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CABLECASTING

Cable TV Engineering



The official journal of the
SOCIETY OF CABLE TELEVISION ENGINEERS



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Technical Manpower Needs in the Cable Television Industry

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PEOPLE IN THE NEWS



LYNN I. DECKER has been appointed Vice President—Engineering and Development for Suburban Cablevision, Inc. Mr. Decker, a former career officer in the U.S. Coast Guard, was in charge of all Coast Guard electronic schools from 1956 to 1960 and served as liaison to NATO countries involved in establishing the European electronic navigation system,

LORAN. He has also been involved in a \$10 million project to establish an experimental communications satellite station in Australia.

Mr. Decker is a member of the IEEE and the Society of Cable Television Engineers.

PERRY L. SCHWARTZ has been named Director of Engineering for Gridtronics, Inc., a subsidiary of TeleVision Communications Corp. Prior to joining Gridtronics, Mr. Schwartz owned and operated Monmouth Communications Systems, a CATV consulting firm. Previous to that, he was manager of systems construction for RCA Cable Systems. Mr. Schwartz was also, at one time, an adjunct lecturer in the Electrical Engineering Dept. of the School of Engineering of the City College of New York. He is a

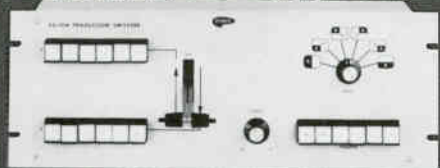
senior member of the IEEE and a licensed consultant in Canada.



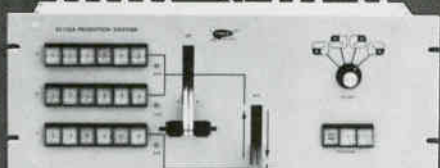
JAMES R. OLDHAM is now Chief Engineer of Multiview Cable Co., operator of five cable television systems in Harford County, Maryland.



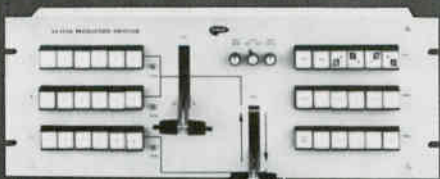
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For complete details, contact:

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Blonder-Tongue Laboratories, Inc., One Jake Brown
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Copper Clad Alum For LVO Cable

Five years operating experience of a major cable TV system owner-builder has proven the capabilities of copper clad aluminum coaxial cable. Especially noteworthy is that during the five-year period LVO Cable, Inc., had no requirement for additional power supplies. This was a surprising discovery inasmuch as aluminum in the core of the copper clad conductor is known to increase loop resistance.

LVO Cable is one of the larger cable TV system owner-builders with systems in ten states serving over 85,000 subscribers.

The company turned to copper clad aluminum coaxial cable back in 1966 when it was first available in limited quantities. At that time, LVOC knew very little about copper clad aluminum. In fact, they had hardly heard of it. But a cable supplier recommended it as electrically equivalent to conventional copper coaxial cable, yet at less cost. So they gave it a try.

According to LVOC's Chief Engineer Richard Schneider, "We changed over because copper clad costs less than copper and has all the advantages of copper." Their first installation was on a 32-mile leg of a system at Grand Junction, Colorado. Because of the distances involved, LVOC used 1 1/4" cable with copper clad center conductor for the one leg and 1" cable with copper clad center conductor for the rest of the 32 miles. Success of that first effort prompted LVCO to make copper clad aluminum standard for all their systems. Although the first system was in 1 1/4" cable, remaining systems use copper clad in common .750", .500" and .412" sizes.

LVCO installed over 100 miles of copper clad in these three sizes in Santa Fe, N.M., a system just completed. The system is completely copper clad. So are LVOC systems at Effingham, Ill., East Lansing, Mich., and a rebuild job in Tyler, Texas. During the last few years, LVOC has also purchased a couple of turnkey systems from Jerrold Electronics Corp. for Galesburg and Monmouth, Illinois. Although

inum Proves Out

LVOC did not specifically ask for copper clad aluminum for these systems—they were purchased to performance specifications at a bid price—these systems are also wired with copper clad aluminum cable.

Long Record of Reliability

Overall, LVOC has found copper clad aluminum performs exactly like copper in service. "We know this because we not only check RF attenuation at every amplifier location when the system is installed, we keep a running log book on every amplifier on a continuous basis. Our tests show that copper clad cable had identical attenuation characteristics to copper.

"What is important is its reliability. The longest records we have come from Grand Junction. During this time we have seen no deterioration of performance at all. Copper clad performs exactly like copper. Our instruments, in fact, can't tell the difference between copper clad and copper," says Mr. Schneider.

This identical performance between the two materials—despite the lower theoretical conductivity of aluminum in the core—is due to the "skin effect" that takes place in transmission of high frequency signals. At cable TV transmission frequencies, the signals actually are concentrated on the surface of the conductor wire. The higher the frequency, the smaller the surface volume involved in conduction. Therefore, only a skin of high conductivity metal is required to achieve full conducting capability for cable TV signals. In other words, the copper in the center of the conductor is literally a waste. Copper clad aluminum conductor material takes advantage of this fact to provide a more economical material designed specifically for the job.

The center conductor for the new cable was developed by Texas Instruments Inc., Metallurgical

MEANWHILE... BACK AT THE LAB!

Blonder-Tongue FSM-2 does the harder signal-measuring jobs you run into in system design and signal strength surveys. Typical accuracy in VHF use is ± 0.75 ; ± 1.5 dB for UHF. It's even extendable down to 5 MHz or from 220 to 280 MHz by means of optional available accessory converters. For bench or lab use, the FSM-2 operates from standard 120 volt AC power source so there's no need to use up battery power. A wide-view taut-band-meter movement and an all-new attenuator switch simplify and speed readings. A 300/75 ohm UHF/VHF Balun is supplied at no cost to cover all input cable possibilities and you can select average or peak readings by flicking a switch on the front panel. Completely shielded for operation in strong electromagnetic fields and filtered to reduce power-line signal pick-up, the state-of-the-art FSM-2 Field Strength Meter comes with its own removable dust cover with safety lock. When closed, it automatically turns off power to the entire unit. In field use, its built-in DC regulator provides up to 50% longer battery life. A DC output jack and Modulation Out jack let you take field-strength surveys, loss and gain measurements, percent modulation tests or make MATV/CATV maintenance checks accurately and dependably.

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Materials Division, Attleboro, Mass., to provide highly efficient RF transmission with a surface of copper, and lower costs with an aluminum core. It has been available in commercial quantities from several cable manufacturers for about three years.

No Extra Power Supplies

The only electrical difference between the two cable materials is in conduction of current to power the amplifiers in a cable TV system. Because conduction of this current takes place across the entire cross section of the center conductor, the aluminum core of the copper clad conductor increases loop resistance. Theoretically, this could lead to a requirement for additional power supplies in a system to make up for power loss. LVOC's experience, however, doesn't bear this out.

"In real life, it just doesn't turn out that way," Mr. Schneider said. "Location of power supplies is almost never at maximum spacing because the system must fit into the real geography of the area. The system designer is faced with poles and houses in established locations and he lays out his power supplies in the most logical manner based on these conditions. He winds up spacing them closer than the theoretical maximum leaving ample power for use of copper clad aluminum cable."

In fact, Mr. Schneider reports that in all of the systems LVOC designed, use of copper clad aluminum

instead of copper did not result in the need for even one additional power supply. "There's really no difference in designing a system with copper clad compared to copper. We lay out our system, locate the amplifier cascades, pick the logical sites for power supplies and then check the voltage margin for use of copper clad aluminum. I'm sure there must be an occasional special situation where an additional power supply or two might be required, but we haven't run into one," he said.

Installation Experience

LVOC has found no difference in installation of copper clad aluminum compared to copper. The company uses all the same connectors and construction practices with copper clad as it did formerly with copper. If anything, copper clad aluminum cable is a little lighter so it might make construction a little faster. But the difference is not significant.

At Grand Junction, LVOC was concerned about use of a screw type connector which attaches to the center conductor by actually screwing onto it. This type of connector machines away copper from the surface of the conductor wire and LVOC was afraid it might cause transmission problems with copper clad. But none developed. Subsequently, LVO Cable has used screw type connectors on copper clad cable in many installations and consistently finds that a high quality connection results, with no deterioration of signals.

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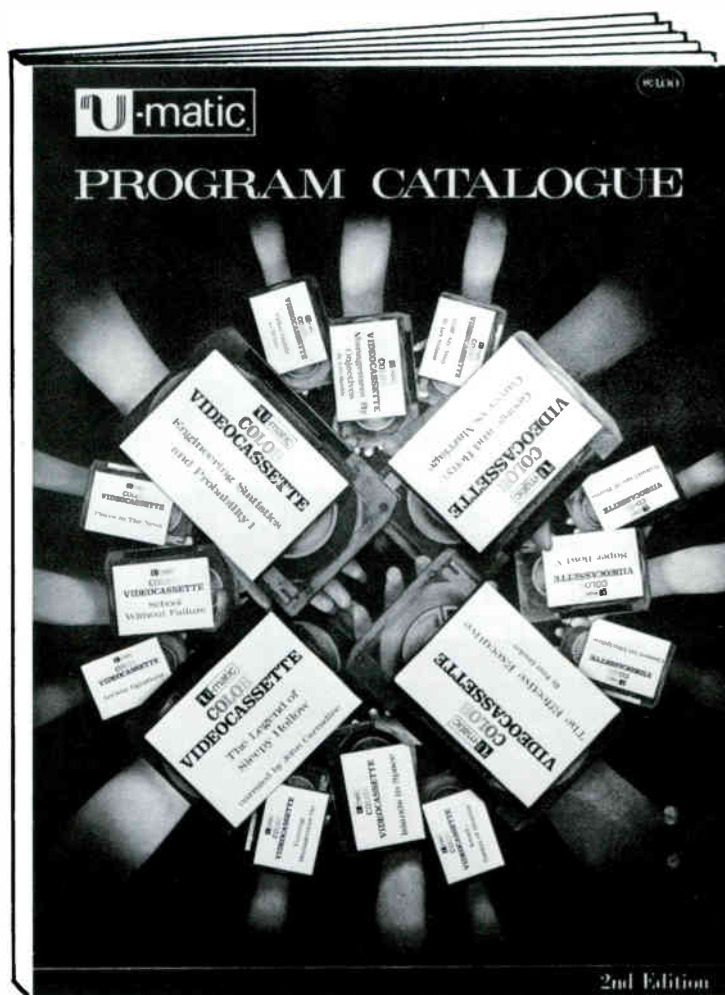
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Technical Manpower Needs in the Cable Television Industry

By Edward J. Roth, consultant
Dept. of Commerce, Office of Telecommunications

The U.S. Office of Telecommunications in the Dept. of Commerce recently set out to determine what are the engineering and technical manpower requirements of the rapidly expanding cable television industry. The ultimate goal is to develop a joint Government-CATV Industry plan of assistance to the unemployed engineer and technician of the aerospace and related industries and to the vast group of discharged technically trained members of the armed forces..

The cable industry was selected because of its growth potential and because authorities in the industry believe there is a serious shortage of trained and qualified engineers and technicians. As an example to demonstrate the seriousness of this shortage, the National Cable Television Association recently pleaded with the Federal Communications Commission for an extension of its December 31, 1972, deadline for the beginning of system performance tests, stating there are only 100 persons presently qualified to do the work—this would take them almost 27 years to complete!

An ad hoc group was formed in March of 1972 for the purpose of exploring what, if any, opportunities for employment exist in the developing cable industry for the many thousands of engineers and technicians made idle by a combination of a general

Note: The terms "engineer" and "technician" can cause confusion when related to the cable industry. In some systems or firms the General Manager or other executive is also the "engineer" or "technician," in others, mostly the larger systems, the category is more clearly defined, and in medium-sized systems the terms are interchanged. While significant differences exist between the professional engineer and the technician, in this report the categories have been joined together to mean any employee who has responsibility for any technical, mechanical, or engineering job performance in any system or firm.

business decline and a change in national priorities. This group was composed of the following professional associations and the Office of Telecommunications, U.S. Department of Commerce:

National Cable Television Association
(Delmer Ports, Vice President, Engineering)
Institute of Electrical and Electronic Engineers
(Joseph Casey, New York)
(Ralph Clark, Washington)
American Institute of Aeronautics and
Astronautics
(James Harford, Executive Director)
National Society of Professional Engineers
(Paul Robbins, Executive Director)
Electronic Industries Association
(John Sodolski, Vice President, Communications
and Industrial Electronics Division)

A survey, the first of its kind, has been conducted by OT-DOC and the National Cable Television Association, with assistance and advice from IEEE, NSPE, EIA, and AIAA, to determine what are the manpower requirements of the cable television industry. The survey was conducted simultaneously in the three sections of the industry: the cable systems operation section; the construction of cable systems section; and the manufacturing of cable and equipment section. This census survey of the cable industry had a limited intent: to query the three identifiable parts of the cable industry about their views relating to manpower requirements.

There has been an approximate 19% response from cable systems operation; 10% from construction; and 10% from manufacturing. These data reveal there are substantial employment opportunities now available.

Assumptions Underlying Forecasts

All attempts to forecast future manpower requirements for any industry carry with them considerable risk and for obvious reasons. This is particularly true of the relatively disorganized cable television industry wherein there is very little historical data to use as a guide. Moreover, even though CATV has been around for over 20 years it remains an infant, and we know from experience infants do not always grow and develop as one would anticipate or hope.

Therefore, given the basic assumption the economy will continue to expand to a forecast GNP of nearly two trillion by 1980, there are three basic assumptions underlying the forecasts in this report. They are:

1. that the FCC will continue to foster the growth and development of cable television by not imposing additional restraints on the industry, particularly in matters relating to distant signals, sports coverage and subscription television,
2. that the Congress will enact a copyright bill which will resolve the long controversy between broadcasters, motion picture producers and distributors and the cable system entrepreneur, and
3. that the respondents to the survey reflect the status of the entire industry today, including its predictions for the future, at least to the degree where the following forecasts can be reasonably made.

Main Findings

Cable Systems Owner/Operator

- (a) The 448 cable system operators whose responses were used (out of 470 who responded) predict an expansion of their engineering and technical manpower requirements of 70% by 1973 and 199% by 1977.
- (b) The 448 cable system companies have 238 jobs open now and within the next six months will have an additional 1847 jobs open.

(c) There are from 7000 to 8000 engineers and technicians employed in the cable systems operation section of the industry.

(d) There are from 1000 to 15000 jobs open now in the cable systems side of the industry.

(e) During the following 15 months there is expected to be an additional pool of job openings ranging from 3000 to 4000.

(f) Between the period 1972 to 1977 it is anticipated there will be from 15,000 to 29,000 new jobs opening in the cable systems operation section of the industry.

CATV Construction

(a) The ten major cable construction firms predict an expansion of their engineering and technical manpower requirements of 41% by 1973 and 349% by 1977.

(b) The ten construction firms have 113 jobs open now and within the next six months will have an additional 136 jobs open.

(c) It is estimated there are from 565 to 1130 jobs open now in the cable construction industry.

(d) During the following 15 months there is expected to be an additional pool of job openings ranging from 669 to 1338 in the cable construction industry.

(e) Between the period 1972 to 1977 it is anticipated there will be from 10,500 to 21,000 new jobs opening in the cable construction industry.

Cable and Equipment Manufacturing

(a) Ten cable and equipment manufacturing firms predict an expansion of their engineering and technical manpower requirements of 97% by 1973 and 328% by 1977.

(b) The ten manufacturing firms have 27 jobs open now and within the next six months will have an additional 168 jobs open.

(c) It is estimated there are from 135 to 270 jobs open now in the cable and equipment manufacturing industry.

	<u>Cable Systems Owner/Operator</u>	<u>CATV Construction</u>	<u>Cable and Equipment Manufacturing</u>
Now	1000-1500	565-1130	135-270
By 1977	3000-4000	669-1338	835-1670
Range of New Job Openings 1972-1977	15,000-29,000	10,500-21,000	3275-6550
Totals	19,000-34,500	11,734-23,468	4245-8490

(d) During the following 15 months there is expected to be an additional pool of job openings ranging from 835 to 1670 in the cable and equipment manufacturing industry.

(e) Between the period 1972 to 1977 it is anticipated there will be from 3275 to 6550 new jobs opening in the cable and equipment manufacturing industry.

Thus, it is estimated that taking the entire cable industry as one entity, the range of new jobs opening in the industry during the period 1972 to 1977 is from 35,000 to 62,000. Based upon the data received these must be considered to be conservative estimates.

Job Specifications and Training

1. Cable Systems Owner/Operator

(a) The 448 respondents favor on-the-job training programs by 80% and classroom teaching by 20% for the eight positions listed.

(b) Educational background and previous experience are clearly recognized but not to the extent they are in the construction and manufacturing industries. In the more senior positions a man with an E.E. plus five years experience and a man with an E.E. and no experience is recommended. The pattern is somewhat consistent, for in the other positions a technology school graduate is recommended over the high school graduate with four years of technical experience.

(c) Thirty one other job titles were submitted which were different than the eight most generally used in the industry.

2. CATV Construction

(a) The ten respondents favor on-the-job training programs by 70% and classroom teaching by 30% for the 19 positions listed.

(b) Educational background and previous experience are considered more important in the cable construction industry than the cable systems operation area. The man with an E.E. and five years experience at one level and the man with two to four years of technology school education at another level are clearly preferred.

(c) Seven other job titles were submitted which were different than the 19 most generally used in the cable construction industry.

3. Cable and Equipment Manufacturing

(a) The ten respondents favor on-the-job training programs by 92% and classroom teaching by 8% for the 18 positions listed.

(b) Educational background and previous experience are considered to be of prime importance in the manufacturing industry. The importance of a man with an E.E. and five years experience is very clearly indicated. For other level positions the two to four year technology school graduate is in demand.

(c) Only one other job title was submitted which was different than the 18 most generally used in the cable and equipment manufacturing industry.

Recommendations

As the establishment of a retraining and training program is a time consuming process covering a span of several months and would probably involve other government agencies, the NCTA and other professional engineering organizations, it is recommended that preliminary steps be taken immediately to begin such a program.

This prompts the recommendation that the government fund a technical manpower retraining and training program to bring the badly needed new technical

Main Findings: A Profile of the 448 Cable Systems Owner/Operators

(1) Number of subscribers	2,083,926
(2) Number of miles	48,751
(3) Average subscribers per mile	42.7
(4) Technicians employed now	2,973
(5) Job openings now	238
(6) 1973 employment projection	1,847
(7) 1977 employment projection	3,839
(8) Technical employees per system	6.6
(9) Percentage jobs open per system	.53%
(10) Number of technicians to employ in 1973 projection per system	4.1
(11) Number of technicians to employ in 1977 projection per system	8.5
(12) Average miles of cable per system	108.8
(13) Average number of subscribers per system	4,651

people into this exciting industry. The U.S. Department of Labor considers the national problem of unemployment to be serious enough to cause it to function, as required, on a one-to-one basis to assist the unemployed. The attached evidence demonstrates there are jobs open at the present time in the CATV industry. Many more openings are anticipated, particularly in the top 100 markets where CATV has yet to arrive. It is in the national interest, therefore, that some type of government program be approved to bring unemployed engineers and technicians into the cable industry.

The U.S. Department of Labor has agreed to permit the cable television job specifications and related data to be inserted into its vast computer job/match system in Sacramento, California. This represents a unique opportunity for a cooperative effort by government and industry to bring together highly trained and skilled, but unemployed, engineers and, for the first time in the National Registry for Engineers and Scientists, technicians with job openings in the

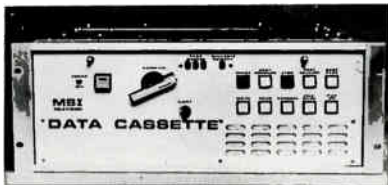
cable industry. The DOL should be encouraged to participate in a program to assist the CATV Industry to meet its manpower needs. (The Teleprompter Corporation and Sterling Manhattan Cable have agreed to participate in the NRES project. Both await further information and advice.)

As a matter of priority, OT-DOC should assist the NCTA, to the extent it can and is requested, and the NCTA Engineering Advisory Committee to re-write, as needed, cable TV job specifications so they may be utilized by the NRES at the earliest possible time.

Now that a data base has been created, further research into the problem of manpower requirements for the entire cable industry is needed. A survey should be made to determine the capacity, in terms of classroom facilities, equipment and faculty, of the technology and trade-school level institutions in the country to determine whether they are presently capable of handling the task of retraining engineers and technicians for the cable industry.

NEW PRODUCTS

EXPANDED MEMORY CHARACTER GENERATOR



MSI Television (4788 South State St., Salt Lake City, UT 84107) has introduced a computer type memory character generator. The Model DCM-1 Data Cassette Memory system includes a 250 page or title memory, full keyboard edit capability, numerical readout for page identification, automatic sequential and semi-random access, and computer grade tape storage. This unit interfaces with the MSI production titler.

NEW DROP CABLES

The Belden Corp. (P.O. Box 5070A, Chicago, IL 60680) has available two new CATV drop cables featuring aluminum braid shields. In addition to this type of shield, types 9242 and 9243 59U cables offer a second shield of Duo-foil aluminum film-foil laminate.

The insulation is cellular virgin polyethylene; jackets are black vinyl. Standard spool lengths are 500, 1000 and 2000 feet. Belden 9242 has a 22 awg solid bare Copperweld center conductor and nominal attenuation of from 1.9 dB at 50 mHz to 9 dB at 900 mHz per 100 feet. Belden 9243 has a 20 awg Copperweld conductor with lower attenuation.

PORTABLE FIELD STRENGTH METER



Blonder-Tongue Laboratories (1 Jake Brown Road, Old Bridge, N.J.) is now producing a new solid-

state portable field strength meter that weighs less than 4½ pounds. The FSM-4 includes separate VHF and UHF tuners, with accurate signal strength readings in dBmV and microvolts from 10 to 100,000 microvolts on a large scale suspension meter. The unit has gold-plated calibrated attenuator switches and an audio output jack. It operates on four standard 9-volt batteries. Accuracy of VHF readings is said to be ± 3dB and ± 4 dB for UHF.

FM COUPLER



The Magnavox Co. (133 W. Seneca St., Manlius, N.Y. 13104) has released an upgraded version of its Model 95 FM coupler. Chiefly, the input-to-output bandwidth has been increased for 5-300 mHz use. VHF rejection on the FM tap is said to be 25 dB and thru-loss is negligible. The unit has a fully-shielded metal case; two lugs are provided for mounting on a flat surface. F-type connectors are supplied.

APPLICATION FOR MEMBERSHIP

in

THE SOCIETY OF CABLE TV ENGINEERS

(fill in completely and mail to SCTE, 607 Main St., Ridgefield, Conn. 06877)

Name Title

Company

Company Address

City State Zip

Home Address

City State Zip

Professional Experience:

Company City, State

Position Length of Time

Company City, State

Position Length of Time

Company City, State

Position Length of Time

Education:

School: Degree or Certificate

School: Degree or Certificate

Two references familiar with your work: (Society Members Required as References for Grade of Member)

1.

(name)

(company)

(address)

2.

(name)

(company)

(address)

I agree to abide by the Constitution and By-laws of the Society if admitted.

Signed Date

Chapter

Admissions Committee Action Date

- Membership Grade: Member
- Associate Member
- Sustaining Member

REFERENCES

(Three Society Members Required as References for Grade of Member)

Name	Company		
Address	City	State	Zip
Name	Company		
Address	City	State	Zip
Name	Company		
Address	City	State	Zip

DUES

(Please List All Fees Enclosed)

Annual Dues (\$10 per year)\$ _____

SCTE Pin (\$3.) _____

SCTE Tie Clasp (\$3.) _____

TOTAL ENCLOSED\$ _____

I agree to abide by the Constitution and Bylaws of the Society of Cable TV Engineers if admitted to membership.

Signature _____

Do Not Write Below This Line

Chapter

Admissions Committee Action Date

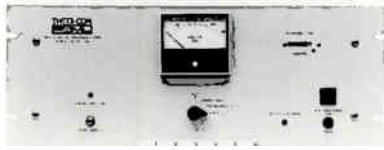
Membership Grade: Member
 Associate Member
 Sustaining Member

1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26		

New Products

(Continued from page 14)

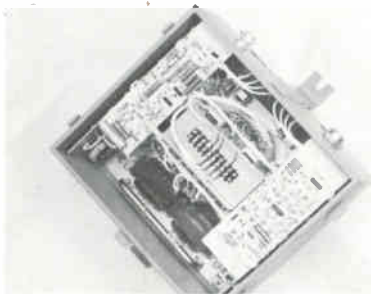
SINGLE-CHANNEL AML



Theta-Com, AML Division (9320 Lincoln Blvd., Los Angeles, CA 90045) now has available a new single-channel high power. AML transmitter for use in the CARS band. The new unit is capable of transmitting standard color video signals, with audio, within a 6 MHz bandwidth. Approval for use of the unit was received in Nov. from the FCC for the frequency range from 10,550 to 13,250 MHz.

• • •

CATV CONNECTORS



EG&G Inc. (CATV Products Div., Georgetown, Mass. 01833) has a new line of CATV connectors for aluminum sheath cable. The product line includes connectors for entrance, feed-thru, splice and termination. They are available in sizes for .412, .500 and .750 coax. Return loss is given at better than 40 dB.

• • •

STANDBY POWER

Gulton Industries Inc. (13041 Cerise Av., Hawthorne, CA 90250) is delivering the model EMNB 107 solid-state standby power unit, which delivers either 30 or 60 volts at a full rated load of 12 amperes for a minimum of 60 minutes when using the standard battery pack. The system consists of a square



wave inverter, a static voltage detector and line switch, and a battery charger. A redundant power source is provided for the solid-state line switch control circuits. The unit includes overvoltage suppression circuits and supervisory and alarm circuits.

• • •

TWO-WAY LINE EXTENDERS

Ameco Inc. (P.O. Box 13741, Phoenix, AZ 85002) is now delivering two-way line extenders, the NOVA-LE 2W, which provide up to 26 channels in the forward direction and reverse operation in the 5-30 MHz range. A plug-in reverse amplifier, which includes compli-

mentary filters, can be added. The unit features 25 dB full gain at 300 MHz, with 12 dB noise figure, according to the manufacturer. Cross mod is said to be -75 dB, and second order beats are -72 dB. The amplifier has a 0-24 dB cable equalization range with plug-in equalizers and 18 dB return loss.

• • •

UHF TO MID-BAND CONVERTERS

Entron, Inc. (Route 79, Morganville, N.J. 07751) has developed a new series of UHF to mid-band solid state crystal controlled CATV converters. These units can accept UHF input and provide outputs in the IF and mid-band channels. UHF to VHF conversions are also available. The C-200 can accept an input of only -22 dBmV and still provide a TASO grade three picture, according to the manufacturer. Gain is 20 dB and maximum output is 40 dBmV. The noise figure is said to range from 9.5 dB to 10.5 dB.

• • •

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year in all kinds of weather.

Be canny about CATV connectors. For more information about "Scotty" economy, immediate delivery, and the name of your nearest distributor, contact ITT Cannon Electric, International Telephone and Telegraph Corporation, 666 East Dyer Road, Santa Ana, California 92702. Telephone (714) 557-4700.



CANNON ITT