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BME

BROADCAST MANAGEMENT ENGINEERING

EATV GOES UNDERGROUND



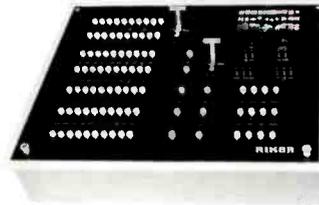
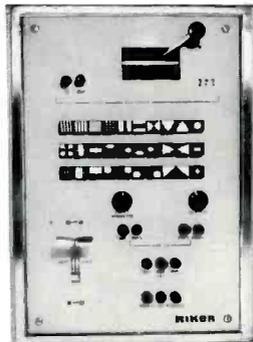
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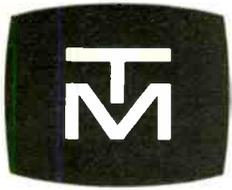


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BM/E

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- 6 **Broadcast Industry News**
Focus on CATV, p. 11
- 14 **Interpreting The FCC Rules & Regulations**
New Rules On Experimental Fm Operations

G1 NCTA Convention Guide

- G2 Exhibitors' Directory
 - G4 Instant Guide to Exhibitors
 - G7 Program Agenda
-

- 21 **CATV Shoots for the Moon While Washington Grumbles**
Ebullient optimism at NCTA is overshadowing the ominous sounds periodically emanating from Washington, as the CATV industry continues to grow.
- 25 **College Students and CATV Make a Happy Marriage**
A group of Canadian college students mix their talent with the right blend of studio equipment for professional-level CATV origination.
- 26 **Local Origination Thrives in Leisure World**
Working on a typically tight CATV budget, Laguna Hills, California operator programs 30 hours a week of local material that captivates subscriber interest.
- 29 **CATV Goes Underground**
Local ordinances, the simple economics of long-haul operation and public relations efforts aimed at potential subscribers, have joined forces to make cable burial the preferred method of installation.
- 37 **Six Ps of KPQ**
This Washington State a-m'er finds that its formula for success alliterates with the letter P.
- 42 **The Case for an On-Channel Fm Booster**
When terrain features cause blank spots in a coverage area, an on-channel fm booster may be the way to fill them in.
- 49 **Broadcast Equipment**
Reports on newly introduced products and equipment.
- 60 **Names in the News**
- 64 **Broadcasters Speak**
Feedback and chit-chat from *BM/E* Readers.
- 68 **Literature on Interest**
Valuable data you can obtain by using the Reader Service Card between pages 68 and 69.
Reader Service Card
Use FREE postage paid card to receive more data on new products and literature described in this issue.
- 73 **Classified Marketplace**
- 75 **Index to Advertisers**
- 76 **Editorial**
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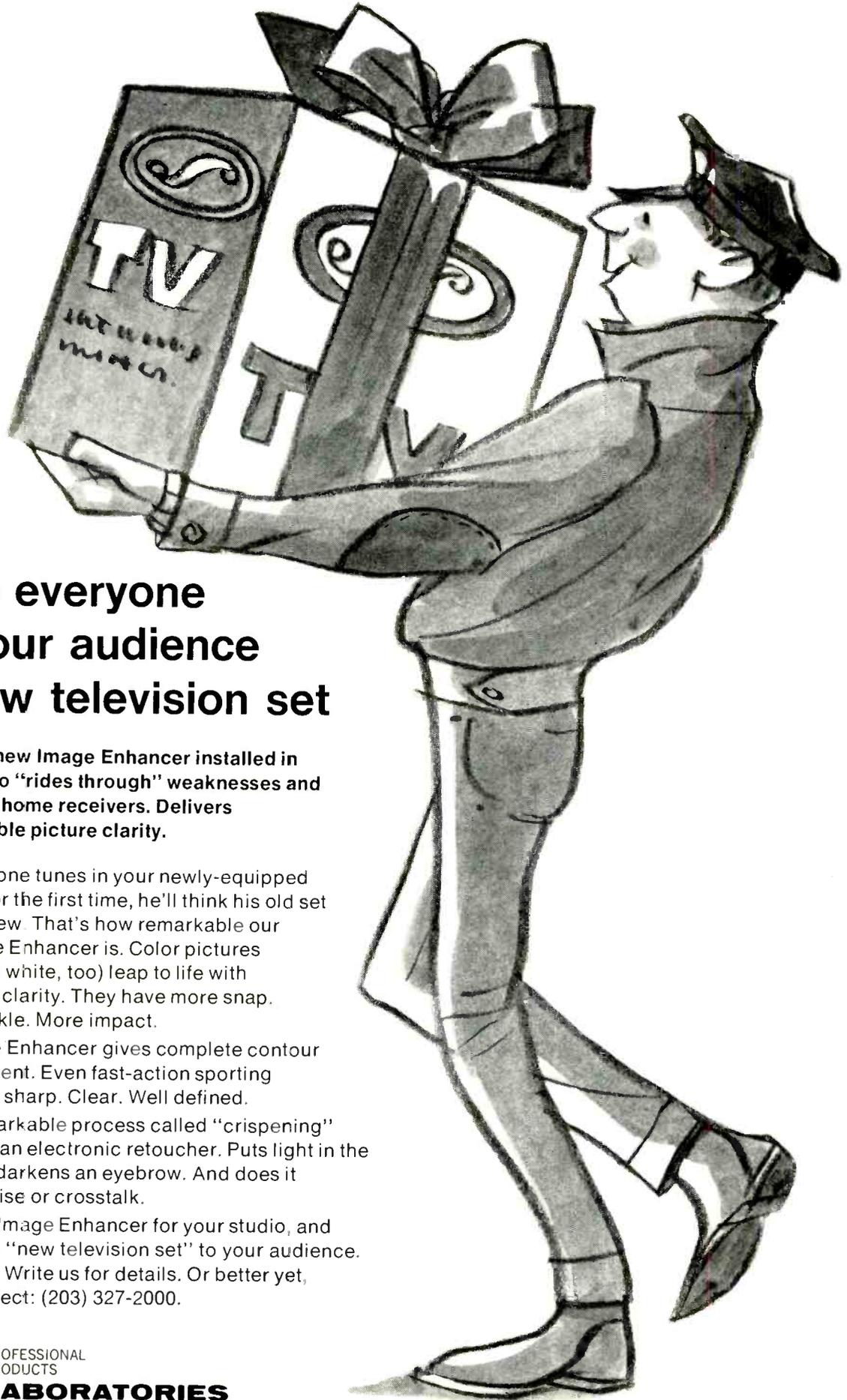


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This month's cover: Art Director Walt Mesaros took our word for it that Br'er Rabbit 'round the country are being disturbed by CATVers poking cables into their burrows. Nevertheless, CATV is taking the "dig we must" slogan to heart.



Give everyone in your audience a new television set

Amazing new Image Enhancer installed in your studio "rides through" weaknesses and defects in home receivers. Delivers unbelievable picture clarity.

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BROADCAST INDUSTRY NEWS

NAE To Study Future Telecommunications

The National Academy of Engineering has announced the formation of a Committee on Telecommunications to conduct a study of developments in communications technology through 1980. The 15-member committee is chaired by William L. Everett, dean of the College of Engineering of the University of Illinois at Urbana.

The committee will advise both the President's Task Force on Communications Policy, created in August 1967 to review the nation's domestic and international policies in communications, and the Department of Housing and Urban Development, which is funding the study

in connection with its long-range program of research toward improved urban life.

The committee will examine long-range transmission modes such as satellites, cables, and guide laser beams. It will also consider the problem of distribution of radio, television, and data signals within cities and the types of terminal equipment that may be available for business and personal use, such as receivers, video-phones, and data input consoles.

At the initial meeting of the committee, Dr. Everett said, "We should be able to take a good look into the future of communications, which is dominated by technical development." He said he had confidence that the committee would "produce a document that will stand as a forward-

looking, imaginative blueprint of what communications can be, and what it can do for our society."

NAB: 'Need More Time For Ownership Replies'

The National Association of Broadcasters has asked the FCC to extend its deadlines from June 26 to September 16 for written comments, and from September 16 to September 30 for reply comments to its proposed rule to prohibit any future multiple ownership of radio and television stations in the same community.

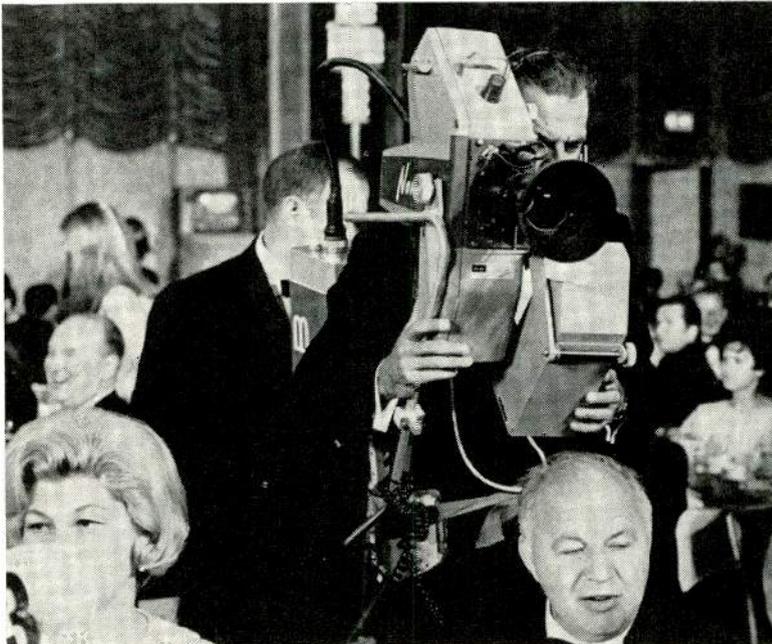
The Commission's proposal, NAB General Counsel Douglas A. Anello said, "represents a drastic departure" from its long standing policy "of dealing on an ad hoc basis with issues involving concentration and diversification of the broadcast media."

Previously, he said, the Commission has taken into account "the significance of those interests in terms of number and size with reference to the area covered, the number and coverage of broadcast services being received from other communities and the extent to which outside media, including newspapers, deal with local problems in the community in question."

Manufacturers To Host Production Workshop

"Production '69: A Workshop in Television Techniques" has been announced by the cosponsors of the program, including Reeves Sound Studios, Ampex Corporation, Memorex Corporation, 3M Company, Philips Broadcast Equipment Corporation and RCA. It is planned as 30 hours of instrumentation shoe-horned into two 9:00 A.M.-to-midnight days, with parallel sessions for different industry areas. The sessions, slated for September 24 and 25 at the Hotel Roosevelt, N.Y., may be attended by invitation only. Recognized experts will instruct, using practical applica-

'Little Shavers' View Emmy Awards



NBC was first to televise live TV pictures with the Norelco PCP-70 portable color camera, when two of the Little Shavers were used in the 20th Annual Emmy Awards Show May 19, 1968. One of the PCP-70s was on duty in New York and the other in Hollywood. Both were operated continuously, with the cameramen moving among the audiences for closeups of winners. When first announced last fall, Philips Broadcast said that it was hopeful of delivering Little Shavers in time for this summer's political convention coverage. "The networks just wouldn't wait," said John Auld, Philips Broadcast vice president, "so we tried harder."

Fringe Benefits



Want to give your CATV subscribers crisper sound, cleaner pictures and better color? Don't fall back on taller towers, bigger Yagis or downtown head-end cable. Leap ahead with the total solid-state reliability and superior performance of FM microwave CATV intercity relay and CARS band TV links . . . from Microwave Associates.

Wideband linear phase and amplitude designs provide minimal differential phase gain and group delay . . . for superb color quality, audio fidelity and picture resolution.

But great performance won't be your only fringe benefit. Our CATV systems use solid-state RF sources rather than klystron tubes. There are no high voltages anywhere. Cooling is unnecessary. Tube replacement costs are eliminated. Power consumption is minimal. Reliability is maximal.

Systems are available right now for 6 and 11 GHz common carrier and CARS 13 GHz bands, plus complete RF system engineering, installation and related services.

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tions and case histories rather than theoretical examples.

Production '69's concept is seen as a practical way of updating the knowledge of the latest techniques in videotape production for individuals from advertising agencies, production houses, education and training areas. Emphasis of the workshop will be on costs and cost planning. Students of the sessions will receive a textbook drawn from the lectures.

The instruction agenda includes day sessions in applications and creativity in videotape productions; use of cameras, recorders and videotape to their best advantage; working demonstrations in lighting, sound recording, makeup, electronic editing, video mixing and sound mixing; and illustrated lectures on examples of set building, set decoration and color, and duplication and distribution.

Tours to operating facilities will be available on September 26, the morning following the workshop, for interested students. Circle 300 on Reader Service Card

Quasi-Laser to Debut in CATV

Operating in the upper-millimeter microwave region, a transmission system dubbed the "Quasi-Laser" may make CATV more economically attractive to operators in congested and difficult-to-cable areas.

The new system, described recently by Dr. Joseph Vogelmann of Laser Link Corp., transmits in the 40- to 50-GHz region. Although this system is technically a microwave transmission, Dr. Vogelmann points out that propagation characteristics are "optical in nature," and can be handled very much like the better-known optical laser.

A transmitter with an azimuth beamwidth of no more than 70° would be mounted atop a high structure, such as an office building or bridge tower. Buildings "wired" for this type of CATV reception would have a receiving system on the roof. Line-of-sight propagation is a must for such a system, but it has absolutely none of the optical laser's disadvantages. Dr. Vogelmann pointed out that transmissions in the 40- to 50-GHz region are completely impervious to adverse weather and atmospheric conditions.

The present system is licensed for operation at 42 GHz, and has a bandwidth capacity of 12 TV

channels. The modulation is done by "essentially" optical methods. The technique is part of a proprietary system developed jointly by Laser Link under Ira Kamen's direction, and Chromalloy American. It is expected that the overall system will have greater service reliability than conventional wired CATV. A prototype system will be evaluated in Brooklyn, N.Y. using Bartell Media Corporation's CATV franchise, which is now pending.

In addition to the laser beam's inherently wide bandwidth, such an installation would be a major time-and-money-saving factor in CATV systems. This would be especially true in congested municipal areas like New York, where underground cable runs are very costly.

New Lamps Triple Life Of Incandescent Types

Newly developed tungsten halogen lamps for television and motion picture studio lighting have been recently put into use by the CBS Television Network.

The new lamps, which have nearly three times the effective useful life of conventional incandescent studio lamps, were developed by Sylvania Electric Products, Inc., with the assistance of the CBS Network which participated in the testing and evaluation of prototypes.

The tungsten-halogen lamps, directly interchangeable with standard studio lamps, are currently being used on *The Ed Sullivan Show*.



David L. White, (left) director of studios holds the new lamp, while Salvatore Bonsignore, staff lighting consultant for the CBS Television Network, holds a conventional 2000-watt lamp.

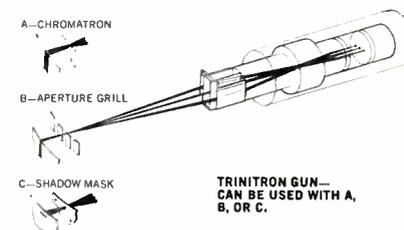
Other salient features of tungsten-halogen lamps are maintenance of a uniform light output throughout the life of the lamp; stable color temperature; reduced bulb size for ease in shipping, storing and handling; and low-

noise operation without "sing" which might interfere with a program's audio transmission.

Trinitron: Son of Chromatron

Directly descended from the Chromatron, with a great aunt (by marriage) called shadow mask, the infant Trinitron made its debut in New York recently. Sony Corp. Executive Vice President Akio Morita demonstrated the new color picture tube in two configurations and in two screen sizes. The smaller set, with a 7-inch diagonal screen, is a lightweight all-transistor portable that takes an accessory battery pack for those summer beach parties. But alas, this summer will be colorless, since the 7-inch Trinitron sets won't hit the U.S. market until late August.

Like the Chromatron, Trinitron (no relation to a Lopez of similar appellation) has a single electron gun assembly to eliminate convergence problems. The gun has three electron sources for each of the three primaries and these three beams are sharply focused within an "electronic lens" in the



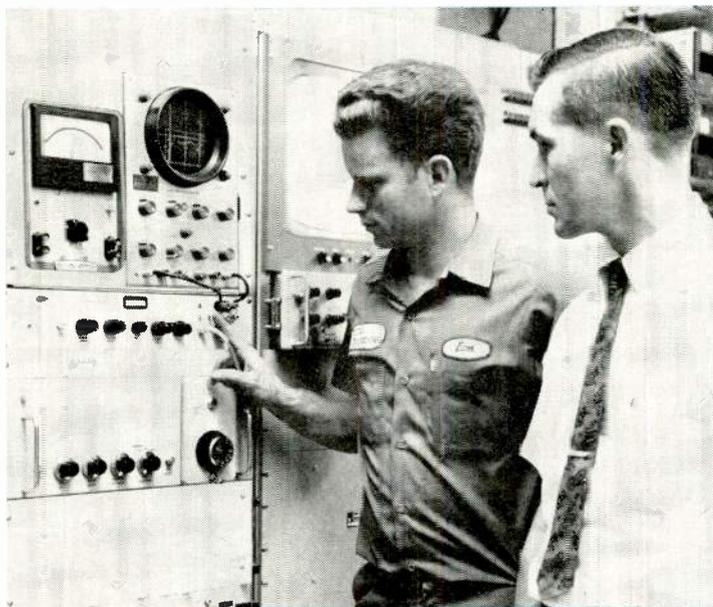
gun assembly. The focused beam is deflected electrostatically and passes between the tines of a vertical "aperture grill" that vaguely resembles Chromatron's vertical wire grid. But this grill is all at the same electrical potential; there's no post-deflection focusing as in the Chromatron.

The grill is chemically etched from steel plate blanks—the same way the holes are formed in a shadow mask. Then, using the grill as a template, the good old light-house process (again of shadow mask fame) is used to deposit the vertical phosphor stripes in perfect register. This is the basic structure of the 12-inch Trinitron. The picture tube in Sony's 7-inch set uses a Trinitron gun and a Chromatron-type wire grid (with all wires at the same potential)—presumably because of the coarse vertical line structure that might result from an etched grill in this size tube.

Morita indicated that the new

"EVERY CABLE TV SYSTEM USING MODULATORS NEEDS A SIDEBAND ANALYZER,"

says Don Cantrell of
TOTAL TV,
Santa Rosa, California



Don Cantrell, Chief Technician, demonstrates operation of TS-100B Sideband Analyzer to Jim Monroe, Mgr. of TOTAL TV.

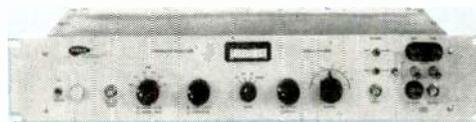
TOTAL TV of Santa Rosa, California has been using a DYNNAIR TS-100B Sideband Analyzer for over a year. Here's the way they feel about it . . .

"The DYNNAIR sideband analyzer allows us to check modulator operation at any time—precisely and in just a matter of minutes. It also greatly shortens the time required for modulator alignment."

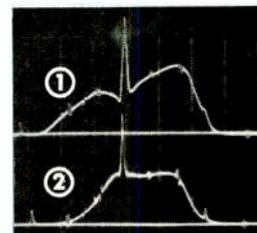
Yes, cable TV operators everywhere have discovered what broadcasters have known for years . . . *the only practical way to check transmitter operation is with a sideband-response analyzer.*

The DYNNAIR TS-100B Sideband Analyzer is designed especially for the needs of the CATV operator. It is completely solid state and has a self-contained regulated power supply. It is extremely compact. And it is priced at only \$1250 . . . a small price to pay for the savings in time and the increased system performance that are immediately realized. (And an *especially* small price when compared with the \$8500-odd worth of standard precision test equipment you would have to assemble to do a roughly equivalent—but many times slower—job!)

These units are available for immediate delivery. Give us a call and place your order today. (If you're still not convinced, ask the man who has one . . . or see it in operation at the NCTA convention, booths 69, 71 and 73 along with the RX4000A Demodulator and the TX4A Modulator.)



Actual Sideband Analyzer waveforms indicating (1) poor modulator response and (2) Proper response.



The Dynair TS-100B generates a video sweep signal which is applied to the video input of the modulator under test. The RF output of the modulator is then directed back through the TS-100B, where the RF spectrum is analyzed and then applied to an oscilloscope for display. The display is a precise representation of the sideband response curve, showing both the visual and aural carriers. Markers for frequency measurement are provided at 0.2, 0.5, 1.5, 3.6 and 4.5 MHz to allow exact frequency determination.



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tube's elements could be mixed readily, and on display were examples of this which included a shadow-mask tube with a Trinitron gun. Color brightness and fidelity of the new tube appeared to be excellent and fully repeatable; the manufacturer's claimed increases in brightness level over shadow-mask tubes were well borne out by eyeball measurements.

Phosphors used in the tube are Europium- and sulfide-based formulas. The aperture grill itself is about the same thickness as a conventional aperture mask plate, and the constant potential on it eliminates the alternate line switching needed in the Chromatron tube. Horizontal resolution of the 12-inch tube is stated at 400 lines, and Sony officials are talking seriously about incorporating this tube in high-quality broadcast monitors.

That all-important brightness level is about 1.3 times the brightness of a shadow-mask tube (at the same voltage) for the Trinitron and about 1.5 times for the 7-inch Trinitron/Chromatron tube. Unlike the Chromatron, the Trinitron's brightness level will not be limited by screen size, since the

single electron source is effectively a three-gun type of supply with convergence problems eliminated by the "electron lens" design.

The small-size sets might find immediate use converted to color monitors in mobile vans and other remote console setups. The \$400+ price certainly makes it worth consideration in any such tightly budgeted installations. And one more plus—no X-ray emission!

EIA Unit Urges Action On USA Commo Birds

The Electronic Industries Association's Satellite Telecommunications Subdivision has urged "aggressive pursuit and implementation" of a domestic telecommunications satellite system.

In a policy statement adopted at a recent meeting, the subdivision called for implementation of the system "at the earliest possible date."

The statement continued: "We urge that all appropriate governmental, legislative and industrial activities vigorously work toward this end without further delay.

"Problems of ownership, financing, frequency allocation,

etc., must be resolved in a positive manner, but without unduly compromising the United States' leadership position.

"It is in the national interest to resolve the terrestrial satellite interface and interference problems as rapidly as possible by an early implementation of a U.S. domestic communication satellite project.

In other action at the meeting, the subdivision endorsed propagation experimentation to fill information voids regarding frequency sharing between communications satellite systems and terrestrial systems, and experimentation to determine the utility of frequencies above 10 GHz.

RCA Reveals Plans For Hard-Core Unemployed

RCA has initiated special programs to hire and train hard-core unemployed in two major cities and plans to intensify its efforts in the company's plant communities throughout the nation, President Robert W. Sarnoff disclosed at the recent 49th Annual Meeting of Shareholders. Sarnoff reported that several hundred so-

simple arithmetic:

$$\frac{\text{Number of Flashes in 10 seconds}}{10} = \text{Hz error}$$

called unemployables, school dropouts with spotty work records, were given intensive on-the-job training and are now productive employees of the company in Boston and New York.

"We plan to step up these efforts in the cities where we operate," Sarnoff said.

The RCA executive also reported that the company has made specific job pledges to the program for the recruitment and training of hard-core unemployed being sponsored by the National Alliance of Businessmen in the nation's 50 largest cities. It also is loaning management personnel to assist the Alliance in several cities.

Jefferson Standard Wins Liberty Bell Award

Charles H. Crutchfield, president of Jefferson Standard Broadcasting Company (WBT, WBT-FM, WBT-TV), has been named winner of the 1968 Liberty Bell Award by the Charlotte-Mecklenburg Bar Association.

The award was presented at a

recent "Law Day USA" luncheon. The Liberty Bell Award is given for community service to encourage greater respect for law and stimulate a deeper sense of individual responsibility.

Crutchfield's interest in public affairs resulted in WBT-WBT-TV's becoming one of the first broadcasting companies in the nation to set up a daily schedule of editorials.

FOCUS ON CATV

CATV Stifled But Growing

Representative Talbott (R-Cal.) asked some embarrassing questions of the FCC at the Commission's annual appearance before the House Appropriations Subcommittee.

Talbott indicated that he is concerned about "what appears to me, an attitude of the Commission to stifle CATV."

He said that FCC actions "have had a very serious dampening effect on CATV" and accused the Commission of "trying to protect

the broadcasting industry."

The FCC Commissioners defended themselves as best they could, but they did not point out that in spite of their actions, CATV is growing rapidly.

Television Digest, which has been charting CATV growth since 1952, reported that "cable TV grew tremendously last year, despite FCC's near freeze."

The number of subscribers rose from 2.1-million to 2.8-million and the number of systems rose from 1700 to 2000.

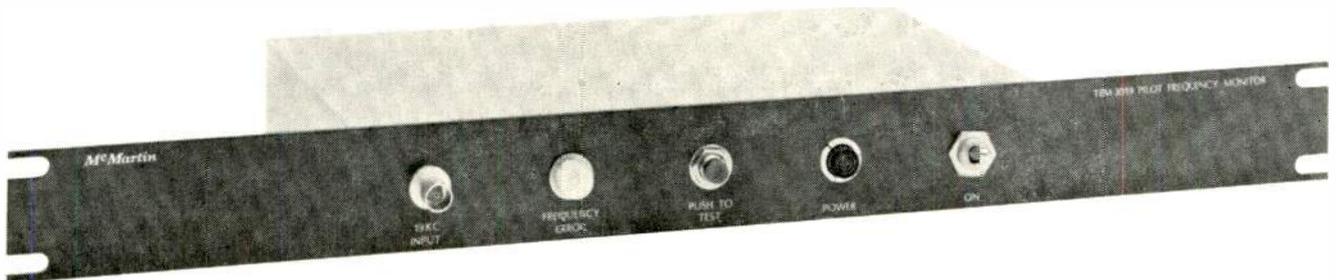
"It makes one wonder," said the *Digest*, "what might have happened if FCC had not frozen start of top-100-market systems more than two years ago."

More than half of all existing systems are relatively small, with less than 1000 subscribers and grosses under \$60,000 per year. Only 27 systems have more than 10,000 subscribers; Cox's San Diego system has over 40,000 subscribers, with an annual gross in the neighborhood of \$25-million.

CATV and PUC

The cable TV industry is becoming increasingly concerned that CATV will fall under the jurisdic-

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The solid-state TBM-3019, only 1 3/4" high, is an extremely simple device for measuring the 19kHz pilot error. Just count the number of flashes in ten seconds on the frequency error indicator lamp. The Hz error is the number of flashes divided by ten. It's that simple.

The TBM-3019 has a 76 kHz crystal-controlled oscillator divided down to provide a 19 kHz standard accurate to ± 0.25 Hz. The unit will work with the McMartin TBM-4500A stereo monitor or any monitor with a 19 kHz pilot signal output between 25 and 60 Mv.

Meet the FCC requirements the easy way—order your TBM 3019 Pilot Frequency Monitor today for immediate delivery.

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tion of Public Utilities Commissions (PUC) in many states. Representative James R. Nolan of Massachusetts introduced a bill for public regulation of CATV two years ago. If his current bill is passed, CATV will be regulated by the Department of Public Utilities.

In one of his speeches, Representative Nolan charged that CATV systems enjoy profits of 59 to 68 percent. He said, "Now is the time to harness the runaway horse before it tramples on the consuming public at large."

However, Massachusetts Attor-

ney General Elliot Richardson ruled that under present law the Massachusetts Department of Public Utilities has no authority to regulate cable television. He also said that Massachusetts cities and towns cannot license CATV systems or regulate their rates.

At the same time, California Senator Miller has submitted a bill that would:

- (1) Place CATV under PUC control
- (2) Deny cities and counties the right to issue cable franchises or licenses.

Similar legislation is pending in Pennsylvania, the nation's number one CATV state. And in New Jersey, Senator Guarini has introduced a bill that would require cable systems to obtain certificates of convenience and necessity from the PUC. Under this bill, the N.J. PUC would regulate "territory, construction equipment, maintenance, convenience and necessity may require."

A.C.R. Stone of Storer Broadcasting summed up the attitude of many in the industry when he said: "We feel that some legislation will be passed to put CATV under state control, but PUC control is 10 to 20 years premature. I feel that until a homeowner requests cable television in addition to standard utilities, PUC control would have a serious detrimental effect . . . at present, complete PUC control would put many small operators out of business."

CATV is currently under PUC control in only two states—Nevada and Connecticut. Testifying before the House Government Regulation's Committee, NCTA President Ford said that in Connecticut "not one CATV system has been constructed in the five years that CATV has been under PUC control.

In Oregon, however, the PUC—which does not regulate CATV—gave cable system operators a boost by rejecting a Pacific Northwest Bell Telephone Company "lease back" tariff.

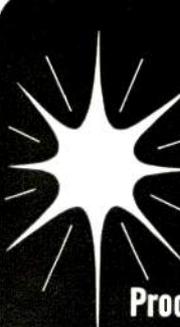
Ford Still Optimistic

In spite of the many complex problems facing cable TV, NCTA officials are still quite optimistic. President Frederick Ford said recently that CATV can be the means to higher living standards, better health and safety programs, and a panoply of other community services. He mentioned such extended uses of cable television as facsimile newspapers, books and magazines, living room shopping, and "instant delivery of telegrams and mail . . . no matter what the weather or the mailman's disposition."

Local Origination

Potential And Problems

Wally Briscoe, NCTA managing director, has been urging cable operators to get "acquainted on a first name basis" with lawmakers by offering them time for video-

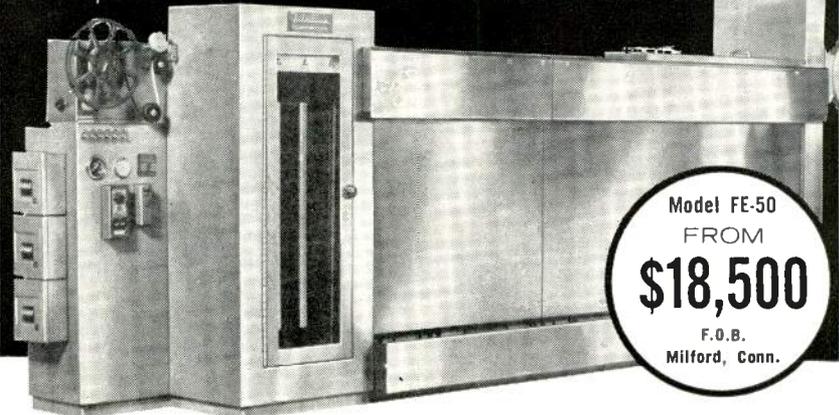


A STAR IS BORN

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A Processor for Ektachrome Film

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Model FE-50

FROM

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Who knows more about building film processors than Filmline? Nobody. And everything we've learned has gone into our newest Ektachrome processor, the FE-50. It is top quality equipment at a sensible price . . . the result of Filmline's productive know-how. Designed and engineered to fulfill the requirements of both large and small TV stations the FE-50 is the most versatile, fully automated Ektachrome processor ever built.

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ADDITIONAL FILMLINE FEATURES:

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Recent FE-50 Installations: WEAT-TV, WCKT-TV, WMAL-TV, NBC, CBS, WTOP-TV, A-1 Labs, Precision Labs, Film Service Lab.

Now available: Filmline FE-30 Ektachrome Processor. Speed — 30 FPM. Complete with Replenishment System . . . \$15,750. F.O.B. Milford, Conn.

For more details write: Dept. BME Ju-68



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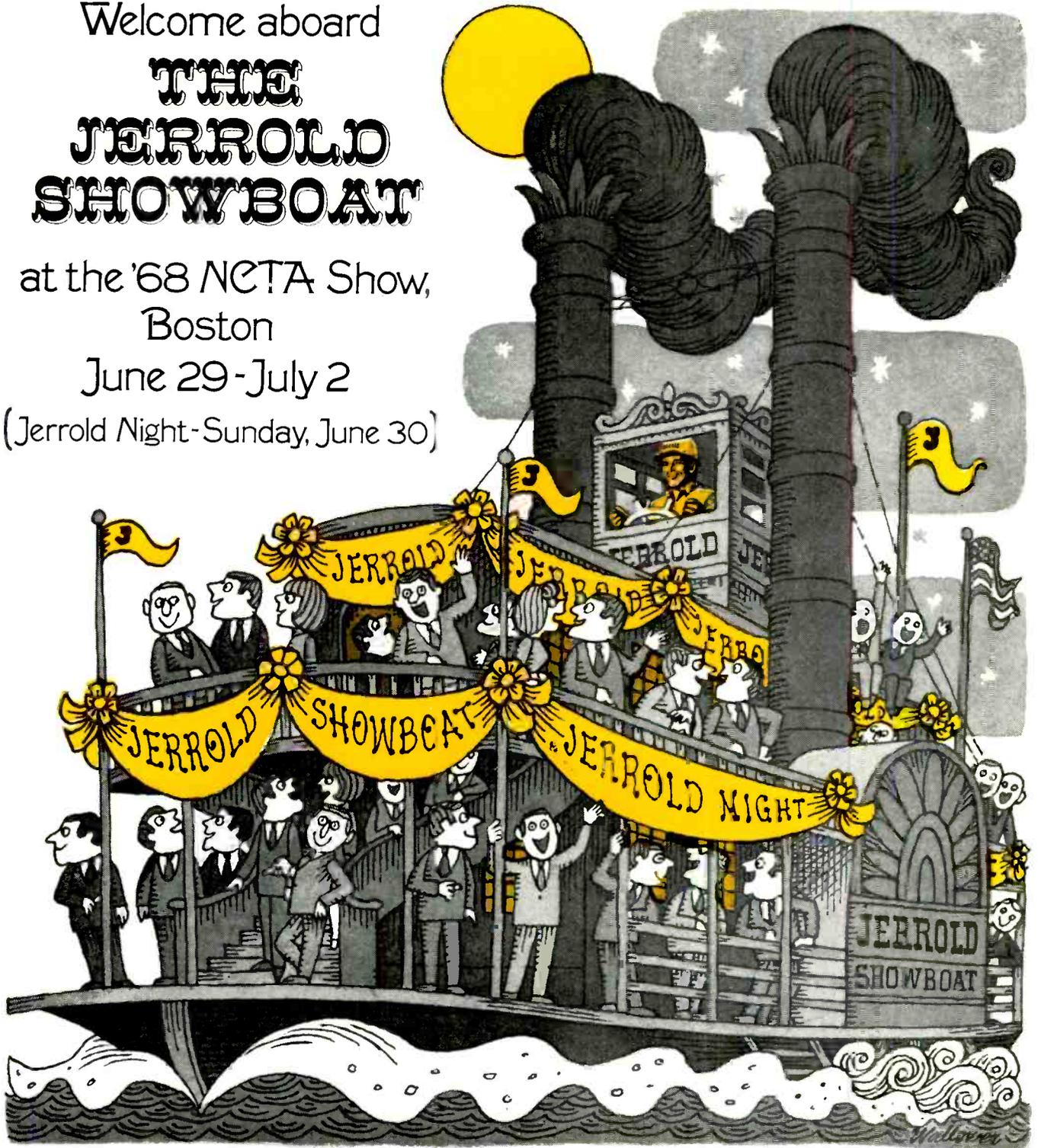
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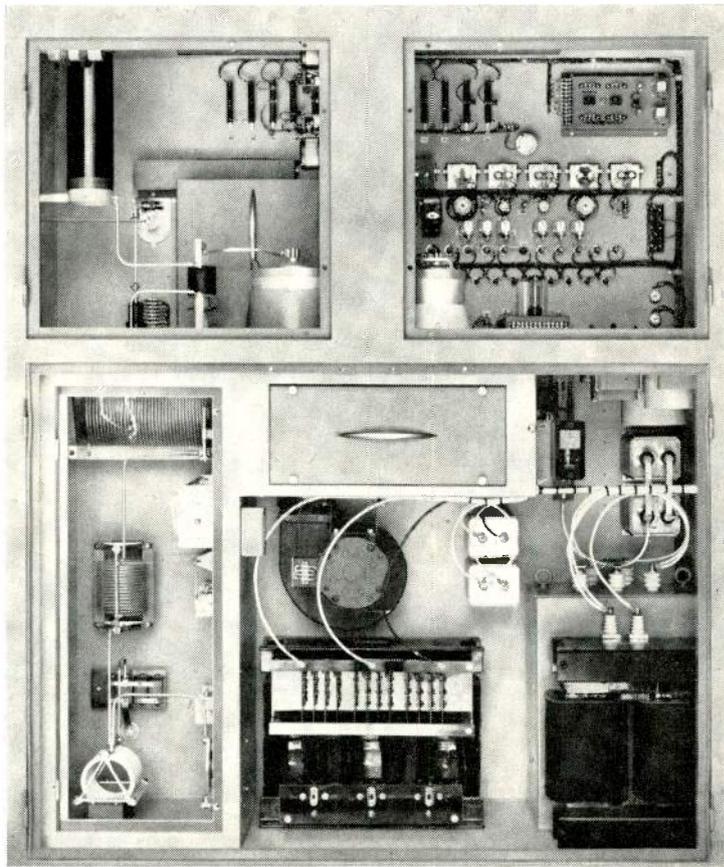
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Bauer AM Transmitter. Aft view.



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This is the aft end of the all-new Bauer AM Transmitter from Granger. The 5 Kw Model FB-5V.

Look at its well-engineered mechanical layout. Clean. All components are arranged within easy reach for quick inspection and servicing. Model FB-5V is compact. Measures only 75"H x 60"W x 30½"D. In fact, it's the most compact 5 Kw AM transmitter on the market. Around in front, full metering shows all functions simultaneously. Tally-light system provides instant warning of any malfunction or momentary overload, permits fast reset to back-on-the-air status, and pinpoints the cause for later servicing. Compare its performance. Low distortion, wide frequency response and 6,000-watt power-plus capability. Excellent modulation capability — boosts signal in fringe areas and provides "clean" sound. Consider the cost-savings. The output tube's operating level has a service capability of more than 20,000 hours, proved in actual use. Save hundreds of dollars per year in operating costs. Need a higher kilowatt model? Ask us about the all-new 10 Kw Model FB-10J. It has the same clean, compact features as the FB-5V, with 12,000-watt power-plus capability. Write for complete data.



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taped or filmed messages to their constituents. However, the NCTA points out that the operator who does this should abide by the NCTA code and FCC rules which say, in effect, that all candidates should be offered equal time.

Mr. Briscoe pointed up the potential of CATV operators working with radio stations, especially daytime-only radio stations. "At sundown," he said, "when FCC rules require the broadcaster to go off the air, the station is all dressed up with no place to go."

Briscoe also told a chapter of the Academy of Television Arts and Sciences that "cable television would be an important training ground for the development of new television talent—both performers and technicians."

Perhaps the biggest boost to local origination, however, came in Cleveland, Ohio, where the local cable TV operator has begun exclusive television coverage of 13 Cleveland Stoker soccer matches. This is believed to be the first time a CATV operator has been given the right to cablecast a professional sport.

Meanwhile, the cable TV industry has been warned about one of the dangers of local origination.

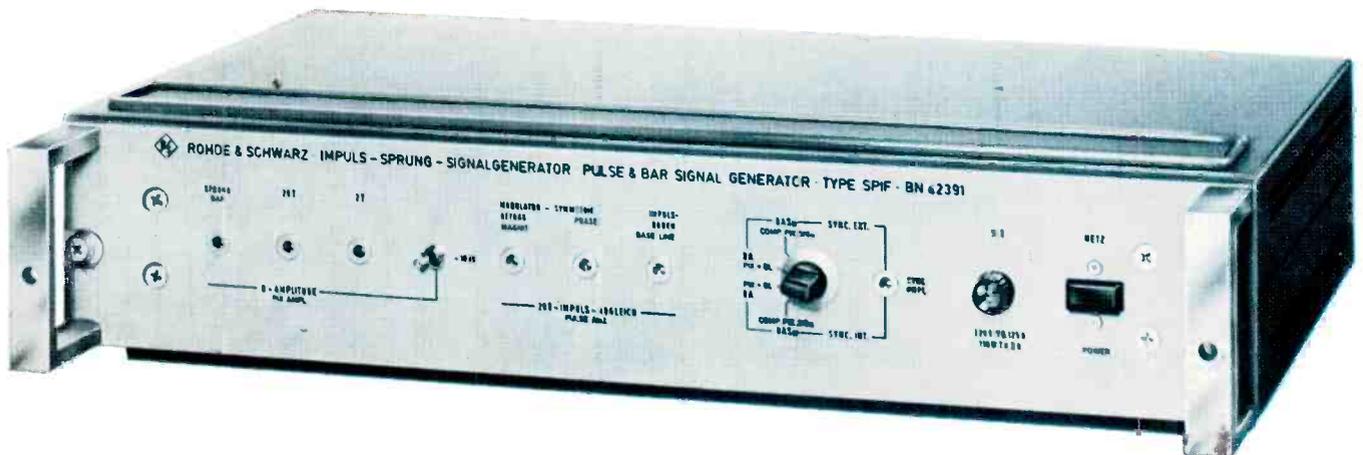
In a speech at the NCTA Cablecasting Seminar, George C. Hatch said: "If you are playing background music on a weather or news channel; if you are picking up a high school sports event and the band plays in the background; if you cover a civic ceremony and there is any music involved; if you broadcast a film or tape and there's any music on it, you are infringing on the composer's copyright. The minimum damage is \$250.00 per selection (musical) played . . ."

FCC Approves CATV Without Trunk Line

The FCC has approved the Teleprompter-Hughes microwave system for two portions of New York City. Known as AML (Amplitude Modulated Link), the new cableless system uses a single 18-GHz transmitter to send 12 or more TV channels simultaneously.

The new system will pick up signals at a site near the George Washington Bridge and transmit them to receivers throughout the area. Then, cables will be used to distribute the signals through neighboring buildings.

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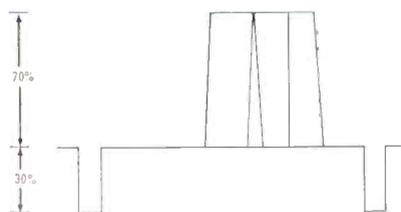
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The all solid state Type SPIF generates the required test signal. Sync pulses are internally generated or can be externally applied. Switchable one or two line operation is provided. The picture component can be attenuated by 10 dB. The pulse & bar signal can substitute for the picture signal applied to a mixer or test generator.

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INTERPRETING THE **FCC** RULES & REGULATIONS

New Rules On Experimental Fm Operations

ON DECEMBER 13, 1967, the Commission adopted a Report and Order (Docket No. 17660, RM-1140, FCC 67-1337), amending Section 73.262 of the Rules concerning the period for experimental operation of fm broadcast stations.

The *previous rule in this regard, Section 73.262, limited the experimental period for fm stations to the period between 1:00 A.M. and 6:00 A.M., local standard time*, and unlike the TV rule (Section 63.666) did not make provision for other experimental periods.

Reasons for Change in Rules Re Testing And Maintenance Of Facilities

In support of its request for increased hours of experimentation for testing and maintenance of facilities, the commenting parties had urged that (1) fm facilities are allocated upon the same fundamental philosophy as television facilities (which are not limited as to time during which non-program material may be transmitted); (2) the propagation characteristics of fm signals are similar to television signals, (3) the nature of fm and television signals do not require restrictive time periods for experimentation as is required in the case of standard broadcast signals, and (4) the mileage separation plan affords the necessary protection to other stations. Because of the similarities of fm and television signals, the NAB requested that the fm experimental period for testing and maintenance of facilities be lengthened one hour so as to permit testing from midnight to 6:00 A.M., local standard time, instead of from 1:00 A.M. to 6:00 A.M., local standard time. Furthermore, because many fm stations operate on limited schedules and with limited personnel, the previous rule works, in many cases, an unnecessary hardship on personnel; and return to the station for the testing period by the personnel thereby resulted in added expense to the licensee. The NAB claimed that the one hour increase will result in no degradation of the Commission's technical standards, and no "perceptible" increase in

interference would occur to other fm stations. What did FCC do about it?

Reasons For Changes In Rules Re Improvement Of Facilities

With respect to its request for permission for fm stations to conduct experimental tests looking toward improvement of its facilities, the proponents stated that, with the increased complexity in the transmission of fm signals brought about by SCA and stereophonic broadcasting, it is necessary to conduct tests other than during the designated experimental period. This argument was advanced because SCA and stereophonic broadcasting, in many cases, requires precise adjustment of both the receiver and the antenna system. Since the receiver adjustments are made by the listener and service personnel during daylight and early evening hours, the parties requested that the Commission provide, upon proper conditions, that experimentation may be made in periods other than the designated experimental period. The conditions requested for experimentation looking toward improvement of an fm station were (1) that informal application must be made to the Commission; (2) that the fm station complies with Section 73.261 of the Rules which deals with minimum hours of transmission; and (3) that no interference is caused to other fm stations.

All the comments filed in the proceeding supported the requested relaxation in the rules. No oppositions to the proposal were filed. Some of the parties, however, proposed two changes: (1) that routine test and maintenance activities be permitted at any hour of the day without informal application for authority, and (2) that the time reference in the rule be made to local *clock* time rather than local *standard* time.

Conclusions

As to routine testing at any time, the Commission found that it can relax the requirement for prior informal authority without adversely affecting the public interest; at the same time, this would relieve the Commission and the licensees of the burden of seeking and receiving permission each time such tests are deemed necessary. However, the Commission's new rules re-

This section, providing broad interpretation of FCC rules and policies, does not substitute for competent legal counsel. Legal advice on any given problem is predicated on the particular facts of each case. Therefore, when specific problems arise, you would be well advised to consult your own legal counsel.

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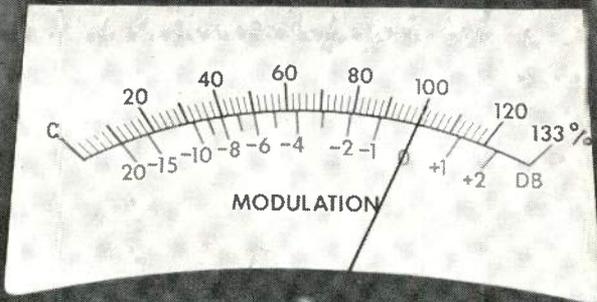
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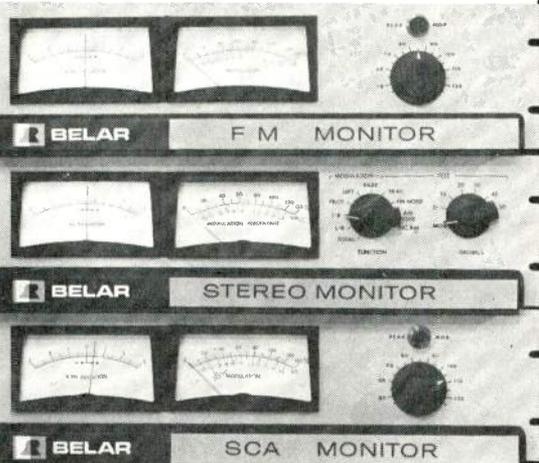
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quire notification of the commencement of such tests and adjustments to (1) the engineer in charge of the district in which the station is located and (2) the Commission in Washington. The rule adopted reflected this change. It is important to note that while the NAB proposal referred to "technical experimentation," the only references in the petitions to experimentation were to routine testing of equipment, adjustments of equipment for SCA and stereo operation, and the like. *There was no intention to include actual experimentation with signals and standards other than those authorized in the Rules, as is the case with the TV rule.* The Commission decided it would be useful to include such experimental operation by fm stations, and the rule adopted does so. However, since this type of operation may have an impact on the listening public and the development of the fm broadcast service, *the Commission retained the requirement for prior Commission approval of such operations.*

With respect to changing the rule to specify local clock time rather than local standard time, the Commission found that people's living habits are geared to locally adopted clock time, and that the purpose of the new rules will be defeated if local standard time is retained in the rule. For example, during the summer months, when daylight saving time is in effect, the station could not begin testing until 1:00 A.M. daylight saving time or 12 midnight, standard time. If the station during this same summer period wished to begin programming at 6:00 A.M. daylight saving time, it would have to cut short its testing period—having only 5 hours instead of the intended 6 hours. Following adoption of the Uniform Time Act of 1966, sometimes known as "daylight saving time" or "advanced time," has become all but universal in the conterminous 48 states from late April until late October. Accordingly, it changed the time reference to read *prevailing local time.*

Accordingly, the Commission amended Section 73.262 to read as follows:

'Section 73.262 Experimental Operation'

(a) The period between 12 midnight and 6:00 A.M., prevailing local time, may be used for experimental purposes in testing and maintaining apparatus by the licensee of any fm broadcast station on its assigned frequency and not in excess of its authorized power, without specific authorization from the Commission.

(b) Fm broadcast stations may (with prior notification to the Commission and the Engineer in Charge of the radio district in which the station is located) test, maintain, and adjust the apparatus at the station during other time periods; and may (upon informal application) conduct technical experimentation directed to the improvement of technical phases of operation during other time periods, and for such purposes may utilize a signal other than the standard fm signal, subject to the following conditions:

(1) That the licensee complies with the provisions of §73.261 with regard to the minimum number of hours of operation.

(2) That emissions outside the authorized bandwidth shall comply with §73.317(a) and that no interference is caused to the transmissions of other fm broadcast stations.

(3) No charges either direct or indirect shall be made by the licensee of an fm broadcast station for the production or transmission of programs when conducting technical experimentation.

Specific problems concerning the above, should be directed to your attorney. ●

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In Boston

Project X Shoots for NCTA Moon In Face of Washington Probes

THIS YEAR'S NCTA Convention is opening on a note of expectancy. At this writing the anxiously awaited Supreme Court decisions have yet to be handed down, and projected restructuring of the FCC is deeply buried in a Congressional committee. Yet by the time you read this, some decisions will have been made, and whether or not these rulings will have a harmful effect on the CATV industry is certainly open to conjecture.

Theme of this year's 17th Annual Convention is "Exploring the New Dimensions of Cable Television." NCTA officials are expecting attendance figures to reach 2500 at Boston's huge War Memorial Auditorium, with a record-setting near-50 exhibitors. The NCTA itself will be exhibiting "Project X"—a display that was kept under tight wraps until show time. All they would say is that the project will "demonstrate for the first time, the many potential uses of cable television in American homes."

CATV's Future

The convention theme "is descriptive of the growing uses for, and the newly developing opportunities in the public service medium of cable television," explains Convention Committee Chairman Albert J. Ricci. Add-





NCTA makes the scene this year in Boston's War Memorial Auditorium. Sheraton-Boston is in rear.

FCC Wins Round One

The first CATV ruling is in, and the Supreme Court has found against CATV. In the case of **United States of America and Federal Communications Commission v. Southwestern Cable Co., et. al**, the Supreme Court has reversed the Superior Court ruling which had in effect permitted Southwestern Cable to import Los Angeles signals into its subscription areas.

This decision indicates a slow development for CATV in the top 100 markets. It's certain to cloud the issue for some operators. In the meantime, all signs point toward continued industry growth at the present pace while waiting for the other shoe to drop.*

*The other shoe just dropped. Supreme Court has ruled that antenna-received programs carried by CATV are not subject to copyright payments. More on this in **BM/E's** NCTA wrapup next month.

Frederick Ford Speaks Out

There's an increasing tendency on the part of local governmental agencies to assume control of CATV, often to suppress it. In recent hearings held by the Massachusetts Government Regulations Committee, a major speaker was NCTA President Frederick W. Ford. Here are some of his comments made before the committee on May 28:

"I am particularly disturbed by some of the proposed regulations, because I believe they intrude into the federal area. Furthermore, I submit that any state legislature should have grave reservations about attempting to enact any comprehensive CATV regulation this year in the face of the legal uncertainties involving FCC regulation, copyright and the question of whether CATV can constitutionally be regulated in a public utility context.

"In March of this year, two cases of enormous significance to CATV were argued before the Supreme Court of the United States. The first case argued was **United States of America and Federal Communications Commission v. Southwestern Cable Co., et al**. It involved CATV systems in the San Diego area. The FCC had issued temporary stays under section 73.1109 of its Rules to prohibit the CATV system from importing Los Angeles signals into certain areas pending a full hearing on the merits before the FCC.

"On March 13, 1968, the case of **Fortnightly Corporation v. United Artists Television, Inc.** was argued before the Supreme Court. The question presented is whether CATV carriage of broadcast signals constitutes a public performance for profit.

"Because of the complexity of applying copyright sanctions to CATV systems, Congress, in connection with its omnibus revision of the copyright laws of the United States, is seriously considering legislation with respect to CATV involvement with copyright. The legislation . . . involves the question of rights to withhold TV signals from CATV systems because such signals transport copyrighted material. NCTA has held approximately 40 meetings since last October with the major motion picture producers and distributors; with the three national networks; with the performing rights societies, ASCAP, BMI and SESAC; with the

ing impetus to this concept of public service will be panels and seminars, starting off with "Future of Cable TV" panel on Convention opening day.

A cablecasting demonstration will spotlight local origination—a fast-growing element in cable systems. "These program originations—involving such events as meetings of town councils and school boards, debates between state office candidates, community fund-raising drives and high school athletic contests—are enabling our industry to achieve a new dimension in local service and community involvement," Ricci noted.

According to NCTA figures, about 10 percent of the nearly 2,000 cable systems now operating in the U.S. originate programs of their own, and this number is expected to double within the next year. Actual head count (provided by General Instrument

Corp.) at the close of 1967 was 1817 CATV systems serving over 2400 communities in the U.S. Besides these, some 3500 additional communities have granted franchises for new systems or are considering such franchises. Today's cable audience numbers some 3 million, compared with 2.5 million at the end of 1966, and 2 million a year earlier.

In the meantime, CATV is helping change the pattern of TV viewing in many areas of the country. New operators are entering cablecasting at a steady clip, while keeping a careful eye on the doings in Washington. Some cable systems are starting to produce locally originated programs in color—representing substantially increased plant investment. And some operators are finding themselves mired down by foot-dragging community councils, hesitant expectation over the Supreme

National Association of Broadcasters; with the Register of Copyrights, and other congressional representatives . . . we believe that there will be CATV copyright legislation next spring.

"There is litigation . . . which will probably have a significant impact in the area of state regulation . . . At issue is the question of whether the 1967 Nevada statute making CATV a public utility is constitutional. The question is whether interstate commerce considerations and federal preemption considerations preclude such a regulatory approach by a state.

"The Supreme Court cases representing years of litigation, are now ripe for decision. Over the summer, after these decisions are in, the future of the CATV industry will take shape . . . Good legislative timing requires . . . patience.

"CATV should not, under any circumstances, be regulated as a utility.

"It is not a necessity, but is a medium for the provision of entertainment and information. It must compete with translators, satellites, high-power TV transmitters and even with rooftop antennas which are vastly improving technologically.

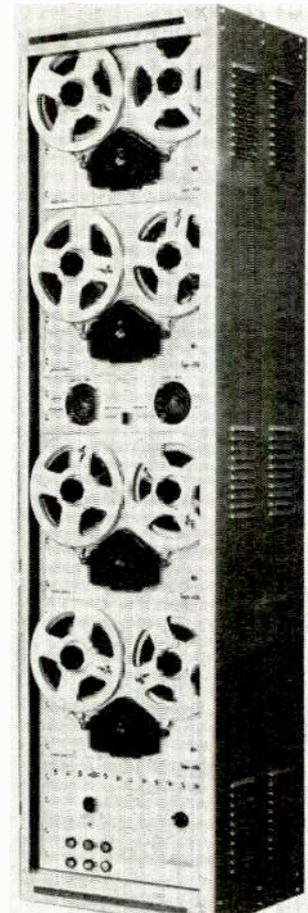
"CATV is a private enterprise which provides an optional service. There is nothing which compels the public to subscribe to the service. It is a high risk business which depends on venture capital. The Department of Public Utilities regulation would probably dry up venture capital overnight.

"A recent study by NCTA reflects that since 1960, the monthly service charge has increased only 6.5 percent, and installation charges have decreased sharply during the same period. Compare this with the increase in the average weekly earnings of workers in manufacturing of 20 percent from 1960 to 1966. During the same period the cost of living and of doing business has increased 9 percent.

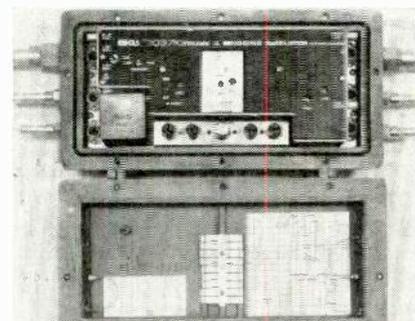
"Normally a public utility is entitled to some protection as a monopoly, but the state does not have the means to grant CATV any protection whatever from actions of the FCC. The conflict between state and federal regulations of CATV does not necessarily carry down to the municipal level. CATV is closely related to the municipalities which it serves and because of its physical requirements, reasonable municipal regulation of the use of city streets may be appropriate."



Low-cost color camera, IVC-100, has electronic viewfinder, sync gen, encoder, \$14,000 price tag.



Tape-Athon's "Programmer III" customizes background music for CATV.



Trunk & bridging amplifier by SKL has maximum insertion loss of 1 dB, will amplify full gain of 18 dB.

Court decisions, and in a few isolated cases, flagging revenues.

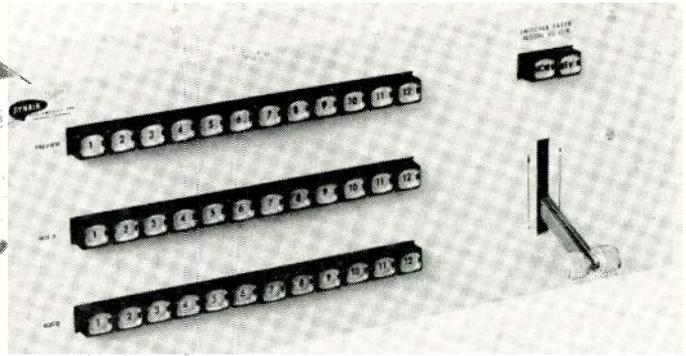
Pending Rulings

BM/E's editors asked NCTA National Chairman Jack Crosby for his thoughts on the pending legislation and rulings. He struck an optimistic note by saying, "Negotiations are proceeding with the copyright holders, and we're hopeful that they'll bear fruit, and that we'll have something to . . . report on the copyright issue.

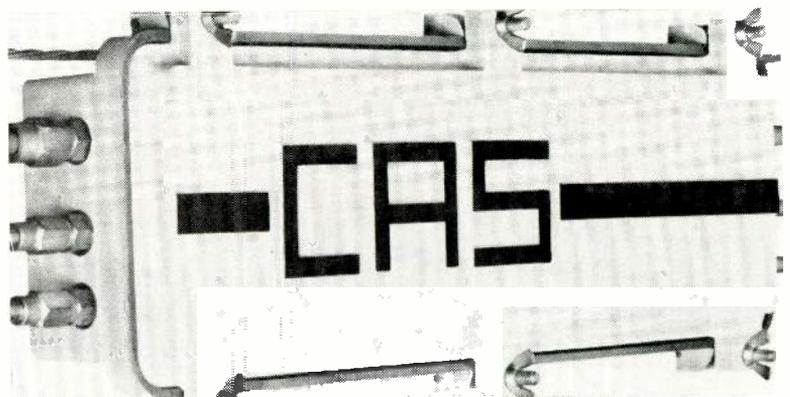
"We're hopeful on the Supreme Court decisions, but regardless of the way they come down, we don't see them as a 'death knell' for CATV; we think CATV in its present form is here to stay, and we think that the future of CATV as such holds great promise in its present form and in the future of tele-communications as a whole.

"Unless waivers are a little quicker to come out of the Commission, we can expect only a 'normal' growth pattern. If in fact the Commission can see its way clear to start to grant the waivers, or enter the top 100 markets on a more productive basis, then of course we anticipate a sizable growth there. The number of franchises that have been granted in the country thus far has been quite gratifying to us, and many of these are just in the waiver stage; hopefully, if the log jam can be broken there, we think that we'll have a very sizable growth in CATV."

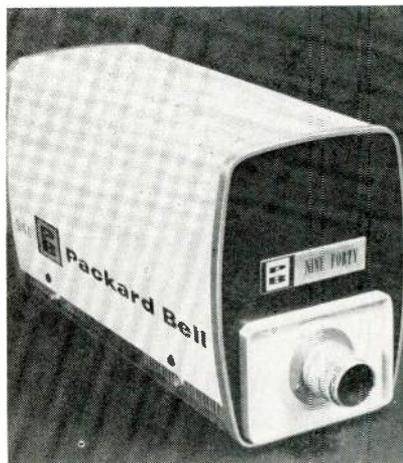
What of the future? Part of the answer can be found in Boston during NCTA week. Another aspect relies entirely on those enigmatic court rulings, and at this writing, the entire industry will be evaluating judicial opinions and their potential impact on the industry. But for now, the picture looks bright, and outspoken industry officials are battling valiantly to assure a future for free enterprise in cable TV. ●



Solid-state video switcher-fader from Dynair is economical unit with big-studio programming capability.



CAS "Longline Series" solid-state CATV amplifiers are designed for 12- or 20-channel operation.



Packard Bell PB-940 transistorized camera has positive 2:1 interlace, separate mesh vidicon. Resolution is stated as 800 lines at 525 scan.



Brand-new TMC-2100V viewfinder TV camera from TeleMation is included in broad line of equipment specifically tailored for CATV.

Working on a typically thin CATV budget, Laguna Hills, California operator programs 30 hours a week of local material that captivates subscriber interest.

YOU DON'T HAVE TO BE A TEENAGER to swing. The over-52 residents of Leisure World, an all-adult community in Laguna Hills, California, are as turned-on and tuned-in as most teenagers—with a slight difference. The mind expander in Leisure World is CATV channel 6, a closed-circuit, cable television outlet that boasts the world's largest single-cable audience.

More than 11,000 subscribers watch Channel 6 information, education and entertainment programs during the 30 hours that it's on-the-air each week. The station's programming is carried to all residences in Leisure World via a \$1.5-million cable system, which also carries "piped-in" music during non-TV hours on channel 6.

A Busy Central Control

Everything at Channel 6 is designed for maximum efficiency. All station chores are handled by a staff of three, headed by station producer/director Thom Keith, assisted by program coordinator Elizabeth Livingston and technical director Dane Keller. When the occasion demands, residents of Leisure World or members of its administrative staff are pressed into service to provide extra hands. There is no shortage of volunteers.

The studio/control room, nestled in a small corner of Leisure World's Clubhouse No. 1, is unique in arrangement and design. It provides an amazing degree of production flexibility crammed into a very small area.

The studio is jammed with a full array of television lighting, five video cameras, and an assortment of film and slide projection equipment. Yet, there is enough elbow room to vary furniture arrangements for multiperson discussion panels and three-piece musical groups for live shows.

Closet-Size Control Room

The control room is even more startling. In an area not much bigger than the average household closet, is a specially-designed control console that allows one man to handle audio, video, switching and fading, music cues, title cues, film chain and slide chain—tasks normally requiring a 10-man crew.

Station director Thom Keith explains: "When we started channel 6 about three years ago, there were only two of us to do everything, a technical director and myself. I wrote, directed and appeared in almost every production, while the technical director did everything else. In a situation like that, things had to be efficient. So, we designed or specified every piece of equipment in the station to meet our needs. Sony equipment—monitors and video recorders—played a major



Two-thirds of channel 6's permanent staff on camera; Elizabeth Livingston and Thom Keith.

Local Origination Thrives in Leisure World



Technical director Dane Keller (left) at special console backed up by director/producer Thom Keith.

role in setting us up to operate both live and on tape with a minimal crew.

"Things have changed some in the past year or so, but we're still not over-staffed by any stretch of the imagination. As a result, our one-man control console—with its six solid-state Sony monitors, and our Sony BV-120U and portable EV-200 Videocorders are still the key ingredients that allow us to operate efficiently.

"We now have a sister CATV station at the new Leisure World site in Walnut Creek, California. Since this station is relatively young, we are helping out by taping many of our own programs for broadcast there. Later, we will be exchanging programs of interest with the Walnut Creek facility.

"We recently went 'commercial' on an experimental basis. Our ability to videotape commercial spots either in the studio or on location has played a big part in our early success. We figured that to be self-supporting, we'd have to bill around \$2000 a week in commercial time. Right from the start, we've been over-sold."

CATV a Commercial Success

Channel 6 program coordinator Elizabeth Livingston feels that part of the reason for the station's commercial success is the nature of its audience. "This is the most energetic, active group of people you will find anywhere," she says. "Leisure World people are extremely involved in social, cultural, political and religious pursuits."

In spite of its small staff and tiny facilities, channel 6 carries a full range of programs. Most news-type programs are keyed to Leisure World

Continued on page 68

Next in Line: CATV Network

So successful has been some of Channel 6's special programming, that it sparked the idea of creating a nationwide network of cable television stations to exchange interesting programming.

Plans are already underway to unite the 2000 CATV stations throughout the country in a network. Thom Keith is planning to create 15-minute local news programs on videotape and distribute them to subscribing CATV stations. Similarly, such programs as channel 6's series on astrology and hypnotism will be taped and offered to network cable outlets on a subscription basis. Ultimately, such special programming will be created by many of the local cable television stations for syndication.

"If this project sounds ambitious," says Keith, "it's really only the beginning. The CATV network is logical. Most of the local cable stations serve a limited geographical area; a news program aimed at this strictly local area is a natural. And, being cable stations, we can offer programming that is just not available on normal broadcasts.



Station manager Bob Nelson hosts televised deejay program "Swing with Bob" from master control.

College Students

Start with a lively CATV operation tied into 40,000 subscribers, add a substantial investment in studio equipment plus a group of enthusiastic college students, mix well, and the result is professional-caliber programming that many cable operators can only dream about.

IT'S A STRANGE BUT HAPPY marriage when cable TV gets together with a bunch of enthusiastic amateurs in a college broadcasting environment. It seems almost axiomatic that the collegians make up in ebullience and high-gear interest what the CATV operator may be lacking in substantial plant investment. Closed-circuit cameras end up acting as studio units; old and revamped equipment gets called into play; even homemade gear finds its way into the camera chains.

The situation has been even further complicated at Cable TV Ltd.'s channel 9 in Montreal. After initiating a very successful program with students at McGill University, semester schedules and student turnover brought an abrupt change early this year. Channel 9 currently calls on student talent at Sir George Williams University, and McGill will probably be back in the act starting with the Fall semester.

Student Talent a Valuable Asset

The situation's complexities have been taken in hand by university students and Cable TV Ltd.'s channel 9 operator. In this case, added versatility and flexibility are possible by using non-salaried students as performers and operating personnel—they're delighted to participate for the experience gained and just for the fun of it. Add to this the salaries most of them don't receive, and the commercial cable operator can conceivably



Amateur group from Sir George Williams University gathers to present "Concrete Campus" program.

and CATV Make a Happy Marriage

buy more equipment and perhaps outfit a complete studio. This in turn attracts more talent from the university, the programs get better and better, and the spiral can begin to repeat itself. While this arrangement is not unique in the U.S., it's a relatively new phenomenon in Canada.

The lack of salary restriction also frees the cable operator to produce large-cast and other special taped shows that would be impossible any other way.

"We're glad to train interested students," says chief engineer Sam Salvin, "and then hire them as camera operators at \$2.50 an hour." This arrangement apparently works out to everyone's satisfaction—the students-turned-cameramen who work part time, and the station operator who doesn't have to hire full-time cameramen for a few hours' taping time. Members of the radio club at Montreal's Sir George William's University gladly participate in panel shows and productions of their own inception.

Starting the Fall semester, Salvin expects that McGill will once again participate in the channel 9 cable programs, providing such coverage as otherwise untelevised football games and other special events. Under the present setup, student productions are entirely staffed by the students themselves; they supply their own director, talent, cameramen. "They don't have any technical knowledge, so we train their cameramen. Having these students available lets us produce programs that otherwise wouldn't be at all possible."

Cable TV Ltd.'s 40,000 subscribers represent a hefty viewing audience, and connections are also provided (free of charge) to TV sets in the university's lounge areas. This way, student participants can see themselves perform (on tape) when the program is transmitted.

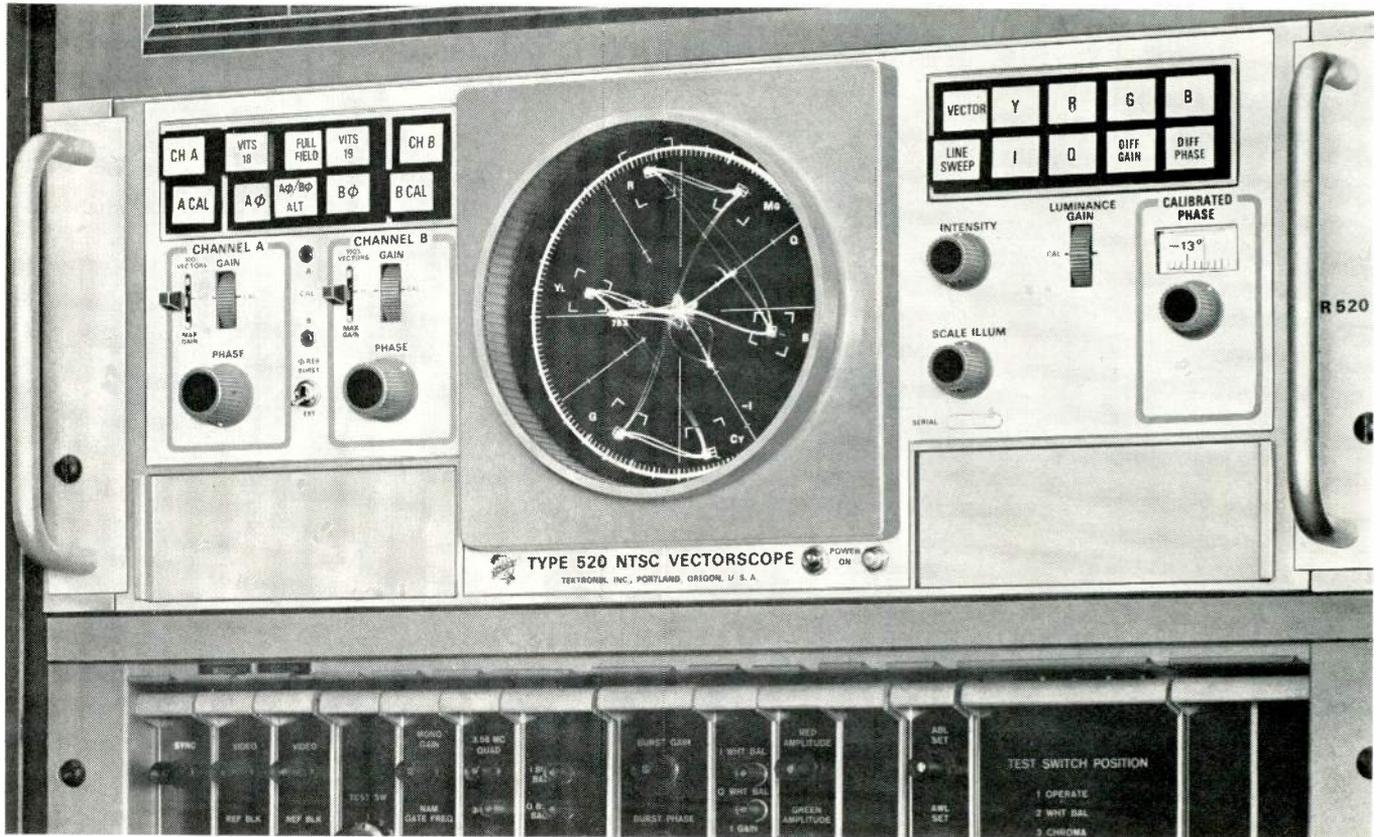
Montreal's channel 9 (cable) is currently oper-

ating with *six* cameras which include: two Marconi image orthicons, two Fairchild vidicons, and two ("very old") Dage vidicon jobs. The channel's weather station is home-built while everything else in the studio is commercial gear. In some cases, it was definitely not equipment intended for broadcast use. Working with a larger studio equipment investment than most CATV operators do (about \$145,000 worth), Cable TV Ltd. is able to offer an exceptional degree of program capability and native talent.

One odd item in this CATV operator's bag of tricks is a mobile van used to cover blacked-out football games, championship fights and other remote pickups that might not otherwise be available on any TV outlets. Professional quality is a primary goal in this cable studio, and much of the equipment is part of that philosophy. EIA standards are met as a matter of course, and two local sync generators are in constant use. Three VTR's see yeoman service, and despite the \$20,000 investment they represent, chief engineer S. Salvin is planning on upgrading their quality as soon as feasible.

Part of the unusual conglomerate picture at channel 9 is its bilingual character. About 20 percent of its total programming is in French, in spite of the fact that participating students are from an English-speaking university. Such scheduling includes interview shows, skits and other programs in French.

School's out for the summer, but Salvin is already hard at work setting up schedules for the Fall semester. There's that hefty list of McGill football games coming up, along with a multitude of other sporting events of wide interest to his subscribers. And there'll be a fresh crop of eager cameramen to train for the new season of televised campus activity. ●



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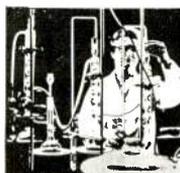
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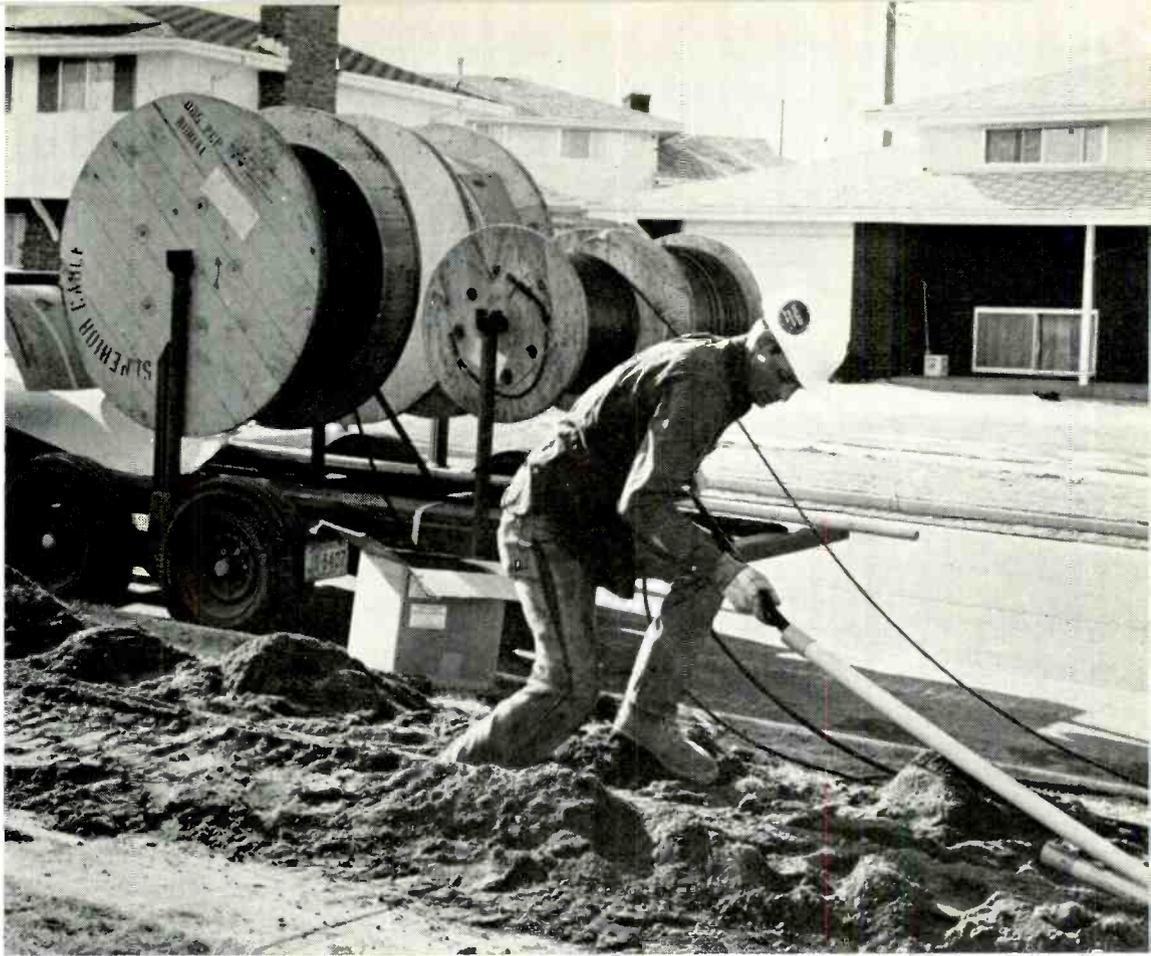


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Cable and conduit are payed out into trench from converted Davis Hustler in Daniels installation.

CATV Goes Underground

By Lon Cantor

Local ordinances, the simple economics of long-haul operation and public relations efforts aimed at potential subscribers, have joined forces to make cable burial the preferred method of installation.

FROM HOLLYWOOD HILLS TO MANHATTAN, many of today's CATV systems are going underground. Like the telephone companies and the utilities, CATV system operators are moving rapidly away from poles and aerial construction.

Apparently, there are some excellent reasons for this:

- The public likes it. Many of today's new communities have ordinances prohibiting aerial wiring of all kinds. Thus, in many cases it is not a choice of underground-vs-aerial construction. The alternatives are underground construction or no CATV system at all. A community looks a lot better without overhead poles and wires.
- Operating costs are lower. Since underground cables and equipment are not exposed to the elements, fewer breakdowns occur. Also, when trouble does come, it's easier to track down and repair in most underground systems. There are

no poles to climb and maintain against weathering.

- Less thermal compensation is required. Cable attenuation varies in direct proportion to temperature. Each degree Fahrenheit change in temperature causes 0.1-percent change in cable attenuation. The biggest problems occur when temperatures drop rapidly at night. The earth, however, tends to retain heat. Therefore, there is less temperature variation in an underground system. Consequently, signal fluctuation and center conductor pull-out are minimized.

The NCTA is currently negotiating with the phone companies to try to get some agreement on pole rental rates, but no real progress has, as yet, been made. Unless an agreement is reached, the only way the CATV operator can be safe from the possibility of steadily increasing pole rental rates is to go underground.

The Cost Factor

With all the advantages of underground construction, it apparently has one big drawback—cost. In many cases, the operator has to invest a lot more in an underground system than he would have spent to have his plant attached to someone else's poles. To find out just what the cost differential is at present, *BM/E* queried a

number of industry leaders. Unfortunately, there was no clear-cut answer.

A spokesman for the Jerrold Corporation said that they "do not wish to comment on comparative costs of underground versus aerial construction" because they believe "there are too many variables." However, a recent Jerrold press release stated: "In many instances, because of recent innovations in cable burying equipment, it has proven more economical to bury cable systems than to mount them on poles."

Hubert Schlafly, senior vice president of Teleprompter, agreed that costs vary widely. He estimated the range at \$6500 to \$20,000 per mile, depending on terrain, soil, etc. This compares with an average of about \$4000 per mile for aerial construction.

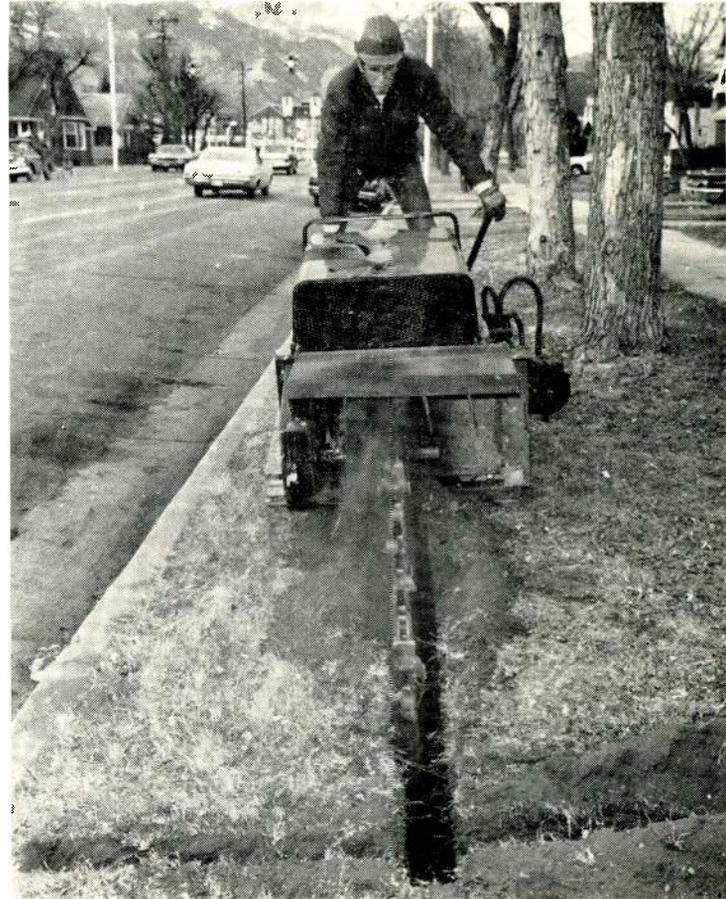
In a publication on underground construction (Bulletin 67100), Ameco states: "Under normal conditions, the cost of underground construction should be comparable to the cost of aerial construction. With the availability of proper equipment and the use of proper techniques, underground systems can be installed at the same or less cost than aerial systems." What they are probably talking about, however, is ideal conditions in a new development, in a rural area, with sandy soil, and where burial costs can be shared with the telephone and electric power companies.

Teleprompter cites some actual examples to prove the high cost of going underground. Their Hollywood Hills installation in California is costing somewhere between \$15,000 and \$20,000 per mile. Schlafly attributes these high costs to winding roads, rocky soil, and the high cost of repairing landscaping.

In New York City, costs were even higher. Here, Teleprompter had to use ducts owned by the city and under the management of the phone company. It costs them a whopping \$1350 per mile per year, which is a lot more than telephone pole rental.

And it isn't easy to pull the cable through the New York City ducts. First, the ducts must be cleared of accumulated dirt and debris. Then, it costs about 80 cents a foot to pull the cable through the duct. To all of this is added the normal \$4000 per mile for cable, hardware and labor.

This contrasts sharply with CATV Enterprises' system which covers the Riverdale section of the Bronx. An affiliate of Westinghouse, CATV Enterprises is headed by C.C. Woodard,



Jr. The 12-channel system is being installed on a turnkey basis by Entron. According to Jim Carter, Director of Publications for Entron, the system will serve a potential of 18,000 residential units. To minimize local pickup, it will run at exceptionally high levels, with closely spaced Entron RT-6 series amplifiers. In spite of this, the Bronx system will cost less than \$6000 a mile to build. This is because most of the system is aerial, with less than 20 percent being buried.

Economical Underground Runs

GE Cablevision Corp, on the other hand, has had some excellent experience with underground installations. William Henchy cited two good examples.

In San Joachin Valley, California, they put in a 13-mile $\frac{3}{4}$ -inch trunkline with 45 amplifiers in cascade. "We've had no problem at all with AGC," he said "because instead of a 40° to 50° swing, we only get swings of 3° or 4° per 24 hours." The plant is buried 30 inches below ground, and Henchy estimates that even from summer to winter the temperature will only fluctuate by about 20°. Amazingly enough, this trunk run actually cost less than an aerial system—under \$3000 per mile.

Even in a residential suburb of San Francisco, GE Cablevision didn't run into astronomical



Davis Trencher is used to excavate trench in Colorado Springs residential area in Daniels cable-laying (far left). Above: Davis Hydra-Borer goes under driveways and streets. Right: Workman cleans up around trench, an important "public relations" phase.



costs. In spite of the fact that no pedestals were allowed and they had to repair lawns and replace shrubs, the 20-mile system only ran them about \$9000 per mile.

Irv Faye, of American Electronic Laboratories, Inc. said that "in general, the cost of an underground system is about 2 to 2½ times per mile the cost of aerial construction. In some cases however, underground is even higher . . . we have calculated that the underground system for Las Vegas, Nevada will run about \$40,000 per square mile."

Obviously, there is no general consensus of opinion as to just how underground costs compare with aerial construction costs. The only area of agreement is that underground costs do vary much more widely than aerial costs. You can safely estimate \$3000 to \$5000 per mile of plant for an aerial system. And given a specific area with specific reception problems, turnkey construction companies can give you a very accurate per mile bid. But there are simply no good rules of thumb for underground installations, and it is very difficult to get a firm estimate of costs. In fact, many construction companies are finding that the costs of underground systems consistently exceed their estimates.

Building a buried CATV plant is a lot like installing an underground telephone or electrical power system. In fact, most of the burial equip-

ment used for CATV underground installation was developed originally for these utilities.

Two Ways to Bury Cable

There are two basic ways to bury cable. You can dig a trench, or you can simply plow the cable in. Trenches are usually dug 4 to 12 inches wide, but there is no standard for depth.

E. Mark Wolf, chief engineer of Anaconda's Communications Division states that buried cable is "not infrequently damaged by insects, rodents, frost heaving, accidental dig-ins, rocks, or rough handling."

These problems can be solved, he said, "by burying the cable about three feet below grade. Vibrating plows do a good job of surrounding the cable with rock-free dirt where rocky terrain is a problem. Cable plows are designed to reduce to a minimum the possibility of damage during installation."

Few systems today, however, do bury their cables as deep as three feet. Ameco has written a specification which states that, "The depth of placing buried cables shall generally be 30 inches for trunk lines, 24 inches for feeder cables and 18 inches for service cables." Colorado Springs, with the world's reputedly largest underground CATV system, uses Anaconda Cable buried two feet deep in a 5-inch wide trench.

In new developments, it's a good idea to look into the possibility of sharing trenches with power, telephone or gas companies. Sharing trenches not only reduces costs for all concerned, but insures that proper clearances are made. When CATV cables or telephone cables are buried in the same trench as power lines, the power lines are laid first. Then, a six inch layer of sand is generally added before the CATV cable is laid.

Conduit or Direct Burial

Conduit is not required for cables buried in trenches, but it is virtually a necessity for plowed cables. One of the problems of burying cable is to keep out moisture. As explained in "Guide To Cable Selection, Part I" (*BM/E* March 1968), cable jackets are waterproof but not vaporproof. Therefore, moisture can enter the cable by osmosis.

The first step in preventing the jacket from acting as an osmotic membrane is to use high molecular weight polyethylene for underground cables. In addition, you have to make sure that the jacket is bonded to the outer conductor, as in Anaconda's Sealmatic cable, or extruded very tightly around a solid aluminum outer conductor.

One of the advantages of using conduit is that it keeps moisture away from the cable. Another is that it protects the cable. If you try to plow in cable without conduit, you can damage the jacket and shield. Even if the cable is to be buried in a trench, you have to be very careful to avoid damage by rocks or other sharp objects in the soil. The common practice is to lay the cable carefully in the trench and then cover it with a 4-inch layer of sand.

Two types of conduit are commonly used for CATV cable burial—fiber and plastic pipe. Fiber is generally used in trenches because it is rugged. Also, spare fiber pipes can be buried to facilitate expansion. Plastic pipe, on the other hand, is more flexible. It can be plowed in, provided you use a plow with a wide enough sleeve to accommodate not only the cable, but the pipe.

Where plowing can be used, it is generally less costly than trenching. Plowing is almost universally used for service cables, which are the underground equivalent of house drop cables and are not buried very deep. House drop cables are

almost never protected by conduit. The Colorado Springs system uses conduit in trenches.

One good method of going across streets and driveways without tearing them up is with a Davis Hydra-Borer. A unit called a Pneuma-Gopher can also be used to punch holes across a street. Where this is not practical, you can also cut across streets and sidewalks using a Concut concrete saw. Trenches are generally filled in with automatic equipment such as Racine Rapack.

The Public Relations Aspect

One of the most important jobs in installing an underground system is to maintain good public relations. Remember, most of the people whose property you cross are potential subscribers. Therefore, you want to make sure they are happy. This involves restoring the property to its original condition once the cable is laid. For example, in Colorado Springs, virtually all of the 412 miles of trench required is on city right of way, running along side-streets, sidewalks or alleys. Yet few homeowners have complained about damage to their homes. This is because the crewmen are carefully instructed on neatness and courtesy. They fill in the trenches, reseed and fertilize the area, and sweep up. No trenches are left open overnight and the crewmen explain that all newly seeded areas will be rechecked in the spring.

In Colorado Springs, Daniels Associates makes sure that all complaints, even minor ones, are handled promptly. The result is that only about one out of 30 property owners has complained. Daniels explained, "We have worked overtime in Colorado Springs on public relations, and to date 50 percent of the complaining persons have subscribed to our service."

With eight crews working, Colorado Springs is progressing at the rate of about 16 miles per week. About 300 miles of plant have been completed as of this writing, and they have signed up more than 10,000 subscribers.

Pedestals and Vaults

While the cable in an underground system is buried, the amplifiers, splitters, taps and other hardware must be accessible. Until recently, most underground systems used plastic pedestals to

house equipment. These pedestals are usually about 30 to 36 inches high, and very easy to open for service.

The Colorado Springs system and some others are using flush concrete vaults instead. While they do not provide the easy access that pedestals do, concrete vaults do have two distinct advantages over surface pedestals:

- They are quite unobtrusive.
- The homeowner can mow the lawn around them very easily.

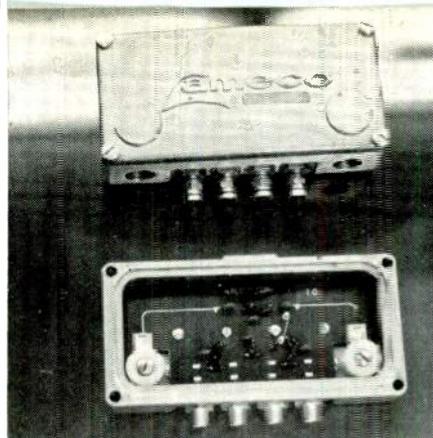
Many in the industry feel that these advantages are not sufficient to overcome the problem of poor access.

According to C.W. Crisp, Supervising Engineer for Illinois Bell Telephone Co., in a recent *Telephony* article: "We have literally hundreds of complete subdivisions and even villages with entirely buried plant (power and telephone) except for the 'above ground' closures. Within a year or two the closures are hidden by the shrubs. We like them concealed. We know they can be easily found should the need arise.

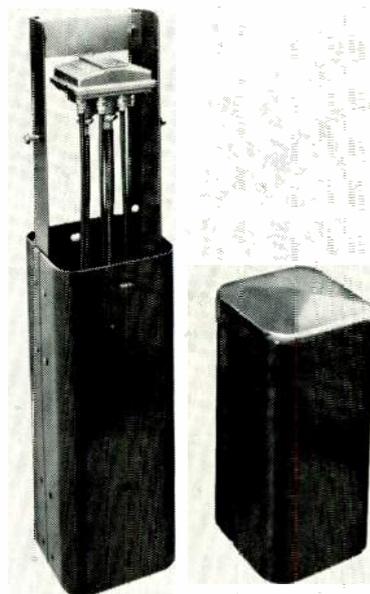
" . . . With above-ground closures we have found that service can easily be established or restored during inclement weather by laying a drop on the ground temporarily and waiting for good weather to plow in a new one. If you have 42 inches of snow as we did last year, it becomes more important to think 'above ground.' Even one inch of snow can present a real location problem with flush enclosures . . ."

Partly because they have to, and partly because they want to, more and more CATV operators will be having their systems built underground. In some areas, they have to go underground to comply with local ordinances. In other areas, they want to go underground to avoid pole rental fees and utility company control, as well as to lower maintenance costs.

CATV is a big business now. What's more, it shows every indication of playing an increasingly important role in the nation's communications picture. CATV businessmen are no longer looking for the quickest, easiest and least expensive way to start collecting subscriber fees. Instead, they are investing and building for service and profits over the long haul. Buried systems may cost more to build, but most CATV operators see them as an excellent investment for the future. ●



Ameco's Pasesetter directional tap is designed for underground applications. It uses modular PC board and seized center conductors. Cables attach easily.



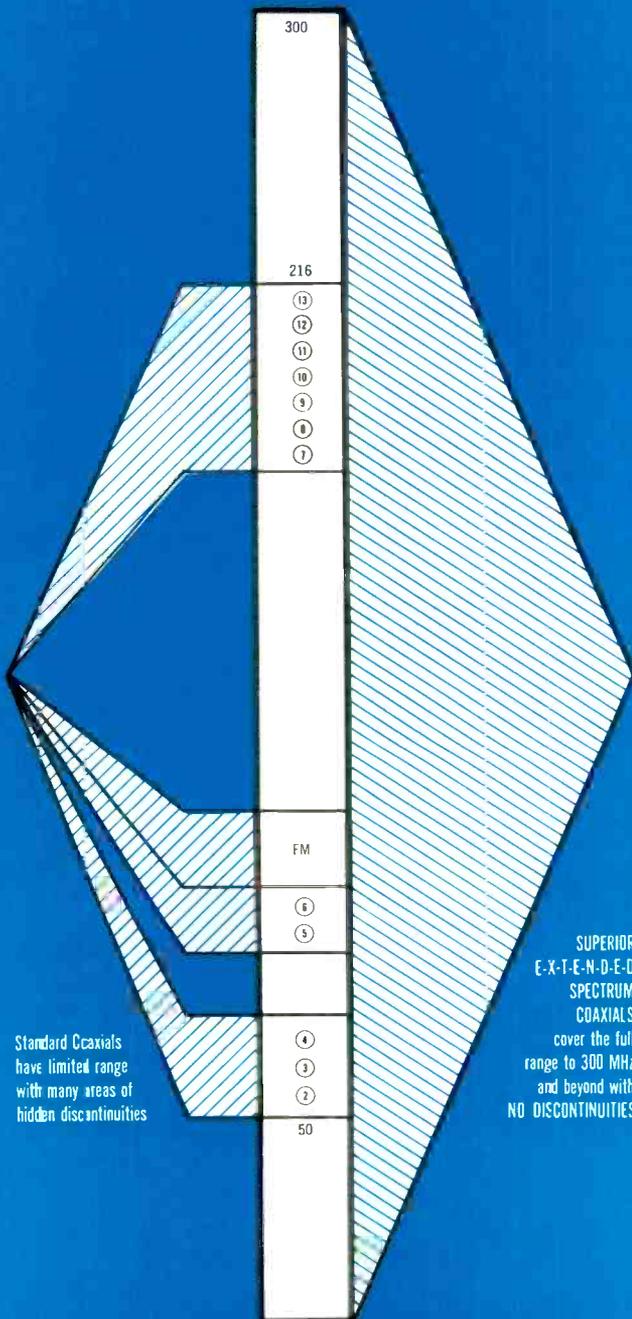
Jerrold Starline series amplifier mounts in plastic pedestal.



Entron uses Crouse Hinds Traffic Controller pedestal in their underground system in the Bronx. ●

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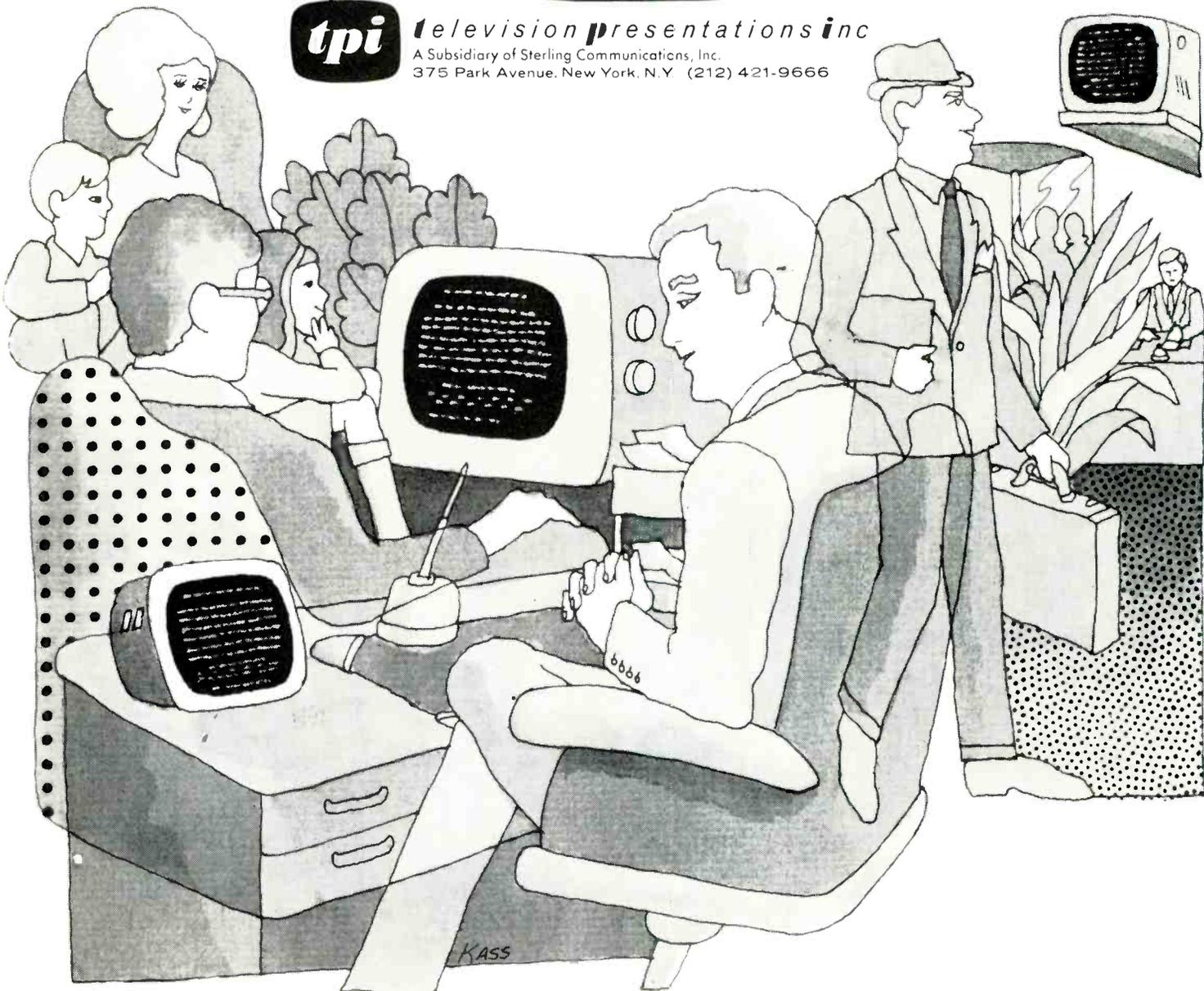
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AN FM ON-CHANNEL BOOSTER can effectively supplement fm station field strength within assigned contours in cases where the signal has been degraded severely by terrain. Problem is to bring actual coverage area into conformity with the theoretically predicted coverage area. Unfortunately, many areas have a multiplicity of hills and other natural barriers which block out fm signals from large communities. The area served by experimental station KA2XTG encompasses over 175,000 people and over 6 cities and towns which are located in KPEN's theoretical coverage. For this reason power levels less than 250 watts are insignificant in this specific case. KPEN is not, however, advocating "super-power" boosters or translators. The power levels of these devices can best be tailored to the specific job requirement of the unit. It is felt, however, that to provide the best fm service for cars and portables, the specific community should be saturated with the desired fm signal. KPEN discovered in the operation of KA2XTG that optimum results and minimum interference between the retransmitted signal and the direct signal from the main transmitter required a wholly vertically-polarized antenna.

This concept of booster fm retransmission can be applied to the fm on-channel translator objective with many benefits. Optimum fm service to meet the needs of diversified receiving requirements in specific areas could be provided by saturating the area with a vertically-polarized fm signal utilizing beam tilt to contain the radiation within the area. Two advantages over the proposed low-power translators are thus offered. First, as previously discussed, the on-channel translator is capable of providing more selection of stations without using additional frequencies. Second, as the on-channel translator is operating on an already occupied channel, higher powers may be

used without creating severe interference problems.

There will be cases of adjacent-channel problems with this proposed system, but the advantages offered by a system of fm on-channel translators supplemented by translators would offset any problems created. In some cases, translators will have to be used to solve adjacent-channel problems. The theory and concept does work and should be investigated by the Commission. KPEN has found with the operating of KA2XTG that an on-channel booster of reasonably high power can be stable, reliable, and economical. All experiments were conducted in the broadest techniques to insure that the success of KA2XTG was not a localized single case.

Area Served by the Booster

Fig. 1 is a profile of the radial between the main KPEN transmitter and the operating on-channel booster. The terrain problem is evident and the shadowing effects of the various hills is severe as shown by the following measurements and calculations. Fig. 2 shows the relationship of authorized and proposed field strengths in the area served by the fm booster. Curve A is the theoretical smooth-earth authorized field strength of KPEN. This curve shows the field strength which should exist in the section of East Contra Costa County now served by KA2XTG. Table I shows actual field intensity measurements in the area. Within the geographical area of these measurements reside approximately 175,000 people comprising the communities of Alamo, Walnut Creek, Pleasant Hill, Concord, Martinex, and sections of Lafayette.

Table I reveals the severity of the shadowing effect of the terrain. It also shows as the distance from the hill range is increased, the field strength increases even though the distance from the KPEN

*Author Gabbert is co-general manager, KPEN, San Francisco, California.

Table I: Field Intensity Measurements

Point #	Miles to KPEN	Miles to Booster	62° Radial, $\mu\text{V}/\text{m}$	62° Radial, $\mu\text{V}/\text{m}$	135° Radial, $\mu\text{V}/\text{m}$
	Note 1	(62° Radial only) Note 2	(Booster off) Horiz./Vert. Pol.	(Booster on) Horiz./Vert. Pol.	(Booster on/off) Horiz./Vert. Pol.
1	24.0	0.1	0.04/0.04	5.0/19.5	0.28/1.0
2	24.2	1.0	0.05/0.06	3.9/8.0	0.30/0.9
3	24.5	2.0	0.04/0.05	0.9/1.9	0.25/1.1
4	24.7	3.0	0.05/0.08	0.7/2.0	0.32/0.8
5	25.0	4.0	0.03/0.09	0.45/0.9	0.39/1.0
6	25.5	5.0	0.04/0.05	0.40/1.0	0.31/0.8
7	26.0	6.0	0.05/0.06	0.40/0.9	0.40/0.9
8	26.5	7.0	0.12/0.10	0.35/0.8	0.33/0.8
9	27.0	8.0	0.04/0.03	0.25/0.5	0.41/0.9
10	27.5	9.0	0.06/0.12	0.30/0.40	0.32/0.9
11	28.0	10.0	0.10/0.06	0.25/0.30	0.29/0.8

Note 1: Distances to KPEN are approximate airline distances and measurements across the 62° and 135° radials at a slight angle. The 62° and 135° radials are both at approximately 110 kW erp points on the KPEN directional antenna pattern.

Note 2: Distances to the booster are in a line which follows approximately the 0° radial of the booster station, which is the center of the 1 kW erp main lobe on its directional antenna pattern. The first point is the closest point to the booster on highway 24, and is 80° to the right and 30° below the main lobe of the antenna.

Table II: Relationship of theoretical vs booster signal with horizontal polarization.

Point	Miles to KPEN	62° Radial $\mu\text{V}/\text{m}$	62° Radial $\mu\text{V}/\text{m}$
		Actual	Theoretical
1	24.0	20.0 Horizontal	11.0 Horizontal
5	25.0	1.8 "	10.0 "
7	26.0	1.6 "	9.0 "
9	27.0	1.0 "	8.0 "
11	28.0	1.0 "	7.0 "

transmitter is increasing also. Before this experiment, the area did not receive adequate fm service; yet theoretically over 20 fm stations are saturating the area with primary coverage signals, but in reality do not. After the fm booster was made operational the field strength increased as shown in Table II. These are only comparisons of the horizontally-polarized field strengths. As the ultimate system adopted for KA2XTG was entirely vertically polarized, we will assume that the theoretical vertical field strength equals the theoretical horizontal field strength. Figures for the 62° vertical polarization radial actual field strength with booster on are as follows: 78, 3.60, 3.60, 2.0 and 1.2 $\mu\text{V}/\text{m}$. The theoretical values, again, are assumed identical to the horizontals.

The improvement in reception in this area with the operation of KA2XTG is many fold. The measurements clearly show that the field strength from the booster does not exceed or even approach the theoretical field strength in the area with the exception of the predicted saturation zone surrounding the booster transmitting site. This saturation zone exists for only a mile from the transmitting site. The booster erp for these measurements was 1 kW.

Booster Receiving Antenna

Various types of commercially-available receiving antennas were tested. The best for signal

isolation and maximum gain in this specific installation was a 10-element yagi cut to KPEN's frequency of 101.3 MHz. The location of this antenna was critical and was the most difficult task of the project. The feed line had to be long for maximum isolation between the input and output of the system, so RG 11/U was used with the necessary matching devices.

The receiving antenna location was determined by operating the booster and using a mobile signal strength meter. A null behind the transmitting antenna was found and used for the receiving antenna location. For added isolation, the terrain lent itself to placing the receiving antenna down the hill towards the KPEN transmitter behind the booster transmitting antenna. The cable length from the receiving antenna to the booster transmitter is about 100 feet. An fm rf booster amplifier was installed at the receiving antenna to boost the received signal, to compensate for the transmission line loss, and to provide optimum signal-to-noise ratio. Fig. 3 is a photograph of the receiving antenna installation.

Transmitting Apparatus

The equipment used in the KPEN experiments was simple and straightforward. The design can be simplified even more on a production basis and made very reliable. The incoming signal from the receiving antenna was fed into a McMartin

Engineering Measurements Method Performed by Western Broadcast Services

Test antenna used was a Finco horizontal cross-dipole cut to 98 MHz, known to be uniform in its omnidirectional pattern within 1 dB, with the exception of a 40° wide null. The antenna was mounted on a short mast attached to a small truck, with the antenna three feet above the truck top and ten feet above the ground. The null was placed at the front of the truck, and the signal path was maintained behind the truck during all measurements. Vertical measurements were made with a 30-in. whip antenna mounted on the truck so that the tip was ten feet above the ground, and again the pattern was within 1 dB of uniformity, except for a null caused by the horizontal mast. This null was avoided during measurements. The horizontal antenna was matched to 72 ohms with a transformer, and

both antennas were connected to the Jerrold Model 720 field intensity meter via approximately 10 feet of RG59U coaxial cable. Each measurement consisted of a mobile run of approximately 1/10th of a mile at 50 mi/hr. Meter reading was averaged over the distance, using the natural damping of the meter to remove sharp variations due to reflections.

This data is intended to be used as comparative values, although good correlation can be provided to relate these measurements to true $\mu\text{V}/\text{m}$ values. Due to cross-coupling of the dipoles, and a loss in the matching transformer, horizontal readings will be 5 to 6 dB below actual $\mu\text{V}/\text{m}$ values, while vertical readings are nearly correct. Also, the factor of height from 10 to 30 ft must be considered in comparisons.

rf amplifier designed to drive modulation and frequency monitors. For stability and for good stereo separation, this unit was broadbanded and run at a low gain factor. At first, a 5-watt Gates rf amplifier was used to drive the final amplifier stage of the booster. The isolation between adjacent channels was not adequate in this unit and intermodulation byproducts of various stations were present in the output of the booster final amplifier. This problem was solved by combining the two rf amplifiers, the Gates and the McMartin, and using the desirable features of each. The input and i-f stages (21.5 MHz) of the McMartin amplifier were used to drive the last two stages of the Gates amplifier. This method afforded ample output power to drive the final amplifier booster stage with good isolation between adjacent frequencies. There was no appearance of any instability with this system. The McMartin incorporates a cutout relay, which actuates in the event of a main carrier failure, connected to the plate voltage of the booster final amplifier as a failsafe device.

The final amplifier stage is a single tetrode amplifier incorporating a type 4X150A tube. The stage is similar to the 250-watt stage used in the Bauer Electronics fm transmitters. The power output level is controlled by varying the screen voltage to this tube. It can be varied from practically zero to 250 watts output power. The output impedance is 50 ohms. Complete stereo proof of performance measurements follow very closely the same measurements taken from the main KPEN transmitter. Also, there is no significant degradation of the stereo signal.

Transmitting Antenna

Fig. 4 is a pattern plot of the desired booster radiation requirements. The beam width required was 60° with a front-to-back ratio in excess of 30 dB, a power gain of 5 or 7 dB over a resonant dipole, and a low VSWR. With these requirements as specifications, the Scala Radio Corp. designed the log-periodic antenna shown in Fig. 5. For maximum signal isolation between the input and transmitting antenna, the transmitting antenna was placed on the downward slope of the site hill facing the desired coverage area. The transmission line length is 125 feet. The transmitting antenna was vertically polarized and mechanically oriented to tilt the beam downward.

During initial tests horizontal polarization was used, but there were a few complaints from

continued on page 66

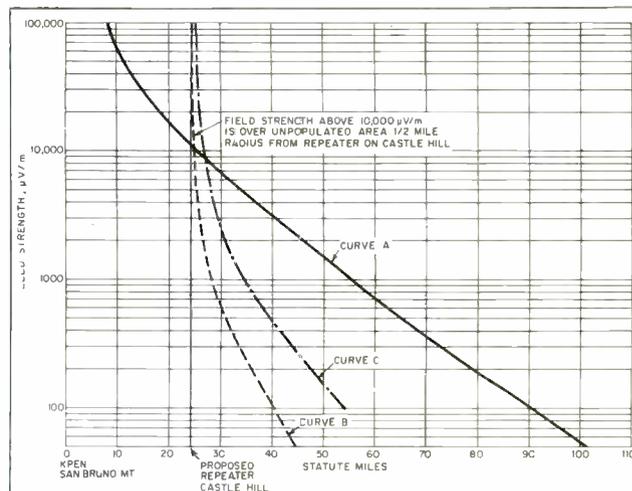


Fig. 2. Curve A shows theoretical smooth earth authorized field (F 50, 50) for KPEN at 119 kW erp. Curves B and C display theoretical field strength of proposed 250-W repeater station 586 ft above average terrain with 0° radial only over Walnut Creek and Concord (C), and 100 ft above average terrain typical for 7 radials with radiation centers 68 ft below average terrain (B).

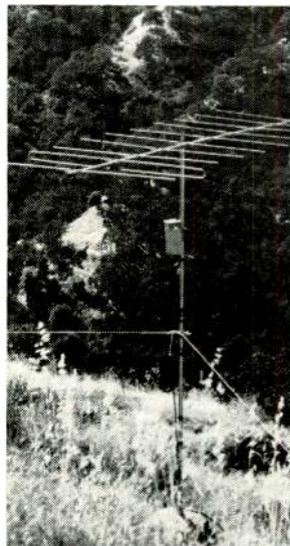


Fig. 3 (left). Receiving antenna installation.

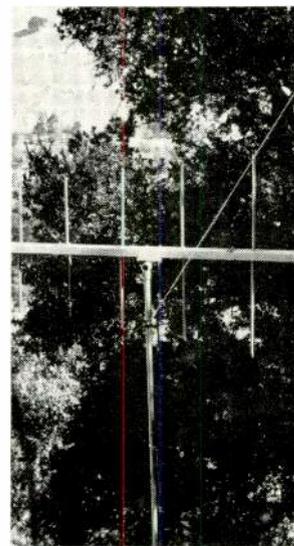


Fig. 5 (right). Booster transmitting antenna installation.

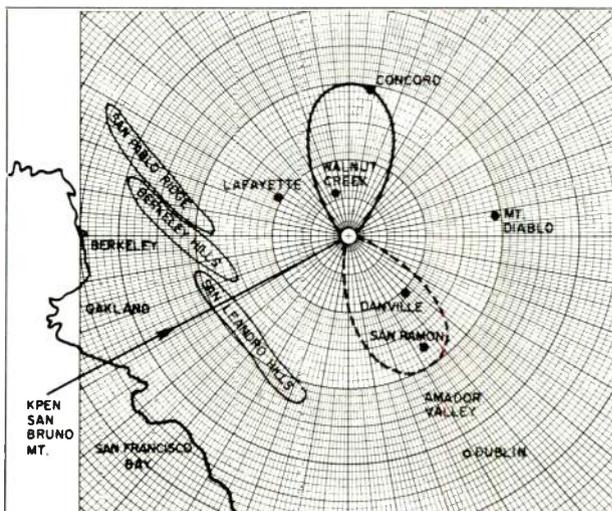


Fig. 4. Proposed KA2XTG radiation pattern.

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Plug-in relays save time, trouble Down-time for relay replacement is held to a minimum because all relays are plug-in. And, since only one type of relay is used throughout, spares requirement is greatly reduced.

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The AG-440's time-proven, trouble-free transport is 100% accessible for easy servicing whether rack mounted or in console. Components can be removed and remounted with exact alignment for proper tracking. The precision milled, rigid die-cast top plate maintains precise long term alignment of the tape path.

Quick-change heads align easily

The AG-440 head assembly and individual head stacks plug into place quickly. No struggle. No time lost. Registration dowel pins bring heads into perfect alignment. And for cleaning, degaussing, editing, the head gate opens wide.

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The AG-440 has more of the features engineers ask for than any recorder: Ferrite erase heads, with their increased efficiency; triple mumetal head shielding against hum from stray RF fields; three edit modes for fast, easy production; low profile console designed for convenient sit-down operation; low impedance heads that let you separate transport from electronics without affecting S/N or losing high frequencies; and a security cover on the electronics that discourages unauthorized fiddling.

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Trouble-free operation comes from quality components

The AG-440 was designed and built with the best components available. Because the broadcaster's product depends on this recorder, every possible step is taken to insure that the AG-440 is the most dependable recorder made.

Your AG-440 can pay its own way

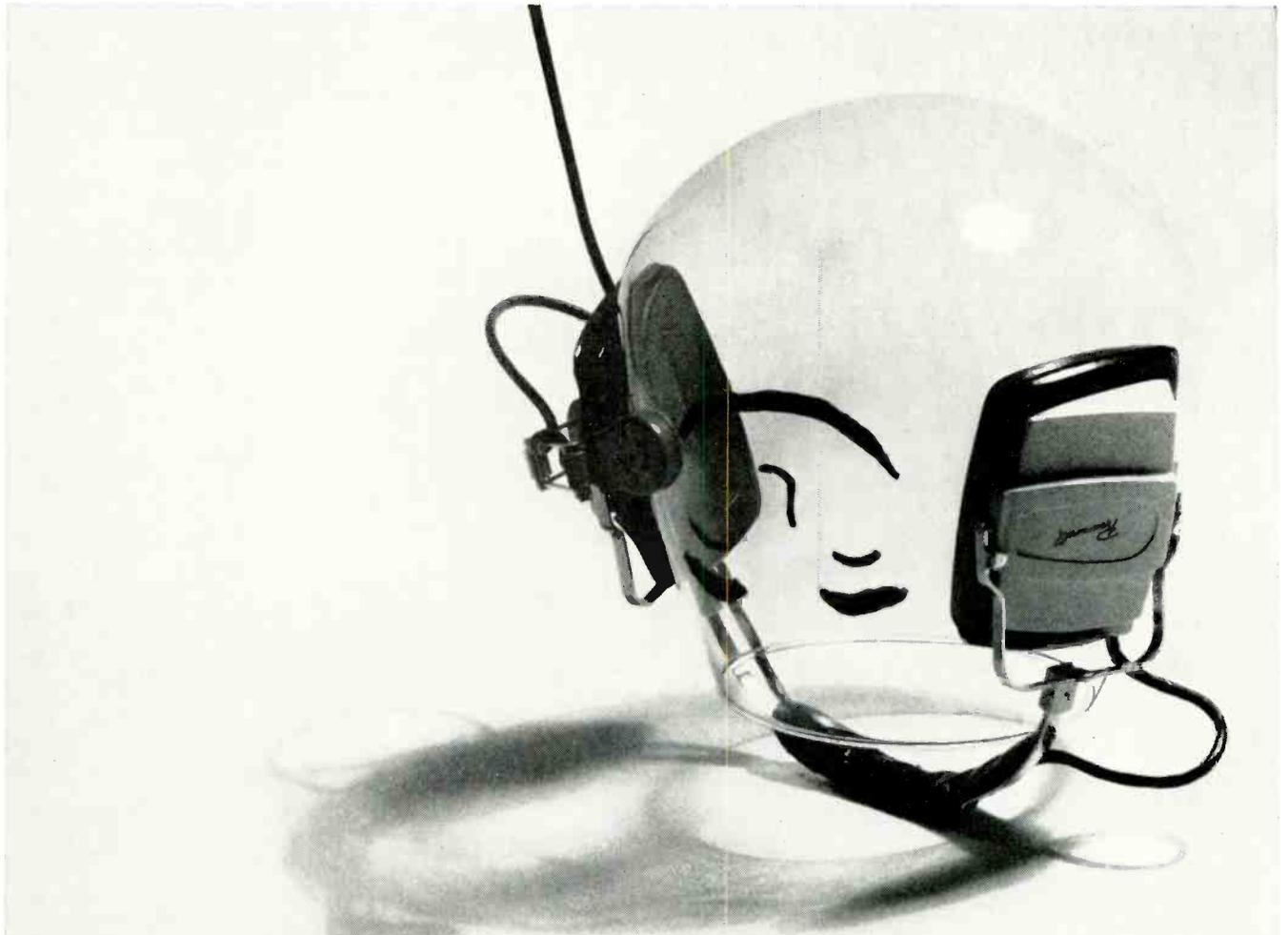
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Actually, there are six different versions of the comfortable new Roanwell TV Special Headset... though they are variations on the theme of a revolutionary lightweight receiver and the famous Roanwell noise-canceling microphone. The receiver element weighs only 3/10th of an ounce and is 1/3rd the size and 1/10th the weight of any unit with comparable output.

You can choose the broadcast quality dynamic microphones as used by commentators, or carbon mikes for the cameramen and floormen. In either case, the units are noise-canceling, reducing background noise a full 18 dB—that's like closing your window on loud city street noise.

Comfort has been improved, too. The whole headset is remarkably light... and it won't slip. It has just enough tension in the headband to keep the headset secure—without causing discomfort even through long periods such as taping sessions and sports events. Double earphone headsets may be used to monitor both director and program.

Convenience is built-in through an integral, hand-operated switch with a dummy load resistor included. There's both momentary and lock-in two-way conversation modes that leave hands free for regular work. And all Roanwell headsets are rugged enough to take the occasional rough usage that

inevitably happens in a working studio.

For complete descriptive literature, write: Roanwell Corp., Department K710, Roanwell Bldg., 180 Varick St., N.Y., N.Y. 10014.



ROANWELL CORPORATION
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New York, N.Y. 10014.

BROADCAST EQUIPMENT

Color Monitor

Ball Brothers Research Corp., Boulder, Colo., has developed a solid-state 14-in. display monitor that fits into EIA rack space measuring 10½ in. high by 19 in. wide by 18 in. deep. Accessibility to the TCB-14R's controls is enhanced by an extendible printed circuit card



located immediately behind front control panel. Power, brightness and contrast are located on the front panel; others are on extendible panel, which locks in place when not in use. TCB-14R comes with slide guides attached for rack mounting or may be mounted in a 19-in. equipment cabinet available at extra cost.

Circle 100 on Reader Service Card

Film Cueing System Uses Infrared

A new cueing system, which utilizes an infrared-sensing principle, has been introduced by Hazeltine Corp., Little Neck, N.Y. Designated the Motion Picture Film Cueing System, Model 2110, the system consists of a Cue Detector (which mounts directly to printer), an electronic control console and a Cue/No-Cue Applicator. The system is compatible with previously notched films and current notching methods. It employs a shallow-depth notch, one-half to one-quarter the depth of current notching techniques. Cancelling of cues is accomplished easily, by notch-



ing again, with a short shallow notch adjacent to the original. The control console contains solid-state components, logic circuits and subassemblies. It measures 4¾ × 8¾ × 5⅞ in., and weighs approximately 10 lb. Power consumption is less than 20 W. Model 2110 is capable of handling film printer speeds up to 500 ft/min.

Circle 102 on Reader Service Card

Remote Scanning Platform for CCTV

A new closed-circuit TV accessory, known as Auto-Scan, Model AS-2, extends the range of coverage of closed circuit TV cameras by providing remote controlled and automatic scanning control up to 360° horizontally. Auto-Scan is a product of GBC Closed Circuit TV Corp., New York, N.Y. Unit makes it possible to mount a CCTV camera on

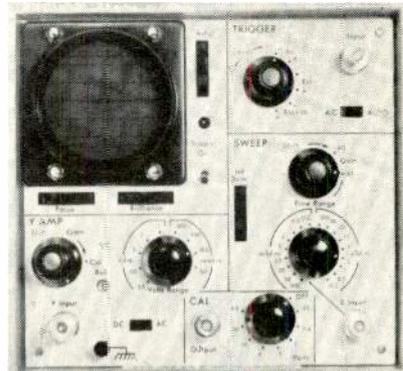


walls, ceilings, towers, etc. Fully automatic panning head oscillates continuously at either 90°, 180°, 270° or 360° on a horizontal plane. User can select the degree of horizontal oscillation desired when ordering. In addition to automatic oscillating function, Auto-Scan can be remotely controlled. Manual tilt control provides vertical coverage of up to 90°. Unit's platform accepts virtually any CCTV camera now on the market.

Circle 103 on Reader Service Card

Portable Oscilloscope

Texscan Technical Products Corp., Indianapolis, Ind., announces the addition of Model 101 solid-state battery operated portable oscilloscope to its line of test equipment. Model

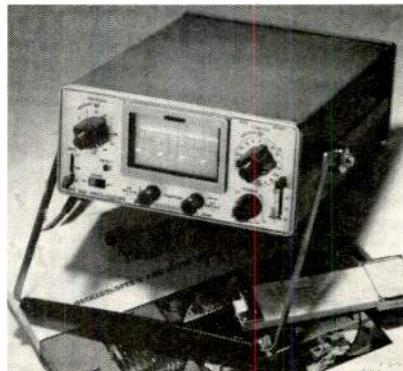


101 has 20 MHz bandwidth, and is suited for applications on CATV sites, remote communications sites, etc. Sensitivity is 50 mV/cm. When used with the internal battery pack the unit provides over 1½ hr of continuous operation, and includes build-in charger. Operation on 115 V ac or from an external 12-V battery is also provided for. The unit measures 9 × 8½ × 15 in. and weighs 17 lb. Price \$665.

Circle 104 on Reader Service Card

Mini-Scope

Tektronix, Inc., Beaverton, Oregon, announces the availability of the Sony-Tektronix Type 323—a new portable oscilloscope which provides its own power for a full working day. The Type 323 all solid-state, 4 MHz portable oscilloscope permits the operator to choose ac, dc or internal batteries for instrument power. Unit



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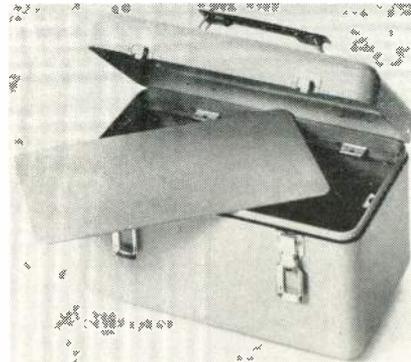
RCA

measures $10\frac{5}{8} \times 8\frac{1}{2} \times 4\frac{1}{4}$ in., and weighs 7 lb (including batteries). Bandwidth of 4 MHz is provided at 10 mV/div deflection factor is provided with 2.75 MHz bandwidth. Sweep rates are $5 \mu\text{s}/\text{div}$ to 1 s/div. A $\times 10$ sweep magnifier extends the fastest sweep rate to $0.5 \mu\text{s}/\text{div}$. Price of the Sony-Tektronix Type 323 (including batteries) is \$850. Availability is late 1968.

Circle 105 on Reader Service Card

New Instrument Carrying Case Series

A new series of instrument carrying cases in six sizes is available from Zero Mfg. Co., Burbank, Calif. Designated the Zip 800 Series, the cases are deep-drawn seamless 0.063 in. aluminum, and include provision for mounting an instrument panel, which is available optionally, with



necessary mounting hardware. The six sizes range between $6 \times 9 \times 7\frac{1}{2}$ in. and $10 \times 16 \times 11\frac{1}{2}$ in. Rubber gasketing maintains seal between case and its outside-fitting cover; separable steel hinges permit removal of cover if desired for access to panel surface. Finish is textured gray vinyl enamel, with single molded black plastic carrying handle. Circle 106 on Reader Service Card

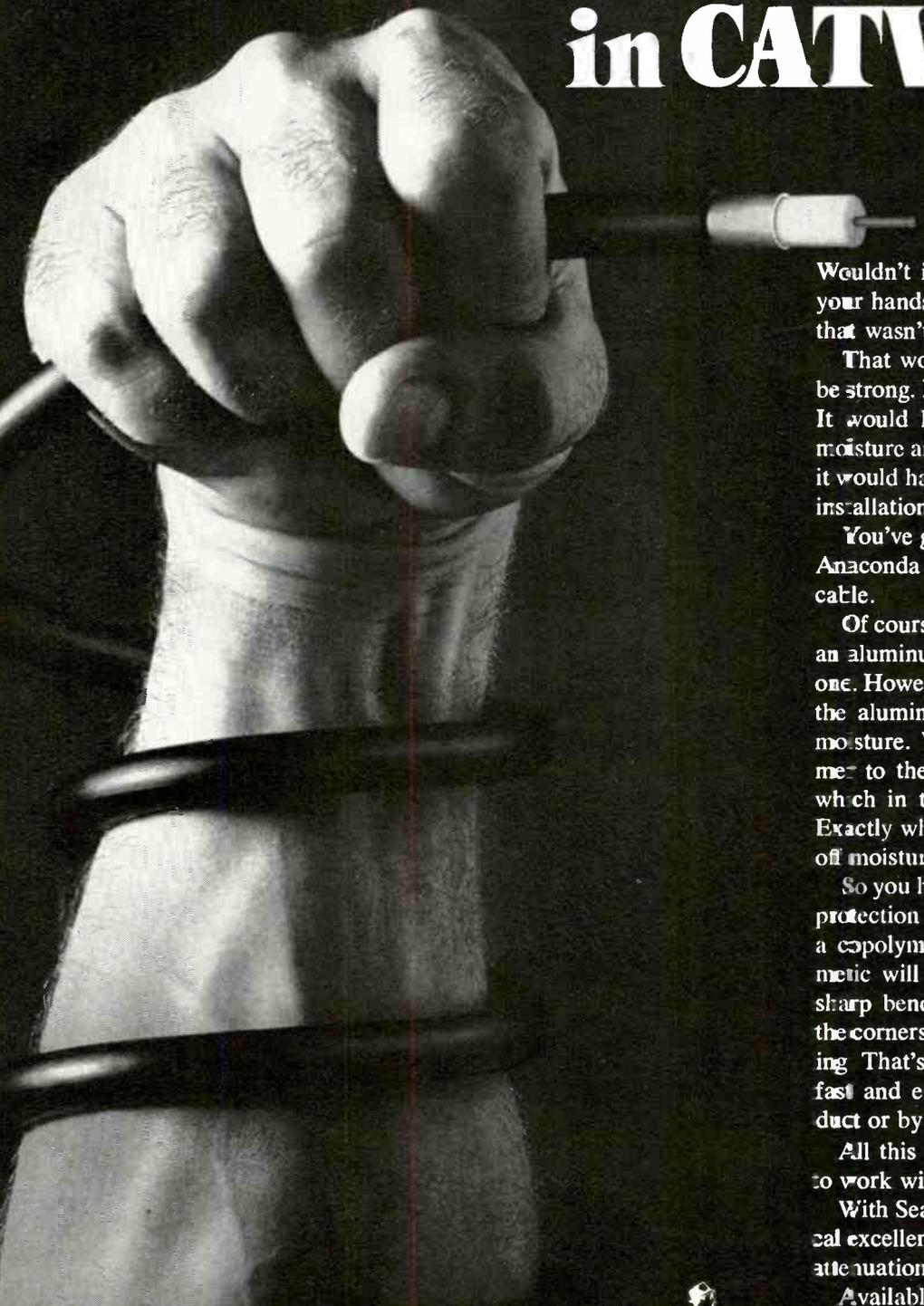
Amplifier-Equalizer

A new amplifier-equalizer combining a mic preamplifier and equalizer in one unit is available from Melcor Electronics Corp., Farmingdale, N.Y. Known as Model AE-20, unit is designed for individual mic channel use. Preamplifier portion is a low-noise transformer input stage, with variable gain switching of 20, 40 and 50 dB. Equalizer portion is active, using a bridged tee notch filter switched from feedback loop to the input for boosting or dipping at selected frequency. Other features include four low- and four high-frequency selectable equalization points.

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For further information call or write Anaconda Wire and Cable Company, 505 Third Avenue, New York, New York 10016, or Anaconda Electronics Company, 1430 South Anaheim Boulevard, Anaheim, California 92803.

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History was made on April 18, 1968, 6:30 PM, Palm Desert, California.

The world's first locally originated public service program* was cablecast in color to 10,000 subscribers of the Coachella Valley CATV system. Cable management and subscribers alike were enthusiastic about the results. Color quality was as good or better than any color programming previously re-

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"Outstanding local color will be part of our service in Coachella Valley because of recently purchased IVC color cameras and recorders. IVC's equipment mates well with cable systems . . . and IVC's price breakthrough now brings local color within reach for nearly any cable operation. I sincerely urge other cable operators to consider color equipment so they can take advantage of rapidly increasing color set saturation."

To see how IVC can add color to your cable operation, turn the page.

* World's first local color cablecast was originated April 17, 1968. An IVC-100 color camera was set up in the auditorium at College of the Desert, Palm Desert. At a stage lighting level of 400 ft. candles, a one and one-half hour program of the Riverside County Industrial Development Council was taped in color on an IVC-810. This tape was played back the following evening (via the IVC-810) over the Coachella Valley cable system. Photo above is off-the-set image of actual cablecast seen by subscribers.



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* Accepted format by Bell & Howell, GPL and RCA

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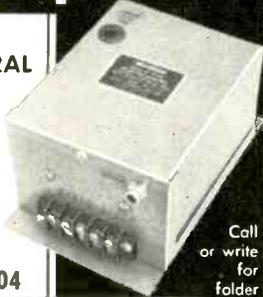
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Model RTM-2, made by Middlebury Mfg., Inc., Waterbury, Conn., is a 5-digit, nonresettable, running time meter. Unit measures 2 in. square by 1¾ in. deep. Height of digits is ½ in., and readout is 4 white digits on black in hours and 1 digit coded red



on white background indicating 1/10 hr. Power consumption is 2 W. A rotating red flag is located on the face of the dial to indicate when the meter is running. All units have a 1-year guarantee, with no lubrication required. Life expectancy is 5-10 yr. Price is \$16.00.

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**Oxycon-Tube
CCTV Camera**

Fairchild Space and Defense Systems Division, Syosset, N.Y., has announced that its TC-177 family of closed-circuit TV cameras is now

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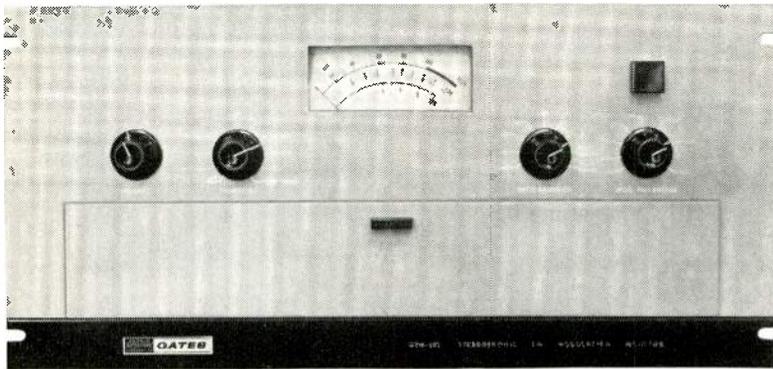
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NOW GATES MONITORS GATES

Three new solid-state FM monitors from Gates . . . supplier of the most complete line of FM broadcast equipment from a single-source manufacturer. From microphone to antenna, and everything in-between.

Advanced modular design of our monaural monitor permits conversion for stereo, a bonus feature for monaural users. Space program integrated circuits add to Gates reliability. And, of course, they can be used to monitor whatever brand of FM transmitting equipment you have.

Available from stock, our new solid-state FM monitors are fully FCC approved and thoroughly field tested. So check with Gates first - your single source for all FM broadcast equipment.



GTM-88S FM Stereo Modulation Monitor
Integrated circuits for greater dependability. Full provision for adding SCA adapter. All controls accessible from front panel. Silicon solid-state circuitry.



GTM-88M FM Monaural Modulation Monitor
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available with Oxycon tubes as well as the usual vidicons. The Oxycon

is a 1-in. lead oxide-surfaced pickup tube particularly well suited for use under conditions of brilliant illumination where absence of burn-in and image smear are desirable. It also offers better shading characteristics and exceptionally low dark current.
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All-Purpose Cart

Techbilt Corp., of Glendale, Calif., has dubbed one of its new carts "The 1000 Purpose Cart" because of its general application. The folding cart, designated Model DD-8 in the Tech-



bilt line, has a 7/8-in.-thick tubular steel frame and is chrome plated. It moves on 4-in. ballbearing wheels, all of which swivel. The lower wire deck measures 30 x 21 1/2 in. and the removable basket measures 16 x 24 x 10 in. deep.

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Cable-Packager

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The RA-4CA is a lightweight, four-channel portable mixer amplifier specifically designed for remote broadcast or auxiliary studio use. It is completely self-contained and operates from either AC or batteries (switching automatically to battery operation if AC power fails); runs as long as 200 hours on low-cost "D" cells. It offers four microphone channels with master gain and P.A. feed, all controlled from the front panel. Lightweight construction (just 11 pounds with batteries), a convenient carrying handle and a snap-on front cover mean the RA-4CA can be easily set up to operate anywhere. For further information, please write or call today:

Spotmaster
BROADCAST ELECTRONICS, INC.

8810 Brookville Road
Silver Spring, Maryland 20910
Area Code 301 • 588-4983

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CARTRIDGE TAPE ERASER

**GUARANTEED TO ERASE
COMPLETELY IN 3 SECONDS**

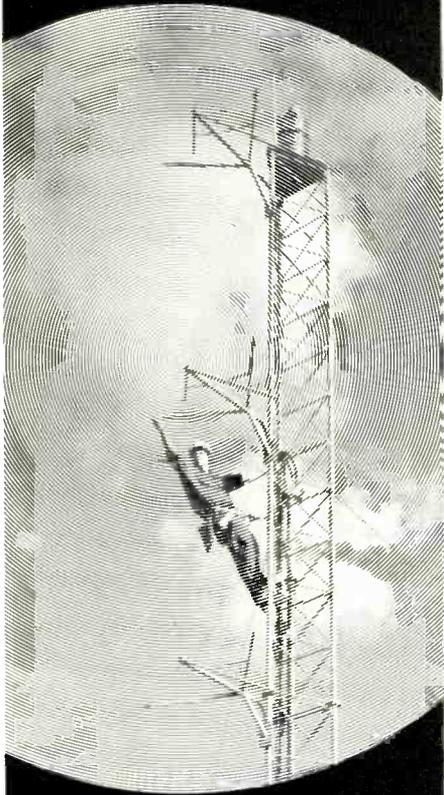
Designed specifically for tape cartridges. Absolutely NO sound carry over from previous recordings. Handles all cartridge sizes. Also reel tapes up to 10 1/2 inches. Entire process takes only 3 seconds. Price \$39.50.

PARTA
ELECTRONIC CORPORATION
A DIVISION OF COMPUTER EQUIPMENT CORPORATION
5851 FLORIN-PERKINS ROAD SACRAMENTO,
CALIFORNIA 95828 (916) 393-5353

Circle 33 on Reader Service Card

JAMPRO

RUNS CIRCLES AROUND FM ANTENNAS FOR BETTER RECEPTION



JAMPRO advanced technology has developed another industry "first"! A circularly polarized FM Antenna with variable horizontal to vertical gain ratios! Jampro will adjust the ratio to your exacting specifications for the best possible reception performance available—Reception to the outer fringes, and to more auto FM receivers, too.

EXCLUSIVE DIGITAL TUNING END STUBS allow lower VSWR on your tower (GUARANTEED under 1.1 to 1), and field trimming to 1.08 to 1, \pm 200 KC.

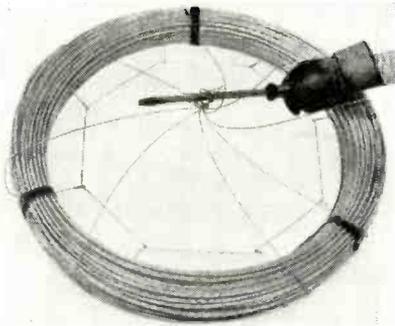
AVAILABLE IN EITHER PARALLEL OR SHUNT FEED SYSTEMS.

Write for full specifications or make a circular motion on your phone dial—Call Jampro today. (916) 383-1177.

JAMPRO

ANTENNA COMPANY
A DIVISION OF COMPUTER EQUIPMENT CORP.
6939 Power Inn Road
Sacramento, California 95828

Circle 35 on Reader Service Card

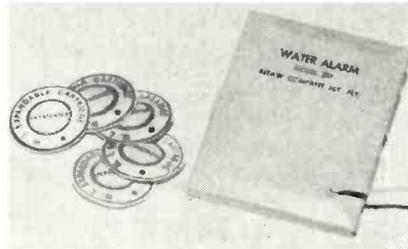


conductions conductors, drop wire and coaxial cable 200 to 500 ft in length with up to 7/16-in.-dia strand. Safety dispenser is manufactured in one size only and is intended for one-time use. Available in standard cartons of 50.

Circle 123 on Reader Service Card

Water Accumulation Alarm

Water alarm, designed by Retaw Co., New York, N.Y., detects water on any surface through the action of an expandable cartridge which reacts to the presence of water, but not moisture, and exerts strong force against a built-in switch triggering



an alarm. The cartridge automatically shrinks to its normal size after it dries and can be used repeatedly. The cartridge is nontoxic and its expandable force can be preserved for more than fifteen years. The alarm is priced at \$26.95.

Circle 110 on Reader Service Card

Device Electrically Simulates Cable

Super-n (KR-250) Simulator, made by Kappa Networks of Carteret, N.J., simulates electrical characteristics of video cable in lengths of 25 to 250 ft in decade steps. Amplitude response is flat within ± 0.05 dB to 12 MHz; ripple, ± 0.05 dB; group delay, -0.5 percent to 12 MHz. Other characteristics include: delay, 360 ns (250 ft); resolution, 36 ns (250 ft); impedance, 75 ohms; and insertion loss, 3 dB at all settings. Price is \$350. A four-unit model (KR-250-A) capable of simulating 1000 ft of cable is priced at \$1100.

Circle 120 on Reader Service Card

Crown

Leadership presents

the NEW

Computer Logic Control Pro 800 Transport



MODEL SX 824

In the league of nimble-fingered tape-handlers there exists a recurrent problem. It has been demonstrated time and again that anyone can ruin a valuable tape by absentmindedly outsmarting the interlock system of an otherwise safe tape recorder.

In answer to this problem and similar problems arising in automated and remote control applications, the CROWN Pro 800 was designed. This recorder has a computer logic system using IC's which prohibit all such destructive operations.

The CROWN computer stores the last command given it in its memory (forgetting all previous commands) and by a continuous knowledge of the operating state of the machine (motion and direction), it takes all the necessary measures and executes the command. This is all done *without* time-wasting delay mechanisms.

Computer Logic Control brings to you rapid error-free tape handling. It is actually impossible to accidentally break a tape. Call your CROWN dealer NOW!

MOST PERFECT REPRODUCTION

- ☐ Performance as yet unequalled
- ☐ Four years proven Solid State circuitry
- ☐ Extremely low noise electronics

FINEST TAPE HANDLING

- ☐ Computer smooth operation
- ☐ True straight line threading
- ☐ Patented Electro-Magnetic brakes never need adjusting

Write to **Crown International**
Box 1000, Dept. BM-7
Elkhart, Indiana 46514

MADE ONLY IN AMERICA

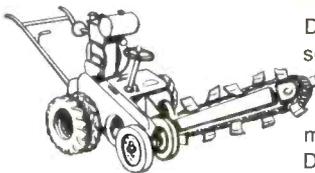
Circle 36 on Reader Service Card



V30

The 30 h.p. trencher that delivers everything you expect from utility and service line equipment, plus a full line of options including backhoe, Roto Witch boring unit, and offset pivot for tight work. You get 4-wheel drive, full hydraulic control, power steering, *uphill ability and side-hill stability*, and trenching up to 24 fpm.

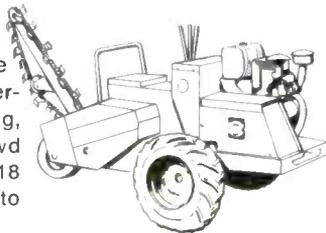
HANDLEBAR SERIES



Ditch Witch rubber tire mount, selective digging speeds, 7 to 12 h.p. and trenching speeds up to 10 fpm. Here's unmatched economy . . . famous Ditch Witch dependability.

H12

The first 2-wheel, steerable-drive trencher to dig straight or curves . . . a riding-type unit with superior maneuverability. Has power steering, hydraulic boom, variable crowd control. Optional 12½ or 18 h.p. engine. Trenches up to 12 fpm.



J20

Teams compact maneuverability with 18 h.p. engine, 3 speed digging chain plus reverse, 4-wheel drive, floating front axle, power steering and hydraulic backfill blade.

Trenches up to 18 fpm. Roto Witch boring unit optional.



R60

Rugged 60 h.p. service and main line unit for trenching up to 36 fpm. Heavy-duty 4-speed transmission standard . . . automatic optional. Features variable crowd control; 4 independent digging chain speeds, plus reverse; hydraulic drive system.



LAST YEAR, MORE PEOPLE BOUGHT DITCH WITCH THAN ALL OTHERS* COMBINED

No doubt about it! Ditch Witch is number 1. First in sales . . . first in performance, value and reliability. Ditch Witch cut digs, cut maneuvers, and out lasts all others. Every model from 7 to 60 h.p. is engineered to deliver more fpm for every dollar spent, while a long list of options adds unmatched versatility. It's no wonder that when other trenchers have to pull out . . . *Ditch Witch Lowers The Boom*. Here's why:

- **SELECTIVE DIGGING CHAIN SPEEDS** for greater trenching capacity.
- **MORE MOBILITY** on the job and more speed in moving from site to site.
- **GREATER VISIBILITY.** Why blindfold your operator? Ditch Witch lets him see his work!
- **HIGH FLOTATION, RUBBER-TIRED MOUNTING** for minimum turf damage, greater ground clearance, dependable traction.
- **4-WHEEL GROUND CONTACT.** Even on steep slopes, you get Ditch Witch uphill ability, sidehill stability.
- **A REPUTATION OF EXCELLENCE . . .** more customer acceptance than all comparable trenchers put together!

DON'T TAKE OUR WORD FOR IT

Ask your Ditch Witch dealer for a competitive demonstration . . . we can prove it to you!

*U. S. Dept. of Commerce Industrial Reports on Construction machinery sales 2nd Q-tr., 1967, Ladder Type Trenchers less than 5,000 lbs.

DITCH WITCH

DIVISION OF CHARLES MACHINE WORKS, INC. • **DITCH WITCH** • 1824 ASH STREET, PERRY, OKLA. 73077, USA

Circle 37 on Reader Service Card

NAMES

IN THE NEWS



Robert I. Brown Rupert F. Goodspeed

Robert I. Brown has been appointed product business manager for Philips Broadcast Equipment Corp., it was announced by Anthony T. Pignoni, director of marketing. Pignoni also recently announced the appointment of **Rupert F. Goodspeed** as general sales manager.



Robert Dressler Maury Betchen

S. Marcus Finkle, chairman of the board of Riker Video Industries, Inc., recently announced the appointment of **Robert Dressler** as president and chief executive officer of the company. **Mario Alves**, executive vice president, has been serving as president.

Maury Betchen has been promoted to manufacturing manager of Jerrold Corporation, it was announced by **Paul A. Garrison**, vice president.

Entron, Inc. recently named **Thomas J. Gee** to the position of supervisor of Quality Assurance.



William H. Kuntz George C. Hanley

William H. Kuntz has been named assistant to the president of Newell Industries, according to **Vintron D. Carver**, president.

George C. Hanley was elected Comptroller of the Anaconda Wire and Cable Company at the company's recent board of directors meeting.

OF APPROXIMATELY 1800 CATV SYSTEMS IN THE U.S. . . .

60% have one or more SITCO ANTENNAS IN USE!
(. . . and more going in every day!)

HEAVY DUTY QUADS-YAGIS LO & HIGH BAND FM ANTENNAS

Write for free SITCO Catalogue

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PORTLAND, OREGON 97220 Telephone 253-2000

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INSTANT REVERBERATION
only with **FAIRCHILD REVERBERTRONS**

Reproduce the thrilling sounds of the Grand Canyon or the colorful reverberation qualities inherent only in good acoustical chambers. And because reverberated sound is apparently louder than the same non-reverberated signal, by utilizing the FAIRCHILD REVERBERTRON in motion picture, radio, television, or your own recording studio, you can create attention holding and realistic sound effects.

In addition to low cost the advantages of a FAIRCHILD REVERBERTRON are virtually unlimited for creating wide audience impact and literally hundreds of "ear appealing" sounds.

The next time you want to "glue" your audience's ears to the sound you're making be sure to use a FAIRCHILD REVERBERTRON.

SPECIFICATIONS OF MODEL 658B (Pictured above)

Compact, reverberation system for the 'big' sound in a small space. Contains reverb equalization in mid and low frequency range; level control; solid state design. Size: Only 5 1/4" x 3 x 10" deep.



PROFESSIONAL MODEL 658A ALSO AVAILABLE:

The 658A is a complete solid state reverberation system with electronically controlled reverb time adjustments up to 5 seconds; mixing control for adjustment of reverberated to non-reverberated signal ratios; reverb equalization at 2, 3, and 5 KHZ. Size: 24 1/2" x 19".

Write to FAIRCHILD—the pacemaker in professional audio products—for complete details.

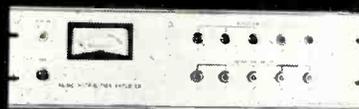
FAIRCHILD
RECORDING EQUIPMENT CORPORATION
10-40 45th Ave., Long Island City 1, N. Y.

Circle 39 on Reader Service Card

SPOTMASTER

The all solid state AD1A

AUDIO DISTRIBUTION AMPLIFIER



Meet the AD1A, a solid state audio distribution amplifier specifically designed for AM, FM and TV broadcast stations and recording studios. The AD1A distributes audio signals via five separate output channels (up to 25 with the addition of AD1A-X extenders), and incorporates a front-panel VU meter and monitor jack to permit visual and aural monitoring of the incoming signal at the output of the line amplifier. Response is essentially flat from 40 to 20,000 Hz, with low distortion and noise, 60 db channel isolation and 12 db peak factor. For further information, write or call today:

Spotmaster
BROADCAST ELECTRONICS, INC.

8810 Brookville Road
Silver Spring, Maryland 20910
Area Code 301 • 588-4983

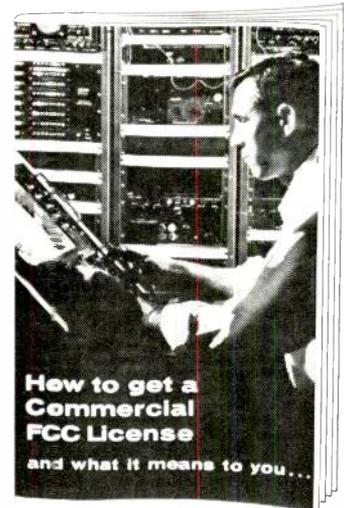
Circle 40 on Reader Service Card

BROADCAST EXECUTIVES—show this ad to the up-and-coming young men on your staff.

Want to move up fast in broadcasting?

This free book may change your life

It takes the mystery out of getting the FCC License you need for security and success



NO WONDER you're interested in a career in broadcasting. It puts you right "where the action is"—behind the scenes of show business, news reporting, politics. You meet famous people. You're the first to know the big news about fires, riots, plane crashes. You get to hear wonderful music. You feel in contact with an audience of thousands.

And one of the most secure high-pay jobs in the field is that of the licensed Broadcast Engineer. He's the key man required on the job by the United States Government

New job opportunities are opening up constantly for qualified license-holders. Many more will be needed to operate and maintain the countless new UHF-TV stations expected to begin operation, now that all new TV sets can receive UHF.

So if you dream of making broadcasting your life work, you need that Government FCC License.

But how do you go about getting it? Where do you apply, and when? How do you get ready for it?

To help you, we have published a 24-page booklet, "How to Get a Commercial FCC License." It tells you exactly which types of licenses and permits are issued by the Federal Communications Commission, and what kinds of electronic equipment each type allows you to operate and maintain.

You will learn which subjects must be mastered for each kind of license. Thirty typical exam questions will give you an idea of the level of training required. You'll be told where and how often the exams are held, and how to find out about the exams held nearest your home.

Frankly, the FCC exams are rough if you're unprepared. Two

out of three applicants fail to pass. Some fail seven or eight times.

But with the right preparation, it's easier than you would imagine. Better than 9 out of 10 CIE-trained men pass the exam with no difficulty. Our record is so good that we are able to promise every student in writing: *after completing your CIE course, you'll be able to pass your FCC exam, or CIE will refund your tuition in full.*

We'll send you a free copy of our school catalog in addition to your free FCC booklet. Then you can see for yourself how thorough our home study courses and teaching methods are. No obligation, of course.

To receive both books free, just mail coupon below. If coupon is missing, write to Cleveland Institute of Electronics, 1776 East 17th Street, Dept. BM-11 Cleveland, Ohio 44114. Do it right now—if you want a solid career in broadcasting, this could be the turning point in your life.

ENROLL UNDER NEW G.I. BILL

All CIE courses are available under the new G.I. Bill. If you served on active duty since January 31, 1955, or are in service now, check box in coupon for G.I. Bill information.

MAIL COUPON FOR FREE BOOKS

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Please send me, without cost or obligation, your 24-page booklet, "How to Get a Commercial FCC License," together with your school catalog of license-preparation courses.

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Accredited Member National Home Study Council
A Leader in Electronics Training...Since 1934

BM-11

"I GIVE CLEVELAND INSTITUTE CREDIT FOR MY 1ST CLASS COMMERCIAL FCC LICENSE,"



says Matt Stuczynski, senior transmitter operator, Station WBOE. "Even though I had only six weeks of high school algebra, CIE's AUTO-PROGRAMMED® lessons make electronics theory and fundamentals easy. After completing my CIE course, I took and passed the 1st Class FCC Exam. I now have a good job in studio operation, transmitting, proof of performance, equipment servicing. Believe me, CIE lives up to its promises. I really enjoy my work and I'm on my way up."

Circle 41 on Reader Service Card



**COLOR
SPECTAGULAR!**



**BIW'S NEW
TV-85C COLOR TV CONNECTOR
ALIGNS PINS, PROTECTS MATED
PARTS...AUTOMATICALLY**

This new concept in outer sleeve design guarantees positive pin alignment; pins *cannot* be bent or damaged by mismatching. The double-sleeve design also prevents injury to mating threads and protects against knocks, drops and abuse from studio rolling stock.

Heavy-duty rubber compression gland provides an effective seal at rear of connector. All pins and sockets on the new TV-85C insert are front release, rear removal, and crimp to cable conductors. Woven cable grip and rugged molded boot provides both bend relief and pull-out protection.

Completely compatible with existing 85 pin connectors used for TV, BIW's new TV-85C connectors are machined from 7075-T6 aluminum, and are precision built for trouble-free performance.

Go BIW all the way — connectors, camera cables (American or European), broadcast panels. Write for details.

Cable concepts grow at...

Boston Insulated Wire & Cable Co.



45 Bay St., Boston, Mass. 02125/141 Nevada St., El Segundo, Calif. 90245
118 Shaw St., Hamilton, Ont./International, 1 Place Ville Marie, Montreal, Que.

Circle 42 on Reader Service Card



S. W. Pai



Patricia Lois Schmidt

S.W. Pai has been promoted from vice president-Engineering of Craftsman Electronic Products, Inc. to the new position of vice president—Advanced Technical Planning.

Centre Video has appointed Miss **Patricia Lois Schmidt** as its new sales manager.

Lyle Poag has been named general sales manager in charge of all sales activities for WWAM and WWTV-FM Radio, Fetzer Broadcasting, according to an announcement by Gene Ellerman, vice president and general manager.

The appointment of **Denis Courtney** as executive secretary of the SMPTE was recently announced by G. Carleton Hunt, the Society's president.

The appointment of **Leon J. Knize** as vice-president-marketing of Blonder-Tongue Laboratories, Inc. was announced recently by Ben H. Tongue, president.

John F. White, president of National Educational Television, has received an honorary Doctor of Letters degree (D. Litt.) from Temple University, Philadelphia.

Lee D. Webster has been named president and chief executive officer of LTV Ling Altec, Inc., subsidiary of Ling-Temco-Vought of Dallas, Texas, and **Alvis A. Ward**, who has held the post, has been advanced to chairman.

The newly named Product Engineering manager for Newell Industries is **John Isabeau**. His appointment was announced by Vinton D. Carver, president.

Howard Lomax has been named to the newly created post of marketing manager, **Walter J. Meclarey** has been promoted to eastern regional manager and **Al Micheli** has been promoted to manager of turnkey sales for the western region, all of the CATV Systems Division of Jerrold Electronics. **Martin Q. Sill** has been appointed manager of Jerrold Corporation's manufacturing plant on Lehigh Ave. in Philadelphia.

Shown here are several good reasons why Altec audio equipment is being used by more and more recording and broadcast studios and auditoriums. And for all sound reinforcement applications.

Altec microphones are engineered and manufactured to the same high standards of quality that have made "Voice of the Theatre"® speaker systems, Altec audio controls, monitors and other sound equipment the standard of the industry for so many years.

Take our Solid State Condenser Microphone Systems (M49 Series), for example. Extremely wide, smooth frequency response. Front-to-back discrimination of 20 dB. Omnidirectional or cardioid types. Battery or AC operated.

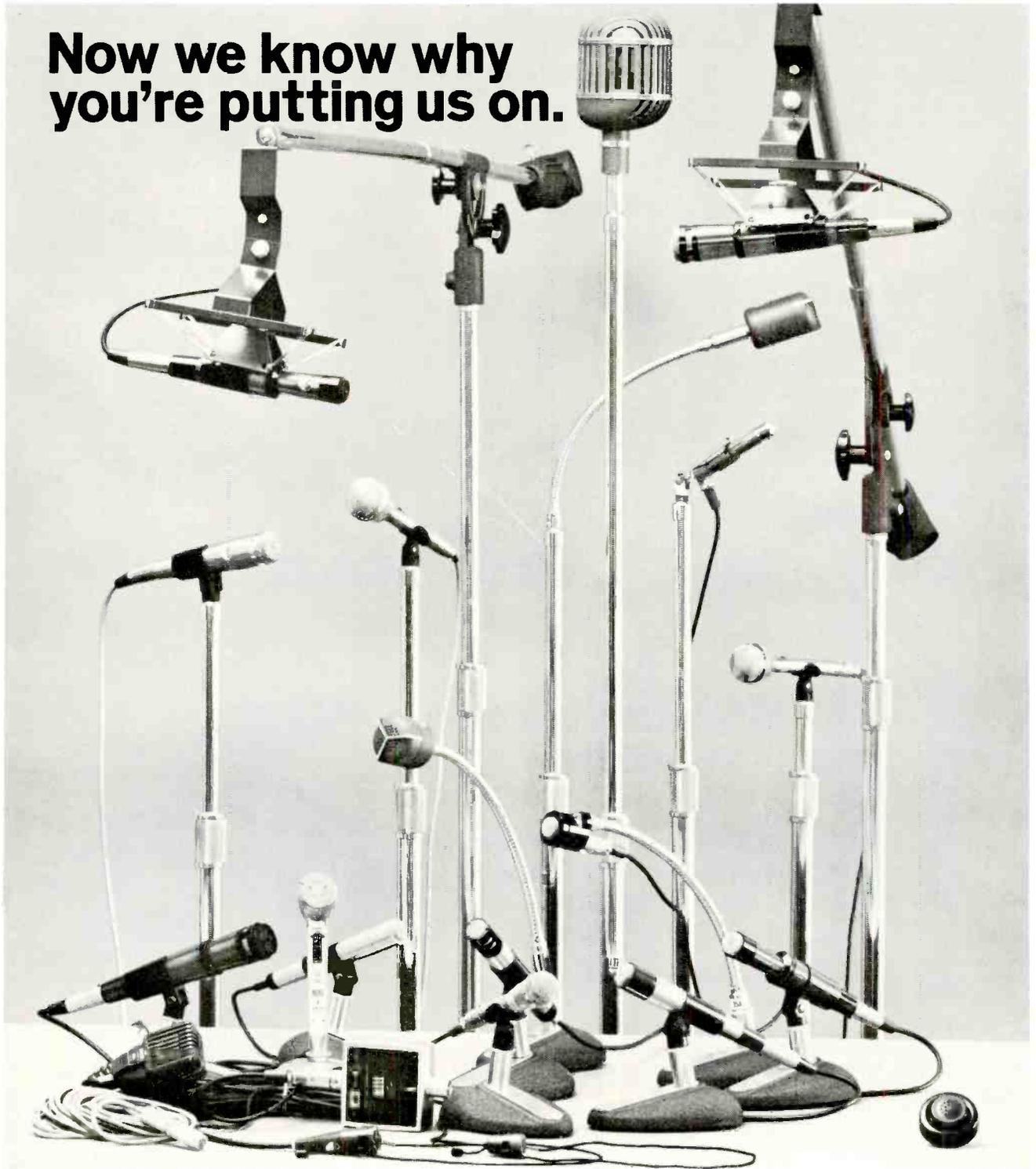
Lightweight but rugged, with power supplies to match. Altogether, these fine, precision-made instruments are the most advanced professional mikes on the market today.

The M49 is typical of the complete Altec mike line, which includes selectable pattern types, miniature lavaliers, close-talking models and other solid-state condenser types. Plus mounts, wind screens and accessories.

So go ahead and put Altec on. Why not start by asking your Altec Sound Contractor for complete technical data? He's listed in the Yellow Pages under "Sound Systems." Or, if you prefer, write direct to us at 1515 S. Manchester Ave., Anaheim, Calif. 92803.



Now we know why you're putting us on.



World's Largest Manufacturers of Sound Equipment Exclusively. Stereo Receivers, Speakers, Speaker Systems. Stereo Ensembles for the Home / Microphones, Control Consoles, Amplifiers, Speakers, Speaker Systems for Public Address Systems / Acousto-Voice Equalization / Audio Controls, Consoles, Amplifiers, Microphones, Monitors for Professional Broadcast, Recording & Motion Picture Studios & Theatre / Telephone Amplifiers & Associated Wire & Microwave Transmission Equipment / Power Supplies & Transformers / Doctors, Nurses & Hospital Call Systems.

Circle 43 on Reader Service Card

DID YOU KNOW—

that for only \$890 you can own a Push-button, Single DC Pair Remote Control System? Now, Rust Corporation offers the RC-1000. This solid state system with plug-in circuit boards is designed for the operation that requires a maximum of 22 control functions (11 ON/RAISE and 11 OFF/LOWER) and a maximum of 10 metering positions plus a calibrate position. Provisions for connecting external meters such as digital readout, modulation, frequency, etc., are included. The built-in pushbutton latching feature readily indicates the selected position. A clear plastic strip directly above permits adjacent labeling of each pushbutton function. By the addition of an external meter at the transmitter site, control achievements and other metering can be observed. This provision results in a one-man calibration system. Electrically the control functions are sent from the studio to the transmitter as frequency shift (FSK) of the carrier. Each metering sample passes through a DC isolator circuit which completely isolates the output from the input and is therefore "floating." RUST AUTOLOG Automatic Transmitter Logging equipment can operate through the RC-1000 and thus utilize the same single DC pair of telephone lines.

Rust
corporation

168 Tremont Street,
Everett, Mass. 02149
(617) 389-3380

Circle 44 on Reader Service Card

BROADCASTERS SPEAK

Sirs:
Would you be kind enough to send a copy of the article to appear in the June issue of *BM/E* on 16mm films being shown on television?

I would like to congratulate you on your April article on "Telecine Quality Deplorable, CBC Tells SMPTE."

We are interested in including this subject matter in our 1969 Festival.

Thank you for your personal consideration.

Al Preiss
Hollywood Festival of
World Television
Hollywood, Calif.

On the way, A.P.

Sirs:
Your magazine improves with every issue. The June issue was tops in every way. No other magazine covers so many varied subjects on broadcasting in so complete a manner.

R.V. Robinson
Chief Engineer
WCYB-TV Bristol, Va./Tenn.

We love you too, R.R.

Sirs:

I have today received the December, January and February issues of *BM/E*, (by sea mail—it takes a while) and in 'Broadcasters Speak' I found letters referring to the 4-125 and 3CX series of tubes. I immediately re-read the original November article, which did not refer to these particular tubes, but since this organization has recently purchased two 5-kw transmitters of Australian manufacture, (they are not operational yet) I would be pleased to hear from stations using either the 4-125A or the 3CX2500F3.

Each transmitter utilizes a single 3CX in the PA plus 2 in modulator service. The rf driver is a 4-125A as are the 2 stages of audio . . .

Keep up the good work, *BM/E*. Pity I can't receive it sooner to utilize the reader service cards.

P. Butler
VQO Radio
Solomon Islands Broadcasting
Service
Honiara, British Solomon
Islands

Sorry about the slow mail and the reader service situation, P.B. If you write us about items you're interested in, we'll send you the names and address of the manufacturers.



FROM **ColorTran**

NEW SUPER-BEAM "1000"

A 1K LENSLESS "QUARTZ" LIGHT
APPROXIMATING THE PERFORMANCE
OF A 2K FRESNEL

- Produces 50 to 560 footcandles at 20 feet from flood to spot, using single-ended, 1000-watt (3200°K) tungsten-halogen "quartz" frosted lamp.
- Provides a well-defined beam with minimum of "spill."
- Continuously variable focusing from spot to flood . . . achieved through finger-tip knob control or through steel ring for pole-operation.
- Sharp barndoor cutoff.

Write for data.

Berkey
ColorTran
CORPORATION

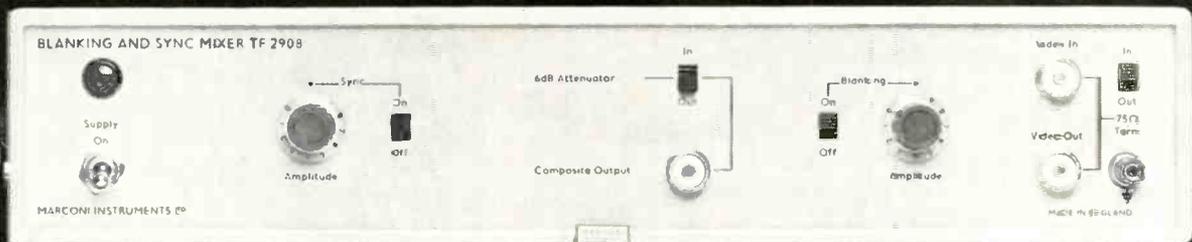
1015 Chestnut St., Burbank, Calif. 91502 • (213) 843-1200
Write Dept. BME 768 for Berkey-ColorTran's new 1968 catalog and price list.

A DIVISION OF
Berkey
Photo Inc.



a dynamic mixer

- Dynamic testing of video circuits
- Reshape blanking and sync pulse waveform and mix with video test waveform



Model TF 2908

The new Marconi Blanking and Sync. Mixer, Model TF2908 is designed for use in connection with external video and synchronizing pulse generators, providing a complete composite signal for performance measurements on TV studio and transmission equipment. Clamping equipment or dc restoring circuits are checked, under normal working conditions, by reshaping and mixing the incoming blanking and sync pulses with the video test signal, producing a correctly proportioned standard level output.

AVAILABLE UPON REQUEST

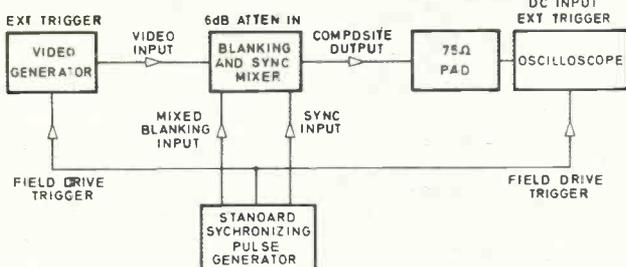
Television Transmission Test Equipment which details methods of TV measurements, and presents a new range of TV transmission measuring equipment available from Marconi Instruments.



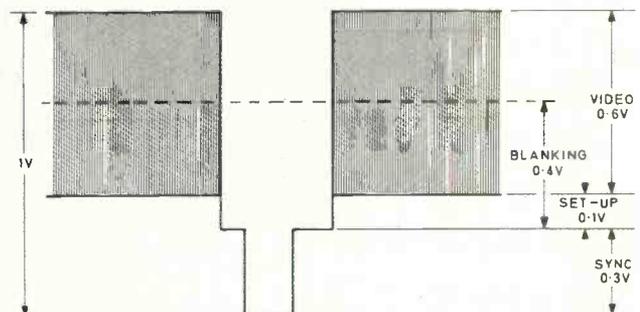
mi MARCONI INSTRUMENTS
DIVISION OF ENGLISH ELECTRIC CORPORATION

111 CEDAR LANE □ ENGLEWOOD, NEW JERSEY 07631
TELEPHONE: (201) 567-0607

709



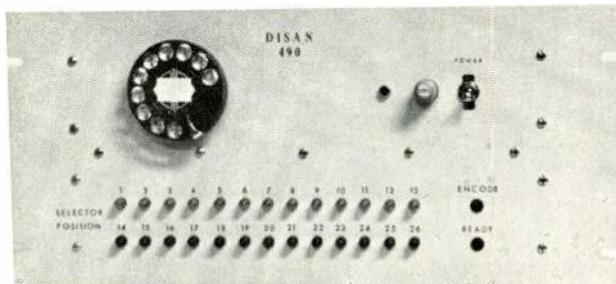
Equipment connections for setting up a standard level composite waveform.



Standard level composite waveform (attenuator in).

Circle 45 on Reader Service Card

THE 360 CARTRIDGE RANDOM ACCESS SELECTOR!



Disan HAS IT FIRST!

The "show stopper" at N.A.B.! Disan's revolutionary new model 490 random access selector.*

Days or minutes in advance you can program up to 360 cartridge selections simply by dialing them into the memory. The memory is then automatically interrogated and the cartridge position read on the light bank.

After programming the 490's memory, the operator simply places the memory in the 490 reader and starts the sequence. The cartridge will then be random selected in the desired sequence manually or by an automation system. In combination with existing carousel units or Disan's Random Cartridge Handlers (both utilizing standard cartridges), the 490 relieves the D.J. of having to handle cartridges.

* available singly or Disan can completely automate a station for under \$10,000. Complete AM-FM station equipment available from Disan.

immediately available through

VISTAS UNLIMITED INC.

1362 E. 43rd St. Tulsa, Oklahoma 74105 (918) RI 2-6663

Disan

ENGINEERING CORPORATION

Circle 46 on Reader Service Card

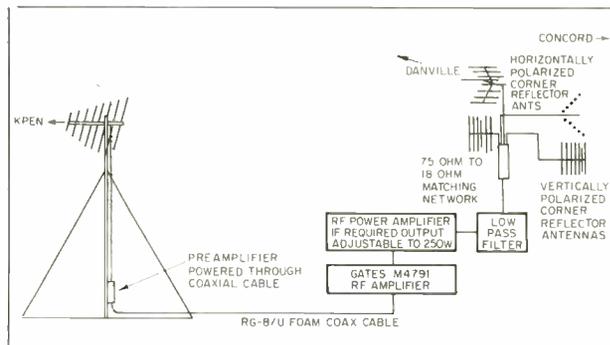


Fig. 6. Block diagram of the KPEN repeater system. High gain yagi stands on guyed, consumer-type antenna mast, not more than 35-ft high.

On-Channel Fm Booster

continued from page 45

listeners within the area. With the on-channel booster in operation, some listeners experienced multipathing. In every single complaint case the installation had a high-gain horizontally-polarized yagi. After a few experiments it was found best to polarize the on-channel booster entirely vertically. This provided a significant improvement in reception for fm sets without outside antennas. The plane polarized high-gain receiving antennas are 90° out of phase of the vertical signal radiated by KA2XTG and offer enough rejection that no further complaints were received. To date KPEN has 100 letters on file. Only two express degradation of service. This means 98 percent of the respondents received remarkably improved reception of KPEN. Fig. 6 is a block diagram of the KA2XTG system.

Summary

All information gathered during the first three months of on-air testing shows that the concept of on-channel retransmission is possible, economical, and reliable. After some initial and minor experimental difficulties, KA2XTG has been operat-

Equipment Costs

The equipment used for KA2XTG was designed by KPEN engineers to meet the requirements of an on-channel booster. With the exception of the directional antenna pattern, the equipment in use currently at KA2XTG could be used in any type of on-channel booster operation.

Receiving Antenna	\$ 15.00
Antenna Pre-amplifier	50.00
Transmitter	600.00
Transmitting Antenna	450.00
Transmission Lines (Helix)	100.00
Total	\$1215.00

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USE THE RCA-4536 IMAGE ORTHICON



The RCA-4536 Image Orthicon in the luminance channel of your TK-42 and TK-43 color cameras is the perfect companion tube for the RCA-4493, -4494 and -4495 Vidicons...designed specifically for RCA cameras and carefully quality-tested in the actual camera components.

The RCA-4536 gives a signal-to-noise-ratio 25% greater than the previous standard, 4492 Image Orthicon. The electronically-conducting glass target assures non-stick and anti-burn operation over a long operating life.

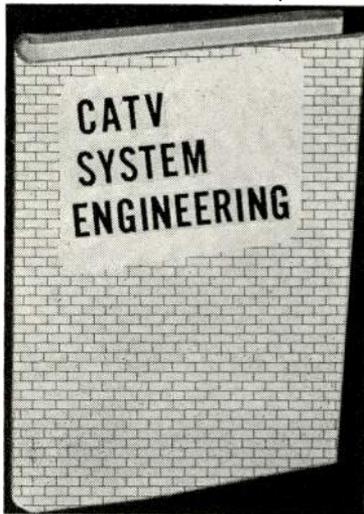
The RCA-4536 Image Orthicon assures the best color...the best in-studio service. Ask your RCA Broadcast Tube Representative about the RCA 4½" I.O. for TK-42 and TK-43 cameras.

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systems composed of uncorrelated components as well as a fully integrated systems with solid-state equipment.

The new Edition includes three new chapters on disadvantageous amplifier design concepts, high level distribution, and principles of cable powering, and shows how to modernize older systems using the new equipment available. Of invaluable aid to practicing engineers and serious technicians are two new Appendices on math and taps in 75-ohm systems, plus an expanded, 7-part Appendix of data and charts including additional information on such subjects as system derating accuracy of symmetrical attenuators, system levels for integrated systems, return loss vs db variation, and voltage drop in cable powering. All previous chapters have been revised and expanded to cover amplifier and system dynamic range, cascaded figure of merit, system operating levels, jumper cables, equalization and alignment and other vital subjects.

Containing only tested and proved information, "CATV System Engineering" is a must for every individual with an interest in day-to-day cable TV operation, as well as a handy reference volume of answers to the problems encountered almost daily in any system.

"CATV System Engineering" regularly sells for \$12.95. Through August 31st, however, the special NCTA Show price of only \$9.95 prevails. **NOTE: The coupon below must accompany your order to obtain this special discount.** Order at our risk for 10-days FREE examination. Simply fill in and mail NO-RISK coupon below for this helpful volume.

PARTIAL LIST OF CONTENTS

THE CATV SYSTEM: Functions and Purpose of CATV; System Performance Standards; Systems

HEAD-END CONCEPTS: Functions and Requirements of the Head End; Frequency Conversion; Remodulation; Strip Head-End and Antenna Preamplifiers

CATV AMPLIFIER CHARACTERISTICS: Amplifier Requirements; Equalization; Noise and Noise Figure; Distortion and Overload; Amplifier Dynamic Range; Cascaded Figure of Merit

CASCADED AMPLIFIER SYSTEMS: System Dynamic Range; Maximum Amplifier and System Gain; Optimum Spacing and Gain; Limitations of Spacing Theory; Determination of Optimum Spacing From Amplifier Measurements

PRACTICAL ASPECTS OF SPACING: Cost and Reliability; Transistors vs Tubes; Practical Limitations To System Length; Jumper Cables

SYSTEMS LEVEL, LEVEL DIAGRAMS, AND TILT: System Operating Level; Distribution Level Diagrams; Main Trunk Level Diagram and Tilt Modes

DISADVANTAGEOUS AMPLIFIER DESIGN CONCEPTS: The High-Gain Amplifier; Passive Equalizers and Attenuators

MATCHING AND REFLECTIONS: The Critical Cable Length; Worst-Case Design; Distribution; Directional Couplers and Their Use; Worst-Case Conditions; Dir. Couplers

HIGH-LEVEL DISTRIBUTION: Distribution Efficiency and Operating Level; Optimum Distribution Level and Level Diagram; Dual-Output Amplifiers and Cascading; Main-Trunk Derating With High Level Distribution

AMPLIFIER CONTROLS: The Need for Controls; Accuracy of Field Adjustments; Type and Action of Controls

AUTOMATIC CATV SYSTEMS: Reason for AGC in CATV Systems; AGC Concepts for CATV; Temperature Compensation; Automatic Spacing; CATV System Integration

PRINCIPLES OF CABLE POWERING: Methods of Powering CATV Systems; Loop Resistance and Drop Curves; Location and Spacing of Power Stations, Lightning and Surge Protection

TESTING CATV AMPLIFIERS: Equalization and Alignment; Gain Control and Tilt Compensation; Tests of Match and VSWR; Measurement of Noise Figure; Testing Distortion and Overload; Tests of AGC Performance; Temperature Correction and Automatic Spacing.

APPENDICES: Calculation of Cumulative Noise and Overload; Mathematical Derivation of Optimum Spacing; Taps in 75-ohm Systems; CATV Mathematics; Typical Equipment Specifications; Miscellaneous CATV Data & Charts; Literature and References. Index.

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ing continuously (as of Dec. 1, 1967) without a single problem of feedback, oscillation, or carrier instability. It has been monitored closely by high-fidelity experts and no degradation of signal quality has occurred. The basic project has approached a textbook case where every step has followed predictions.

It is our firm opinion that on-channel fm boosters can serve in a practical manner two basic purposes. First, they can successfully be used in place of translators, thereby providing more spectrum space, fewer allocation problems, and fewer political problems. In conjunction with or in place of translators the on-channel booster can provide many small communities with fm service they could not otherwise have. Second, on-channel boosters can be used to provide signal to areas within the theoretical primary contour of a station which because of terrain or other factors does not receive adequate signal from a station's main transmitter. By using an on-channel booster in this manner, a station is theoretically not adding to its coverage, but only filling in areas that should normally have coverage from the main transmitter. •

Leisure World CATV

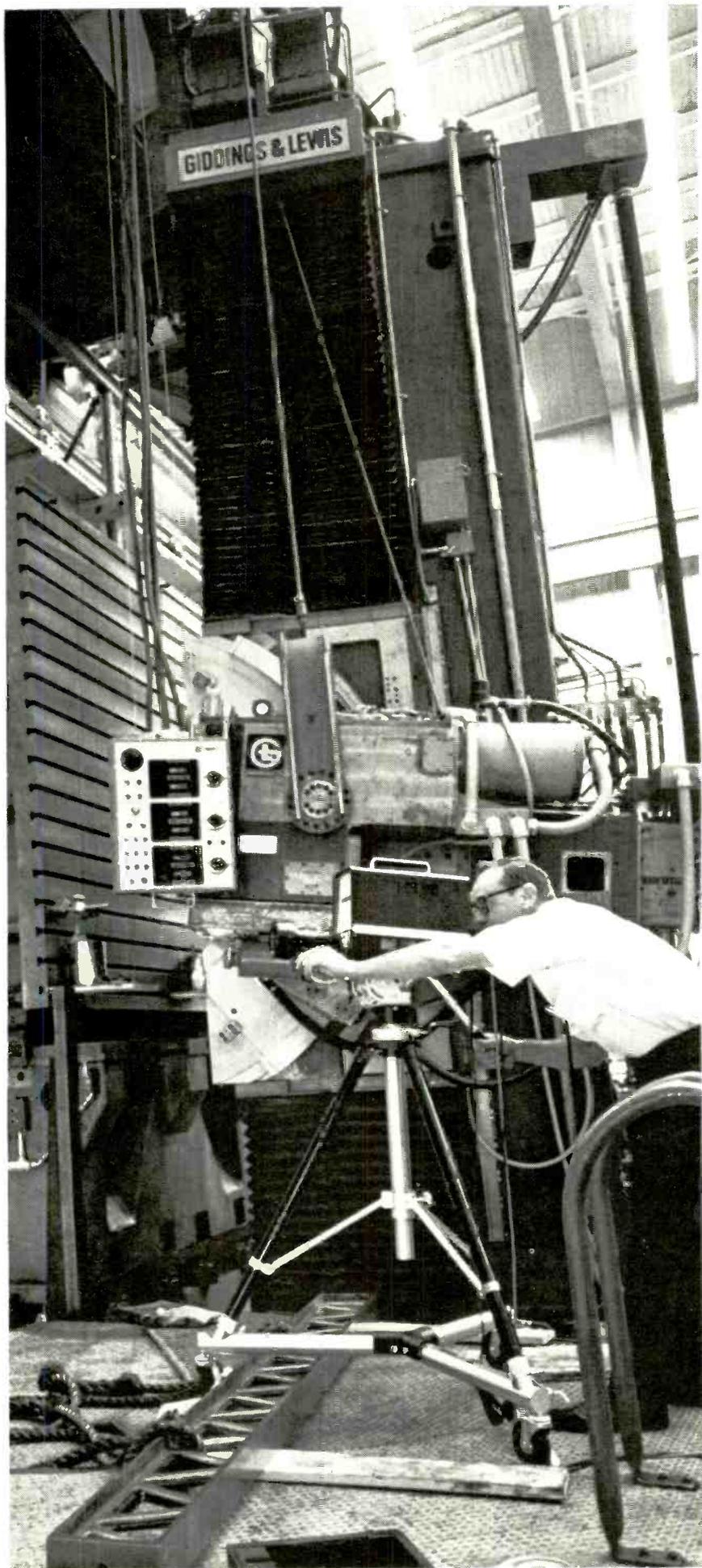
continued from page 26

activities and the surrounding area. Recently, for example, the station presented a live, half-hour telecast of the Leisure World Christmas Hobby Show, displaying the handicrafts produced by residents. Similarly, the station presents a daily sports show covering internal sports and activities, and a news program covering the local area.

Elizabeth Livingston estimates that 90 percent of the station's programming is of and about Leisure World residents. "But, this does not mean that we can be parochial in our broadcasts," she hastens to add. "Let's face it, these people are sharp, intelligent, successful individuals. In order to hold our viewers in the face of competition from seven Los Angeles commercial stations, and three in San Diego, we've got to present topical, interesting material."

As a result, channel 6 often carries material not normally seen on television, such as first-run drama presentations by local theatre groups, religious and political discussions more direct than normal, medical and cultural lectures, and a series on astrology and hypnosis. In many cases, the "stars" of these shows are Leisure World residents with expertise in a particular field. At other times, visiting experts are invited to make the presentation.

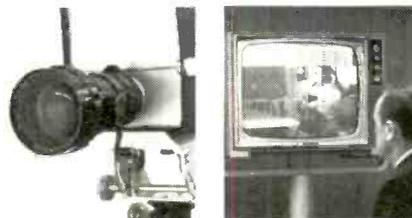
Judging from the response of CATV channel 6's audience, whatever Thom Keith and friends dream up is all right with them. As one elderly woman put it, "I can get involved with the channel 6 programs—they're for and about me. Yet, it's not hayseed stuff. It's very professional. My grandson would say it's 'groovy'. That's as good a description as any." •



How to train personnel with the new 3M 11:1 TV Zoom Lens

Training customers' personnel is just one reason Giddings & Lewis Machine Tool Co., a division of Giddings & Lewis, Inc., in Fond du Lac, Wisconsin, uses a new 3M 11:1 TV Zoom Lens. It also helps them with sales training, sales meetings and with recording service manuals on video tape.

Giddings & Lewis designs and builds numerically controlled machine tools for heavy industry. These tools, as big as a two story building, will be operated by personnel who must be trained.



G & L video tapes information about their products with a closed circuit television system. Taping is done right in the shop using available light. In turn these tapes are made available as instruction guides to companies buying the machine tools.

The 3M Zoom Lens allows a broad look at the huge machines, as well as closeups. At $f/2.2$, it allows use at low light levels. The focal length range of 11 to 1 (14 to 145mm) maintains excellent focus. And the lens' "C" mount will fit any Vidicon camera. The 3M 11:1 is American made, and available in motorized and manual models.

Discover what this remarkable lens can do for you. Write to R. V. Clapp, Product Sales Manager, 3M Wollensak Television Products, 3M Center, St. Paul, Minn. 55101.

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TELEVISION PRODUCTS

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LITERATURE of INTEREST

For additional data, circle number shown on Reader Service Card.

CCTV Plumbicon technical data, specifications, curves, comparisons with vidicons, etc. are attractively presented in 7-section comprehensive bulletin from Ampex. **150**
Silicon and Germanium transistors are the topic of a 40-page condensed catalog from Solitron Devices. **151**
Figure 8 telephone cable installation data is presented in Bulletin IP-100-4 from Anaconda Wire and Cable. **153**

THE LEADER IN CATV TOWERS

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Circle 49 on Reader Service Card

Ferrite material—K-940—magnetic characteristics are presented in data chart from Krystinel Corporation. **152**

Reducing splice for permanently joining strands of different diameters is illustrated in brochure from Preformed Line Products. **154**

Audio connectors; phone jacks; rf, y, microphone connectors; and ac receptacles are illustrated in catalog C-502a from Switchcraft. **155**

Contact resistance measuring device reprint is available in 7-page booklet from Cherry Electrical Products. **156**

"Color Photography Under Electric Lighting" is the title of an article presented in Engineering Bulletin 0-334 from Sylvania. Article discusses light source, color temperature, use of negative film, filters, film speed and exposure, incandescent and other lighting sources. **157**

Two-way radio base stations, ranging from desk-top to heavy-duty types, are illustrated in 6-page Brochure TIC 3252 from Motorola Communications & Electronics. **158**

"Power Amplifier/Switching Circuits Library" is a 120-page edition from Motorola, containing 18 sections devoted to designing with silicon with silicon power transistors. **159**

Fasteners are the topic of the latest catalog from Pan-L-Fast Systems. **160**

Art room cabinets, viewing tables and file cabinets are the topic of catalog 32A from Fastener Manufacturing Co. **161**

Instrument knobs with "custom look," in 1/2-, 3/4-, and 1-diameter sizes, are illustrated in Advance Manufacturing's Data Sheet SS-1A. **162**

Switching systems are the topic of a 28-page comprehensive booklet from Cohu. **163**

ITFS—Instructional Television Fixed Service—30-page progress report, published by the ITFS Committee for Central New York, outlines plans for a centralized 2500-MHz core facility, as well as the progress being made by the Central New York group. **164**

Dry-type transformers are illustrated and described in a 72-page catalog from Hevi-Duty Electric Division. **165**

Panel meters are the topic of a comprehensive 20-page catalog from Triplett Electrical Instrument. **166**

Flat directional couplers are presented in Data Sheet 12 from Narda Microline. **167**

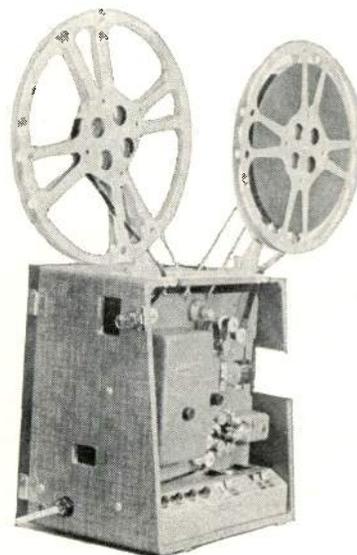
Heath's 1968, 167-page catalog illustrates products in 10 major categories, including color TV receivers and test instruments. **168**

Mercury plunger relays are the topic of Bulletin 12G from Ebert Electronics. **170**

Capacitors, filters and relays are described and tabulated in 120-page catalog from Cornell-Dubilier. Catalog also contains application charts, type selector charts and standard rating tables. **189**

IT'S A SPECIAL 16mm TV Projector

TO MEET THE NEED for Economical TV Distribution of 16mm Films in Schools, Broadcasting and Industry.



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SPECIAL because it is synchronized to the TV camera field rate and offers these important features:

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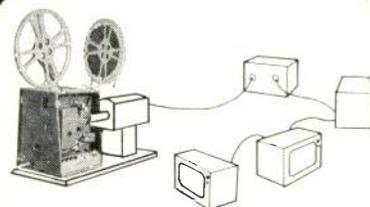


Illustration shows how simple it is to project 16mm films throughout a TV distribution system. Model STV-TB may also be used to project into an optical multiplexer or as a standard projector to preview film.

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All Electrodyne Input Modules share these features. Each are completely **interchangeable** and wire to the same plug. All provide isolated echo send output with independent level control. All draw less than 40MA at 24VDC and are available without input attenuators.

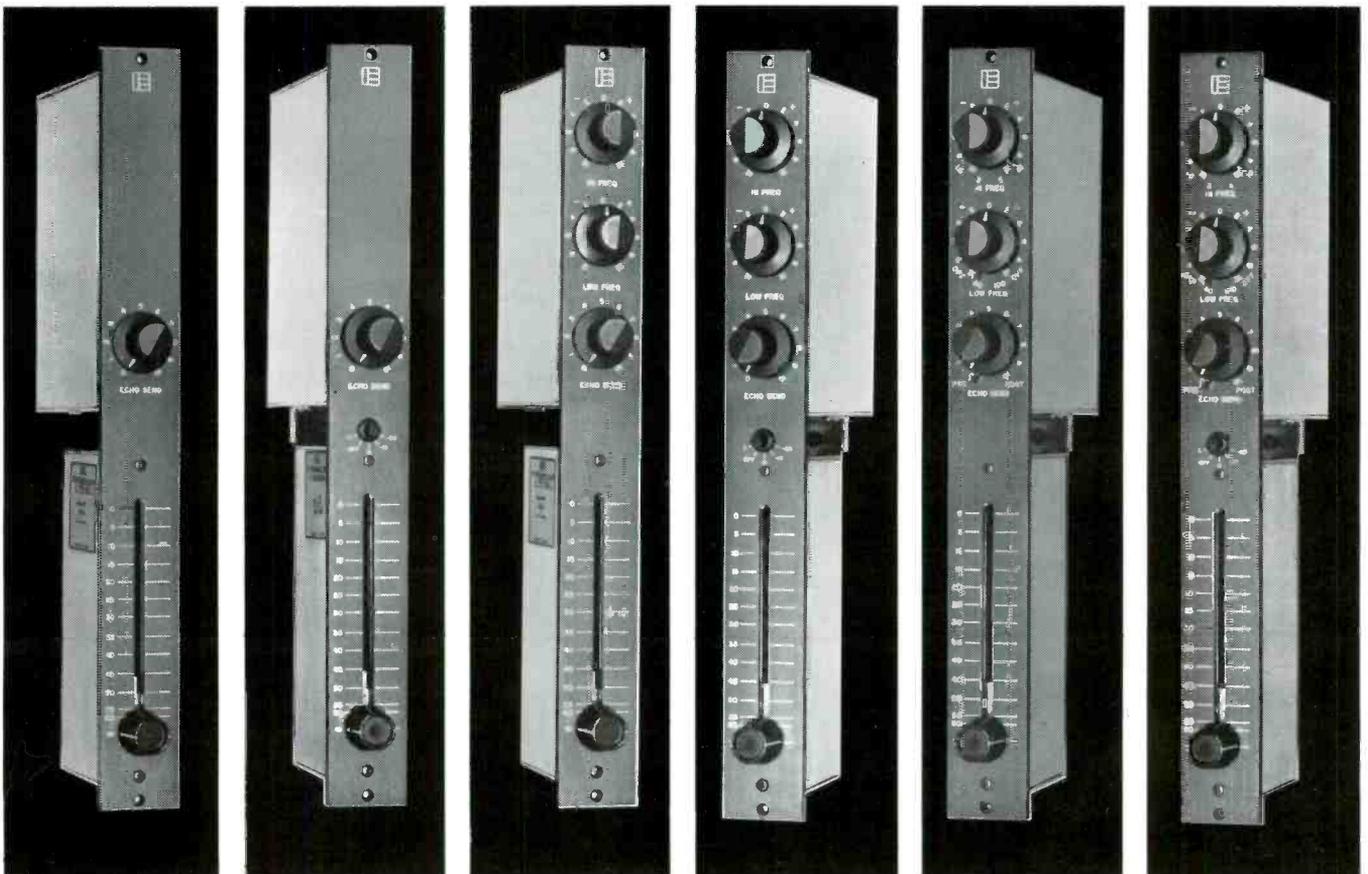
The 309L, 509L and 709L incorporate a low noise microphone pre-amplifier, an input switch for selection of line or microphone input, -10db and -20db to accommodate various microphone output levels.

Low frequency equalization point of the 409L and 509L is 100Hz and the high frequency point is 10kHz. Low frequency equal-

ization points of the 609L and 709L are selectable at 40 or 100Hz and the high frequency points are selectable at 1.5, 3, 5, or 10kHz.

The 609L and 709L have a coaxially mounted switch which selects echo send output from before the attenuator or after the program amplifier.

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microphone input.

409L
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equalization.

509L
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input, 2 frequency
equalization.

609L
Line level input,
6 frequency
equalization.

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input, 6 frequency
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Morning man for MOR midwest 5 kw—good on production—some TV also—right salary for right man. Send picture, resume and references to Box 768-11, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Wanted immediately—TV engineer, first phone required. Studio operation and maintenance. Write Chief Engineer, WILX-TV, 1510 Springport Road, Jackson, Michigan 49204, or call 517-783-2621.

Transmitter supervisor to install and maintain new remote RCA TTU 30. Apply to Wallace Provost, Chief Engineer, WREP-TV, 1168 Commonwealth Ave., Boston, Mass. 02134.

MOR PD, 10 thousand plus. Must be sharp administrator, creative spec prod. Group op. NY state. Box 768-3, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Openings—1st phone engineers experienced in maintenance, audio, videotape. Send resume, Chief Engineer, WGBH-TV, 125 Western Avenue, Boston.

HELP WANTED (Cont'd.)

First Class men, all levels, for maintenance only. No mike work. If you have experience we will pay for it. If you need experience we will train you. Pleasant operation. East Coast. Box 768-12, c/o BM/E, Blue Ridge Summit, Pa. 17214.

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Opening for 1st Class studio engineer. Color experience desirable, but will consider aggressive learner. Call or write Arthur Bone, WJRT-TV, P.O. Box 12, Flint, Michigan. 313/239-6611.

Very successful local AM/FM wants another good salesman, send brief resume and photograph: WING. Sag Harbor, Long Island, New York.

POSITIONS WANTED

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Versatile DJ-Announcer-Newscaster. Recent graduate broadcasting school. Tight board. 3rd endorsed. Married. Prefer Northeast. Box 768-10, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Negro announcer—dependable—experienced. Reliable—can work any type station. Third endorsed. Box 768-15, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Announcer with one year's experience wishes to relocate in east. M.O.R. 3rd endorsed. Dennis Egan. 860 Sutter Street, San Francisco, Calif.

Authoritative newscaster DJ, announcer third class ticket, non-floater, family man. Jazz or popular music. Box 768-16, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Soul jock—3rd endorsed, tight board. Draft exempted. College training, relocate. Box 768-17 c/o BM/E, Blue Ridge Summit, Pa. 17214.

Soul R&B, top 40 dj—Needs start—authoritative news—excellent commercials—third endorsed. Clarence Collins, Box 5627, Chicago, ILL 60680.

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Radio school grad, 24. knowledge of sales and sports. Anywhere east of Mississippi. Box 768-18 c/o BM/E, Blue Ridge Summit, Pa. 17214.

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BC 5 P Gates 5 KW tuned 600, high altitude blowers, now operating, new oil-type transformer, limiter, 3 Austin ring transformers 3.6 KW, 2 beacons, 2 three hundred foot towers guyed, 101 operating, 12 sheets new copper screen, 1,000 lbs new copper strap and number 8 wire, 2 tuning houses. Moving new location. Early availability. KCLS, Box 640, Flagstaff, Arizona.

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Equipment for sale: Tape-Athon tape machine, Seeburg 200's, 8000 45RPM records, files, cabinets, cartridge machines, PA speakers, FM amplifiers. Ideal situation for background music operation. Ferrari Incorporated, 678 North Dearborn, Chicago. 642-8162.

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RCA TTU-1B transmitter with spare parts, \$15,500.00. Color corrected and presently tuned to channel 33. Good condition, also available one RCA channel 33 filterplexer. Contact David Boyer, WICD-TV, 17 E. University Ave., Champaign, Illinois 61820.

Largest supply of G.E. & Motorola radio and mobile telephone equip. in the U.S. (30-50), (150-174), (450-470), Base, repeater, and dial equip. Dealers invited. Western Mobile Telephone Company, 200 South Anaheim Blvd., Anaheim, Calif. (714) 774-0520.

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Brand new remote amplifiers, 2 channel remote microphone amplifiers, 2 1/2 inch VU, battery operated, 7 transistors \$95.00 FOB Kokomo. GREDCO, INC., 1830 S. Webster, Kokomo, Ind. 46901. Area 317-883-5688.

Used Mylar Tapes—1800 foot. Minimum order 10 tapes—70¢ each. 100 tapes 50¢ each. Money refunded if not satisfied. Send check to Tape Duplicating, 4041 Central, Kansas City, Missouri 64111.

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ADVERTISERS' INDEX

Advance Industries	76	International Video Corp.	52, 53, 54
Altec Lansing, a Div. of LTV Ling Altec, Inc.	63	Jampro Antenna Co.	58
*American Electronic Laboratories, Inc.	19	Jerrold Electronics Corp.	13
*Ampex Corp.	46, 47	Kalart Co., The	70
Anaconda Wire & Cable Co.	51	Lang Electronics, Inc.	55
Ball Brothers Research Corp.	17	McMartin Industries, Inc.	10, 11
Belar Laboratories, Inc.	18	*Marconi Instruments Div. of English Electric Corp.	65
Berkey-ColorTran, Inc.	64	Microwave Associates	7
Boston Insulated Wire & Cable Co.	62	3M Co., Wollensak Television Products .	69
Broadcast Electronics, Inc.	57, 60	National Alliance for Business	72
*CBS Laboratories, A Div. of Columbia Broadcasting System, Inc.	5	RCA Electronic Components	50, 67
*Charles Machine Works, Inc.	59	*Riker Video Industries	Cover 2
Cleveland Institute of Electronics	61	Roanwell Inc.	48
Crown International	58	*Rohde & Schwarz	15
*Disan Engineering Corp.	66	Rohn	20
Dynair Electronics, Inc.	9	Russco Electronics Mfg.	55
*Economy Finance, Communications Finance Div.	55, 57	Rust Corp.	64
Electrodyne Corp.	71	Sitco Antennas	76
Fairchild Recording Equipment Co.	60	*Sony Corp. of America, Industrial Div.	Cover 4
Filmline Corp.	12	*Sparta Electronics Corp.	57
Fort Worth Tower Co., Inc.	70	Superior Continental Corp.	34, 35
Gates Radio Co., A Sub. of Harris- Intertype Corp.	56	TAB Books	68
Granger Associates	14	Tektronix Inc.	28
International Nuclear Corp.	Cover 3	*TeleMation, Inc.	3
		Television Presentations, Inc.	36
		*Video Instrument Corp.	75

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FROM THE EDITOR

Reward Local Programming Effort

Furor over the propriety of FCC Commissioners' Cox and Johnson survey of Oklahoma broadcasters has drowned out the message. But it is there. In a 308-page report, Cox and Johnson say that the local service concept of broadcasting is mostly myth, and definitely so in Oklahoma. The two have labeled the FCC renewal policy a sham in that engineering and financial deficiencies revealed by renewal applications are a cause for delaying a grant but not programming deficiencies. Recently Cox and Johnson urged a motion that would defer renewals for further inquiry if the renewal application proposed less than five percent news, one percent public affairs and five percent other. The motion was defeated 4-2, Commissioner Wadsworth being absent.

Broadcasters are now protected from competition such as CATV, pay TV, and seek protection from direct satellite to home transmission on the theory that, if otherwise, local service and local expression would be lost. In the light of the lack of local community service rendered by broadcasters, this protection is unjust.

Many thoughtful broadcasters have urged that their associates improve local service as the best defense against those who would change our current system. We heartily agree with this advice.

We also heartily endorse CATV operators doing local origination and thereby affording the opportunity for local expression to the local community.

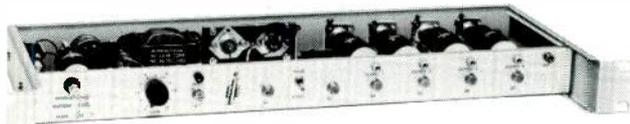
Free TV that is only entertainment is not worthy of protection against competition. Most of us are accustomed to paying for local newspapers. We should have the opportunity of paying for a TV service that reports or gives voice to the local community. CATV can do this in the markets smaller than the top 100 and it can do it for suburbs and metro neighborhoods within the top 100. It may be the only logical means of offering local expression opportunities.

The FCC's right to regulate CATV is now assured by the Supreme Court's recent decision. If local expression, as envisioned by the Communications Act, is important, it would seem that cable systems within the top 100 markets ought to get consideration to import distant signals if they also offer local news and programming.

Such a reward as proposed for CATVers should also be available to broadcasters. If there is no penalty for not providing local news and local expression, there should be a reward. This might take the form of awarding extra channels (limited power and pattern) to hometown broadcasters to present alternative programs. Instead of the FCC being so determined of preventing monopoly of media why not give broadcasters a chance where possible, to do more varied programming? We're sure news staffs can fill more time slots.

James A. Lippke

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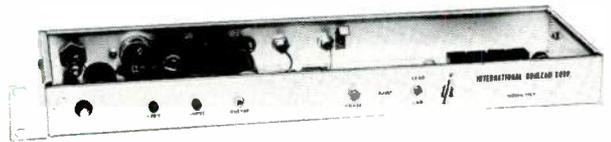
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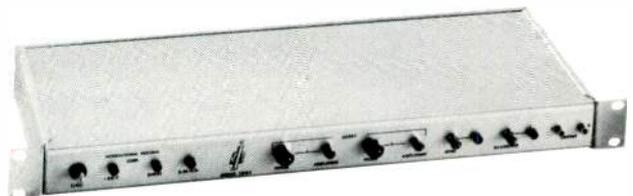
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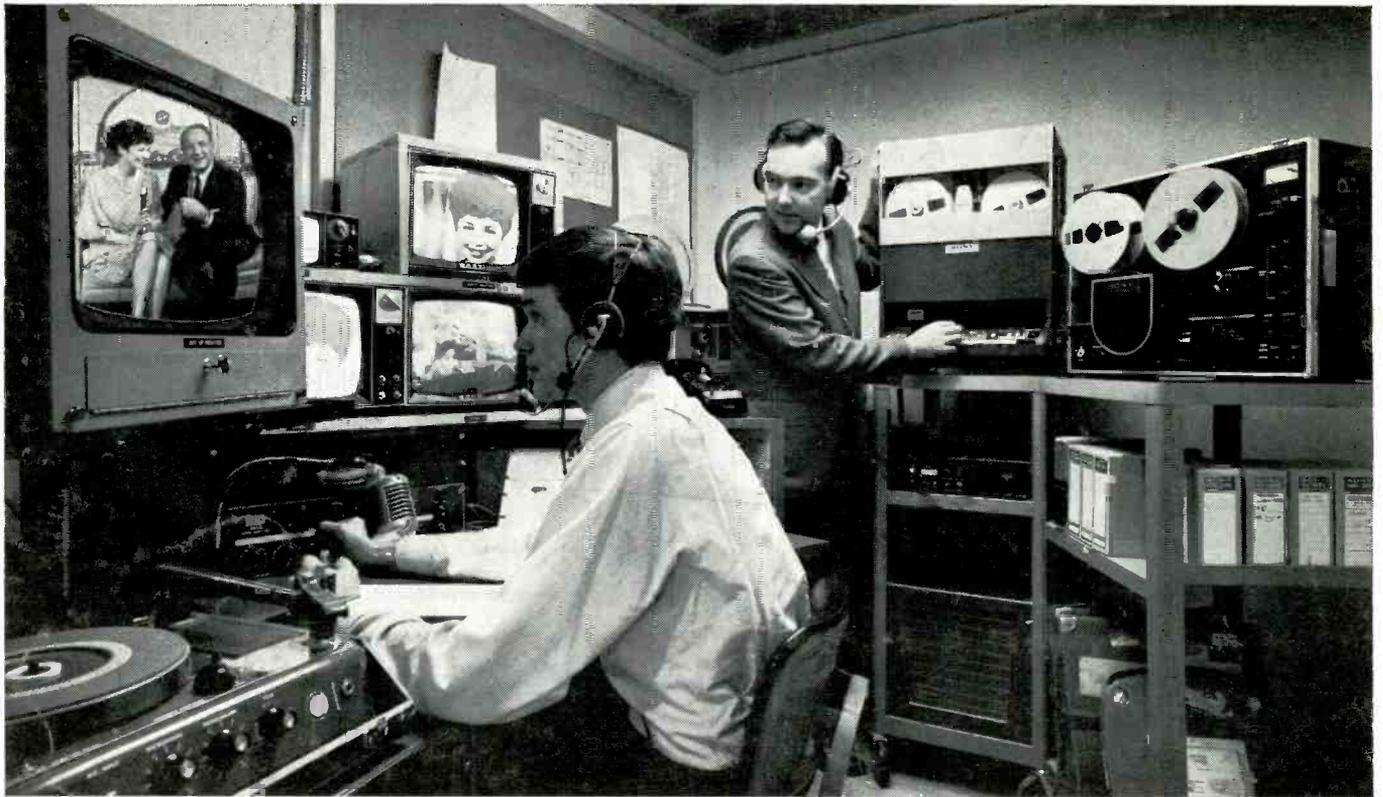
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