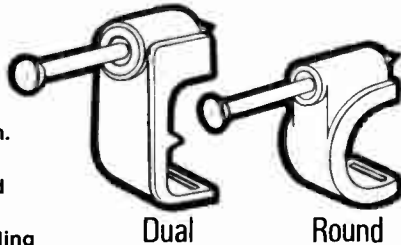
Our seminar teaching staff includes highly qualified CATV technical personnel



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with professional experience in teaching electronics and conducting seminars. In addition to our permanent staff, we also invite experienced instructors—prominent in local CATV circles for their technical expertise—to appear as guest lecturers. Guest lecturers have included Robert Vallerand from RO-VAL Technical Services; and Richard Covell and Michael Marsuich from Phascom. Upcoming seminars will feature guest speakers from Wavetek.

The Magnavox CATV Training Seminar program began in January, 1982, with two seminars scheduled for consecutive weeks in Los Angeles. Before the first seminar was over, the third seminar—scheduled for Dallas, Texas in March—was already sold out.

The seminar schedule for the remainder of 1982 will take the Magnavox training seminars to Syracuse, Boston, Atlanta and, finally, St. Louis. Seminars are given during two successive weeks in each city.

### Syllabus

#### For Classroom Work

##### Part I: Basic Theory

System Overview  
Ohm's Law  
dB and dBmV  
Spectrum Allocation  
Headend Equipment  
Transmission Line  
Connectors  
Cable Parameters  
Amplifier Operation  
Splitters  
Distribution Devices  
Distortion Parameters

##### Part II: Practical Application

System Design (How & Why)  
Return (Set-up)  
System Maintenance  
Sweeping Cable Systems  
System Measurements/Spectrum Analyzer  
System Records  
System Sweeping/Picture Documentation  
Bench Set-ups  
Bench Testing

*Larry W. Richards serves in a dual capacity at Magnavox CATV as director of technical services and product manager of active products. Prior to joining the company, his work experience included positions with Avalon Cablevision, Ltd., Jerrold Electronics, Lake Superior Cablevision and Ottawa Cablevision, Ltd. A graduate of Ottawa Tech, he is a former chairman of the Canadian Cable Television Association Committee for Training, and is a member of SCTE of Canada and the United States.*

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# No Loose Ends— Part II

## Techniques For Tests And Measurements Using The Spectrum Analyzer

By Linley Gumm, principal engineer, Communications Division, Tektronix Inc.

The first part of *No Loose Ends* was presented in the June issue of **CE**. Part II is presented here and the following installments will be presented in the October and December issues of **CE**. This four part series deals with the best and most thorough use of the spectrum analyzer for laboratory quality CATV tests and measurements, proof of performance

and system maintenance. This series is a state-of-the-art update of the widely used original *No Loose Ends* published by Tektronix in 1973 and written by Clifford Schrock.

### 4. Composite Triple-Beat

In combination with other test equipment, the Tektronix 7L12 spectrum analyzer will make composite triple-beat measurements to 80 dB below the picture carrier. Triple-beats are caused by

distortion in the distribution amplifiers which forms sums and differences from three different picture carriers. As the number of carriers increase, the number of triple-beats becomes very large. In a 35-channel system for instance, 353 beat signals fall on or near the channel 11 picture carrier. Since there are so many triple-beat products, the sum of all the beats is measured instead of the individual amplitudes. This requires great care.

Since CW carriers must be substituted

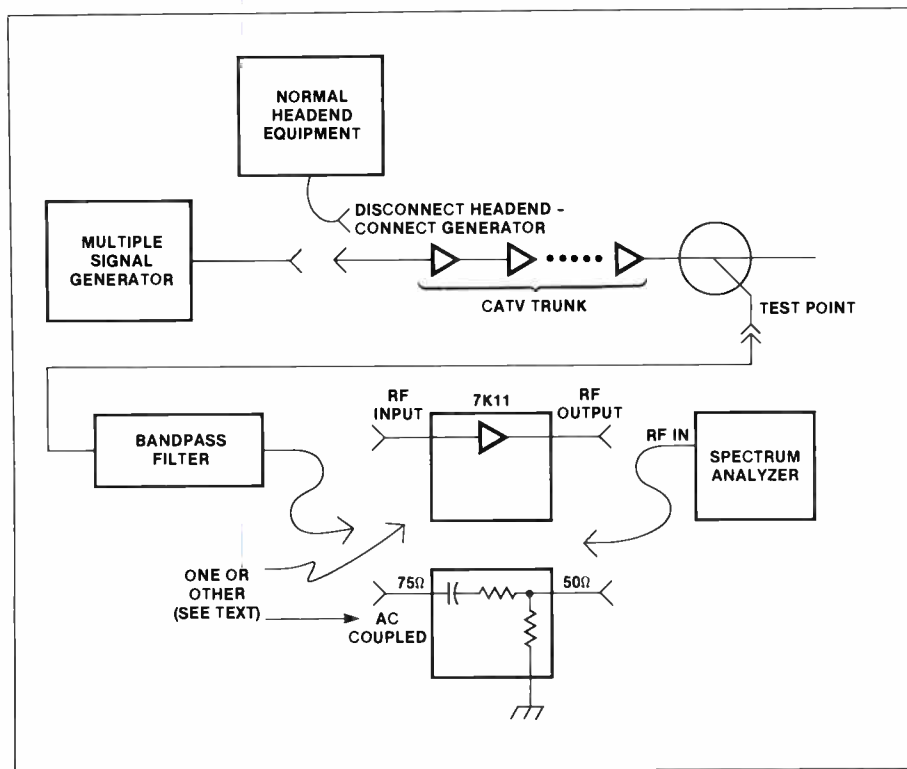


Figure 4-1 Equipment connection for composite triple-beat measurement

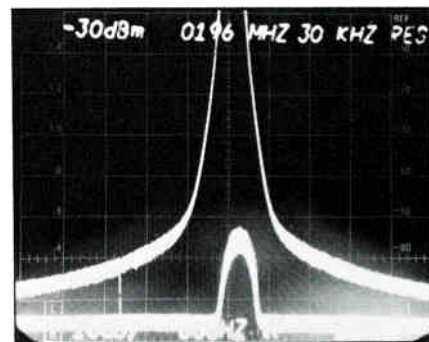


Figure 4-2 Composite triple-beat measurement (multiple exposure photo)

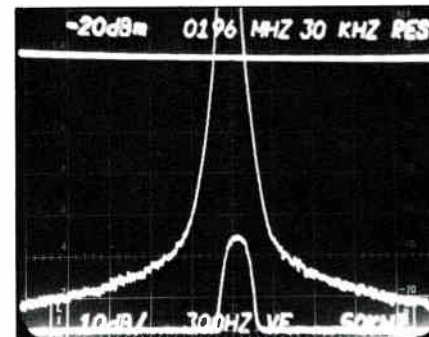


Figure 4-3 Composite triple-beat measurement using digital storage

for all the picture carriers in the system, the CATV system must be taken out of service to perform this measurement.

### Equipment Required

1. Spectrum Analyzer: Tek 7L12 or 7L14.
2. Mainframe: Tek 7613 or any 7000 Series mainframe.
3. Preamplifier: Tek 7K11 (Optional. Not usable with 7L14.)
4. Multiple Signal Generator: Matrix model SX-16 or equivalent.
5. Bandpass Filter: Tuneable or fixed for channel to be tested (normally channel 11).  
*EXAMPLE: Wavetek 5200 Series or equivalent.*
6. Adapters: As required.

### Procedure

1. At the headend, disconnect the normal headend equipment. Connect the multiple signal generator to the distribution trunk. (A possible alternative is to disconnect all inputs to the headend processors and modulators and use their substitution carriers to provide a CW carrier at the frequency of each picture carrier.) Carefully verify the amplitude of each carrier.
2. Connect the test equipment shown in figure 4-1 at the test point in the distribution system. The bandpass filter must pass the picture carrier of the channel to be tested. Channel 11 is normally used for this measurement. The 7K11 preamplifier is unnecessary when a tap level of +20 dBm or greater is available.
3. On the spectrum analyzer, select a frequency span of 1 MHz/DIV and a

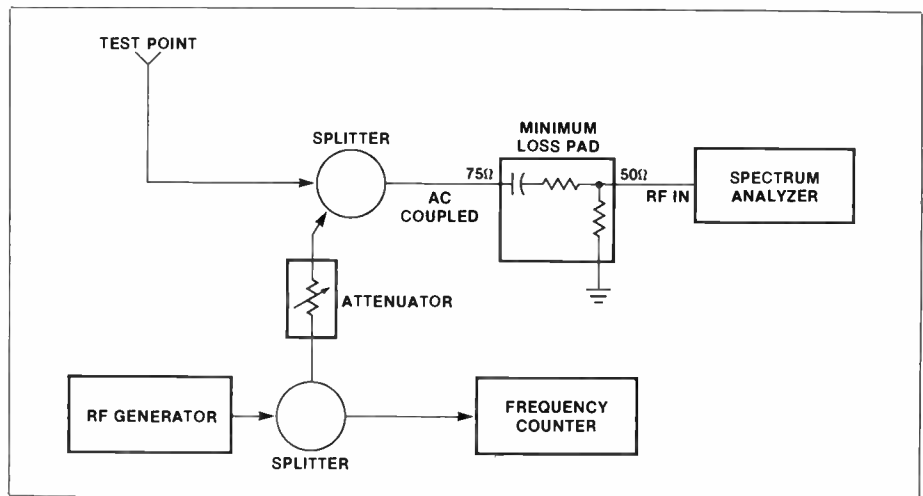


Figure 5-1 Equipment connection for frequency measurement

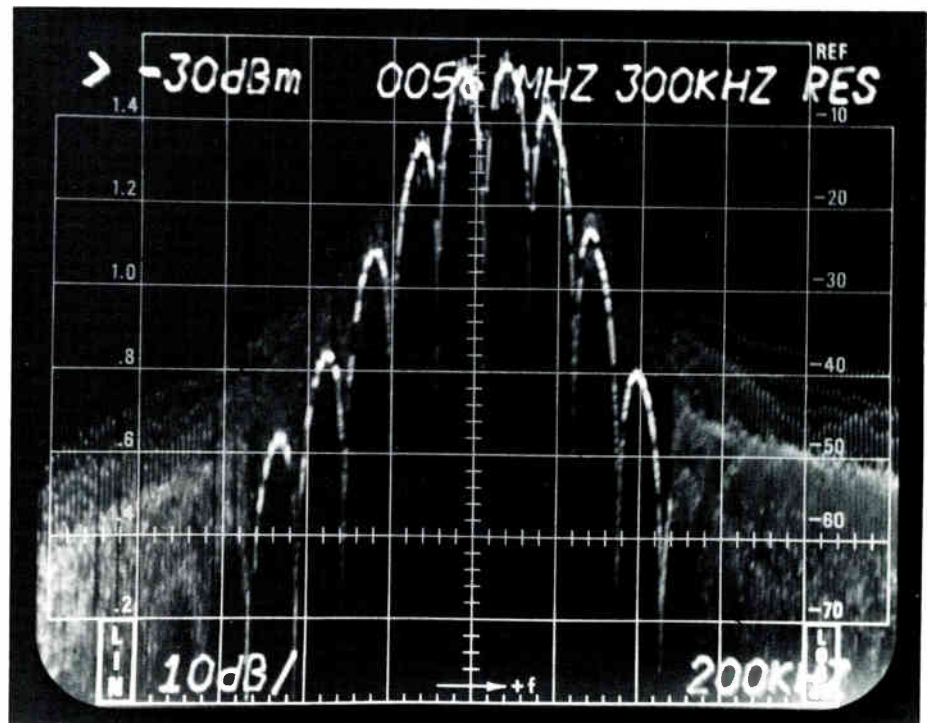


Figure 5-2 Frequency measurement

resolution bandwidth of 300 kHz. Center the picture carrier and use the 7K11 REFERENCE LEVEL controls to bring the peak carrier to the reference level. Use REF VAR on the analyzer if the 7K11 is not used. If a variable bandpass filter is used, rock the tuning to maximize the signal level.

4. Narrow the FREQUENCY SPAN to 50 kHz/DIV and select the 30 kHz resolution bandwidth. Center the carrier on screen. Select a 300 Hz video filter and slow the sweep speed.
5. Change the 7K11 REFERENCE LEVEL control to lower the reference level by 10 dB. If the reference level of the 7K11 is less than 10 dBmV, increase the IF gain on the 7L12 by 10 dB. The carrier to be tested is now 10 dB off the top of the screen. Have someone at the headend turn off this picture carrier.
6. The composite triple-beat will appear below where the carrier was (figure 4-2). Starting at the carrier amplitude (10 dB off screen), measure down to the middle of the triple-beat response. Since the composite triple-beat consists of multiple independent signals, the measurement on the spectrum analyzer screen will read low by 2.5 dB. Correct the measurement results by subtracting 2.5 dB from the measured value. For example, in figure 3-2, the composite triple-beat measures 66 dB below the carrier. The beat is actually 66 dB—2.5 dB or 63.5 dB below the carrier.

### Hints And Precautions

1. The pilot carriers must be left on (if used) so that distribution system is at its normal operating amplitude.
2. It is best to check the measured results by raising the level of the carriers by 3 dB with respect to the pilot carriers. If the amplitude of the composite triple-beat rises by 9 dB, the measured composite triple-beat is valid. If it does not, check to make sure the correct signal was measured or verify that all the distribution amplifiers are operating properly.
3. Very low triple-beat levels can often be measured by raising the signal amplitudes in the distribution system until the measurement can be made. The normal amplitude of the composite triple-beat is the level measured minus three times the amount the system amplitudes were raised to make the measurement.
4. If a 7L14 is used, move the PEAK/AVERAGE cursor to the top of the screen and slow the sweep to 1 sec/DIV. The 7L14's digital storage makes the measurement much easier (Figure 4-3.)

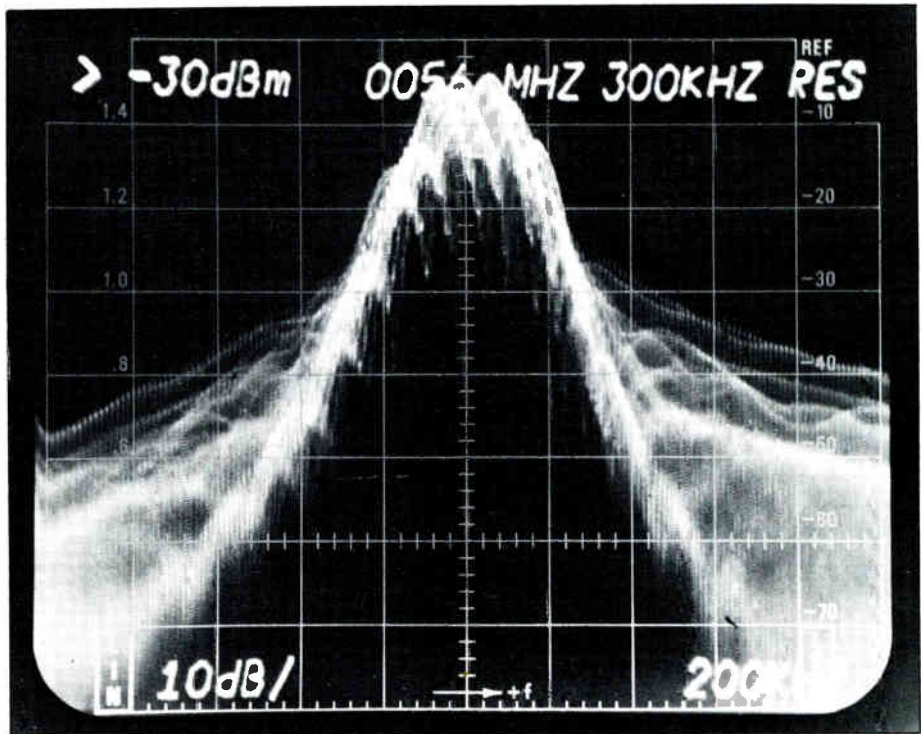


Figure 5-3 Near-zero-beat on 15.75 kHz sideband

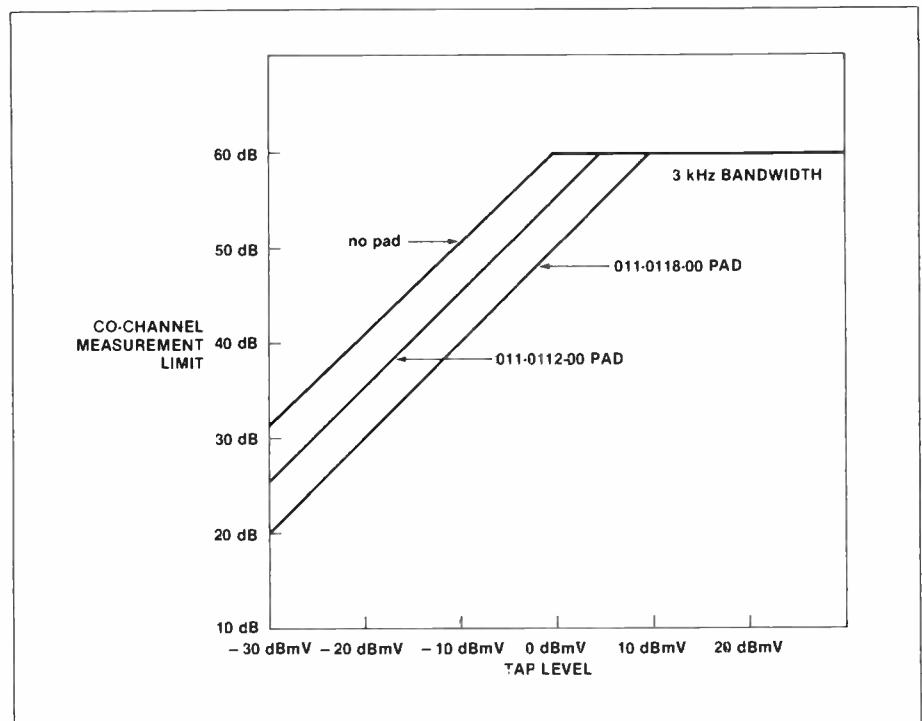


Figure 6-1 Co-channel measurement capability

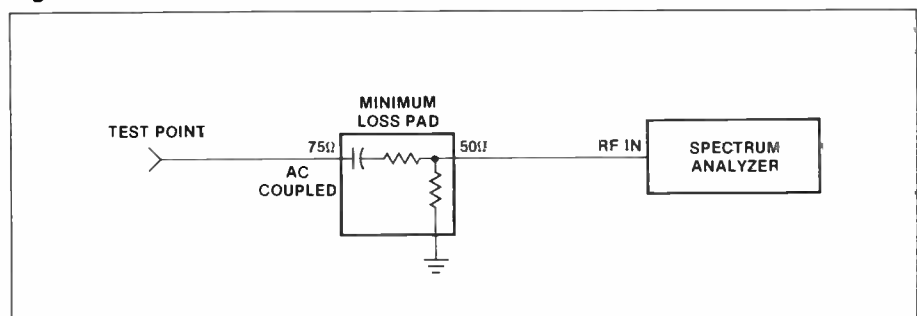


Figure 6-2 Equipment interconnection for co-channel measurements



Multiply the counter reading by the harmonic number of the signal you are using.

6. A carefully matched 75 ohm system is not required for this measurement.
7. In theory, it is possible to zero beat a 15.75 kHz sideband instead of the carrier. In practice it is quite difficult and looks different than a carrier zero-beat. Figure 5-3 shows what such a zero-beat looks like. Note the lack of the bright line outlining the beat note.

## 6. Co-channel Interference Measurements

### Capability

Co-channel interference measurement capabilities of the 7L12 Spectrum Analyzer are graphically represented in figure 6-1. These curves are valid for a resolution setting of 3 kHz. The signal level at a normal subscriber tap (0 to +5 dBmV) is sufficient for co-channel interference

---

**The signal level at a normal subscriber tap (0 to +5 dBmV) is sufficient for co-channel interference measurement.**

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measurement. These measurements are limited to 60 dB below the carrier by information in the TV signal between the carrier and the first 15 kHz sideband.

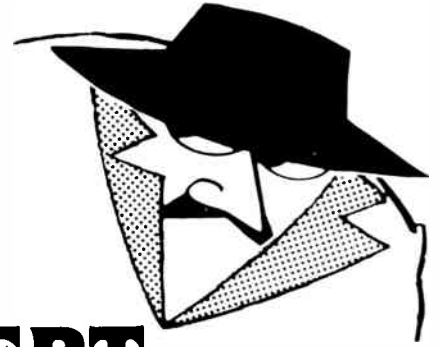
### Equipment Required

1. Spectrum Analyzer: Tek 7L12 or 7L14.
2. Mainframe: Tek 7613 or any 7000 Series mainframe.
3. Minimum Loss Pad: Tek 011-0112-00 or 011-0118-00 or equivalent.
4. F to BNC Adapter: Tek 013-0126-00 or equivalent.

### Procedure

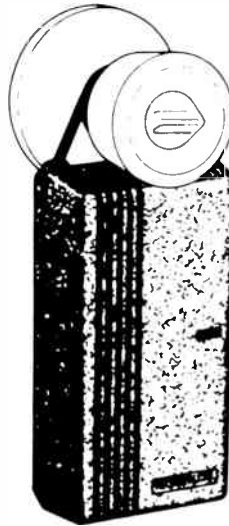
1. Interconnect the equipment as illustrated in figure 6-2.
2. Select the channel to be tested with the analyzer's FREQUENCY control.
3. With the analyzer's FREQUENCY SPAN and the RESOLUTION controls locked together, decrease the frequency span to 5 kHz/DIV while keeping the trace centered. The display should look similar to figure 6-3 with video modulation (random spikes) running through the display. If co-

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## 5. Frequency Measurements

The following procedure can be used to measure FCC specified visual and aural frequencies for CATV. Processors are available that (combined with a counter) enable carrier measurements to be completed quickly and easily. However, the zero-beat method listed here is more flexible and can be used to measure the frequencies of low-level signals or other signals such as pilots, random beats, and spurs that may not be within the range of a given signal processor.

### Equipment Required

1. Spectrum Analyzer: Tek 7L12 or 7L 14.
2. Mainframe: Tek 7613 or other 7000 Series mainframe.
3. Signal Generator: Stable CW source (must be easily tuneable over small frequency changes).

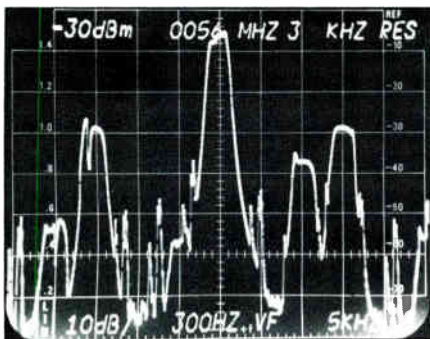


Figure 6-3 Co-channel signal with +10 kHz carrier offset

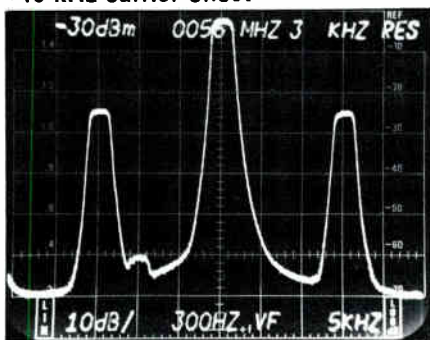


Figure 6-4 Low level interference measurements can be made using storage, slow sweeps and video filtering

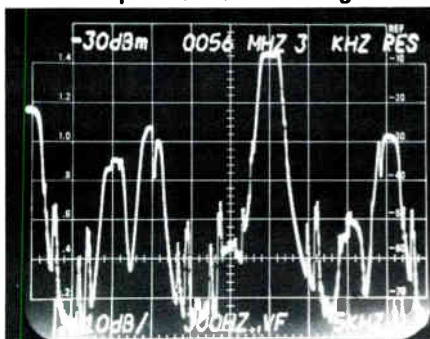


Figure 6-5 Co-channel interference with total offset of 20 kHz

4. Frequency Counter: Tek DC508A.
5. Two-way Hybrid Splitter (2): Jerrold 1596A or equivalent.
6. Attenuator: 75 ohm, 0 to 70 dB in 1 dB steps.
7. Minimum Loss Pad: Tek 011-0112-00 or 011-0118-00 or equivalent.
8. F to BNC Adapter: Tek 013-0126-00 or equivalent.

### Procedure

1. Interconnect the equipment as illustrated in figure 5-1.
2. Set the spectrum analyzer controls to select:

- a. 55.25 MHz FREQUENCY (Channel two picture carrier)
  - b. 200 kHz/DIV
  - c. the display. Adjust the BASELINE CLIPPER to blank the bottom division.
4. Switch the mainframe to high persistence or storage. Sweep (or manually rock) the generator's output frequency over its 100 kHz to 5 MHz range. A piame amplitude on the spectrum analyzer. It may be necessary to slightly readjust the frequency of the CW signal so that the two amplitudes can be easily compared.
  5. Carefully adjust the frequency of the signal generator so the CW signal and

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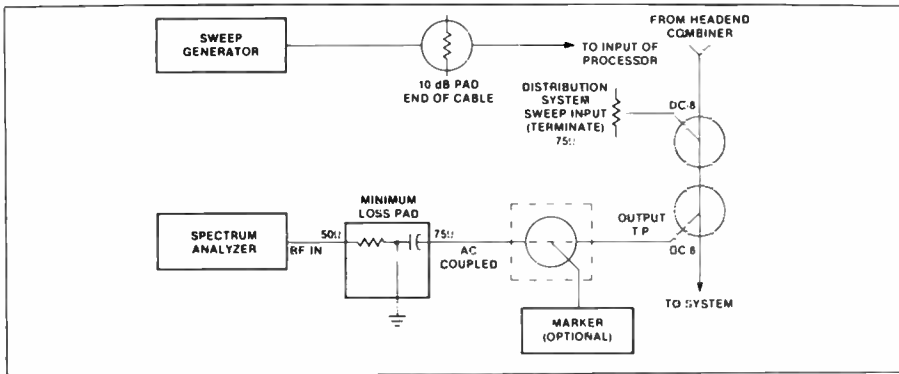


Figure 7-1 Equipment connection for headend frequency response measurements

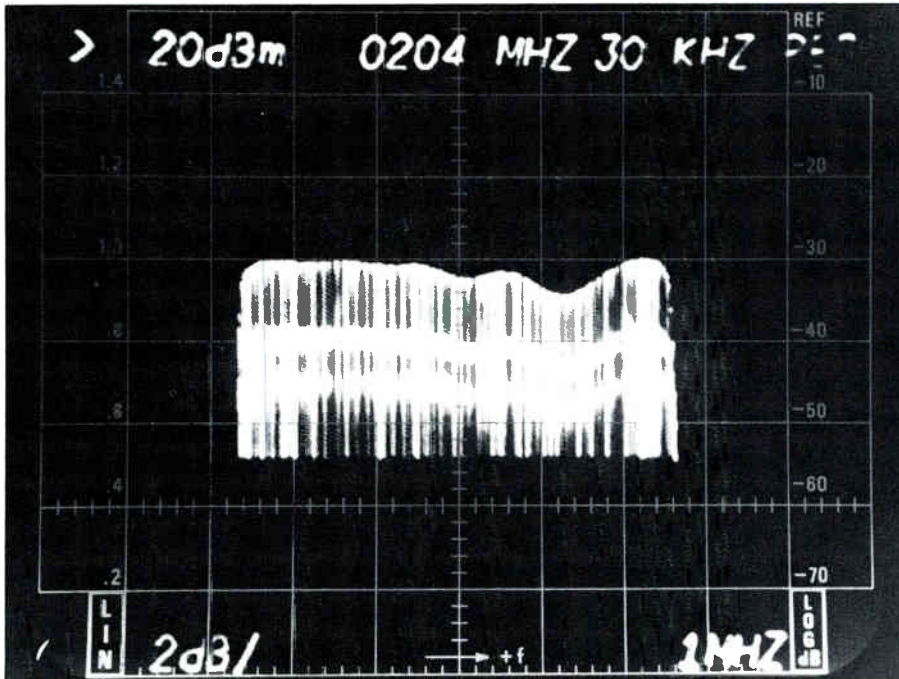


Figure 7-2 Swept heterodyne processor response

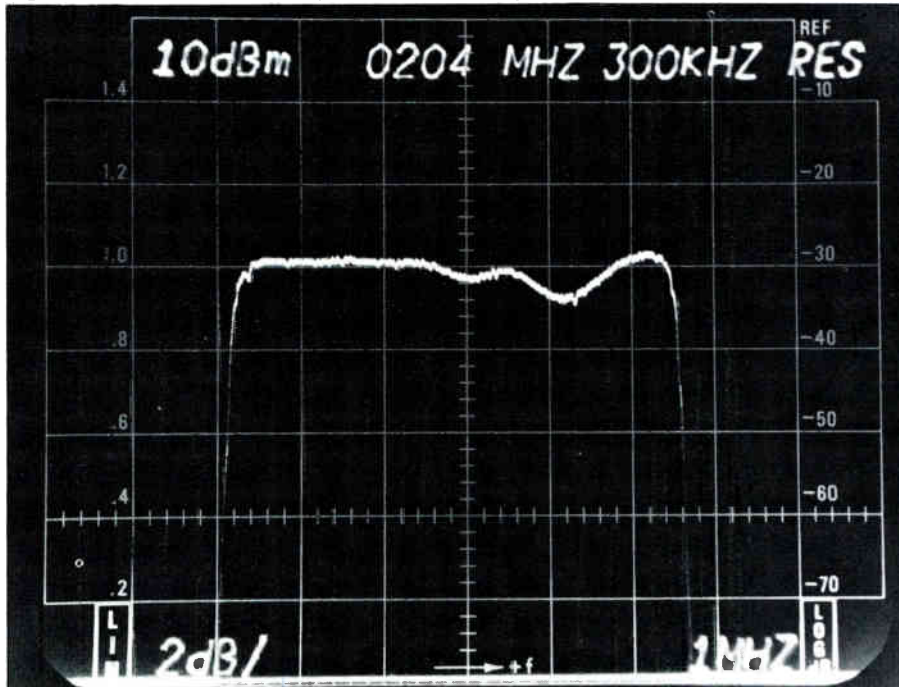


Figure 7-3 Digital storage display of processor response

the carrier slide together. A zero-beat pattern will be noted just as they cross over one another (see figure 5-2). If necessary, rock the generator's amplitude slightly to maximize the depth of the null.

- Carefully trim the fine frequency adjustment on the signal generator to minimize the frequency of the beat (the fewest number of cycles per horizontal division). The frequency indicated on the frequency counter is the frequency of the channel two carrier.
- The sound carrier is measured in the same manner. However, a series of frequency readings should be taken and averaged. This method may be tedious but is necessary for accuracy.

### Hints And Precautions

- A mechanical or electronic vernier should be incorporated in the signal generator as an aid in finding the zero-beat frequency. A standard utility CW generator can be used if your sweep generator is not equipped for stable operation.
- For the aural measurement, also monitor the signal with a radio or TV set. Making the measurement during quiet periods simplifies the process and produces the most recognizable beats.
- When the two signals are close together in frequency, finding the zero-beat point is sometimes facilitated by switching the analyzer to 0 Hz/DIV (or Zero Span). After changing the FREQUENCY SPAN control use the FINE TUNING controls to maximize the displayed signals.
- Measurement error can be easily estimated when measuring in Zero Span. Note the period of the beat using the TRIGGERING controls and the TIME/DIV control as you would on an oscilloscope. The frequency difference between the CW signal and the carrier is the reciprocal of this period.
- If you do not have a CW generator or counter that tunes high enough, it is often possible to use the second or third harmonic output of the generator.

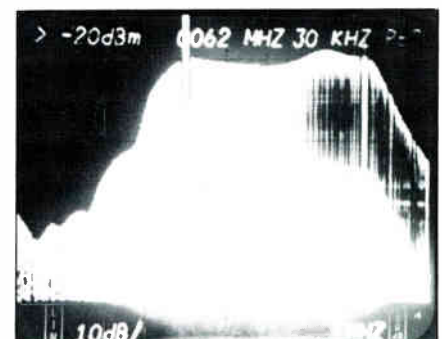


Figure 7-4 Swept modulator response

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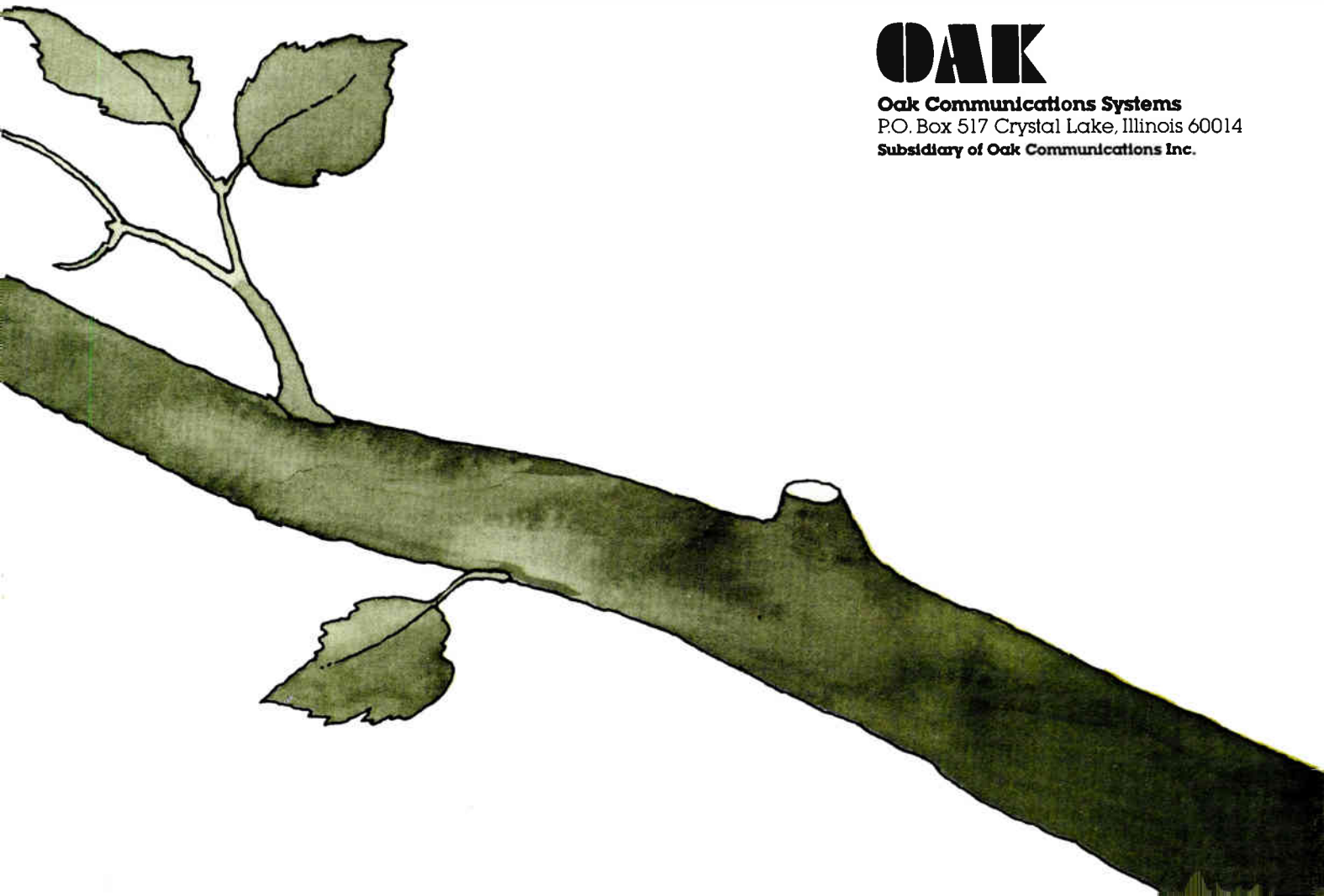
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channel interference is present, it will appear as an additional carrier offset 10 or 20 kHz from the picture carrier.

4. For maximum sensitivity, remove all of the spectrum analyzer's RF attenuation when the carrier is -30 dBm or less. Increase IF gain as necessary.
5. Using the 10 dB/DIV display mode, determine the co-channel signal amplitude by measuring the vertical separation between the amplitude of the picture carrier and the co-channel carrier.

### Hints And Precautions

1. The use of video filters and slow-sweep speeds coupled with CRT or digital storage produces very clean traces (figure 6-4). The digital storage capability of the 7L14 is very effective in the co-channel interference measurement. Slow the sweep, use a video filter and position the PEAK/AVERAGE cursor at the top of the screen so the entire display is in the AVERAGE mode.
2. Additional carriers may be observed from strong co-channel stations. These carriers are the 15 kHz sidebands caused by the horizontal sync pulses on the co-channel signal. This can be seen at the first graticule line from the left in figure 6-3.
3. Co-channel carriers can occur on either side of the picture carrier and as far away as 20 kHz depending on station offset as illustrated in figures 6-4 and 6-5.
4. Since the measurement relies on amplitudes relative to the carrier and are over a narrow frequency range, the 75 to 50 ohm matching pads can be omitted for increased sensitivity.

## 7. Headend Frequency Response Measurements

### Capability

Headend components such as processors and modulators can be tested rapidly and accurately using a spectrum analyzer and a sweep generator. Resolution of 1/4 dB is possible, and the out-of-service time is minimized.

### Equipment Required

1. Spectrum Analyzer: Tek 7L12 or 7L14.
2. Storage Mainframe: Tek 7613.
3. Sweep Generator(s) or Signal Generator(s): Must be tunable over the input frequency range of all processors and from 100 kHz to 5 MHz.
4. Fixed Attenuator: 75 ohm, 10 dB.
5. Minimum Loss Pad: Tek 011-0112-00 or 011-0118-00 or equivalent.
6. F to BNC Adapter: Tek 013-0126-00 or

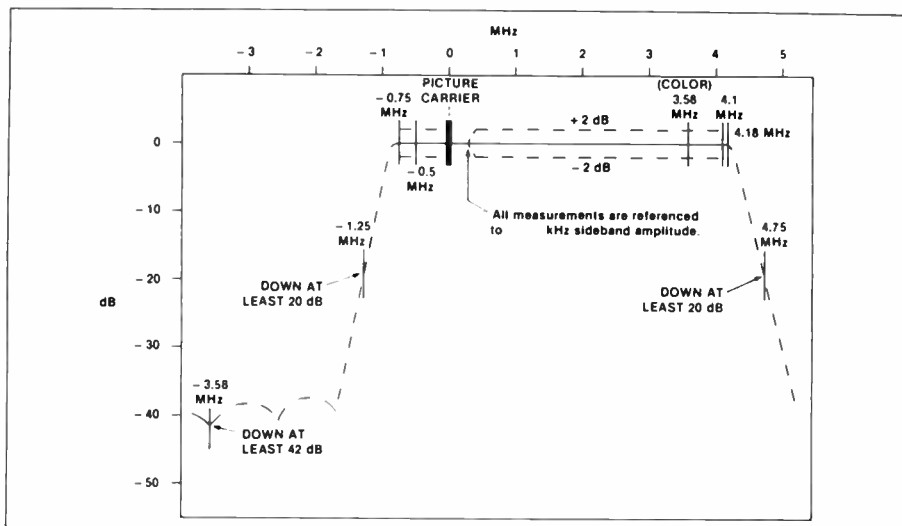


Figure 7-5 Idealized NTSC color transmitter response

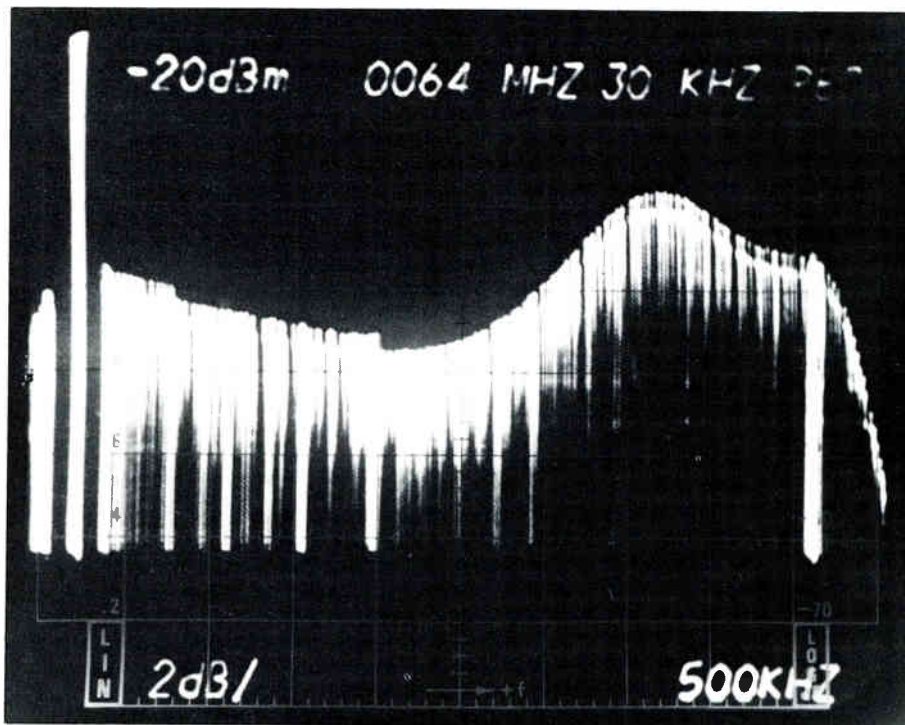


Figure 7-6 2 dB/DIV swept modulator response

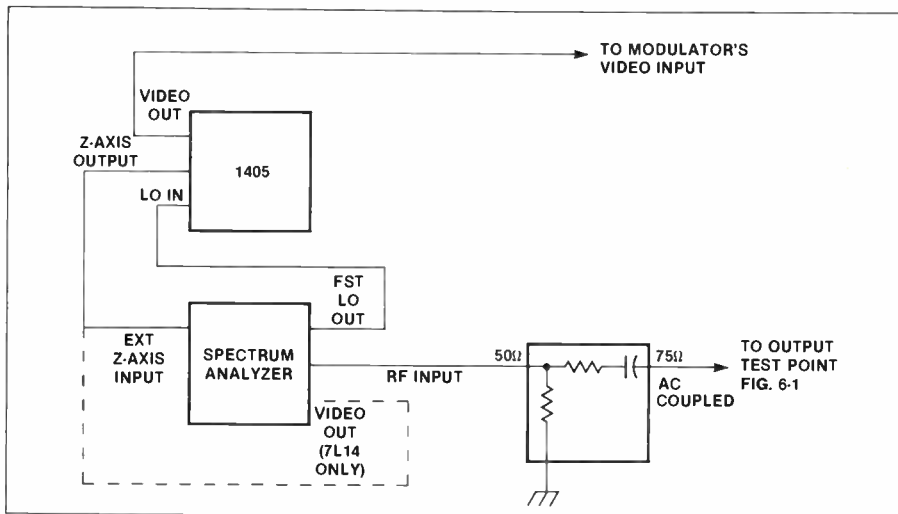


Figure 7-7 Equipment connection for testing modulators using 1405

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**For Test Equipment:**  
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Indianapolis, Indiana 46219  
(317) 357-8781

**For Character Generators:**  
Texscan MSI  
3855 S. 500 West, Suite S  
Salt Lake City, Utah 84115  
(801) 262-8475

**For Canada:**  
Texscan Communications  
2750 Pittfield  
St. Laurent, Quebec  
Canada H4S 1G9  
(514) 335-3152

**For Overseas:**  
Texscan Instruments Ltd  
Hertfordshire, UK  
Ph: 0427-71 38

**For Overseas:**  
Texscan GMBH  
W. Germany  
Ph: 089 6701048

# Texscan

equivalent.

7. Directional Couplers (2): 8 dB.
8. Terminator: 75 ohm.
9. Sideband Adapter: Tek 1405 (optional).

## Procedure For Processors

1. The headend output feed should include two test points, each developed by a directional coupler inserted in the directions indicated in figure 7-1. These couplers provide system access for the headend tests. Set up the equipment as shown in the figure.
2. Connect a cable of sufficient length to reach all the processor inputs to the sweep generator. Connect a 10 dB pad between the cable and the processor input to reduce reflections in the cable and ensure a proper impedance match.
3. Connect the spectrum analyzer through the Minimum Loss Pad to the output test point.
4. Select a channel to be swept and tune it to center screen with the spectrum analyzer's FREQUENCY control. Also select a FREQUENCY SPAN of 1 MHz/DIV and set the RESOLUTION to 30 kHz.
5. Use the analyzer's REFERENCE LEVEL controls to bring the peak of the picture carrier within the top two horizontal graticule lines of the display. Carefully adjust the analyzer's FREQUENCY control to bring the picture carrier to the second vertical graticule line from the left.
6. Switch to 2 dB/DIV.
7. Set the processor to manual mode or disable its AGC by some other means. Use the manual gain control to reset the picture carrier to its former amplitude.
8. Disconnect the antenna cable from the processor and connect a cable from the sweep or signal generator in its place. Note that the input signal must be connected at a point that precedes all bandpass filters or any device that will alter the frequency response of the processor.
9. Determine the input frequency of the processor. Using the CW mode of the sweep generator, (input frequency may be different than output frequency) adjust the sweep generator amplitude and frequency until a signal is displayed on the spectrum analyzer at the same frequency and amplitude as the picture carrier.
10. Once the sweep generator level has been established, the spectrum analyzer can be switched to high persistence, and by manually rocking the generator frequency about the picture frequency, a picture of the exact response will be stored in the display as in figure 7-2.

1. Reconnect the antenna to the processor and photograph the display.

## Hints And Precautions

1. Once the foregoing technique has been mastered, it can be performed in approximately 30 seconds of off-air time per channel.
2. The signal insertion step (9) may impose a number of variables such as cross channel conversions, AGC and AFC circuits, and automatic signal

sense circuits. Each case may require a slight modification to the approach but can be successfully accommodated with the foregoing procedure.

3. When the 7L14 is used, the same procedure is followed except that MAX HOLD is used to store the sweep display. Position the PEAK/AVERAGE cursor at the bottom of the screen and turn MAX HOLD on just before sweeping the processor (figure 7-3). Turn off MAX HOLD to clear the screen.

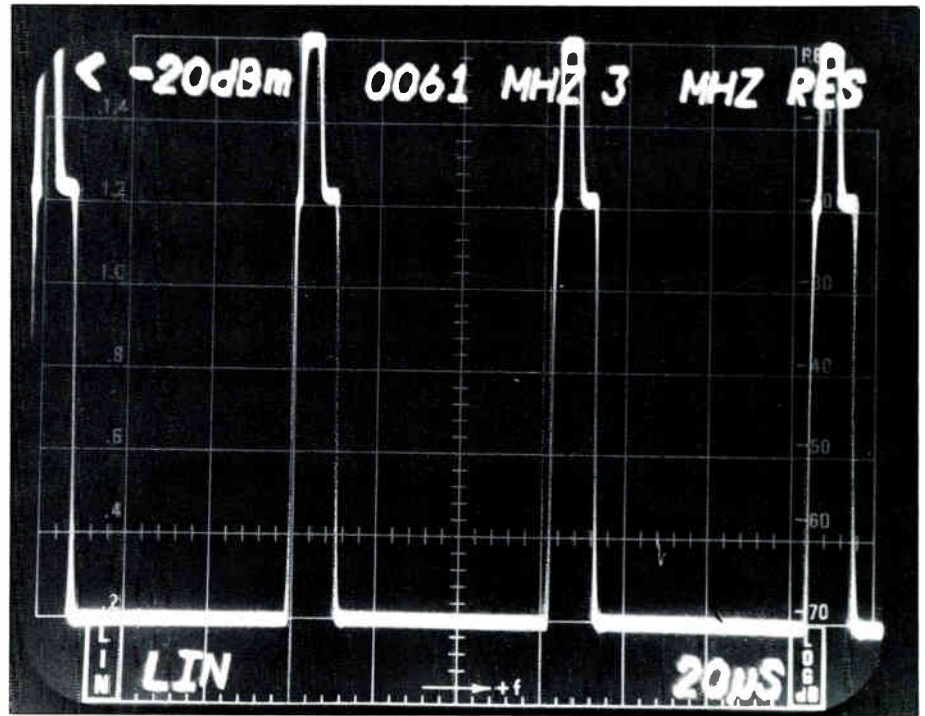


Figure 7-8 Adjusting percentage of modulation using 1405



Figure 7-9 Swept modulator response using 1405. Markers are at 1.25 MHz, 3.58 MHz and 4.75 MHz



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## Procedure For Modulators

1. Disconnect the video source from the modulator and connect a signal from the (100 kHz to 5 MHz) sweep generator in its place. Adjust the generator's amplitude control for an output signal of 300 mV RMS or less.
2. Connect the spectrum analyzer to the output test point through the Minimum Loss Pad (figure 7-1).
3. Determine the output frequency of the modulator and tune the analyzer's FREQUENCY control to that channel. Set analyzer FREQUENCY SPAN to 1 MHz/DIV. RESOLUTION to 30 kHz and select 10dB/DIV. Adjust the analyzer's FREQUENCY control to center the picture carrier over the fourth vertical graticule line from the left. The peak picture carrier should be near the top of top of the display. Adjust the BASELINE CLIPPER to blank the bottom division.
4. Switch the mainframe to high persistence or storage. Sweep (or manually rock) the generator's output frequency over its 100 kHz to 5 MHz range. A picture of the modulator's response will be developed on the display screen (figure 7-4).
5. Check the modulator's response with respect to figure 7-5.

6. Turn off the analyzer's storage. Select 2 dB/DIV and 500 kHz/DIV. With the generator tuned to a frequency of about 1 MHz, increase the analyzer's IF gain until the generator's signal appears on the screen. Turn on the analyzer's storage and sweep the generator's frequency again. Verify this response (figure 7-6) with respect to figure 7-5.

## Alternative Procedure For Modulators

In the procedure above, the modulator being measured is operating without sync. The procedure is slow and any adjustments required are often tedious. The Tektronix 1405 Sideband Adapter supplies standard video signals to the modulator and allows rapid and accurate measurements. The 1405 also provides verification of modulator performance as the video parameters are varied.

1. Connect the test set up shown in figure 7-7.
2. Connect the RF IN on the 7L12 to the output test point via a Minimum Loss Pad and an F to BNC Adapter.
3. Adjust FREQUENCY control on the analyzer to bring the modulator output signal (picture carrier) to center screen. Select 10 dB/DIV, FREQUENCY SPAN of 1 MHz/DIV and RESOLUTION BANDWIDTH of 300 kHz. Readjust the FREQUENCY control to bring the picture carrier to the fourth vertical graticule line from the left.
4. Set the AMPLITUDE control on the 1405 to 100 percent and the APL LEVEL to 50 percent. Turn the 1405 SYNC to ON and deselect all the markers. Connect the 1405 output to the modulator input.
5. If necessary, check the percentage of modulation using the 1405 as a source:
  - a. Adjust the analyzer's FREQUENCY controls to bring the picture carrier to center screen.
  - b. Select Zero Span (SPAN control fully CCW)
  - c. Set AUTO PHASE LOCK to OFF
  - d. Adjust FREQUENCY control to maximize response

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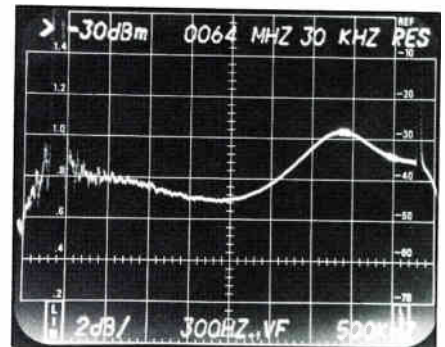


Figure 7-10 2 dB/DIV swept modulator response using 1405. Markers are 3.58 MHz and 4.18 MHz

- e. Select LIN Mode
  - f. Adjust IF gain and REF VAR controls to bring sync tips to top graticule line.
  - g. Disconnect the cable between the 1405 z-axis output and the mainframe.
  - h. Set 1405 APL LEVEL to 100 percent, AMPLITUDE control to 0 IRE
  - i. Adjust the modulator's VIDEO GAIN to bring peak white to 12.5 percent of sync tip or 1 division from base line (figure 7-8)
  - j. Reconnect the z-axis output to the mainframe. Set the analyzer AUTO PHASE LOCK to ON, the FREQUENCY SPAN to 1 MHz and select 10 dB LOG Mode
6. On the 1405, reset APL LEVEL to 50 percent; tune the TRANSMITTER FREQUENCY control to the channel of interest. As this control is adjusted, a spurious signal will move past the picture carrier. Continue to turn the control to bring the two signals together until the display floor suddenly rises. This display condition indicates that the video sweep from the 1405 and the sweep from the analyzer are synchronous and that the response of the modulator is being displayed.
  7. Rock the FINE control on the 1405 to maximize the response. Set RESOLUTION BANDWIDTH to 30 kHz and again rock the FINE control for maximum response amplitude. Select a video filter to smooth the response (figure 7-9).
  8. On the 1405, turn on the 1.25, 3.58 and 4.75 MHz markers. Adjust the INTENSITY and WIDTH controls for pleasing markers. Verify that the lower 3.58 MHz sideband and channel edge amplitudes are within specified limits (figure 7-5).
  9. On the analyzer, select 2 dB/DIV. Adjust the IF gain as required to bring the displayed waveforms on screen. On the 1405, turn off the 1.25 and 4.75 MHz markers leaving on the 3.58 MHz marker. Turn on the 0.75 and the 4.18 MHz markers. Adjust INTENSITY and WIDTH as necessary. Check for overall flatness. Verify sideband amplitudes at 3.58 MHz and channel edge amplitudes are within specified limits (figure 7-10).



Figure 7-11 Swept response with markers on 7L14 display

## Hints And Precautions

1. The 7L14's digital storage capabilities work very well for the frequency response measurements. Note that the 7L14's Max Hold feature can be used to build up a swept display.
2. To use the 7L14 with the 1405, the z-axis output of the 1405 is connected to the VIDEO OUT on the 7L14 (using a Tek 175-1175-00 cable). The displayed waveform will show a downward deflection at the marker frequency as shown in figure 7-11. Position the PEAK/AVERAGE cursor to the top of the display screen.

*Linley F. Gumm holds a B.S.E.E. degree from Washington State University and a M.S.E.E. degree from the University of Washington. He began his career with Tektronix in 1964 and now holds the title of principal engineer. As a member of the engineering group within the Frequency Domain Instrumentation Business Unit, part of the Communications Division, at Tektronix, Inc., in Beaverton, Oregon, Gumm has been associated with the development of many quality spectrum analyzer instruments.*

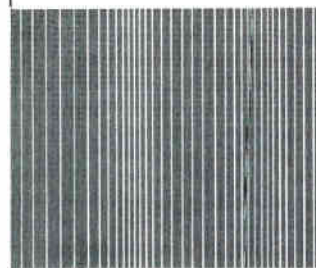


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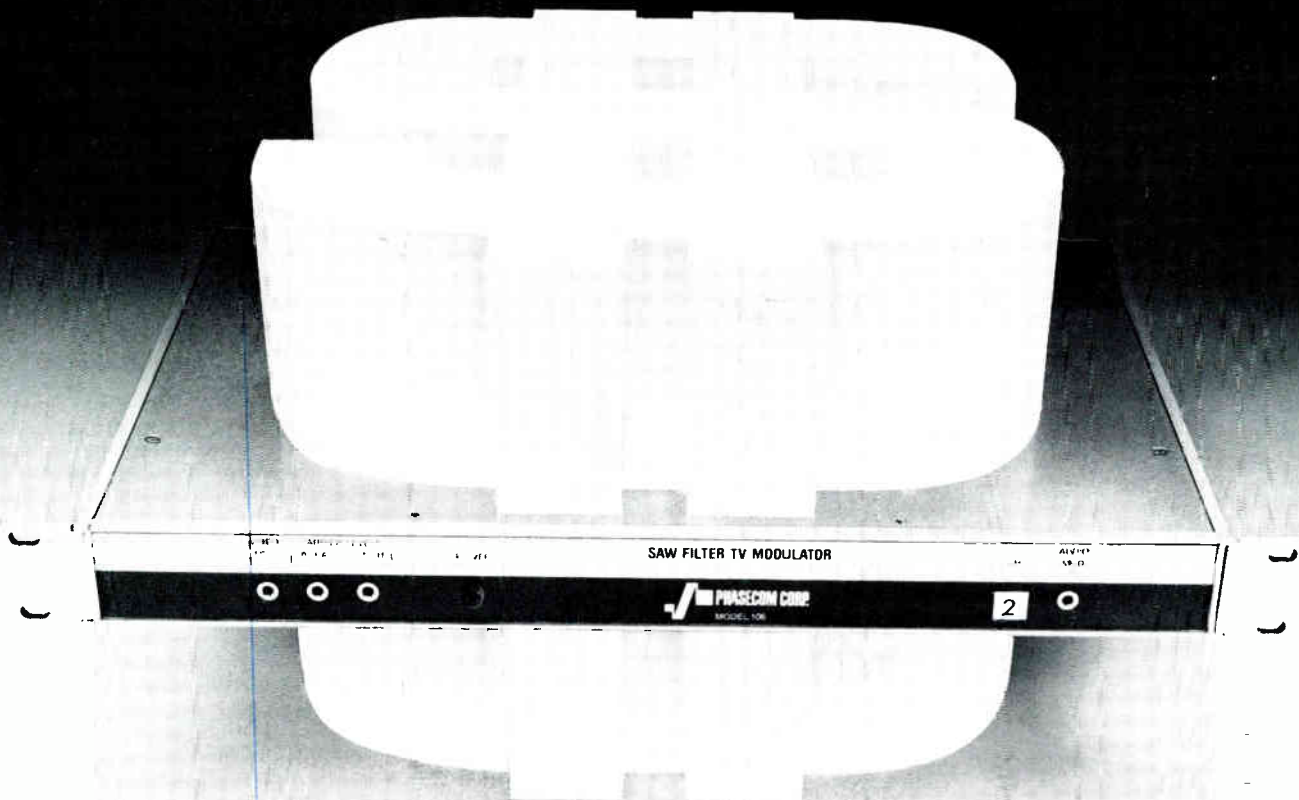
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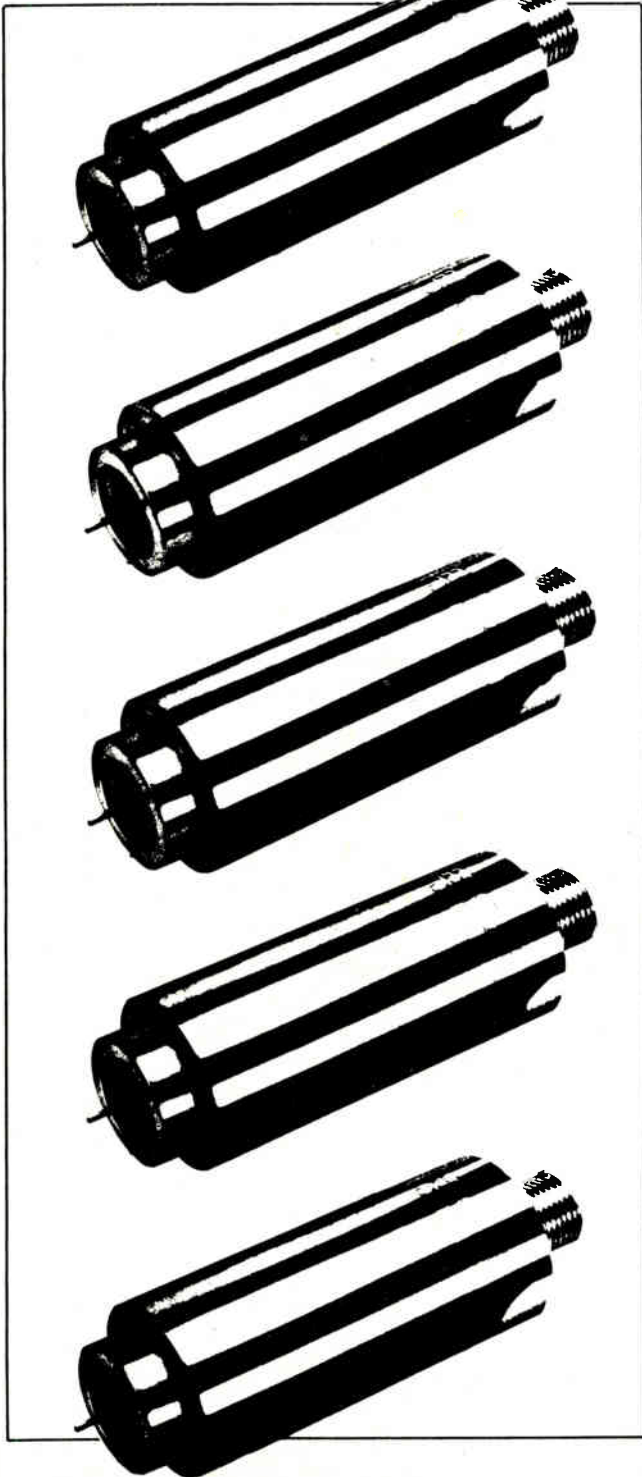
\* Channels 2 - 13: \$895.00; Channels A - W: \$995.00



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# Product Profile



**T**his month's **CED** Product Profile focuses on single channel traps for cable television applications. The comparisons on the following pages were constructed for the sake of brevity and organization. All of the manufacturers listed make traps other than those listed. As always, we recommend that individual manufacturers be contacted for more specific information (e.g. 3-, 4-, 6- or 8-pole traps). All of the specifications listed are minimum specifications and should not be taken as absolute.

By way of introduction, there is probably no other kind of hardware in the industry that is so widely differentiated. There are single- and multi-channel traps, band pass and band reject filters and parental control traps for every conceivable application. Particular system needs are entirely predicated upon an operator's commitment to certain channels and the cost of switching those channels around. Technically speaking, it is most convenient to trap channels A, 2, 5 and 7 in the low band so the trap has a wider bandwidth and a deeper notch. The question of how much video loss is needed depends upon the application (operator's drop levels) and the sensitivity of the average subscriber's receiver. Top of the line receivers will obviously need more trapping than less sensitive receivers. If an operator also wants to suppress audio, he or she will want to have more video trapping to knock out the adjacent audio frequencies. In most cases, if the video is trapped deep enough, audio can be completely wiped out or at least rendered unintelligible. Traps can be manufactured to system specifications and most of the manufacturers on the following pages will accommodate those needs.

At press time, data from Microwave Filter Associates, East Syracuse, N.Y., had not been assimilated. They not only make single- channel traps, but traps for any special application that may be encountered. Another manufacturer, Electroline Television Equipment Inc., Montreal, Quebec, does not manufacture single-channel traps *per se*, but rather, they make extra broadband filters. For more information on the manufacturers listed, contact:

ARCOM (through Northern CATV Supply)	(315) 463-8433
Eagle Comtronics Inc.	(800) 448-7474
Electroline Television Equipment Inc.	(514) 725-2471
GAMCO Industries Inc.	(201) 241-7500
Intercept Corp.	(800) 526-7452
Keystone Electronics Corp.	(201) 792-6900
Microwave Filter Co.	(315) 437-3953
PICO Products Inc.	(315) 451-0680
Vitek Electronics Inc.	(201) 287-3200

## Traps

# Product Profile

Model	Minimum Rejection Depth	Lower Adjacent Channel Video	Lower Adjacent Channel Audio	Upper Adjacent Channel Video	Insertion Loss	Return Loss	Temperature Stability	Additional Information	Price Range
<b>ARROW Communications Laboratories Inc. (d.b.a ARCOM), Syracuse, New York</b>									
AN-4	-55 dB	-0.5 dB	-4 dB	-0.5 dB	-0.5 dB	N.A.	-40° to +140° F	Traps manufactured to operator specifications. Urethane potted to prevent moisture absorption, security shields included, low radiation. Also available, positive traps, tier traps and super-band traps. Multiple channel traps available in single housing.	
AN-ABC	-55 dB	-1 dB	-6 dB	-1 dB					
AN-DEF	-55 dB	-1 dB	-6.5 dB	-1 dB					
AN-GHI	-55 dB	-2 dB	-8 dB	-2 dB					
AN-7	-55 dB	-1.5 dB	-9 dB	-2 dB					
<b>Eagle Comtronics Inc., Clay, New York</b>									
<b>Single channel super traps</b>									
ST-NF-2-6	-75 dB	0.5 dB	-4 dB	-0.5 dB	0.2 dB	N.A.	-40° to +140° F	Also available: band reject traps, low pass and high pass traps, decoding filters and sub-low rejection filters. Features include anti-corrosion nickel plating, security shield available, totally foam filled, shock resistant, thick-wall brass housing, interlocked connectors, power protection on center conductor, lap-mounted outdoor application, sealed connector and pin, soldered linear ground pad, completely potted to prevent moisture absorption and stabilize circuitry, main body sealed with "O" rings.	N.A.
ST-NF-A-F	-75 dB	1 dB	-6 dB	-1 dB					
ST-NF-G-I	-75 dB	1.5 dB	-7 dB	-1 dB					
ST-NF-7-11	-75 dB	2 dB	-10 dB	-2 dB					
ST-NF-J-O	-70 dB	3 dB	-15 dB	-3 dB					
ST-NF-P-W	-70 dB	3 dB	-25 dB	-3 dB					
<b>Single channel traps-standard</b>									
NF-2-6	-60 dB	1 dB	-7 dB	-1 dB					
NF-A-F	-60 dB	2 dB	-20 dB	-1.5 dB					
NF-G-I	-60 dB	2.5 dB	-25 dB	-2 dB					
NF-7-8	-60 dB	3 dB	-25 dB	-2.5 dB					
<b>GAMCO Industries Inc., Roselle, New Jersey</b>									
<b>Model 601</b>									
2-6	-55 dB	-1.5 dB	-7 dB	-1.5 dB	1.0 dB	18 dB	-40° to +140° F	Trap circuits housed in convenient package: one end has "F" fitting attached, the other end a short double shielded (foil and braid) 59U cable and "F" fitting. Also available: model 640 multi-channel traps, model 661 single channel band pass filters, model 625 splitter-trap, series 610 and 611 trunk distribution channel traps and key-lock parental control traps, including the new MITI TRAP (multi-tiered).	
A-1	-55 dB	-2 dB	-20 dB	-2 dB					
7-13	-55 dB	-5 dB	-30 dB	-3 dB					
G-W	-50 dB	-10 dB	-40 dB	-15 dB					
<b>Intercept Corporation, Clifton, New Jersey</b>									
TTL lowband 2-6	-60 dB	0.5 dB	-4 dB	-0.5 dB	0.2 dB	18 dB	-40° to +140° F	Features nickel plated brass construction, threaded sections machined from solid brass, completely encapsulated, weather-tight "O" ring seals outer sleeve, PVC boot seals against port, printed circuit board construction. Also available: one, two and three channel parental control traps-video only and a video and audio parental control trap.	\$5.50-
TTM midband A-1	-60 dB	1 dB	-5 dB	-1 dB					\$8.00
TTH highband 7-13	-55 dB	2 dB	-8 dB	-2 dB					
TTS superband J-W	-55 dB	3 dB	-12 dB	-3 dB					

N.A.—Not Available

# Product Profile

Model	Minimum Rejection Depth	Lower Adjacent Channel Video	Lower Adjacent Channel Audio	Upper Adjacent Channel Video	Insertion Loss	Return Loss	Temperature Stability	Additional Information	Price Range
<b>Keystone Electronics Corp., Hoboken, New Jersey</b>									
106/2-6	-55 dB	-5 dB	-5 dB	-5 dB	-1 dB	18 dB	-40° to +140° F	Zinc diecast housing, zinc plate—yellow irridiate finish, jumper cable with "F" fitting attached at one end; other end has short double shielded (foil and braid) 59U cable and "F" fitting. Also available: new line of four-pole traps, trunk/ distribution channel traps, two-way splitter trap and key-lock trap for parental control.	\$4.75-
106/A-1	-55 dB	-1 dB	-10 dB	-1 dB			\$6.00		
106/7-13	-55 dB	-2 dB	-10 dB	-2 dB					
106/S J-W	-55 dB	-3 dB	-15 dB	-3 dB					
<b>PICO Products Inc., Liverpool, New York</b>									
<b>Tier traps</b>									
LBR-4 low band	-50 dB				0.5 dB	18 dB	-40° to +140° F	Drop tested 20 feet to hardtop successfully, thick wall brass housing, anti-corrosive nickel plated, completely potted to stop moisture, neoprene "O" ring at male end, security shield available. Also available: dual filter traps, "Promo" encoder and decoder	\$4.50-
MBR-A-1	-50 dB	0 dB	0 dB	-2 dB			\$9.00		
HBR-7-13	-50 dB	-1.5 dB	-5 dB	-17 dB					
SBR-J-W	-50 dB	-1 dB	-2 dB						
<b>Super notch filter traps</b>									
SNF-3,4 and 6	-55 dB	-1 dB	-3 dB	-1 dB					
SNF-ABC	-55 dB	-1 dB	-4 dB	-1 dB					
SNF-DEF	-55 dB	-1 dB	-5 dB	-1 dB					
SNF-GHI	-55 dB	-1 dB	-6 dB	-1 dB					
SNF-7	-55 dB	-1 dB	-7 dB	-1 dB					
<b>Vitek Electronics Inc., Edison, New Jersey</b>									
<b>Single, Dual, Three and Four Channel traps</b>									
<b>Low band</b>									
2 and 5	50 dB	2 dB	2 dB	2 dB	0.5 dB	N A	-20° to +120° F	Coil-type trap, multi-channel capability, components not temperature sensitive, coil-type fits easily on pedestals, easily audited, color coding available, low maintenance, direct control device outside subscribers home, inverted, HRC and standard frequencies, weather boots available. Also available: descrambler trap and band reject/band pass filters.	\$5.50-
3,4,6	50 dB	2 dB	2 dB	8 dB			\$12.00		
<b>Midband—High band (non-preserve type)</b>									
A-2-1	50 dB	3 dB	40 dB	3 dB					
7-13				dual channel -4 dB					
<b>Midband (preserve type)</b>									
A-1	50 dB	3 dB	15 dB	1 dB					
<b>Midband (special notch)</b>									
A-1 (ch. 7 also available w/ this spec)	65 dB	3 dB	40 dB	3 dB dual channel -4 dB					
<b>Superband</b>									
J-W	50 dB	5 dB	40 dB	4 dB					
<b>Hyperband</b>									
AA-QQ	50 dB	5 dB	40 dB	4 dB					

# 1982 Eastern Cable TV Trade Show & Convention

*"The Largest Cable Industry Event Ever Held East of the Mississippi !!!"*

## CONVENTION SCHEDULE

**Wednesday, September 8:** Pre-convention activities, including CTAM Track Day, golf and tennis, hospitality suites, and entertainment. **Pre-registrants may begin picking up registration packets at the Georgia World Congress Center at 1PM . . . Avoid the rush on Thursday!!!**

**Thursday, September 9:** 8AM—Registration Opens at the Congress Center  
9:30-11:30AM—Concurrent Management/ Technical Sessions at WCC  
11:30AM—Exhibits Open (Ribbon-cutting & Reception)  
Deli Lunch in Exhibit Hall  
5PM-6PM—Social Hour in Exhibit Hall (Exhibits Close at 6PM)  
Evening—**Hospitality Suites**

**Friday, September 10:** 8AM—Registration  
9:30-11:30AM—Concurrent Management/ Technical Sessions  
10:30AM-6PM—Exhibits Open  
Noon-2PM—Luncheon, Keynote Speaker—**Art Buchwald**  
5PM-6PM—Social Hour in Exhibit Hall  
7PM—Annual Southern Cable TV Association Banquet at Peachtree Plaza Hotel. **Gala Entertainment** featuring comedian **Bob Hope**  
Co-sponsored by SCTA & Home Box Office

**Saturday, September 11:** 8AM—Registration  
9:30-11:30 AM—Concurrent Management/ Technical Sessions  
9AM-Noon—Exhibits  
Afternoon—**CABLE TV DAY AT ATLANTA STADIUM**  
Courtesy of Atlanta Braves/WTBS

## TECHNICAL SESSIONS

### Thursday, September 9

- 8:30-9:30AM—"Data Technology Coordination"  
Most everyone either is or will be involved with Data. Get a first hand look at how to handle this new world!
- 9:30-10:15AM—"Addressable Converters"  
The type of equipment that will be controlled by a data stream.
- 10:45-11:15AM—"Business Data Communications" — How to send, control, and maintain the data system between users miles apart.
- 2:00-3:00PM—"Cable Security Systems"  
When - How - Where? And, are you ready?

### Friday, September 10

- 8:30-9:15AM—"Status Monitoring"  
For operating large broadband systems with 24 hour services, this is a must!
- 9:15-10:00AM—"Fiber Optics" — Good things are happening. Are you up to date?
- 10:30-11:15AM—"Automatic Testing"
- 11:15-Noon—"Feed Forward Amplifiers"  
Distortion improvements . . . an improved transmission system.

### Saturday, September 11

- 8:30-9:15AM—"FCC/FAA Update" — Don't be caught off guard!!
- 9:15-10:15AM—"Broadband RF Systems 450 MHZ"

**REGISTER NOW!** Pre-registration will save you time by avoiding long registration lines!!

Headquarters hotels will be the beautiful Peachtree Plaza—"the world's tallest hotel," and the fabulous Atlanta Hilton Hotel. Be sure to check the blank on the adjoining registration form to receive your room reservation materials. The hotels are within walking distance of the **Georgia World Congress Center**; however, a **COURTESY SHUTTLE BUS WILL RUN CONTINUOUSLY THROUGHOUT ALL CONVENTION HOURS.**

**WE'RE LOOKING FORWARD TO SEEING YOU AT THE "EASTERN SHOW."**

For Further Information, Contact:

**SOUTHERN CABLE TELEVISION ASSOCIATION**  
c/o Convention & Show Management Company, Inc.  
3355 Lenox Road, NE, Suite 952  
Atlanta, Georgia 30326  
(404) 237-8228



## REGISTRATION FORM

### 1982 Eastern Show — Southern Cable TV Association September 9, 10, 11 — Georgia World Congress Center

NAME  (FIRST)  (LAST)  (MID INITIAL) TITLE   
 COMPANY NAME   
 ADDRESS   
 CITY  STATE  ZIP   
 NICKNAME  If registering spouse give name for badge

MEMBER       NON-MEMBER      BUSINESS PHONE (\_\_\_\_)\_\_\_\_

**BUSINESS CATEGORY (Check one only)**

- (A) Independent Cable System Operator       (C) Cable System Technician       (E) Press/Media  
 (B) Multi-System Operator       (D) Exhibitor       (F) Supplier to the Industry  
(consultant, attorney, mfg., etc.)

**REGISTRATION & FUNCTION FEES**

CHECK ALL APPLICABLE	After July 15	Amount
<input type="checkbox"/> (G) <b>Full Registration</b> (Includes Seminars & Exhibits all Days, Thursday Luncheon, Thursday Social Hour, Friday Luncheon, Friday Social Hour, Friday Banquet).	SCTA Member      \$175.00 Non-Member      \$225.00	\$ _____ \$ _____
<input type="checkbox"/> (H) <b>Spouse Registration</b> (Includes Exhibits all days, Special Tour Program, Friday Banquet).	SCTA Member & Non-Member      \$85.00	\$ _____
<input type="checkbox"/> (I) <b>Thursday Daily Registration</b> (Includes Exhibits Thursday ONLY, Seminars Thursday ONLY, Thursday Luncheon, Thursday Social Hour).	SCTA Member      \$60.00 Non-Member      \$75.00	\$ _____ \$ _____
<input type="checkbox"/> (J) <b>Friday Daily Registration</b> (Includes Exhibits Friday ONLY, Seminars Friday ONLY, Friday Social Hour).	SCTA Member      \$50.00 Non-Member      \$60.00	\$ _____ \$ _____
<input type="checkbox"/> (K) <b>Saturday Daily Registration</b> (Includes Seminars Saturday ONLY, Exhibits Saturday ONLY).	SCTA Member      \$25.00 Non-Member      \$40.00	\$ _____ \$ _____
<input type="checkbox"/> (1) <b>Friday Luncheon Tickets</b>	SCTA Member & Non-Member      \$20.00	\$ _____
<input type="checkbox"/> (2) <b>Friday Banquet Tickets</b>	SCTA Member & Non-Member      \$35.00	\$ _____

TOTAL AMOUNT DUE ..... \$ \_\_\_\_\_

- Yes, I intend to go as a **guest of the Atlanta Braves** to the game on Saturday, September 11.  
 No, I do not intend to go to the Braves game.  
 Check here if you need hotel reservation information.

Make checks payable to **Southern Cable Television Association**. Payment must accompany all registrations. We cannot invoice. No cancellations or refunds made after August 3rd, 1982. All cancellations must be in writing and received by August 3rd, 1982. No pre-registrations postmarked after July 15, 1982, will be accepted.

Submit one form for each person registering. Photo copies will be accepted. RETURN WITH CHECK PAYABLE TO SCTA TO: Convention & Show Management Co., 3355 Lenox Road, NE, Suite 952, Atlanta, GA 30326. (404) 237-8228.

**FOR SCTA USE ONLY**

Check # \_\_\_\_\_  
 Cash \$ \_\_\_\_\_  
 Total Amt. \$ \_\_\_\_\_

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★ **Jackson Enterprises** has announced the appointment of **Edwin Patterson** to director of construction and technical services. His responsibilities include all new and rebuild construction, strand mapping and related mapping services provided by Jackson Enterprises.



Charles Lindsey

★ **Charles Lindsey** has been named director of engineering at **National CableSystems Inc.** Lindsey will also serve as director of engineering for Telesat Receiving Systems Inc., a subsidiary of National CableSystems which will provide broadband communication services to small towns and apartment and condominium complexes.

★ **Broadband Engineering** has announced the promotion of **Mark Conklin** to manager of the repair division.

Conklin will be charged with the direction

and coordination of the firm's CATV repair activities including the installation of replacement electronics and the repair of the complete range of CATV distribution equipment.

★ Jerrold Distribution Systems Division of **General Instrument Corporation** has named **David Schmidt** vice president of Operations.

★ **Modulation Associates Inc.** announced that **Michael Phillips** has joined the firm as vice president of Business Data Transmission Products. In this position Phillips is responsible for managing the design, development, and production of Modulation Associates' new digital products; including high speed data channels for satellite network control, computer-to-computer information transfer modems, and multi-baud data message handling systems for local distribution of satellite network data.

★ **Robert Beck** has been appointed technical manager for **Columbus Cable TV**, Nebraska, a subsidiary of ATC. Beck will be working to build a state-of-the-art system in Columbus. ATC plans to rebuild the 12-channel system to 54-channel capacity over the next several months.

★ **Keith Johnson** has been appointed director, international product planning, for **RCA Commercial Communications Systems Division**.

Johnson is responsible for the develop-

ment of television cameras, video tape recording systems and associated equipment for the international marketplace.



George Benton

★ **George Benton** has joined **Belden Corporation** as General Manager, Fiber Optics. In this newly created position, Benton will direct the activities of the Fiber Optic Department, and will be responsible for marketing modems and other communication electronic devices under development at the Belden Technical Research Center.

★ **Sony Broadcast Products Company** has appointed **Merle Arnold** and **Andy Kryworuchenko** as sales engineers for its newly created southwest region.

Arnold will be responsible for sales of Sony broadcast equipment in southern Texas and Louisiana. Kryworuchenko will be responsible for Sony broadcast sales in Arkansas, Oklahoma and New Mexico.

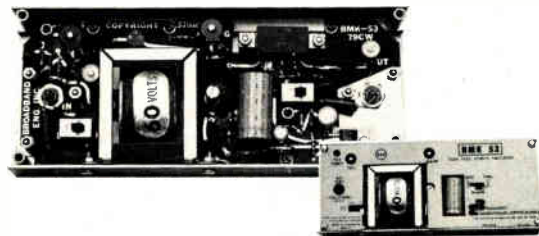
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- (146) PROJECT MANAGER—Head up construction, engineering and operations in Illinois, \$35,000 with excellent benefits.
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- (209) SYSTEMS ENGINEER—Five to 10 years of broad cable experience with special emphasis in equipment evaluation, northeastern locale. Salary ranging from \$30-40,000.
- (177) ENGINEER—Circuitry design experience in uplink, salary of \$45,000, plus excellent benefits and moving package.
- (184) STAFF ENGINEER—Design feed-forward CATV components, \$35,000 with New England location.
- (185) STAFF ENGINEER—Needed to head R & D group in broadband engineering, EE degree required, salary up to \$45,000 with New England location.
- (189) INSTALLATION SUPERVISOR—Great opportunity for Lead or Chief Tech with 2-plus years experience. Salary in low \$20s in Ohio location.
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- (193) MICROWAVE TECHS—FCC a must for this Southern location, 10,00 per hour.
- (179) CHIEF TECH—Three years of CATV experience with proven supervisory skills in a Iowa location. Salary in low \$20s.
- (180) LEAD TECH—Act as Assistant Chief tech in this Virginia location, \$17,000.
- (164) CHIEF TECH—Good outside maintenance experience with good supervisory skills for this New England location, up to \$24,000.
- (161) CHIEF TECH—Supervise 8 Techs in this Missouri location, \$24,000.

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- II. A Field Engineer to:
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  - implement new projects including site selection for TVRO, microwave and headend installation.

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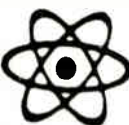
CFTN	INPUT	OUTPUT
977	I-1	3
1105	H	2
7776	I	1
82	I	2
214	E	4
3600	E	2
1706	B	2
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# Product News



## Jerrold Announces Successful Test Of "EPIC"

The Jerrold Division of General Instrument Corporation has announced they have successfully field-tested a new headend scrambling system that promises improved signal security for cable system operators.

The system was tested during the Cooney-Holmes fight pay-per-view offering by International Cable in West Seneca, N.Y. Dubbed the "EPIC" (electronic program intrusion control), the system rendered inoperable "pirate" descramblers purchased on the open market. Subscribers who had purchased the "pirate" descramblers found that the boxes could not defeat the intermittent random scrambling of the new "EPIC" system. International Cable now uses the system to scramble The Movie Channel.

Jerrold has not released details of the new unit but a company spokesman said the device will be used in "a significant number of other Jerrold addressable systems," and that, since it operates from the headend, it will not require modifica-

tion of addressable converters already installed.

For more information contact the Jerrold Division of General Instrument Corporation, (215) 674-4800.

## New Converter Line From Texscan Corporation

Texscan Corporation has announced a new converter line that includes three levels of set-top converter capabilities: the Textop 60, Textop Plus and Textop Ultra. Each unit is enclosed in a high-impact, ABS woodgrain housing, supported by a rugged steel frame.

Performance features include: up to 60 channel capability, 11 dB typical noise figure and cross modulation, intermodulation and composite triple beats below 60 dB. All units feature frequency synthesized tuning with bright LED read outs.

The Textop 60 features a two-speed scan-up/scan-down control with an add-on wireless remote option. The Textop Plus offers all of the features available in the Textop 60, plus AB cable switching

and descrambling. A variety of channel capacity options are also available. The Textop Ultra is a microprocessor-based unit with a 20-key direct access IR wireless remote transmitter and memory capable of storing up to 60 favorite channels.

For more information contact Texscan, (602) 252-5021.



Magnavox Magna 6400 converter

## Magnavox CATV Introduces The Magna 6400

A new 64-channel 440 MHz converter has been introduced by Magnavox CATV.

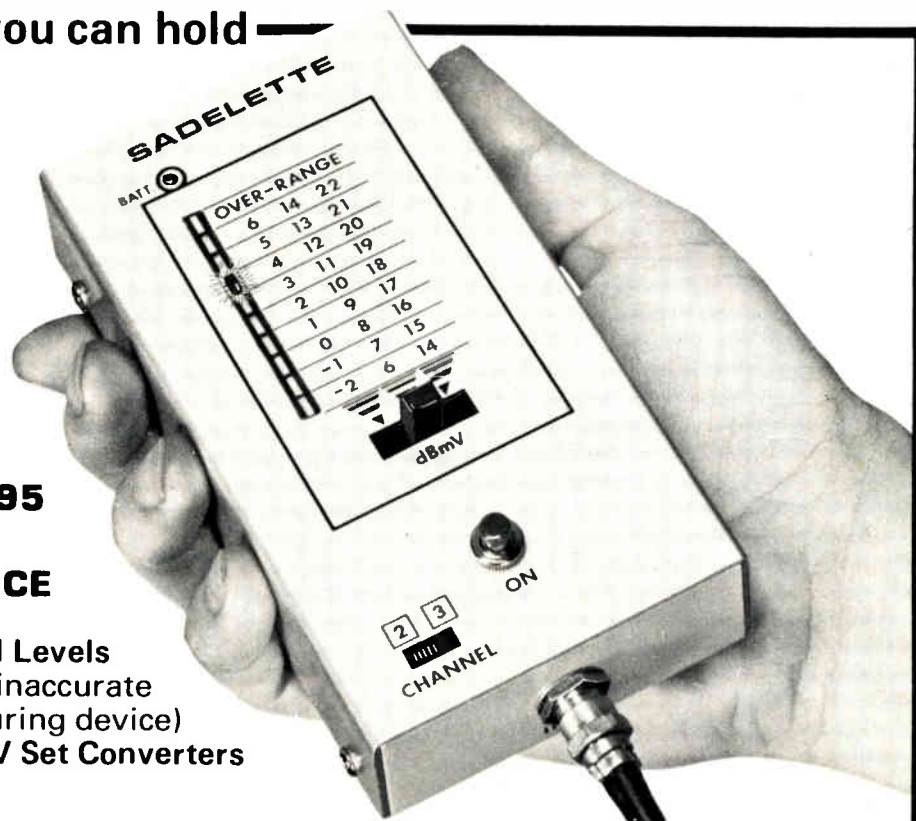
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one dB resolution  
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Trap more profits while securely trapping out non-subscribers. PICO's SUPER TRAP is deeper and narrower, making it possible to receive both upper and lower adjacent channels from Ch. 2 through Ch. 1.

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And PICO's SUPER TRAP is compatible with systems up to **400 MHz**.

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INTEGRATED INTO A  
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**SONY INTRODUCES A 1" VIDEO RECORDER TAILORED TO THE PEOPLE WHO USE IT: THE BVH-2000.**

Because Sony probably has more experience selling and servicing 1" VTR's than anyone else, we're in an unequalled position to understand the wishes of 1" video users.

And now, Sony announces wish fulfillment for the broadcast industry: the new BVH-2000 1" video recorder.

**WHY "BVH-2000" WILL MEAN DIFFERENT THINGS TO DIFFERENT PEOPLE.**

In broadcast recording, there is no such thing as one typical situation.

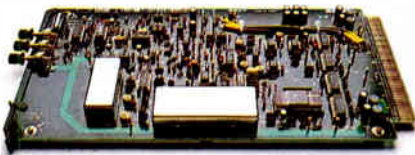
That's why there's no one single BVH-2000.

The BVH-2000 actually allows you to "design" the VTR you need for your own particular applications and budget.

You can choose among three different control panels—ranging from a basic model to one with virtually every possible feature and function.

And the tape transport system, signal system, and control section can either be combined into a single unit, or separated easily and installed in a 19" rack or console.

The BVH-2000 also gives you far greater latitude in setting up your entire recording system. Various remote-control connectors enable you to interface your system in a variety of ways for studio, mobile, and editing configurations. Direct interface with U-matic<sup>®</sup> and Betacam<sup>™</sup> is possible, too. The BVH-2000



A range of plug-in accessories is available.

also has an optional plug-in time base corrector.

What's more, the BVH-2000's lighter weight and smaller size (almost 50% less than its predecessor) make it as ideal on the road as it is in the studio.

And because of the ever-increasing number of applications requiring longer program times, the BVH-2000 provides up to 2 hours of tape time.

**A VTR THAT LEADS THE SIMPLE LIFE.**

In the BVH-2000, unlike most other VTR's, microprocessors are used to their full advantage. All data necessary for servo control are channeled into a central processing unit, making the operator's control over all systems and functions simpler and more precise.

Life is made simpler yet by the fact that every necessary function control, metering facility, and electronic module is accessible from the front.

Even the way the tape moves through the recorder has been simplified. One innovation—an extremely precise servo mechanism



The BVH-2000 (shown with Type-III control panel).



Front access to all electronic circuits and modules.

—permits the entrance and exit guide posts to move about 10mm away from the drum during threading. The result is the easiest threading system ever in a 1" video recorder.

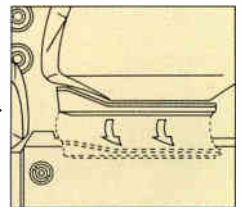
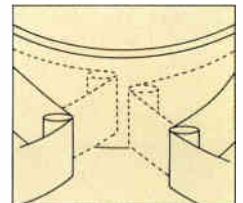
**THE MOST ARTICULATE VTR EVER BUILT.**

The BVH-2000 removes much of the mystery from maintenance, too. It literally tells you about malfunctions—usually well before you'd notice them yourself—through a microprocessor-governed self-diagnostic system.

The system includes various alarm functions and numerous checks to confirm that everything is working properly.

Most defects can be easily found—allowing for far less complicated maintenance and repairs, and reducing downtime considerably.

And because the best way



To simplify threading, guide posts automatically move away from drum, and audio head cover opens.

to simplify maintenance is by lessening the need for it, the Sony BVH-2000 has been designed to be virtually maintenance-free down to the last detail.

For example, only brushless DC motors are used, and all incandescent lamps have been replaced with high-brightness LED's.

Other welcome advances include a greatly expanded dynamic tracking range (from reverse at normal speed to forward at 3 times normal); programmed play (allowing you to vary playback speed across a range of ±20% of normal speed); and video and audio confidence.



Display board for self-diagnostics and other data-processing functions.

Remarkably, these are only some of the Sony BVH-2000's innovations. All of them add up to form the answer to virtually every need ever expressed by the users of 1" video.

To find out how it can answer yours, write Sony Broadcast, 9 West 57th St., New York, NY 10019. Or call us in New York/New Jersey at (201) 368-5085; in Chicago at (312) 860-7800; in Los Angeles at (213) 537-4300; in Atlanta at (404) 451-7671; or in Dallas at (214) 659-3600.

**SONY**  
Broadcast

The design of the Magna 6400 incorporates standard features (remote IR receiver built-in and parental control) that are optional on other converters.

The optional hand-held remote control unit has the same keyboard design as the converter for simple operation. The hand-held unit can be purchased with the converter or it can be marketed to subscribers at a later date.

For further information, call toll free (800) 448-5171 or (800) 522-7464 (New York State).

### Century III Announces New Mid-split, High-Split Trunk Stations

Century III Electronics International Inc. has announced the development of the 4200 Series mid-split and high-split feedforward trunk stations. The new trunk stations are designed for use in institutional cable systems and data transmission systems.

The feedforward mid-split trunk stations provide 160 to 440 MHz forward transmission and 5 to 120 MHz return transmission. The high-split trunk stations provide 235 to 440 MHz forward transmission and 5 to 185 MHz return transmission. All trunk station versions feature 22, 26 or 30 dB of forward operating gain.

Use of feedforward amplification for the new trunk stations produces an overall system that has higher gain and is

relatively free of noise and distortion. Hybrid integrated circuits, coupled with a unique method of noise and distortion cancellation, provide reliability and stability throughout a wide temperature and frequency range.

For more information contact Century III (714) 630-3714.



RF Monolithics SAW resonators

### SAW Filter Eliminates CATV Distortion

RF Monolithics Inc. has announced a new SAW (surface acoustic wave) clean-up filter for cable converters which eliminates picture distortion caused by

interference from adjacent TV channels.

Certain combinations of cable converters and TV sets allow signal bleed-through from adjacent channels to enter the receiver. The SAW clean-up filter eliminates all but the desired receiver input signal.

The new RF Monolithics filter, model number CTVF-3, is connected to the external cable linking the converter and TV receiver units. It is small enough to be easily concealed behind the TV set, and carries an insertion loss of less than 5 dB. Priced at \$16.25 in quantity, the CTVF-3 offers cable companies an economical way to provide more effective subscriber service.

RF Monolithics has also introduced a new SAW resonator. The new resonator is available in frequencies from 600 MHz to over 1 GHz in the TO-18 header with a height dimension of .090 inches. The 1 GHz version is the first of its kind available commercially.

Used as a quartz-stable oscillator frequency source directly at frequency, it avoids crystal multiplier chains, allowing circuit designers the opportunity to achieve improved signal performance levels while significantly reducing the circuit-board space needed with prior techniques.

Further information is available from RF Monolithics at (214) 233-2903.

## Jerrold's Time Proven J-Series Antenna

This Jerrold time proven J-Series Antenna is specifically designed for commercial antenna installations. Its heavy duty construction assures reliability under severe climatic conditions and provides long life and trouble free operation.

### Now Available Cantilever Mount

This new cantilever mounting feature is specifically designed to meet the flexibility demands of today's installations. This feature consists of a high strength mast mount bolted to the rear of the antenna boom. Bracing is provided by a steel horizontal crosspiece U-bolted to the upper portion of the mast, and connected by diagonally opposed tubular braces running down to a steel support bracket which is bolted to the midpoint of the antenna boom. All parts are treated for corrosion resistance.

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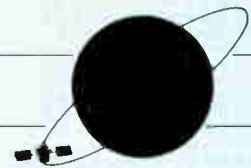
Jerrold converters, installed in more homes than any other, are now addressable . . . and better than ever. Their electronic memory chip offers more capacity, flexibility, and security than any other brand. And with Starbase, our innovative descrambler unit, you can upgrade your existing converters to addressable control rather than scrap them.

The Addressable Starcom head-end system is designed to fit you better too. It speaks English, not Computer. And you can build yours in modular steps to keep pace with your own rate of growth. There are options to support subscriber growth and even pay-per-view.

Addressable Starcom . . . it's another Jerrold system you can build on. And one of the smartest investments you can make today.

For information, call 215-674-4800. Or write General Instrument Corporation, Jerrold Division, 2200 Byberry Road, Hatboro, PA 19040.

## GENERAL INSTRUMENT



Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders	Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders
<b>ARTS</b>		9 00 p.m. / 12 00 a.m.		Satcom III-R #1	<b>HBO</b>		24 hrs	Program 729*/# Scramble 835*/# Duplication 940*/#	Satcom III-R #24 (E.C) Satcom III-R #13, #22 (M.P)
<b>ACSN</b>	Weekdays Weekends	6 00 a.m. / 4 00 p.m. 6 00 a.m. / 1 00 p.m.	192*/#	Satcom III-R #16	<b>HTN</b>		8 00 p.m. / 2 00 a.m.	207*/#	Satcom III-R #21 (P)
<b>BET</b>	Daily	11 00 p.m. / 2 00 a.m.	018*/#	Satcom III-R #9	<b>HTN Plus</b>	Daily	4 p.m. / 4 a.m.		Satcom III-R #16
<b>Bravo</b>		8 00 p.m. / 6 00 a.m.		Satcom IV #6	<b>The Movie Channel</b>		24 hrs	None	Satcom III-R #5
<b>CBN</b>		24 hrs	None	Satcom III-R #8	<b>Modern Satellite Network</b>	Weekdays	10 a.m. / 1 p.m.	243*/#	Satcom III-R #22
<b>CBS Cable</b>		4 30 p.m. / 4 30 a.m.	524*/#	Westar IV #3D	<b>MTV: Music Television</b>		24 hrs	None	Satcom III-R #11
<b>Cinemax</b>		24 hrs	None	Satcom III-R #20 (E.C) Satcom III-R #23 (M.P)	<b>National Christian Network</b>		6 00 a.m. / 8 00 p.m.	073*/#	Satcom IV #7
<b>CNN</b>		24 hrs	None	Satcom III-R #14	<b>National Jewish Television</b>	Sundays	1 p.m. / 4 p.m.		Satcom III-R #16
<b>CNN2</b>		24 hrs	None	Satcom III-R #15	<b>Nickelodeon</b>		8 00 a.m. / 9 00 p.m.	311*/# (E.C.M) 519*/# (P)	Satcom III-R #1
<b>C-SPAN</b>	Daily	9 a.m. / 1 a.m.		Satcom III-R #19	<b>North American Newstime</b>		24 hrs	None	Satcom III-R #6
<b>Daytime</b>	Weekdays	1 p.m. / 5 p.m.		Satcom III-R #22	<b>PTL</b>		24 hrs	None	Satcom III-R #2
<b>ESPN</b>		24 hrs	None	Satcom III-R #7	<b>Preview Channel</b>	Weekdays	10 00 a.m. - 1 30 p.m.	207*/#	Satcom III-R #21
<b>Eros</b>	Thurs -Sat	10 p.m. / 2 a.m.		Westar IV #10D	<b>Reuters</b>	Weekdays	4 a.m. / 8 p.m.	None	Satcom III-R #18
<b>Escapade</b>		8 00 p.m. / 6 00 a.m.		Satcom IV #7	<b>SIN</b>		24 hrs	None	Westar IV #3x
<b>Eternal World Television Network</b>		7 00 p.m. / 11 00 p.m.		Westar IV #10D	<b>SPN</b>		24 hrs	None	Westar IV #11x
<b>GalaVision</b>	Weekdays Weekends	11 p.m. / 11 a.m. 24 hrs		Westar IV #12D	<b>Showtime</b>		24 hrs	None	Satcom III-R #12 (E.C) Satcom III-R #10 (M.P)

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Location: Degrees West Longitude	Satellite	
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70		Southern Pacific-2 (Oct. 84)**
74		Galaxy-2 (Mid 84)
79		Advanced Westar-2**
83	Satcom-4	
87	Comstar-D3	Telstar-2
91	Westar-3	Advanced Westar-1**
94		SBS-3**
95	Comstar-D2 & D1	Telstar-1
97	SBS-2*	
99	Westar-1	Westar-4 (Mid 82)**
100	SBS-1*	
103		GTE-1*
104		Anik-C (Mid 82)
106		GTE-2*
109	Anik-B**	
114	Anik-2 & 3	
119	Satcom-2	Southern Pacific-1 (Feb. 84)**
123	Westar-2	Westar-5 (Early 83)
127		Comstar-D4 (Mid 82); Telstar-3 (1986)
131	Satcom-3R	
135	Satcom-1	Galaxy-1 (Mid 82)
139		Satcom-1R (Mid 83)
143		Satcom-2R (1984)

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5-NF G-I, mid band	-75db	1.5db	-6db	-1db
5-NF 7-13, high band	-75db	2.0db	-10db	-2db
5-NF J-W, super band	-70db	3.0db	-15db	-3db



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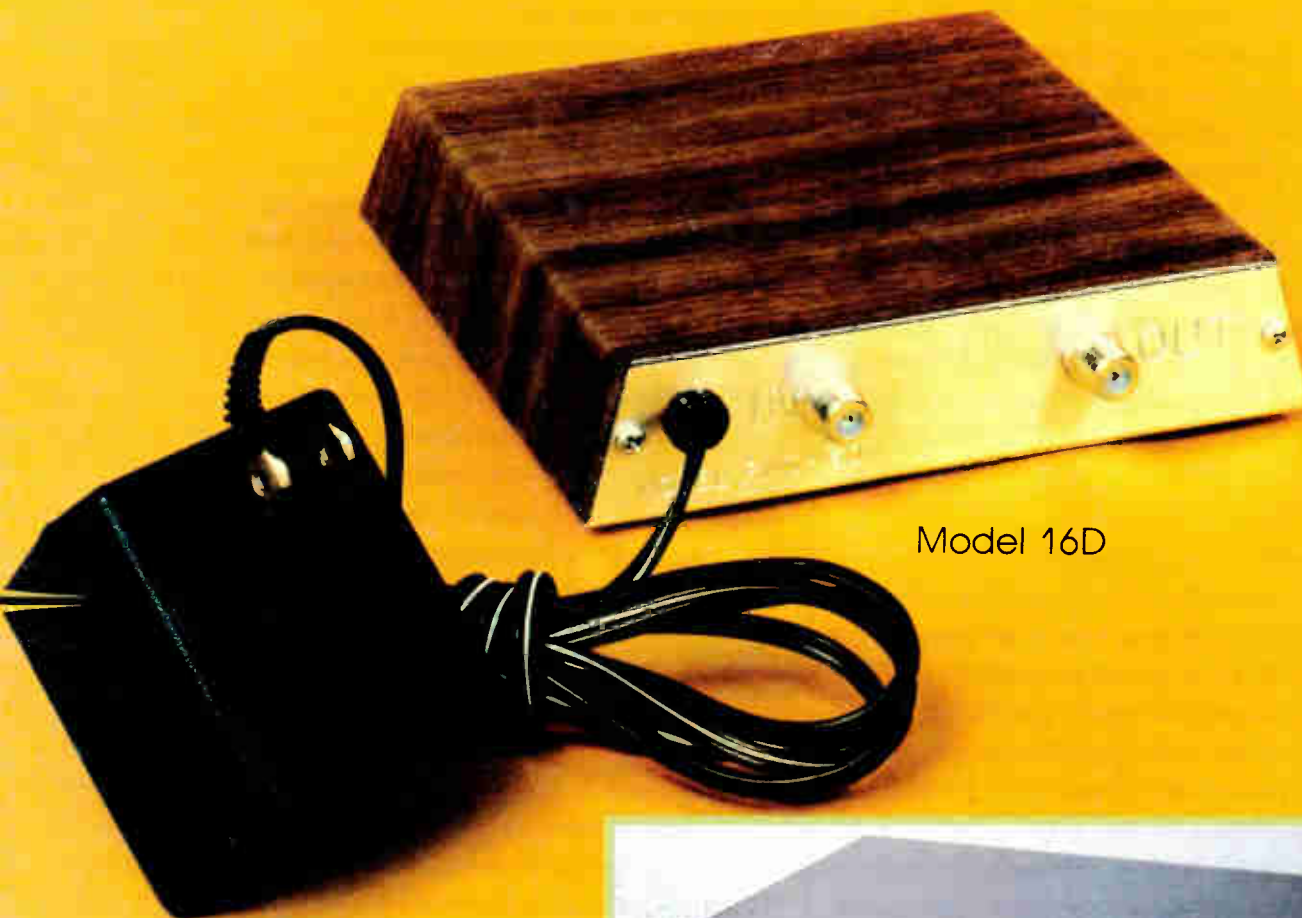
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