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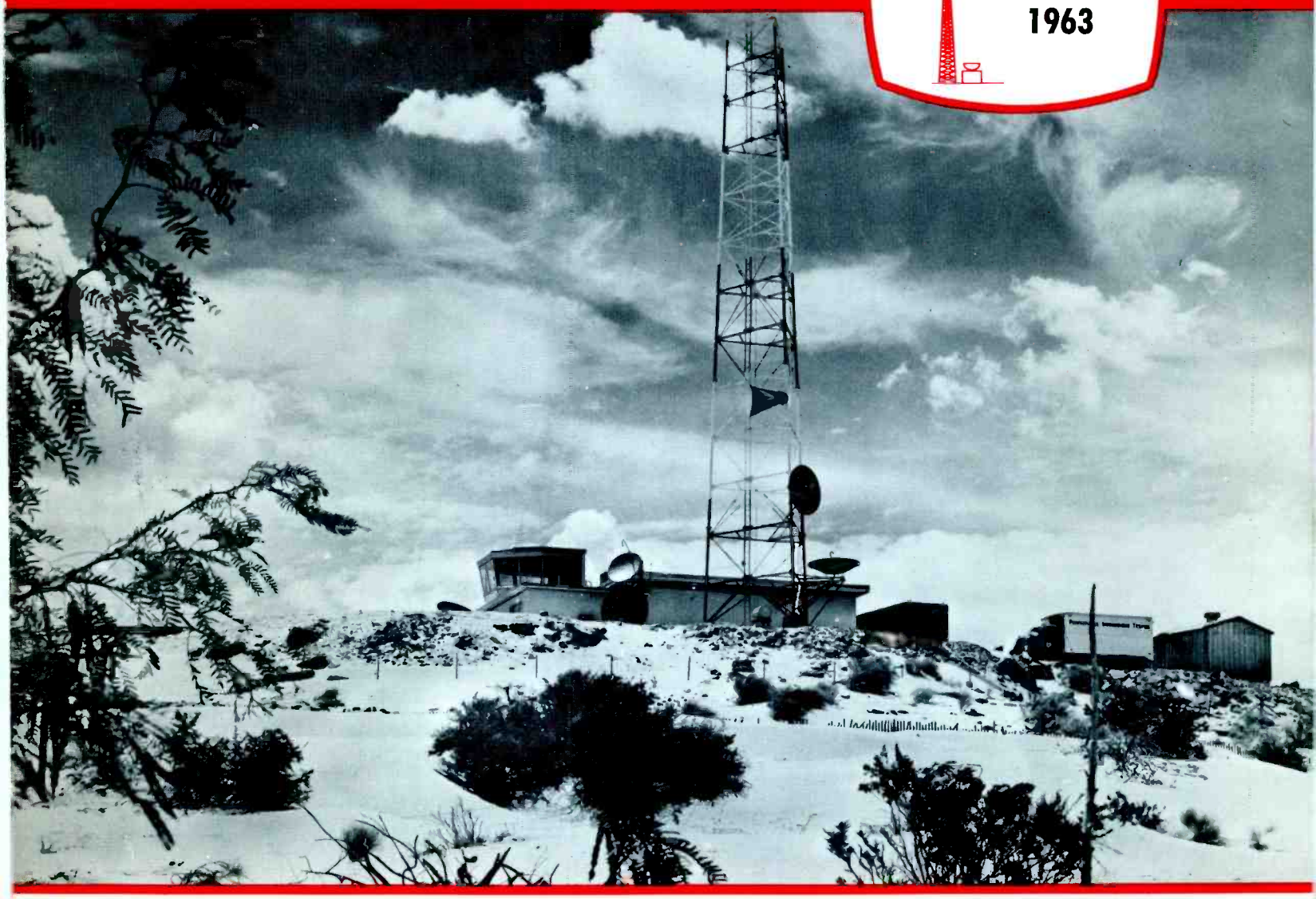
Video Communication Journal

SEPT.
1963



Serving the Audio-Video Communications Industry

IN THIS ISSUE

- STUB-MATCHING COAXIAL CABLE — How it's done
- FCC COMMISSIONER VIEWS — Competition
- SECTION 605 — Part IV
- RELIABILITY — How the engineer sees it

JERROLD VIDEO MICROWAVE 6 TO 13 KMC

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- Simplest to set up
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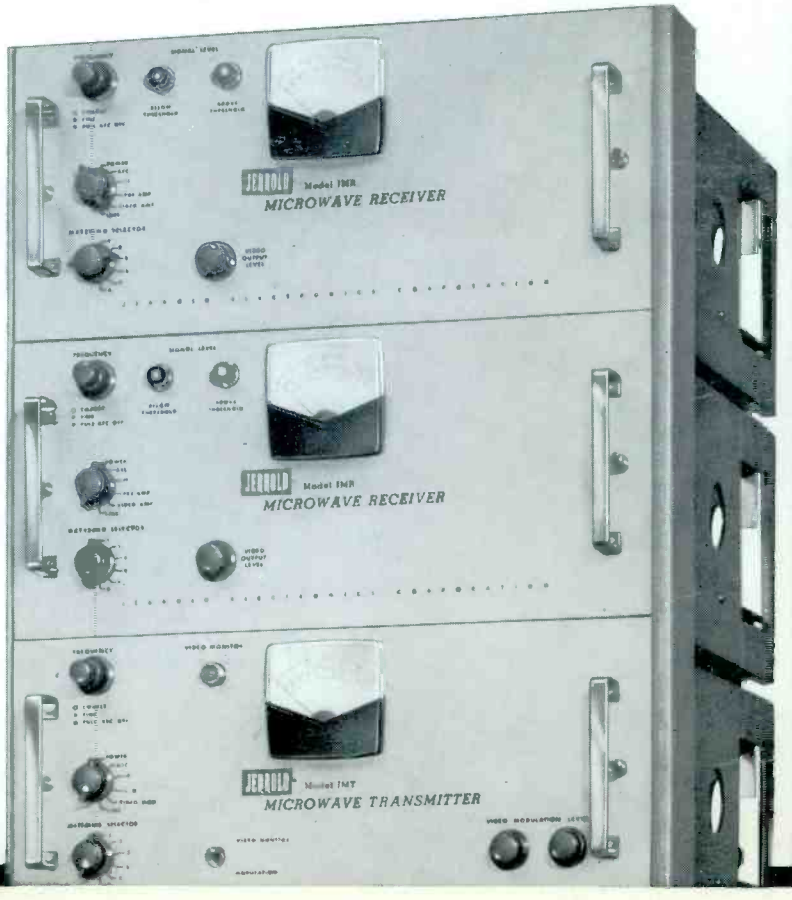
- Greatest stability—±0.005%
- Individual power supplies–can't lose all channels at once

It may cost a little more at first, but Jerrold video microwave gear really pays for itself in no time. Here's why you can't afford to be without it: Front-panel metering of all tubes and circuits . . . Time-delay circuit protects klystron in event of power failure . . . Extended filament life with built-in regulating transformer . . . Only simple test equipment needed for set-up, troubleshooting, maintenance . . . Video monitor output at transmitter eliminates referring to receiver location . . . Compact modular construction saves space, reduces need for spares.

Take advantage of Jerrold's wide experience not only in supplying equipment but in helping you plan any hop from 20 to hundreds of miles. For complete information, write or call Jerrold Electronics, Philadelphia 32, Pa.



JERROLD ELECTRONICS

A subsidiary of THE JERROLD CORPORATION

Channel 1

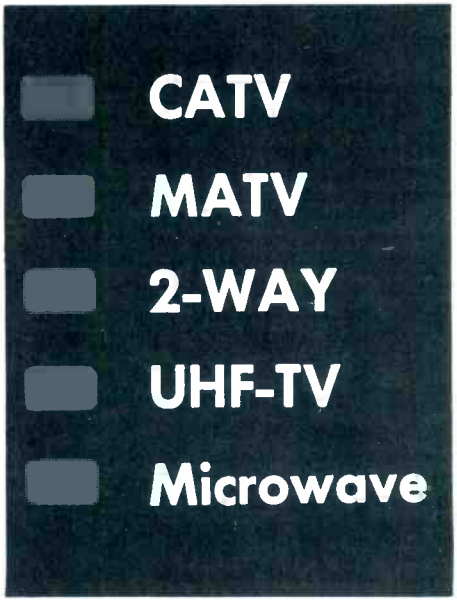
Factually Speaking . . .

Since its establishment in 1958 the Board has had many discussions on the subject of introduction of color television into Canada. In order to get the subject properly before the industry and the public, the Board devoted the first full day of its January, 1963, public hearing to the presentation of briefs, and examination of witnesses, on the topic of color television for Canada. The public examination came about largely through representations of the Electronic Industries Association of Canada that it be given such a forum to state its views.

Board members reviewed the evidence at an **in camera** meeting and came to the conclusion that the time had not yet arrived when the Board could recommend that color TV begin in Canada. Nor could the Board see the future picture clearly enough to fix any forward target dates either for the setting of color standards by the Department of Transport, or for permission to licensees to telecast in color.

Some suggestions were made at the public hearing that the Board set up an industry-wide committee to study the question and make recommendations. The Board has active committees with public and private broadcasters, with advertisers and advertising agencies, and with the Department of Transport. It will continue to keep in touch with the manufacturers as well.

There was general acceptance at the public hearing by witnesses, and by the Board members themselves, that color television will come to Canada and be welcomed by all interested parties, including the viewers. However, because of the great costs involved, and the absence of appreciable public demand, neither the CBC nor CTV networks wanted the introduction of color now. Despite the fact that color programs from the U.S. could be seen in about one-million Canadian homes now, only an estimated 4,500 color sets are in use in Canada today. That is the size of



public demand, partly due to the high cost of TV color sets. The cheapest price in Canada today is about $750 per set. Even in the U.S., where sets are cheaper, there are only a million or slightly more color TV sets in use, against 54,000,000 black and white sets, and only NBC of the three U.S. networks, is doing an extensive amount of color programming.

The Board looks forward to the time when color may be introduced to Canadian TV but it wants the time and cost factors to be favorable to reasonable success. It is the feeling of the Board that no color should be introduced at this time, but the B.B.G. will keep an extremely close watch on the situation and act quickly if and when conditions are right.

(Editorial Note: This feature on Canada and the status of color television is from the Annual Report of the Board of Broadcast Governors for the financial year ended March 31.

LIGHTS

Interference has many causes. Examples: Trouble on a Government frequency was traced by the FCC San Diego office to defective fluorescent lamps in a building occupied by the complaining Federal agency.

FCC ENGINEER GETS IN THE WEIGH

A Colorado sheriff asked the Denver FCC office to inspect communications equipment confiscated in connection with an alleged fraud. It was concealed beneath a weighing scale platform so that a signal would raise or lower the weight as desired. The device, discovered by an employee while removing dirt from beneath the scale platform, had been presumably installed to permit the clandestine operator to park his car in the vicinity of the scale where the truck weighing process could be observed and then transmit a signal which actuated the mechanism.

NCTA TO HOLD SECOND MANAGEMENT INSTITUTE

The place will be the University of Wisconsin and the date, August 12-15. You may expect to meet those people who form the very nucleus of the CATV industry at this, NCTA's Second Annual Management Institute.

Held in the City of Madison in cooperation with the University of Wisconsin, the four-day session is designed to give CATV managers and potential managers an opportunity to explore together the expanding management functions of the growing CATV industry.

Heading the list of Institute faculty members will be Norman C. Allhiser, Director of The Management Institute.

COOPERATION PLUS AND MINUS

A resident of San Leandro, California, called the FCC field office to report interference to radio reception. Inquiry showed the source to be a defective heating pad in the home of a neighbor. When the latter had the pad fixed, the complainant was so advised and was requested to turn on his radio to confirm that the trouble had ceased. But, the complainant declined to make an immediate check. He was then watching TV!

SEPTEMBER 1963
Volume 4 — Number 9

VIDEO-COMMUNICATION JOURNAL

Combining Television Horizons and Communication Horizons

PUBLISHED MONTHLY BY HORIZONS PUBLICATIONS
Post Office Box 1557 • Oklahoma City 1, Oklahoma

Editorial

I was sitting back the other day reading the local newspaper when I noticed that a considerable amount of space was utilized for strictly public service type news and information. Maybe you have seen or noticed this same fine service in your local newspaper?

I thought that, here we are, in the midst of an industry that daily performs all kinds of public services and yet we see or hear little of what has gone on in this particular area. I know that one of the reasons for hearing little of various feats and accomplishments is due sheerly to the fact that most people who perform a really worthy public service do not want to publicize their acts, feeling that it is not in keeping with pride and tradition.

How then can we pass on to others and justly pay tribute to those who perform acts of public service? For instance, I do happen to know of one individual who was instrumental in saving the life of a child injured in a head-on collision. In another instance, and we were fortunate enough to be able to do a story about this particular public service, involved a CATV operator and his aid to a flood-stricken area.

It seems that the only solution to undercovering this type of news is to ask the readers who do have knowledge of specific services to let us know so we may tell others in the industry about this person or company. Don't you feel that credit is really due to those who unslfishly give their time and money to contribute to a community? We certainly feel this is so.

If you have a moment or so, would you drop me a line and let me know about any special service that has been performed by an individual or company? Please include names, dates and any pertinent data you feel is necessary. Photos would be appreciated if available. We aren't asking that you sit down and write a whole story, we'll handle that end. If you would like to give us your own accounts, please do so. Very probably what you may be able to pass on to us and in turn to others might be helpful

R.L.M.

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ADVERTISING Video-Communication Journal accepts commercial display advertising from bonafide manufacturers and suppliers of electronics apparatus and allied services. Advertising rate card and circulation breakdown available upon request from the Advertising Director.

CIRCULATION Video-Communication Journal is circulated through United States and Foreign mails on the first day of each month to an average readership of 15,800. Circulation is to individuals and firms dealing in products and services in closed circuit and community antenna television, television broadcast, commercial and public safety two-way radio. Circulation is both paid and controlled. A detailed circulation breakdown by reader occupation is available upon request from the Advertising Director.

SUBSCRIPTION Video-Communication Journal subscription rates in the North American continent, including the possessions of the U.S.A., $5.00 per year surface mail. Single copies of the Annual Directory Edition, $1.00 each. Published 12 times per year. Subscriptions outside the North American continent, $6.00 per year. Subscription remittances should be made by bank money order or check, negotiable in United States banks.

EUROPEAN BUREAU News items, subscription orders and advertising inquiries in Europe should be directed to Mr. Gordon J. King, Esq., Gordon J. King, Enterprises, Kingsford, South Furzeham Road, Brixham, Devon, Great Britain.

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ameco

First name in TRANSISTORIZED CATV SYSTEMS

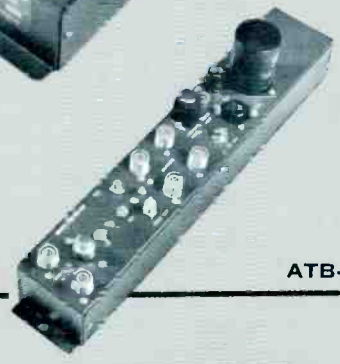
By remote cable powering the amplifiers, and by using Ameco's AHT-1 housing, many dollars are saved in system construction. Costs of clearing poles for power, and costs of mounting conventional bulky amplifier housings are greatly reduced in an Ameco fully transistorized system. These savings, when combined with drastically reduced maintenance and electric bills, will allow you to pay for Ameco's transistorized amplifiers with savings alone, in a surprisingly short time. Mail the attached coupon for complete details on our *thoroughly field tested* transistorized equipment.

ATA-60

TRUNK LINE AMPLIFIERS

Ameco's sensational fully transistorized trunk line amplifier with AGC and *automatic tilt compensating* control. Special components used in the circuitry of the ATA-60 provide amazing temperature stability of *better* than ±1 db through temperature range −50°F to +160°F. The AGC will hold output constant within ±1 db for a ±8 db swing on the input. The special tilt circuit compensates automatically for cable response variations, whether due to temperature changes or differences in cable length. It is effective through a 15 db to 25 db spacing range.

PRICE $395.00

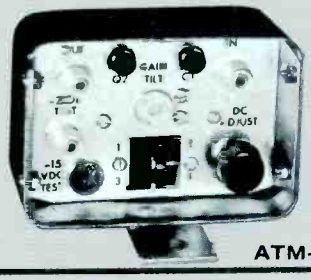


ATB-10-C

BRIDGING AMPLIFIERS

The ATB-10-C is an all-band transistorized bridging amplifier providing four isolated feeder outputs from a single input signal. It is remote cable powered from the 28 VAC Ameco ATPS Power Supply, or from the output of a transistorized trunk line amplifier. The ATB-10-C supplies filtered, regulated DC power on its feeder line outputs for remote cable powering line extender amplifiers. All Ameco transistorized bridging amplifiers feature matched inputs and outputs, and plug-in pads on inputs.

PRICE $135.15

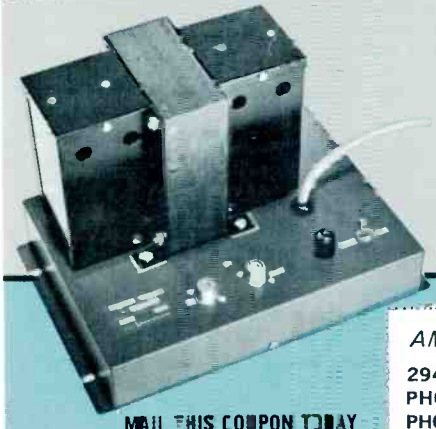


ATM-20C

LINE EXTENDER AMPLIFIERS

Remote cable powered version of the most versatile all-band amplifier ever designed for CATV. The ATM-20C is cascadable and can be mounted on the pole or messenger mounted. Ameco line extenders can be remotely powered from the output of ATB-10 series bridging amplifiers, or from the ATPS-25 and ATPS-20 power supplies. Thousands of ATM-20 series all-band transistorized amplifiers are in use throughout the CATV industry, providing long, stable, trouble-free service for hundreds of CATV operators.

PRICE $69.50



ATPS

REMOTE POWER SUPPLIES

A regulated 28V AC supply with a total of 6 Amp. capacity on two outputs, the ATPS is used to remote cable power the Ameco fully transistorized trunk line amplifiers and companion units. Capable of constant voltage output with changes of input voltage from 95V AC to 130V AC, the ATPS will power 20 various Ameco transistorized amplifiers with a power consumption of less than 300 watts. RF insertion loss is ½ db maximum. Dimensions 8" x 10½" x 8" high.

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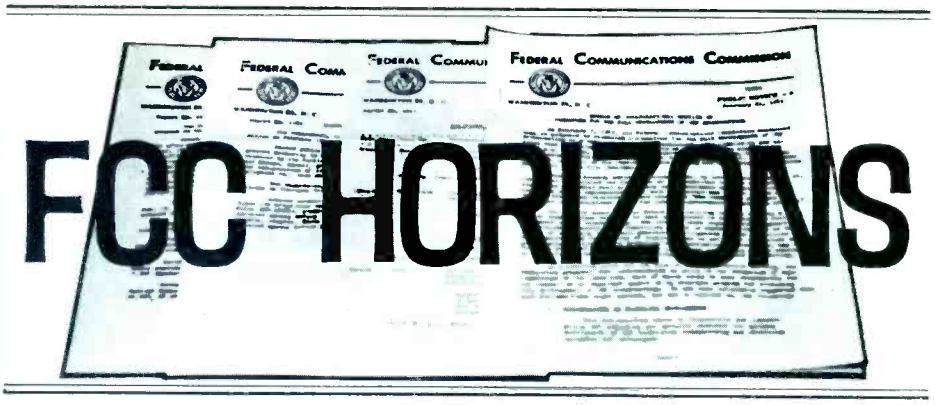


FCC actions, applications and public notices reported here are a representative sampling of actions which the Publishers of Video-Communications Journal feel will be of interest to our readers. The listing is by no means a complete report of all FCC actions in or out of these allied fields of communications.

GENERAL ACTIVITIES

By order, the commission amended Section 1.84 of its rules of Practice and Procedure effective July 26th, to make clear that (1) petitions for reconsideration of Commission action in rule-making proceedings conducted under Section 4 of the Administration Procedure Act need not be served on participants in the proceeding: (2) oppositions to petitions for reconsideration in such proceedings need be served only on the person who filed the petition, and (3) replies to such oppositions need be served only on the person who filed the opposition. (This does not change the number of copies of these filings required to be submitted to the Commission.

A hearing was scheduled for July 25th regarding the application for an AM station (740 kc - daytime 1 kw) license submitted by Hugh Jordon Stock, Riverton, Wyoming. Principal parties in the hearing included KVOW, Riverton, Wyoming.

At the request of the Channel 2 Corporation the Commission extended for an additional three months, from July 3rd, the time for commencement of trial of subscription programming by that company's TV station KCTO (formerly KTVR) on Channel 2 at Denver, Colorado.

The Commission is addressing the following letter to the permittees and/or licensees of 42 UHF commercial and 9 non-commercial educational television stations which had been on the air but which, for various reasons, subsequently suspended operation and are now still off the air, and to permittees who have not completed construction and whose extension applications are pending: "Inasmuch as your application has been on file for a considerable period of time, the Commission finds it necessary to have the information contained therein brought up-to-date. Consequently, you are requested to file an amendment to your application, indicating the present status of your organization, your physical plant, and your plans with respect to future operation of the station. This amendment should be filed within thirty (30) days from the date of this letter."

The Commission, by its Review Board took the following action: Granted motion by the Safety and Special Radio Services Bureau to dismiss proceeding in the matter of R. D. Laird, Idaho Falls, Idaho, to show cause why his license for Business Radio station KBF-576 should not be revoked; and terminated proceeding (Docket 15062). Granted motion by the Safety and Special Radio Services Bureau to dismiss proceeding in the matter of Dale M. Sayles, Tillamook, Oregon, to show cause why his license for Special Emergency Radio station KOE-531 should not be revoked; and terminated proceeding (Docket 15053).

The Commission, by its Safety and Special Radio Services Bureau, granted request by Mid-Ohio Towing, Inc., for stay of Order revoking the license for ship radio station WB-4683 aboard vessel ALTON ZEPHYR, pending action on its petition for reconsideration (Docket 14924).

The Commission, by its Safety and Special Radio Services Bureau, ordered revoked the license for ship radio station WJ-3750 aboard the vessel MUTINY II of Joseph George Klein, Babylon, New York, for repeated failure to respond to official notices concerning alleged violation of rules Section 8.366(a) (2); effective August 12th (Docket 15047).

CATV MICROWAVE ACTIVITIES

By Memorandum Opinion and Order in proceeding on applications of Collier Electric Co. for renewal of its microwave facilities KAQ79, Fort Morgan, Colorado, et al., in Dockets 14341-4, denied application by Frontier Broadcasting Co. (TV stations KSTF, Scottsbluff, Nebraska, and KFBC-TV, Cheyenne, Wyoming) for review of April 24 Review Board ruling which denied Frontier's appeal from Examiner's adverse ruling that Frontier's duplicate checks constitute a "book of original entry" within the meaning of that term.

A Business Radio Service grant was made to Texas Cablevision Corporation by the Commission on June 24th. The grant is for construction of a microwave relay system to relay TV signals to a CATV system in San Angelo, Texas. The applicant voluntarily accepted the conditions attached to the grant (Docket 14895), pending the conclusion of the proceedings in Docket 14895.

Black Hills Video Corporation has been granted petition for extension of time to July 11th to file opposition to the Common Carrier Bureau's opposition to petition to enlarge issues in proceeding on Black Hills' microwave license renewal for station KAR42, Fredericktown, Missouri.

The Commission gave notice that the May 23rd Supplemental Initial Decision which looked toward denying the application of Dakota Microwave Co., for renewal of microwave facility DAQ71 at Turkey Ridge, South Dakota, and not staying the effective date of final decision under hearing Issue (i) in Docket 14315, became effective July 12th.

The Commission on July 3rd granted authorizations in the Business Radio Service to TV Cable of Austin, Inc., to construct a microwave relay system to relay TV signals to its CATV system at Austin, Texas. The grants were made subject to the conditions stated in Docket 14895 and the applicant accepted voluntarily pending the conclusion of the proceedings in Docket 14895.

Southern Transmission Corporation, Silver Spring, Maryland deleted on July 12, 1963 expired C.P. which authorized installation of new fixed (video) radio stations at Brownwood, Santa Ana, Valera, Balinger, Miles, Texas.

Antennavision Service, Phoenix, Arizona applied for renewal of Developmental radio station license expiring August 12, 1963. License was

for 1 unit (6350 Mc) to operate in any temporary fixed location with the States of Arizona and New Mexico.

Western TV Relay, Inc., Elk City, Oklahoma has applied for a C.P. to replace two Microvision type 400 transmitters with two K & F Electronics transmitters, type TM-68 and change frequencies from 6185.5 and 6315.5 to 6182.4 and 6241.7 Mc at its Weatherford, Oklahoma site. Also, Western has applied for a C.P. to replace existing facilities at Elk City, Oklahoma with two K & F Electronics transmitters, type TM-58 and change frequencies from 6269.5 and 6355.5 to 5960.02 and 6019.32 Mc.

Western Microwave, Bozeman, Montana through its attorney, requested that application for C.P. for two new points of communication, Burley and Rupert, Idaho, be dismissed. On 7-3-63 the Commission consequently dismissed, without prejudice, the subject applications.

Mid-Kansas, Inc., Junction City, Kansas has filed for a modification of license to add FM sub-carrier to existing facilities to carry program material of station KCMO-FM, Kansas City, Missouri. Modification was asked for fixed (video) radio stations located at St. Mary's, Manhatten, Abilene, Junction City and Clay Center, Kansas.

Idaho Microwave, Inc., Twin Falls, Idaho received C.P. to add a new point of communication at Burley, Idaho. Applicant proposes to power split the signals at existing station KPS54 in order to furnish a 4-channel service consisting of the signals of KUTV, KCPX, KSL-TV and KUED, Salt Lake City, Utah to Burley and Rupert, Idaho, for service to Transcontinent Communications Systems, Inc., a CATV system in those communities.

Eastern Microwave, Oneonta, New York has filed for a C.P. to install a new fixed (video) radio station at Binghamton, New York. Services will be implemented via a power-split. One channel, 5960 Mc will be delivered to Endicott, New York and 3-channels will be delivered to Vestal, New York according to the proposal.

Western Microwave, Bozeman, Montana has been granted a C.P. to add a new point of communication at East Butte, Idaho. The new point of communication will be used to improve service quality by allowing the construction of a new path from Curlew Valley to Monida Pass, Idaho.

Mesa Microwave, Inc., Oklahoma City, Oklahoma has filed applications for license modification to add an audio program channel for station KODA, Houston, Texas. Modification applies to facilities at Pledger and Rhodes Ranch, Texas.

Columbia Basin Microwave Company, Moses Lake, Washington has filed for a C.P. to install an additional transmitter to operate on 6275 Mc and a new point of communication at Jump Off Joe Butte, Washington. Application contemplates the implementation of a power splitting installation at Mission Ridge to provide for the simultaneous transmission of station KCTS, Seattle, Washington, an educational station operated by the University of Washington, to the proposed new receiving point at Jump Off Joe Butte.

Thunder Bay Microwave Company, Alpena, Michigan was granted a modified license changing the corporate name from Thunder Bay Microwave Company to American Microwave Communications. There was no change in ownership or management of the corporation.

Houston County Telephone Co., Crockett, Texas has filed a Major Amendment to add Madisonville, Texas as a point of communications via power-splitting utilizing same transmitters and frequencies. Service is identical to that proposed for a CATV subscriber in Crockett, Texas and will be provided for CATV subscriber in Madisonville, Texas.

TWO-WAY ACTIVITIES

Mobilfone Communications, Inc., Dallas, Texas was granted a C.P. for 1 base station, and 25 mobile units. Operating frequency: 152.15 and 158.55 Mc. Control point will be at 1302 Victoria Street, Laredo, Texas.

Fresno Mobile Radio, Inc., Fresno, California filed for a C.P. to install two Motorola transmitters to operate on 6375.14 and 6423.9 Mc at existing No. 1 and No. 2 locations; install two Motorola transmitters to transmit on 6108.275 and 6019.325 Mc at location No. 3. (No. 1 — Adler Springs, No. 2 — Coalinga, No. 3 — Fresno, California.)

E. B. and Donna W. Brownell, Worland, Wyoming were granted a C.P. for 1 base station two control stations and 50 mobile units. Base station to be located at Thermopolis, Wyoming (152.09 Mc), control stations to be located at Worland (158.55 Mc) and Thermopolis (158.55 Mc). Mobile frequency is 158.55 Mc. Section 21.505 of Part 21 of the Commission's rules waived to permit 292 watts ERP with an antenna height of 1972' above average terrain for the base facility.

Communications Technical Sales, Inc., Columbia, S. Carolina was granted a C.P. for 1 base station and 50 mobile units. Authority granted to render radiocommunications service for hire to vessels. Frequencies: 152.15 and 158.61 Mc.

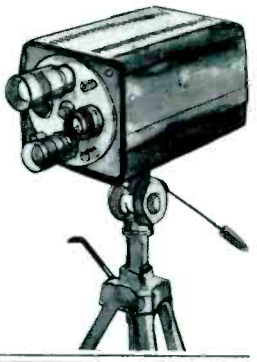
Hawaiian Telephone Company, Honolulu, Hawaii has received a C.P. and License (Developmental) for 2-units to operate in any temporary fixed location within the territory of the grantee. Frequencies: Within the 450-460 Mc band.

Unitah Basin Telephone Association, Inc., Roosevelt, Utah was granted a C.P. and License for a new rural subscriber fixed radio station. Frequency: 157.80 Mc.

Rex A. Murphy, Kankakee, Illinois has filed for a C.P. to install 1 base station and 20 mobile units to operate on the frequencies of 152.18 and 158.64 Mc.

Haviland Telephone Company, Haviland, Kansas was the recipient of a C. P. for 1 base station and 30 mobiles.

SYSTEM HORIZONS



PEOPLE . . .

Don Larsen, until recently with Motorola, Inc., in their sales promotion department, has been appointed Manager of Sales Promotion and Training for the Telecommunications Division of Secode Corporation, San Francisco based manufacturer of mobile radio equipment. Mr. Larsen will be responsible for handling all advertising and sales promotion plus setting up a nationwide sales training program.

A. P. Taylor has become Manager of Manufacturing according to General Electric's Communication Products Department. In his new position, Taylor will have full manufacturing responsibility for all product lines of the department. These include mobile two-way radio, microwave and telecommunications, power-line carrier and military communications.

Prior to Taylor's new appointment, he was Manager-Materials, responsible for purchasing, inventory control, stock and receiving, load control and shipping and warehouse activities.

Our old friend, **Charles Wigutow,** has joined Telesystem Services Corporation as a member of the management staff, according to an announcement by Fred Lieberman,

President. Mr. Wigutow will direct a new technical-management training institute, a community television tri-dimentional department incorporating training of managers and technicians for the community television industry, personnel placement, and consultation services.

Charles brings to his new position, a background of successful CATV system management having recently resigned as manager of South Jersey Television Cable Company to assume his new duties with Telesystems.

In addition to his management abilities, Charles has a long history in the publication field and is currently a Contributing Editor for Video-Communication Journal.

Decibel Products, Inc., Dallas, Texas, has announced that **Kasmier J. Kulesha** has accepted a position as regional manager for the northeastern United States. In his new

position, Mr. Kulesha will assist firms and individuals in the selection and application of DB products, for both vehicular and microwave communications.

Most recently, Mr. Kulesha was with DuMont Laboratories as Midwest Regional Manager, prior to that he was with the Westrex Corporation as Field Project Director for the Indonesian Army Com-

Continued on Page 34

SOLID SEAMLESS ALUMINUM CABLE

- SEAMLESS DRAWN ALUMINUM TUBING
- SOLID SHEATH ELIMINATES MOISTURE LEAKAGE
- VIRGIN FOAM WHITE CENTER DIELECTRIC
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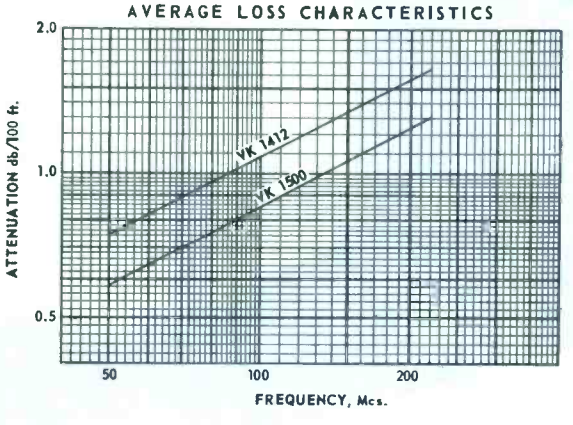

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VK1500	0.098	0.450	0.500		0.84	1.40	130
VK1500J*	0.098	0.450	0.500	0.580	0.84	1.40	160
VK1412	0.075	0.362	0.412		1.05	1.65	100
VK1412J*	0.075	0.362	0.412	0.480	1.05	1.65	120

* J — With extra long life non-contaminating polyethylene jacket.

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by Albert E. Hankinson
Oklahoma City, Oklahoma

In the two previous installments, the basic purpose has been to set up certain "standards" regarding the usage of coaxial transmission lines. How the theoretical approach to coaxial cables is explained, sooner or later we come hard up against reality in the form of actual practice. Theories that are readily explained using vectors or mathematical analysis, become completely obscured when the time to put them into actual practice is at hand. As a result unless the engineer and technician is constantly reviewing methods in which he can put the various theories into practice, he finds the gap between the two ever widening.

It is necessary to keep in mind, that there is really very little "new" in transmission line applications. Different applications appear from time to time which upon close examination, turn out to be a modification, adaptation or improvement over some basic transmission line device which has been around for a long time. We occasionally find that some of the explanations and reasons behind the employment of certain devices have long since been relegated to the reams of material written on the subject and which while all of great importance, fail to state in so many words, just what we are trying to accomplish and why.

In this installment, we will try to delve into a number of these devices as they are used in actual applications.

First a bit of a review of basic concepts so that as we move into a discussion of the actual devices, we can develop an insight of the whys and wherefores of their working.

We have shown in previous installments that for the most efficient transfer of power along a transmission line, the load or termination must be "matched" to the line. This brings about conditions which result in a "flat line." If we do not attain these "matched" conditions, we will find that we will have areas or sections of the transmission line where the reactive component will be either inductive or capacitive even though the termination itself were a pure resistance. See Figure 1.

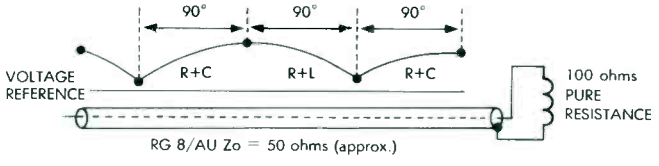


FIGURE 1

This means that in actual practice, if a transmitter and antenna sytem were joined together by a transmission line and the conditions shown in Figure 1 existed, the transmitter would not see a proper load at the point where the transmitter was feeding the line and as a result, loading conditions would probably differ from those shown by the manufacturer. One fallacy which has arisen as a result of some experimentation without obtaining overall results for comparsion, has been the statement that by using a "line stretcher," you can "lower the Standing Wave Ratio." Nothing is further from the truth but first an analysis. In some cases of "pruning" the line, the transmitter is found to load better. This raises the theory that since the transmitter is happy, the VSWR must have decreased. What has actually happened is that in the process of changing the length of line between the transmitter and the load, a point was found which caused the impedance presented to the transmitter to be more to the transmitters liking. Stated simply, the impedance seen at the transmitter end is still incorrect only after

The Basics of Stub Matching

changing the line length it is now a little less "incorrect." Proof of this is as follows: A device for measuring VSWR inserted at the antenna or load will show that regardless of line length, the VSWR will remain unchanged.

There is no argument with a statement that more power reaches the antenna because essentially what has happened is that when the line length was varied so that the impedance presented to the transmitter became more in line with the design conditions of the transmitter, the transmitter responded to these better conditions by loading better and providing more output to the transmission line. The original VSWR and the losses attendant when the VSWR is not 1:1 are still very much present. At first glance then it would seem that the solution to this problem is to never use loads (antennas) which do not present a perfect match to the feed line. This is hardly the answer due to the wide variety of antennas which are encountered.

It may well be that a particular antenna is required which is not a proper match. For example, a quarter-wave whip antenna mounted on a tower used in the mobile communications service. It is not unlikely that the transmitter may be several hundred feet away from the actual radiating element. This requires that several inter-related factors in this type of operation be considered. In a case of this sort, if the long transmission line is a necessity, then the frequency of operation must be considered. Since the majority of stations in the mobile service (excepting Citizens Band) are operating in the VHF range and quite a few are in the 150 Mcs area, then it becomes in our best interest to eliminate any losses other than those losses such as straight line attenuation losses with which we have to live. If we keep in mind that any mismatch and attendant VSWR of some value other than 1:1 will create additional losses, then the attaining of this 1:1 ratio becomes very important. At this point, we come to a parting of the ways between what should be done and the practical economies involved. If we are perfectionists, we can calculate, build and install, a quarter-wave transformer. Build??? Well we can have one built or purchase one through various commercial outlets dealing in communications equipment. Too often in cases where the quarter-wave transformer is desirable, technicians shy away due to mistaken ideas concerning the difficulties of calculation. The major difficulty is keeping in mind several basic concepts and then applying them. As is self-explanatory in the name "quarter-wave" transformer, the device is 90 electrical degrees in length. Here we caution, remember the 90 degrees is based on a velocity factor so don't expect the transformer to be ¼ wavelength as calculated in free space. The next point is that a quarter-wave transformer is an **impedance inverter.** This means that if the output end of a quarter-wave transformer is connected to a low impedance load (like 28 ohms, which is fairly representative of the feedpoint impedance of a quarter-wave whip antenna), then the impedance at the input end of the transformer will be dependent upon the characteristic impedance of the transmission line feeding the transformer. For example, as shown in Figure 2.

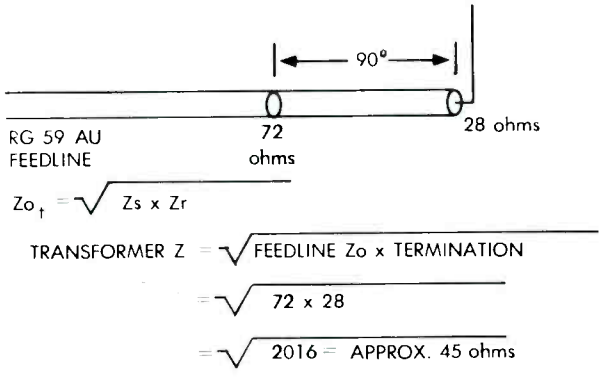


FIGURE 2

In actual practice, the use of a 90° length of 50 ohm coaxial line would probably be put into service and the difference between the calculated value and the value used would be of little consequence. Note that in this example, a low impedance load was matched to a feedline having a higher impedance. The reverse could also be accomplished, that is matching an antenna or load with a higher impedance to a transmission line cable with a much lower impedance. The only factors that must be observed are in the terms of the formula. The term Zs is always the value of the feedline at the input end of the transformer while Zr is the terminating end of the transformer, the value of the terminating end always being a pure resistance. The major disadvantages of quarter-wave transformers are that they are frequency sensitive, expensive if an odd size has to be manufactured, and require some technical knowledge on the part of the installation technician.

There are many facets to examine in the course of discussing matching various loads to transmission lines. It is even desirable to discuss methods where the load cannot be made to match the line but where the results required are such that as great a portion of the line be "flat" as is possible. This inevitably leads to discussion of line "stubs". When the subject of "stubbing" a coaxial line is brought up, there is usually a tendency to shy away from it. This is primarily due to a lack of understanding of the principles involved. "Stubbing" is a very important application if it is desired to use some load which of necessity is a mismatch. It is of value when the necessity to reduce losses to as low a value as possible are required and in certain applications where the feedline length is varied, to maintain a constant sending-end impedance regardless of line length.

The prime application of the "stubbing" technique are found in the area above 100 Mc/s. This is due to the physical dimensions of the stubs and the necessary working equipment.

Certain specialized equipment is required when dealing with coaxial lines. First, a wattmeter with a directional coupler capable of reading forward and

reverse power is necessary. If such device is not available, a Standing Wave Bridge such as is manufactured in kit form by Heath, Allied, Lafayette and many others, will suffice. One thing though, the VSWR Bridge must be balanced in both directions according to manufacturers direction so the SWR scale will have some meaning. Secondly, a Fluted Line is a necessity. This one seems like a real obstacle, however, anyone who is serious in their dealings with coaxial lines can now bring a little ingenuity into play and very cheaply build one. The average Fluted Line is 6 feet in length. So by taking a piece of RG8/AU or whatever coaxial line you wish to construct, strip the plastic cover off a length of at least 6 feet. Remove the braid. You will have to procure a length of rigid copper tubing from a hardware store. The size which is suitable for RG8/AU is just a shade too small. By running a wire brush through a few times, a passage is assured. Solder a snake lead onto the center conductor of the coax and pull the conductor and its polyethylene cover through the pipe. Attach a coaxial fitting to each end, secure the pipe to a board and then **very carefully** drill a ¼ inch hole through the pipe and down through the polyethylene **to** but not **into** the center conductor. Bare the center conductor so a probe can touch it. Now you have a Fluted Line provided you do this at one inch spacing all down the pipe.

The last item is a probe detector. This is nothing but an RF voltmeter to measure the RF. (Figure 3.)

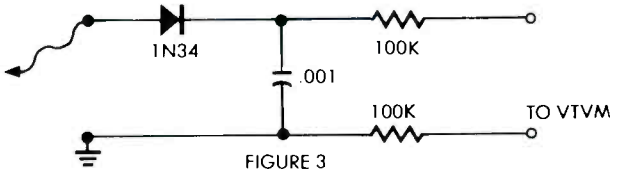


FIGURE 3

To stub, we have to find a point in the line where a particular combination of Resistance and Reactance exists. For this purpose, we will discuss using an open or capacitive stub less than 90° in length which limits us to an area in the line where the Reactive component is Inductive. The point on the line we desire is that point where if we cancel out the Reactive component, the Resistive component left will be equal to the characteristic impedance of the feedline. At this point we have to break off from the theoretical explanation of just what is going on. The reason for this break-off is that it requires a knowledge of Admittance as regards a portion of the line and this particular item is a sticky one even during classroom lecture. The easiest way to explain this is to say that we calculate the distance in inches from a minumum we find using the probe detector and at that point we parallel the line with a capacitor and cancel the inductive component leaving the pure resistance. One "minor" problem exists. We probe the Fluted Line and locate the minimum on the line. We calculate the distance from the minimum into the inductive section where we wish to install the stub. Unfortunately, if we install it at this point, it means we must hacksaw the Fluted Line. More trickery is called for! To keep from cutting up our Fluted Line, we start the whole operation by placing a straight-thru coaxial connector at the load end of the Fluted Line. After the voltage minumum has been located on the line, measure the distance from the center of the "straight-thru" to the minimum. Record this in inches. Now the grand moment is here to calculate just how far into the inductive section we must place the stub! The SWR Bridge should be in the line at the generator end of the Fluted Line. Determine the SWR. Now we have a convenient formula to determine how far we go into the inductive section. That formula is:

$$\text{Tangent } \emptyset = \frac{1}{\sqrt{SWR}}$$

O (theta) is the length of line from the minimum to the stub point. This requires the use of trig tables like those in the Allied Radio formula book. You are solving for Theta in terms of degrees. Now you have to know the phase shift constant of the line. Sounds complicated? Not so! It merely means we want to convert linear units (inches) into electrical degrees. To do this we probe the Fluted Line and find the two minimum points. This represents a half-wave length or 180 degrees. We divide 180 by the distance between the "mins" in inches and we now know just how many degrees one inch represents and vice-versa. If we had found that one inch was equal to 5 degrees, and Theta had calculated out to be 40 degrees, then this tells us the stub point is 8 inches from the minimum into the inductive section. Now we take the measurement we previously recorded of the distance from the center of the "straight-thru" and add this to Theta. Then we take a piece of cable equal to this number of inches and add it on the load side of the Fluted Line. This electrically drags the stub point off the Fluted Line and positions it over the center of the straight-thru. Now we replace the "straight-thru" with a "TEE" connector and we are ready to attach the stub. Using the formula:

$$\text{Tangent } \emptyset = \frac{SWR-1}{\sqrt{SWR}}$$

we solve for the stub length in electrical degrees. Using our phase shift factor we convert this to inches and then add two or three inches to give us some maneuvering room. Set the SWR Bridge to Reflected position and start cutting the stub a very small amount and watch the Reflected indication each cut for a decrease. If your calculations are correct, you will trim the stub until there is no Reflected indication. If you find you cannot eliminate the Reflected voltage, you probably have made an error in your calculation of theta. A short cut without the mess of cutting a stub to check the stub point is to make up a coaxial fitting with a 50 mmfd variable. Put it in place of the stub. If you can eliminate the Reflected voltage with the capacitor, then you can do it with the stub. If you cannot eliminate it, you can adjust the capacitor for a minimum reading. Then probe the line and if the voltage is rising as you move back on the line toward the

(Continued on Page 29)

Laws, Codes or Competition

The following text is the entire address of Frederick W. Ford, Commissioner, Federal Communications Commission as given before the Wisconsin Broadcasters Association, Three Lakes, Wisconsin.

Regulation of the broadcast industry may take many forms. The principal form of regulation upon which we rely is the basic law and the regulations adopted pursuant thereto. A subordinate principle of regulation upon which we also rely is that of self-regulation by the broadcast industry in the form of codes. These codes reflect the views of a major portion of the industry on advertising, taste and other matters covered in them. Perhaps, however, the greatest, most effective, but least mentioned instrument of regulation in broadcasting is competition.

We regulate the broadcasting industry in this country to insure fairness to the public in the orderly use of this great natural resource. Once having embarked on the regulation of broadcasting, out of necessity, it is essential that it be done in such a way, insofar as possible, to insure fairness to broadcasters to compete with each other and those in all other forms of mass media in serving the public interest.

As a member of the Commission, I have tried to accomplish these results, by supporting those actions which more efficiently utilize the limited radio spectrum by existing radio services; by promoting new and efficient uses of radio; and by supporting those proposals which will improve the climate for fair competition by broadcasters in pursuing their obligation to serve the public interest. It is my view that the greatest regulator of either business, service or ideas is competition. Wherever possible, the Commission should make use of this most effective tool in the exercise of its responsibility, rather than more regulations forcing compliance with our idea of what otherwise might be the results of competition.

"Competition is the life of trade." I have heard this phrase as long as I can remember. It is as American as hot dogs and apple pie. It is a basic tenant less modern perhaps than the term "free enterprise," but, nevertheless, a fundamental economic theory upon which the industrial might of this nation has been founded. Competition not only pervades our business community, but it permeates the entire fabric of our society. We teach competition in schoolboy foot races, in organized sports, in our classrooms and in the ever increasing desire to be first in all of our undertakings. We are also great believers in good sportsmanship — in playing by the rules — in fairness and justice for all. We write laws, codes of conduct, mottos, regulations and other rules of the game, all to assure fair competition.

These national characteristics do not exist separate and apart from ideas or the freedom to express them — nor do they exist as theory apart from the realities of everyday life and particularly the life of the broadcaster.

The three national television networks are in fierce competition. Radio and television stations serving the same markets compete in many ways and are constantly alert to new forms of competition.

With these principles in mind, I would like to discuss two recent proposals with respect to the amount of advertising material carried on radio and television stations.

It was recently proposed that a law be enacted to require that every broadcaster belong to the National Association of Broadcasters and that it be given the authority to enforce its commercial standards, with an appeal to the Commission. The effect of this proposal, in my opinion, would be to nationalize the National Association of Broadcasters; give it a form of rule making and enforcement authority with some kind of appellate jurisdiction in the Commission to revise or supervise its actions.

This may be an effective instrument in the securities field to prevent fraudulent and manipulative practices in the sale of securities to the public, but broadcasters are not accused of frauds in the sale of advertising or other practices that the securities association was designed to protect. Broadcasters are engaged in communicating, to everyone within the range of their signal, programs and advertising for all to see or hear including the purchaser of the advertising. The public is the constant judge at the moment of communication of their product. Moreover, I can perceive no logical reason why a private organization should be interposed between the regulator and the regulated assuming that this type of government regulation is desirable. The wisdom of such a course escapes me. It would seem to me that this proposal would establish, by law, an unnecessarily complicated regulatory device giving the Commission some sort of indirect regulatory control. It would be preferable, if we must impose our ideas and specify the amount of permissible advertising on radio and television, that we do it directly, assuming that this would be lawful. I am not yet ready to throw up my hands and turn this matter over to the industry to regulate as a matter of law. Voluntary codes,

Approximately 29 percent of television stations and 63 percent of radio stations do not subscribe to the codes.

yes, but as a matter of law, no. More laws are not necessarily the cure for every dereliction of the industry. In any case, I do not regard it necessary at this time to rely on detailed rules to rectify a situation which competition may well correct.

The second proposal I would like to discuss is the proposal that the advertising standards contained in the Standards of Good Practice for Radio Broadcasters of the National Association of Broadcasters as well as those relating to television or some modification of them, be incorporated in our regulations — thus, giving them the force and effect of law.

This proposal was first discussed in the programming hearings in the latter part of 1959, but was not adopted in the Report and Statement of Policy of 1960. It was again presented to the Commission in July, 1962. After careful consideration, the proposal was defeated by one vote in November of the same year. However, on March 28, 1963, the Commission, by a one-vote majority, announced its intention to adopt a modified proposal of this nature which it finally did on May 15, 1963, including alternatives to the provisions of the National Association of Broadcasters' Codes and the suggestion that they may not be appropriate for across-the-board application.

In January, 1963, I had occasion to discuss my opposition to this proposal even though nothing was pending before the Commission at that time.

Briefly, the objections that I expressed were that since self-regulation is one of the cornerstones of a successful regulatory process, it is important that the industry itself engage in a rather extensive voluntary program of self-regulation. When, however, industry with the encouragement of the government develops satisfactory codes for self-regulation, it appears to me to be wrong for the government to appropriate them and to propose incorporating the codes in our rules in order to give them the force and effect of law. Such a course of action must necessarily undermine and destroy the incentive of the industry to a large extent to engage in self-regulation.

There are some situations that are not provided for in the Radio Code. A daytime station in the northern latitudes in the United States is on the air a comparatively short period of time during the day in winter months, and in the summertime, it has much longer hours. A day-time-only station, and there are about 1300 of them in the United States, in the southern latitudes has a much more even broadcast day, summer and winter. If a station is to operate successfully, it would seem to me that it must make enough money to stay on the air the year around. It must have an effective organization both summer and winter. To enforce the National Association of Broadcasters' Code in winter months against a northern daytime station as a matter of law could cause the elimination of a number of stations furnishing a valuable service to their communities.

In addition, there are rural markets, in which little advertising is sold the first five days of the week, but on Friday and Saturday their stations are full of advertising. They make enough money those two days to pay for the service the other five days. A broadcaster talked to me in Seattle. He said, "I would like to adhere to the NAB Code on advertising, but if I did, I would have to go off the air. I am the only station in a small town so that my people would lose their only broadcast service."

Resort-area radio stations furnish a broadcast service to those people who live as permanent residents in the area the year around, but it is only in the summertime that business is good enough that people can afford to advertise to any great extent on some of those stations. The stations in some cases must make enough money in three months to support it the other nine. Consequently, on the basis of these considerations, it would seem to be impracticable to include the self-regulatory code developed by broadcasters for the general government of broadcasters into rules having the force of law.

Although the present proposal provides for possible flexibility to meet some of these objections, in my view, it is an unwise approach to the problem of overcommercialism. Responsible leaders in both the advertising community and in broadcasting have always recognized that advertising must be limited and abuses avoided. From time to time representatives of advertisers, the national networks and the National Association of Broadcasters have made this abundantly clear.

The National Association of Broadcasters' Codes were adopted some years ago and have been amended from time to time in an attempt to bring into being a better balance between program material and advertising material. To a degree the codes have been successful. The mere fact that a majority of the Commission is proposing to include them or something like them in our rules is an indication of their acceptability. There are many broadcasters, however, who do not subscribe or adhere to the codes. (1). The codes appear to me to be satisfactory for the purpose for which they were intended, but they were never conceived or adopted as models of legislation to bind the entire industry. After all, they are voluntary codes, not laws.

I believe that there is a better way to limit advertising and prevent abuses which should be tried before resorting to the extremes proposed of incorporating the National Association of Broadcasters' Codes in our rules or pursuing the opposite approach by letting National Association of Broadcasters keep their codes, but by law forcing all broadcasters to submit to regulation by this private association with a right of appeal to the Commission.

In the revision of our program form, I would require an annual estimate of the total time the station involved is on the air in the ensuing year for a typical week; the percentage of that total time which would be devoted to advertising continuity and the percentage which would be devoted to program continuity in each segment of the broadcast day. I would retain the composite week for the purpose of obtaining the same information for the previous year. Although I do not consider either the typical week or the composite week appropriate for program material on a percentage basis, I do consider them appropriate for program — non-program time purposes. I would then make these figures public and let the market place regulate the limitation on advertising and any abuses of overcommercialization. It is my belief that the competitive factors involved would soon level off the percentage of advertising continuity, at a point which the listeners, the sponsors, and the broadcasters would find reasonable. My principal reliance, therefore, would be first on competition, supplemented by voluntary codes and only as a last resort on additional laws or regulations.

PROGRESS REPORT ON . . . HIGH POWER FLEXIBLE CABLE

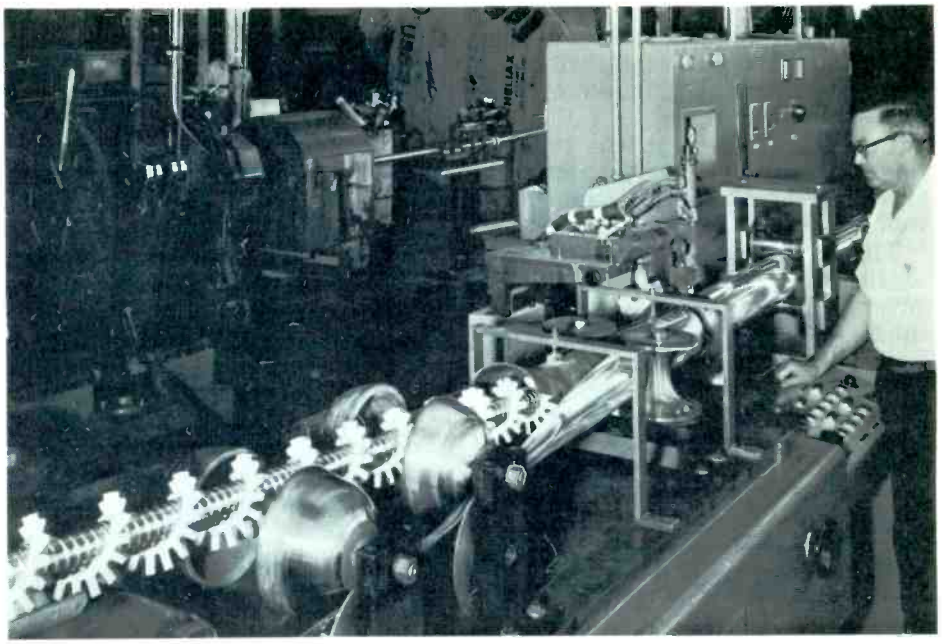
Most all of us have, at one time or another, worked with coaxial cable, whether it was installing, putting fittings on or handling it as a dealer. We've seen coaxial cable that ranged from one-half the diameter of a pencil to that resembling garden hose in size and larger. In special communications systems we've become accustomed to large-size, rigid cable. However, the majority of us may not be familiar with the manufacture of coaxial cable and its attendent problems.

Coaxial cable is not a simply manufactured product. It requires specially treated raw materials, carefully controlled environment and expensive machinery. It is also a process that will leave the most brilliant layman with a feeling of uselessness when surveying some of the large mechanical fixtures that are used by the manufacturers of coaxial cable.

Granted, the assembling of coaxial cable is a job given over to sophisticated machinery but in the case of Andrew Corporation, it is a highly interesting process especially when you consider the fact that they are now producing **5-inch diameter,** flexible, coaxial cable! The 5-inch cable, type H9, produced by Andrew is part of their HELIAX line, an Andrew development first introduced at the 1952 National I.R.E. Convention in New York.

The manufacture of the new H9, 5-inch cable, starts with oxygen-free, high conductivity copper and solid polyethylene strip. The copper is used for both the formed, convoluted inner conductor and outer conductor. The polyethylene strip serves as the dielectric and in the manufacturing process is shaved to close dimensional tolerances to establish correct velocity and attenuation and is notched for flexibility. The application of the dielectric to the convoluted inner conducter is by a specially designed taping machine. After this treatment is given the inner conductor, the next step is the cable assembly.

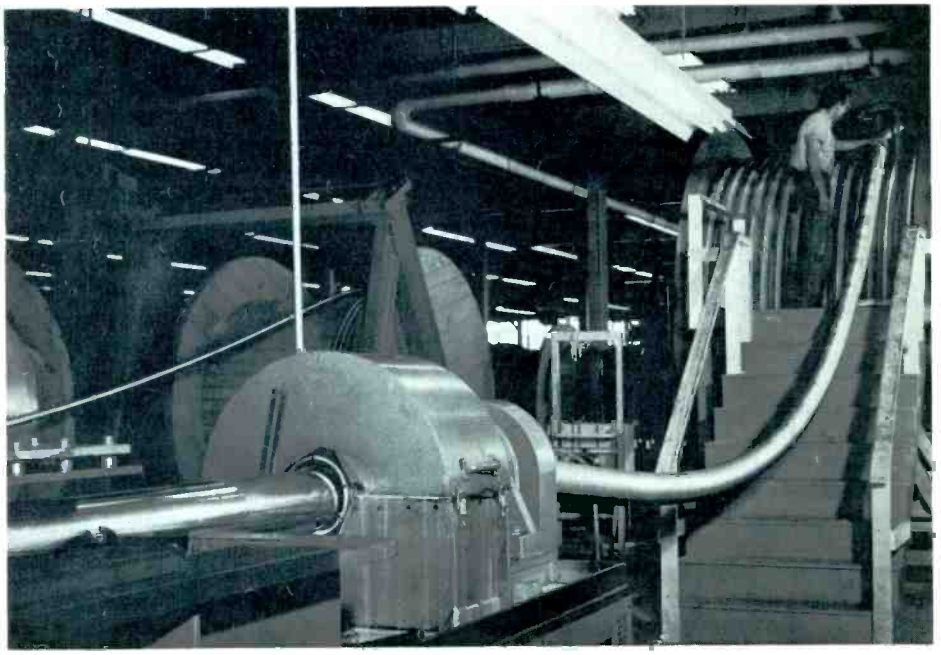
The outer conductor of the H9 cable is made from a copper strip that is carefully inspected and mill lengths welded into long continuous rolls ready for the assembly process. This strip, along with the already processed inner conductor, is fed into a large, special welding machine which forms the outer conductor around the inner conductor assembly. Immediately after this forming process, the outer conductor is seam welded to form a continuous tube. This assembly then goes through a machine which convolutes the outer conductor and captivates the inner conductor and dielectric helix. The emerging cable in its finished form is then wound on storage reels and tested.



At this point on the production line the inner conductor with its polyethylene dielectric is being fed toward the welding machine while the outer conductor strip is rolled around the inner assembly and subsequently welded.

The testing facilities are some of the best with a full complement of lab equipment available for use. Tests such as VSWR, attenuation, pulse reflection, characteristic impedance, velocity, phase linearity and phase temperature coefficient may be performed and recorded to satisfy design or production requirements. Additional facilities include an oven and freezing units large enough to accept large coils of cable for environmental testing.

The end product? An almost unbelievably large, 5-inch diameter, flexible cable with a 50-ohm characteristic impedance. Some of the other specifications on the cable are: peak power handling capability of 826 kw, good for operation to 950 Mc, minimum bending radius of 50" to permit easy bending of the cable around obstructions.



Last part of the forming process takes place when the machine shown here convolutes the outer conductor. Cable is then placed on a reel and tested.

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SECTION 605 AND YOU - PART IV

Jeremiah Courtney

The microphone is symbolic of one of our most precious heritages, the freedom of speech. It does not, however, guarantee the privilege to carry on illegal or illicit communications. Nor, does it represent the right to intercept private communications for personal gain. Section 605 of the Communications Act and precedent cases have established a guideline that is designed to protect the individual.

(Editoral Note: Section 605 of the Communications Act prohibits wire-tapping — both interstate and intrastate — and the disclosure of information so obtained. As a result, evidence obtained by wire-tapping by Federal or State agents cannot be used in trials in Federal Courts. But wire-tapping evidence gathered in violation of Section 605 by State agents is admissible in State courts, unless specifically barred by State law. Section 605 also applies to such widely used devices as extension telephones and the recording of telephone conversations. The courts have held that it is legal for one party to a telephone conversation, without the knowledge or consent of the other party, to allow a third person to listen on an extension telephone and to use the information against the unsuspecting victim of this eavesdropping. Mechanical recordings of such conversations similarly appear legal. These matters were the subject of the first two articles on Section 605. The third article dealt with electronic eavesdropping by means other than wire-tapping. While not covered by Section 605, the sanctioning by the United States Supreme Court, in **Lopez** v. **United States,** 372 U. S.——, 31 U.S. Law Week 4507, of the use of a pocket recording device as a means of collecting evidence constitutes no less a threat to our privacy than wire-tapping. This article — the last of the series — will discuss other aspects of electronic eavesdropping and other effects of Section 605 on the every-day use of our telephone, and on radio communications use.)

An Aid in Enforcing the Communications Act

Except as necessary for the enforcement of the Communications Act and the rules of the FCC, Section 605 protects you against eavesdropping by the Commissions inspectors. In **United States** v. **Sudgen,** 226 F. 2d 281, aff'd. 351 U.S. 916, the Federal Court of Appeals for the ninth circuit was faced with the question whether the FCC inspectors are exempt from the prohibition of Section 605.

The answer, which is law today, was that the Federal Communications Commission is not in the general crime detection business. Thus, the Commission personnel could monitor all radio communications for the purpose of enforcing the provisions of the Communications Act but not for the purpose of enforcing other laws. In this case, an FCC field inspector monitored the use of a Special Industrial mobile radio system by the defendants and reported what he heard to the United States Immigration Service. On the basis of this information, the defendants were indicted for violating the immigration laws in carrying "wetbacks" across the border. Some of the intercepted communications were carried on before the defendants had an operator license, at that time required by the Commission's rules. These communications were considered to be beyond the protection of Section 605 because the use of radio was in violation of the Commission's regulations. However, the communications which were intercepted after the defendants obtained the requisite operator permits were held to be protected and not admissible in evidence.

A Restraint on News Reporting

Neither does our traditional and cherished freedom of the press endow news reporters with protection against violations of Section 605. Two-way radio transmissions, which may easily be monitored by anyone wishing to buy a receiver tuneable to the particular frequency, are protected by Section 605 against interception by news reporters for the purpose of reporting them to the public. **United States** v. **Fuller,** 202 F. Supp. 356. In this case, the defendant a news reporter, intercepted police radio messages and disclosed them to a radio station which used them in its news broadcasts. The Court held that Section 605 prohibited this practice. The fact that anyone could obtain a receiver and tune in to the

police messages did not make the Section inapplicable; nor could the police be required to scramble their transmissions if they wanted protection against interception. (Scrambling is permissible in the mobile radio services.) Finally, the freedom of the press principle did not place the reporter in a privileged category. But **quaere** whether the police should not adopt the practice of scrambling their transmissions, not to frustrate news reporters but criminals. With convenient and inexpensive portable receivers widely available, the criminal elements may easily become privy to police transmissions, some of which may help them avoid detection.

An Aid to Orderly Frequency Sharing

We all know that the radio frequencies available for private mobile systems are growing more crowded daily; and that one undisciplined user of a shared channel can effectively frustrate his co-sharers. Can one then monitor another's radio calls to prove he is engaged in superfluous or prohibited communications on your commonly shared channel, and submit the proof to the FCC without violating Section 605? There is no case dealing directly with the question. But it does not appear that this practice would constitue a violation of Section 605 — as a practical matter, no district attorney would be likely to agree to prosecute, or a jury return an indictment, for a violation of Section 605 in these circumstances. It is clear from the **Sugden** case that the Federal Communications Commission certainly can monitor all radio transmissions and use the information so obtained for the purpose of enforcing the Communications Act. It is equally clear from the text of Section 605 and the Supreme Court's decision in **Bernanti** v. **U.S.** (1957) 355 U.S. 96, that is not necessary to disclose the contents or substance of the conversation to violate Section 605—the disclosure of the existence of an intercepted conversation is sufficient. Thus, if you merely told the FCC that the licensee with whom you share your Business Radio Service channel uses the channel 24 hours a day so that you are effectively precluded from gaining access to the channel, this taken literally, could constitute an interception and disclosure within the purview of Section 605.

On the other hand, however, it is implicit in the Commissions's regulations, which provide for the shared use of the frequencies, that the sharers cooperate with one another in the use of the channel. In fact the FCC mobile radio service rules typically enjoin all licensees to "cooperate in the use of the frequencies assigned in order to minimize interference, and thereby obtain the most effective use of the authorized facilities." (See, for example, Section 11.8 of the Industrial Radio Services Rules.) Such rules appear to constitute every shared user a guardian of the efficient use of the channel allocated to him. In order to achieve such cooperation, it is obviously necessary to monitor the channel before transmitting. As a matter of fact, enforcement proceedings have been instituted against licensees for failure to monitor which resulted in indiscriminate interruptions of the transmissions of others. As a result enforcement proceedings in which we were engaged, a licensee operating a duplex system in the Motor Carrier Radio Service was required to monitor his base station transmit frequency (which he would ordinarily not monitor since the base station was receiving on a different frequency) in order to prevent interruptions to the transmissions of another radio system which operated simplex on the carrier's base station transmit frequency.

It would not seem reasonable, therefore, to view as a violation of Section 605 what in effect is the very basis of an efficient and effective use of shared frequencies and the very foundation of the shared frequency allocation scheme in the private radio services — the monitoring of the channel before commencing transmission. Unless each licensee, in the spirit of shared use, felt free to report to the Commission any abuse of the channel by other users, the quoted injuction of Section 11.8 would be meaningless. For the same reason, it would seem that a licensee who ascertains by monitoring of his shared channel that one of the other users is transmitting communications which are beyond the scope of the permissible communications as defined by the Commission's regulations — for example, sales reports or payroll information on a Special Industrial channel (Section 11.502) — should be free to report this information to the Commission without fear of prosecution under Section 605.

In fact, the Commission should welcome such reports because its own staff is obviously inadequate to police the rapidly growing mobile radio services. Since the purpose of such reports is solely to achieve compliance with the Commission's regulations, the principle of the **Sugden** case permitting the FCC inspector to monitor for the purpose of enforcing the Act should likewise be extended to the sharers of the frequencies who, in this respect, assist the Commission in policing the airwaves. Finally, monitoring a shared frequency and reporting to the Commission a rule infraction can be defended as not violating Section 605 on the theory that every licensee who accepts a grant on a shared frequency gives his implied consent to the other sharers of the frequency to listen to his and to take all actions which may be reasonably necessary to comply with the provisions of the Commissions' rules requiring cooperation between the sharers.

But one **caveat** is necessary. Do not use tions heard on a shared channel for your private business advantage. Neither the implied consent theory nor the theory that you are assisting the FCC in policing the airwaves will help any licensee who pirates the calls of another, with whom he is sharing the frequency, and uses such calls for is own benefit, as for example, to gain a fare for his taxicab or a customer for his business. This is plainly prohibited by Section 605; and any licensee engaging in such practices may be prosecuted by the Department of Justice and fined or imprisoned, if found guilty.

Telephone Company Records not Affected

The provisions of Section 605 prohibiting the unauthorized interception and publication of commun-

ications do not apply to the regular and reasonable business practices of telephone companies who make a business record of the calls passing between their subscribers. It has been held that such records are admissible in evidence in a criminal prosecution; that such calls are not intercepted; but if they were intercepted, the subscriber consented because he must have know that the company would keep some records of this type. **United States** v. **Gallo,** 123 F. 2d 229. It is pertinent to add here, however, that the first clause of Section 605 specifically provides that the telephone companies must disclose the existence, contents, etc. of interstate or foreign communications handled "in response to a subpoena issued by a court of competent jurisdiction, or on demand by other lawful authority."

Private and MCC Radio Calls Protected Against Telephone Company Interception

Can the telephone company monitor the radio calls of your private user or miscellaneous common carrier radio system to determine whether you are interconnecting with their facilities in apparent violation of their tariff; and then discontinue your telephone service without violating Section 605? The answer, in our opinion, is "No". Certainly, if the police agencies in enforcing the law are expected to observe the prohibition of Section 605, no less should be required of a telephone company enforcing its tariff regulations.

Let us assume, for example, that an MCC were interconnecting without an agreement with the local telephone company; and that the telephone company installed a device which activated a bell in the telephone company's exchange every time the MCC put through a local call so that the circuit could be montored to determine whether a mobile radio transmission from the MCC's subscriber was interconnected into the telephone company wire line plant. Under such circumstances, the telephone company would be listening to the radio call before it reached the landline station. In other words, every call of this kind would be intercepted and the information so gained used for the benefit of the telephone company. There is nothing in Section 605 which exempts a telephone company from the prohibition on unauthorized interceptions and disclosures. Any right a telephone company may have to protect the operation of its own system would not seem to extend to intercepting the calls of its customers transmitted on the customers' own radio systems. A telephone company employee monitoring such calls would be intercepting them. Then, reporting to his superiors that these radio calls showed that the telephone subscriber was interconnecting with the landline system, would constitute a disclosure prohibited by the second clause of Section 605. Any action by the telephone company based on such monitoring would seem to constitute the use of this information for its own benefit in violation of the fourth clause of Section 605. Since a violation of Section 605 is punishable by a fine of not more than $10,000 or by imprisonment for a term not exceeding two years, or

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Type	Nom. Outside Diameter (in.)					Attenuation (Nom.) (db/100 ft)		Ship. Wt. (lb/ 1,000 ft)
	Conductor	Dielectric	Shield	2nd Shield	Jacket	Channel 6	Channel 13	
JT-400S	0.114	0.525	0.536		0.632	0.77	1.3	147
JT-400D	0.114	0.525	0.536	0.547	0.632	0.77	1.3	167
JT-404S	0.064	0.285	0.296		0.407	1.31	2.2	64
JT-404D	0.064	0.285	0.296	0.307	0.407	1.31	2.2	73
JT-408S	0.081	0.373	0.389		0.460	1.01	1.6	89
JT-408D	0.081	0.373	0.389	0.400	0.460	1.01	1.6	101

JT-1000 SOLID-SHEATH SEMIFLEXIBLE COAXIAL CABLE

Type	Nom. Outside Diameter (in.)				Attenuation (max.) (db/100 ft)		Ship. Wt. (incl. reel) (lb./ 1,000 ft)
	Conductor	Dielectric	Un-Jacketed	Jacketed	Channel 6	Channel 13	
JT-1750	0.1400	0.680	0.750		0.60	1.03	280
JT-1750J*	0.1400	0.680	0.750	0.850	0.60	1.03	330
JT-1500	0.0980	0.450	0.500		0.84	1.40	130
JT-1500J*	0.0980	0.450	0.500	0.580	0.84	1.40	160
JT-1412	0.0752	0.362	0.412		1.05	1.65	100
JT-1412J*	0.0752	0.362	0.412	0.480	1.05	1.65	120

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Our Man in Public Safety Communications

THE HANDWRITING APPEARS ON THE WALL

A year ago an article written by Ted Merrill appeared in Communication Horizons. It was titled: "Where Are We Going?" People read it; agreed, or disagreed but did nothing. Then, in February, Ted wrote another piece; this time, a "Letter to the Editor."

Ted's letter was in response to the filing made by the National Association of Broadcasters in connection with the E.I.A. petition asking the Federal Communications Commission to reallocate TV channels 14 and 15 to the Land Mobile Radio Services.

N.A.B. suggested that the use of radio for land mobile communication was wasteful of spectrum space and suggested a reexamination of policy by the Commission looking towards establishment of a common-carrier type of radio system to replace the "private mobile radio systems."

Such an approach should not be surprising. The 28th Annual Report (Fiscal Year 1962) of the FCC contains forty pages on Broadcast Services. The Public Safety Radio Services received slightly over one page; the other Land Mobile Services about three more. Your big problem was summed up neatly in the following sentences quoted from the report: "The growth of private radio communication systems shows no signs of abating. At the close of fiscal 1962, 3,702,776 fixed, portable and mobile transmitters were authorized to 936,380 safety and special licensees collectively. This is in contrast to 2,663,475 transmitters and 770,505 licensees at the close of the previous year."

No solution was proposed; in fact, there seemed to be no pressing problem, at least in the minds of the Commissioners.

As March 1963 drew to a close, strange things began to happen. Commissioner Lee pointed out that there was "no relief in sight" for the Land Mobile Services. Victor Reis, Bethlehem Steel Co. official and Chairman of the National Association of Manufacturers' Committee on Radio Use, wrote a letter to President Kennedy urging the President to take into account the needs of the non-broadcast radio services in his next appointment to the Commission. A few weeks later the E.I.A. Land Mobile Section endorsed the suggestion of Mr. Reis in a letter to President Kennedy.

About the same time, rumors started appearing about the possible formation of a new organization to represent all of the land mobile services. The concept was that the organization would have a Washington office and staff. Ted Merrill had suggested it. So had others.

On May 14, 1963 Commissioner E. William Henry was named Chairman of the FCC. Chairman Henry had already admitted publicly that the non-broadcast users had a real frequency problem.

On June 1, 1963 Robert M. Johnson of General Electric, in one of the hardest hitting speeches ever made about the mismanagement of the radio spectrum, called for the "unqualified and unified support of every land mobile user in the country."

Mr. Johnson continued: "Gentlemen, to put it as succinctly as I possibly can, the future of land mobile radio in this country is completely, — I repeat, completely — dependent upon some sane solution to the allocation of radio frequency space for TV transmission.

"Now some of the regulators in Washington would lead us to believe that the problem has been solved. The solution is status quo — 88% of the portion of the spectrum that we can use for land mobile communication continues to be allocated for all-channel television reception. In an unbelievable naive assumption that telecasting must increase many-fold in the United States and an almost calculated unconcern for frequency requirements for other forms of communications the issues were debated in Washington for years. Yet, I challenge anybody to uncover one serious utterance during these proceedings that suggested that a booming industry of two-way radio communicators throughout this country was staggering under an unlivable condition of frequency congestion. This hits home to us all.

"Vital Civil Defense Communication systems are sharing frequencies with every conceivable type of user; police, fire, agriculture, forestry, ambulances, local governments, and even manufacturing plants. (FCC staff officials) have to turn a deaf ear to State Civil Defense organizations on many requirements because they do not have the frequencies to supply them their communication requirements. Los Angeles has industrial communications users piled up to fifty deep on a single frequency. Communication engineers in Chicago throw up their hands in surrender when a requirement for additional transportation frequencies is made. I know of several important federal government systems that are held up because of frequency shortage. Fact of the matter is, many communication systems are being abandoned because of intolerable co-channel interference.

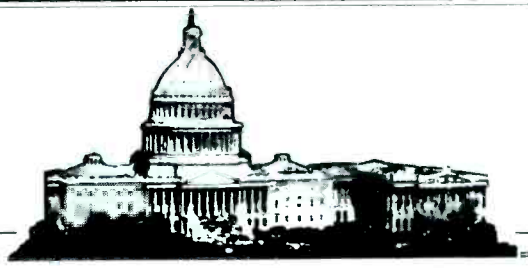
"Why? Why the total lack of concern by Washington? Why the complete preoccupation with reserving badly needed frequencies for a broadcast spectrum that has never really proven a need. Why the toleration of hundreds of idle megacycles of space for some speculated futures for television and no overture to you? Why? Quite frankly, part of the answer may be that — mobile radio is in a state of anarchy."

A few days later the Central Committee on Communications Facilities of the American Petroleum Institute met in Washington, D.C. All seven FCC Commissioners attended part of the sessions. One of them expressed surprise at the amount of use of two-way radio by the Petroleum Industry.

But the big point is that **ALL** of the Commissioners heard about the problem. When was the last time that a Commissioner attended a conference of your organization?

The following week at a meeting, also in Washington, D.C., Commissioner Robert E. Lee told the National Association of Manufacturers' Committee on Manufacturers Radio Use that he was proposing formation of a government-industry committee representing the Commission and the users of non-broadcast radio. Mr. Lee was not the only Commissioner present. Chairman Henry was also present

(Continued on Page 42)



By Robert E. Tall

Our Man in Washington

New TV Service To Be At 2500-2690 Mc — The nonbroadcast radio services lost another round to the nation's broadcast interests in late July as the FCC selected the 2500-2690 megacycle band as the home for a new "Instructional Television Fixed Service" which is established "to promote educational TV" by the transmission of "instructional and cultural material to schools and other selected receiver locations."

The Commission's action completed rulemaking proposed a year ago, when the agency suggested that either the 2500-2690 mc band — allocated for international control and operational fixed microwave stations — or the 1990-2110 mc band — shared by television STL and television intercity relay stations — be used for the new educational TV service.

Private microwave interests, in their comments on the proposals, had recommended that the 2500-2690 mc band be retained for operational fixed usage, while the broadcast industry, led by the National Association of Broadcasters, urged the Commission to leave the 1990-2110 mc band untouched.

The Commission commented that "The new service will operate in a band now only lightly used by operational fixed stations (about 90). Although no present reallocation is involved, the Commission will (with certain exceptions) not authorize new operational fixed stations in this band for a period of three years, pending determination of the ultimate needs of the new service."

The new rules, the agency said, becomes effective Sept. 9, "to enable school systems to plan making use of this auxiliary service and for manufacturers to begin development of the equipment needed." The new service, the agency noted, "will enable a central transmitter to serve scattered local schools or other reception points which, in turn, will convert the transmissions for viewing on conventional receivers in those places. The 31 channels provided will permit sending different subjects simultaneously."

The "primary purpose" of the new service, the Commission said, "is to provide for the licensing of transmitting facilities to send visual and accompanying aural instructional material to selected receiving locations in accredited public and private schools, colleges and universities for the formal education of students.

"Systems licensed for this purpose may also be used for other incidental purposes, among which are the transmission of cultural material and entertainment to these same receiving locations; the transmission of special training material to selected receiving locations outside the school system, such as hospitals, nursing homes, training centers, clinics, rehabilitation centers, commercial and industrial establishments, etc.; the transmission of special material to professional groups or individuals to inform them of new developments and techniques in their fields and instruct them in their use; and to perform other related services directly concerned with formal or informal instruction and training."

"When not being used for such purposes,' the agency said," "the facilities licensed under these rules may be used for handling administrative traffic of the licensee, such as the transmission of reports and assignments, conferences with personnel, etc."

The Commission pointed out that "Stations licensed in the new service may also be used to relay material to and from commercial and noncommercial TV stations, but not to interconnect TV fixed systems in different areas, or to establish relay systems to cover an entire state or large portion thereof. The rules permit the retransmission of programs of other broadcast stations, subject to the usual requirement for consent of the originating station. Any portable pickup needs by educational institutions licensed under the new rules can be accommodated by authorizations in the business radio service."

Eligibility in the new service, it said, "is identical with that of the noncommercial educational TV broadcast service." Licensees in the new service, the Commission noted, "are expected to make use of directive antennas when necessary."

Microwave Frequency Diversity Inquiry — Technical information to help the FCC establish specifications for reliability of microwave communications equipment has been asked from microwave equipment users and manufacturers in a new "notice of inquiry" by the Commission. The principal thrust of the inquiry, it was noted, is to determine the future status of frequency diversity use in microwave systems, but the agency pointed out that it does not plan to change its policy with respect to frequency diversity, if at all, until the end of the inquiry.

The Commission commented that the inquiry was prompted by the growing demand for microwave relay routes — especially for multiple channels which would be used, not for handling increased volume of traffic, but for boosting the reliability of a microwave circuit.

The agency recalled that it had asked the Joint Technical Advisory Committee in late 1959 to make a study of diversity techniques in microwave communications systems "in an effort to obtain factual information on the relationship between diversity techniques and reliability and how these may affect spectrum management," but said that even with JTAC's response, it has "available insufficient data to permit a considered judgment on the frequency diversity method of achieving reliability at a cost of spectrum space."

"Flea Power" Radio For Manufacturers? A 15-month-old proposal of the National Association of Manufacturers' Committee on Manufacturers Radio Use for the allocation of "flea power" frequencies in the 72-76 megacycle band for use by short-range personal two-way radio equipment in the manufacturers radio service has resulted in

FCC-proposed rulemaking along those lines. Comments are due Oct. 1.

Under the Commission's proposals, the manufacturers service would be allocated ten exclusive frequencies for the "flea power" operation — 72.44, 72.48, 72.53, 72.56, 72.60, 75.44, 75.48, 75.52, 75.56 and 75.60 megacycles — and would be given "shared" access to twenty other 20 kc-wide frequencies between 72.01 and 73.40 mc. The 20 frequencies would be available for use by the one-watt communications operations on a shared basis with normal fixed station operation in the 72-76 mc band.

The rule changes had been requested to satisfy a need for low power communication in plant, yard and other manufacturing operations hazardous to personnel who, though in the same area, are often out of sight and sound of each other. One example cited by the Commission was in "some noisy steel mill activities which require quick and reliable communication between the employees engaged," and where "Hand signals, voice commands, and wireline connections fall short of the desired level of communication reliability."

The "flea power" proposals are contingent on FCC action in another outstanding rulemaking case, which contemplates the splitting of channels in the 72-76 mc band. The Commission pointed out that it does not plan to complete action on the flea power proposals until the conclusion of the 72-76 mc split channel proceeding.

The agency summarized that its intent is to: "Provide American manufacturers with 30 narrow band (20 kc each) channels, for apparatus and equipment control, and safety, and other functions, employing mobile, low powered (one-watt input) transmitters. . . . All transmitters would be required to be operated solely within plant, mill, yard, or other manufacturing areas, in order to obviate the possibility of interfering with television reception on channels 4 and 5. Tone, as well as voice, transmission would be allowed; and multiple frequency systems would be authorized."

The Commission pointed out that "Use of the frequencies by the manufacturers is subject to the condition that no harmful interference will be caused to reception of television channels 4 or 5, and, in turn, no protection from television interference will be afforded the manufacturers."

Among conditions which would be imposed on the flea power usage, the Commission proposed, are that "The gain of antennas employed may not exceed that of a half wave dipole; and horizontal polarization will not be allowed." Also, "All antennas shall be immediately attached to, and integral parts of, transmitters. In other words, antennas may not be located or employed at points away from transmitters."

Chicago Area Teletypewriter Network The Chicago Police Department ,which also has one of the nation's most up-to-date mobile communications networks, joined about 30 suburban police departments and county and state police headquarters last month in a closed-circuit teletypewriter communications system, in a move to "strengthen law enforcement throughout the metropolitan area."

The teletypewriter machines can operate selectively. One, several, or all points can be communicated with at a time. The network has been gaining usage by Chicago-area suburban police for the past two years, and now includes the Secretary of State office in Springfield, two state police headquarters, the National Auto Theft Bureau, Lake County, Ill., DuPage County, and Cook County sheriffs' offices. Suburbans included in the hook-up are Evanston, Oak Park, Arlington Heights, Bellwood, Berwyn, Calumet City, Chicago Heights, Cicero, Downers Grove, Franklin Park, Glenview, Harvey, LaGrange, Lombard, Melrose Park, Midlothian, Naperville, Niles, River Forest, Schiller Park, Skokie, Summit, Villa Park, Waukegan, West Chicago and Evanston.

Public Safety Burglar, Fire Alarms—The operation of low-powered transmitters in the police, fire and local government radio services for intruder or fire alarm purposes is now permissible under new rules adopted by the FCC.

Regulations for the new service are in the form of a new paragraph to the "station limitations" section of each of the three radio services involved. The new language provides that frequencies above 25 megacycles which are available to the three services may be used on a secondary basis for "voice, tone or impulse signaling . . . provided a showing is made that such operations will not cause harmful interference to the primary operations of any co-channel licensee, and subject to the condition that harmful interference is not caused to the primary operations or any licensee.

The signaling, under the new rules, can be used in all three services for the "automatic indication of equipment malfunction;" in the police service for actuating "a device to indicate the presence of an intruder or property under the protection of the licensee"; in the fire service to actuate a device "to indicate the presence of a fire on property under the protection of the licensee"; and in the local government service for devices "to indicate the presence of an intruder or fire on property under the protection of the licensee."

Additional limitations, for all three services, specify that: "Any one alarm or warning shall be limited to not more than five transmissions, not to exceed six seconds each"; "The bandwidth shall not exceed that authorized to the licensee for its primary operations on the frequency concerned"; "Frequency loading resulting from the use of secondary voice, tone or impulse signaling will not be considered in whole or in part as a justification for authorizing additional frequencies in the licensee's mobile service system;"

"A mobile service frequency may not be used exclusively for secondary voice, tone or impulse signaling"; "The plate power input to the final radio frequency stage shall not exceed 50 watts"; "Only A1, A2, A3, F1, F2 or F3 emissions will be authorized"; and "Automatic means shall be provided to deactivate the transmitter in the event the carrier remains on for a period in excess of three minutes."

The FCC had issued its original rule proposals in the matter in late 1961. The only major change from the original proposals adopted by the Commission in finalizing the new rules was to add "voice" as a permissible signaling method.

The agency pointed out that the comments which endorsed the original proposals "virtually without reservation, were received from several municipalities in the St. Louis, Mo., area," and "These entities asked that the proposal be amended to the extent that voice as well as tone or impulse signaling would be permitted."

The Commission said it anticipates that the intruder or fire alarms 'would be placed in banks, movie theatres, and large office buildings,' which are essentially "public" in nature, in addition to municipally owned facilities.

Report On CB Violations — The FCC's Field Engineering & Monitoring Bureau, following a concentrated study of rules violations in the class D citizens radio service, has reported that it put 552 man-hours of work on the project at one stretch, and turned up 5470 violations.

Timetable For Possible CB Rule Action A reference to the timetable involved in the FCC's disposition of outstanding rule proposals looking toward a substantial revamping of the citizens radio service, which were issued last November, has been made by FCC Amateur 'Citizens Radio Division Chief

Ivan H. Loucks in a speech to a Fairfax, Va., CB club.

Mr. Loucks reported that the FCC staff "has completed an analysis and summary of the over 3000 comments (many of them duplicates) filed in the docket," and the Commission "is now reviewing that summary." The "various recommendations of the staff will probably follow," he said, "when the Commissioners feel that they are familiar with the problems involved." He added that "it is safe to assume that no decision in the docket will be released before September, and it may be much later."

Despite the fact that the Class D citizens channels are the "most heavily populated frequencies anywhere in the spectrum," Mr. Loucks said, "there is not a ghost of a possibility of increasing the number of those channels. He estimated that there are over 375,000 class D citizens licensees on the 23 channels available to the service.

Discussing difficulties involved in the processing of the increasing load of citizens radio applications, Mr. Loucks pointed out that in July, the application backlog stood at "about 75 days," and that "there is little chance of improving the situation until the new automatic data processing equipment (of the FCC) is installed and can take over." He noted "That is scheduled to happen sometime this fall or early winter."

Government To Set Up New Frequency File — Specific recommendations as to the composition of an "integrated master engineering file" of frequency usage information is called for in a new contract signed by the Telecommunications Office of the Office of Emergency Planning in connection with OEP's current project looking toward improved frequency management. The engineering file is to include, OEP said, information which is now "fragmented" in the records of the International Telecommunication Union, the Interdepartment Radio Advisory Committee, and the FCC, as well as additional data "as may have to be obtained from frequency users."

The new contract, issued to the same firm, follows a February order placed with the engineering firm of HRB-Singer, Inc., for design of a system aimed toward ultimate handling of the entire process of government agencies' frequency selection, engineering, and record-keeping by automatic data methods. The "basic objective" of the new contract, it was pointed out, is the development of parameters of a comprehensive file of scientific and technical information required for improved frequency management throughout the executive branch of the government.

Cook Electric Petition Denied — The FCC has denied a petition from the Cook Electric Co., of Chicago, which asked rulemaking to permit "unused" television and FM broadcast channels to be employed, without a license, for two-way communication to teach languages in classrooms. The Commission said its denial of the request was based "largely on interference considerations."

Littlejohn Gets Permanent FCCA Post— In a departure from the previous practice of having the chairmanship of its radio frequency coordination activities shift year-by-year as officers of the association change, the Forestry Conservation Communications has reorganized its activities and named Raymond M. Littlejohn, Communications Engineer for the South Carolina Commission of Forestry, as the permanent head of its Radio Committee.

The action was taken at the 14th annual conference of the Association in Dallas, Tex. Mr. Littlejohn, as a Past President of FCCA, shared a speaking role at the conference with Association President Fred G. Waters, of the Arkansas Division of Forestry, and a score of other industry and government officials.

FCC Public Safety Division Chief John J. McCue, during his report on activities of the Commission during the past year, pointed to the current study of the FCC's official frequency cards being conducted by the Electronic Industries Association's Land Mobile Communications Section, and predicted some of the probable results of the study with respect to specific radio areas, based on spot analysis he has made.

Applying the results of his analysis to the forestry conservation radio service, Mr. McCue suggested that the EIA study will possibly show some "holes" in the usage of the land mobile radio frequencies, especially in the 150 mc band as far as forestry is concerned.

FCCA, during the meeting, adopted a course of action to make a comprehensive survey of the forestry conservation radio usage throughout the United States, in preparation of suggesting ways in which some of the frequencies assigned to that service could be used on a selected geographical basis to relieve frequency congestion in other services.

Associated Public Safety Communication Officers President Harvey O. Platt, addressing the FCCA meeting, pointed out that this studies of the public safety communications field has shown "frequency problems in all sections of the country," adding that "What has concerned me even more is the fact that the problems we now face look relatively insignificant when they are compared with the problems we are certain to face over the next five to ten years."

Mr. Platt, Director of Communications for Riverside County, Calif., said he has "found a wide-spread feeling that we must take effective action to bring home to officials in our own communities and states, as well as the FCC and the Congress, the serious nature of the problems that are building up."

Satellite Procurement Rules — The FCC has asked for comments by Sept. 10 on proposed rules and regulations to govern the procurement of apparatus, equipment and services for the establishment and operation of a commercial communications satellite system. The Commission said the proposed rules would implement the Communications Satllite Act of 1962 which, among other things, directs the Commission "to insure effective competition in such procurements and to insure that small business concerns are given an equitable opportunity to participate therein."

FCC Approves New Mobile Service Tests — The Bell Telephone Co. of Pennsylvania has received developmental authority from the FCC to construct facilities to be used in Harrisburg field trials of the Bell System's projected improved mobile telephone service. Plans for the undertaking — a joint project of Bell of Pa. and the Bell Telephone Laboratories— were spelled out earlier in the year. Among other things, the program involves "the first attempt to utilize the trunking advantage of multichannel groups in completing base-to-car calls, the company said.

Flexibility For Flight Test — The FCC has completed aviation radio rulemaking to permit, under certain conditions, more than one flight test station for operation on the ground at an airdrome. The rule flexibility had been requested by the Aerospace Flight Test Radio Coordinating Council.

New 450 Mc Concept Proposed — A "new concept" in the use of 450-470 megacycle frequencies — contemplating alternate service use on a secondary, non-interference basis as a way out "of the dilema in which the FCC finds itself in attempting to provide other frequencies for increasing important point-to-point requirements in

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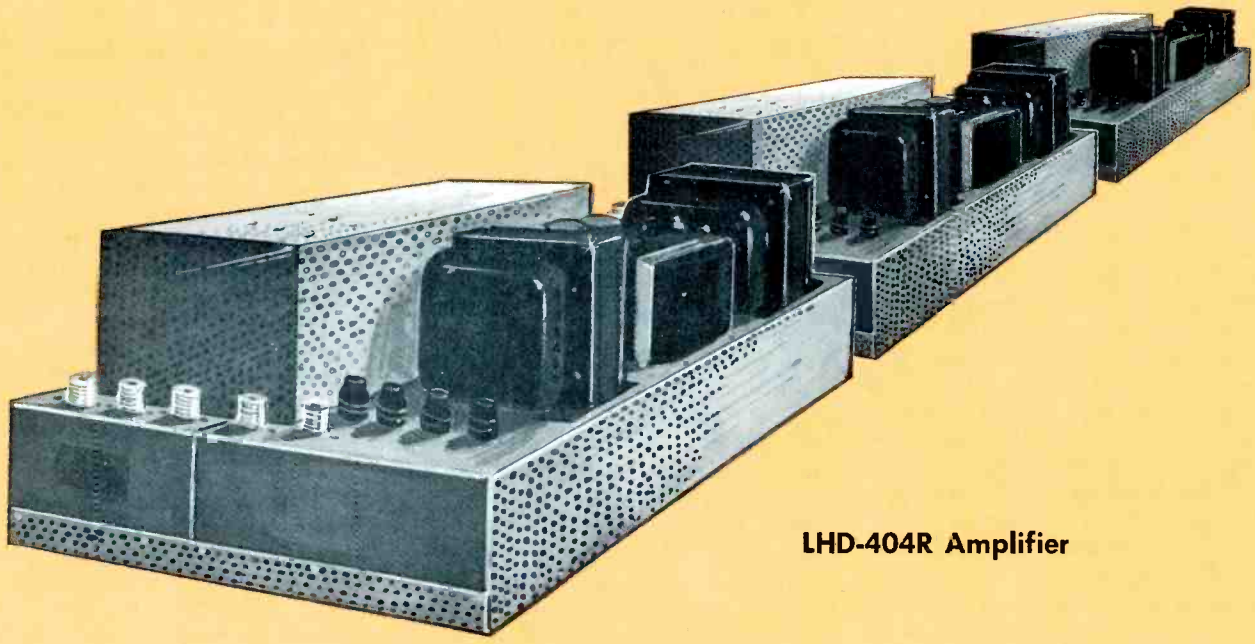

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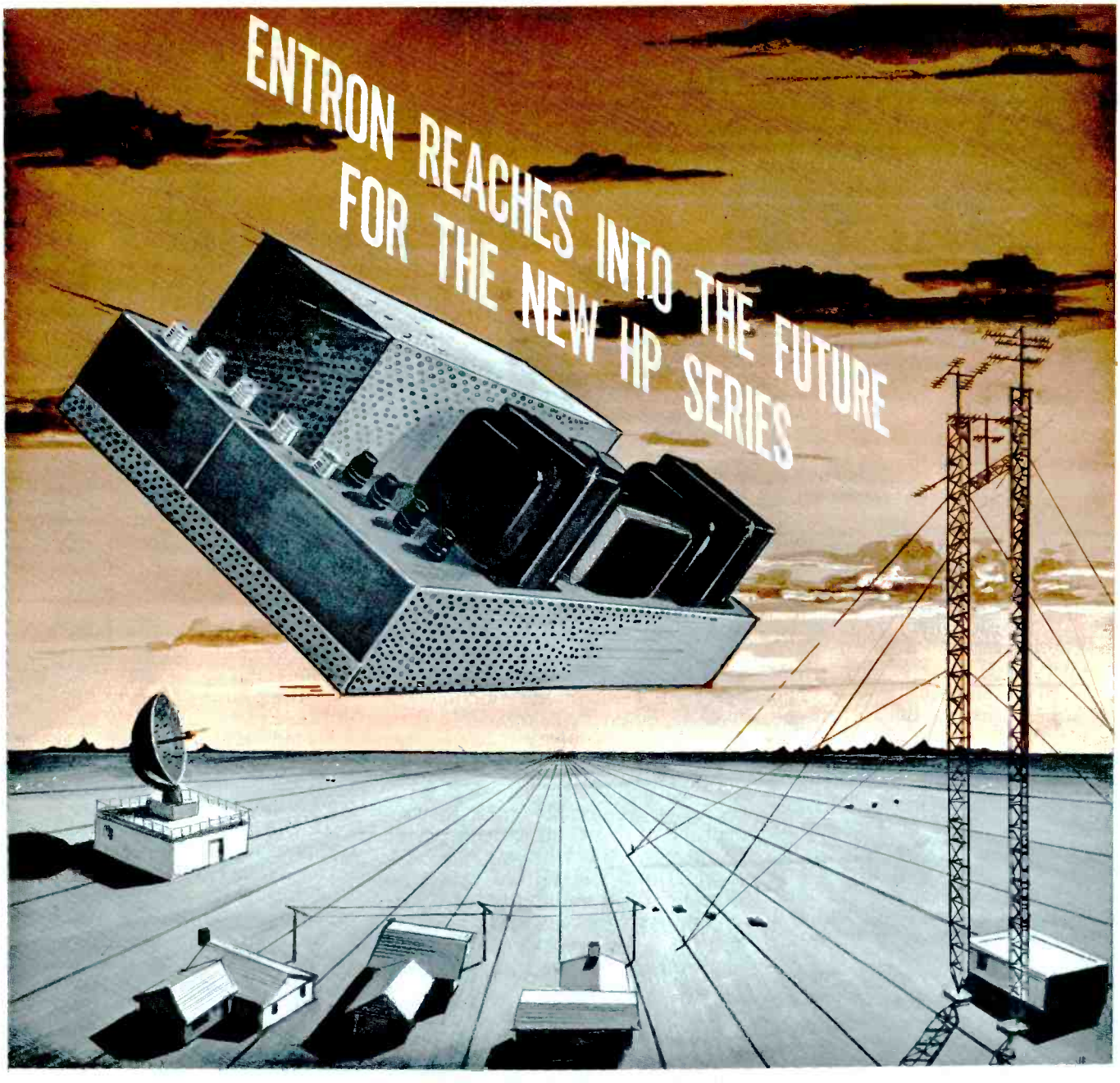

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Reliability - Part of our Environment

by J. A. McCormick
Communication Products Department
General Electric Company
Lynchburg, Virginia

There is an old axiom that a chain is as strong as its weakest link.

In World War II, the Germans had a great deal of trouble with the first flying bombs they attempted to launch against England. They tried to correct their troubles by strengthening the "weakest link" but each time the weakest link proved to be something else. The program seemed to be getting no where.

Finally, German mathematicians analyzed the problem and applied failure rate predictions to all components. The level of those that were substandard was raised, increasing the bomb's mathematical probability of completing its mission. Their predictions worked and England was deluged with buzz-bombs.

Today's reliability engineers knows that the weakest link may not be the first to break within a specified period of time. It might be one of the stronger links.

The typical specification on reliability used to be: "Workmanship and materials shall be of the highest quality. Design and construction shall be in accordance with good engineering practice." If a unit **usually** worked, it was considered reliable. If it often failed, it was considered unreliable.

Over the years, engineers have developed a mathematical approach and put number values on reliability. Reliability is now defined as "the probability of performing, without failure, a specified function, under given conditions, for a specified period of time." Every one of those phrases is significant.

There is one approach to reliability with which you should be familiar because it applies to almost everything you buy and use — a TV set, an automobile or a communications system. It takes the form of a bathtub, is referred to as the "bathtub" curve, and shows failure-rate versus time.

The early failure rate of almost any device is high. The initial period on the curve is the debugging phase — the "burn-in" period. This is the period when initially defective components fail and defects in factory workmanship show up.

Phase Two is the useful life period. Failures occur at a fairly regular, predictable rate for the useful life of the equipment. Eventually, the wear-out period is reached and the failure rate rises sharply. The reliability of tubed equipment, for example, can be improved by replacing all tubes just before they reach the wear-out portion of the curve.

Through careful design, manufacture, and planned maintenance, we can virtually eliminate the first and third periods and deal only with the "useful life" period where the failure rate is nearly constant. It is in the useful life area, where failures tend to occur at an even rate, that probability mathematics enables us to put number values on the failure rate. We can predict, with considerably accuracy, the Mean Time Between Failures — MTBF.

RELIABILITY IN COMMUNICATIONS

Every piece of radio equipment is made up of a number of components, each with a predictable failure rate which can be expressed in percent failure per 1,000 hours of operation. The failure rate is determined by life testing a large number of particular units over a long period of time. Obviously, the larger the number of units tested, and the longer the test period, the higher the confidence level in the predicted-failure rate.

(The best estimate of failure rate from a test is:

$$\text{Lambda} = \frac{n}{T}$$

where Lambda is the failure rate, n is the number of failures observed, and T is the accumulated operating time of the units, i.e. the unit hours.)

Voluminous material has been prepared on the anticipation failure rate of most components used in electronic equipment.

If the failure rate of a certain component such as a carbon resistor is 0.001% per 1,000 hours, this means you could expect one resistor to fail out of 100,000 resistors in 1,000 hours of operation. Or, you could expect one failure out of 10,000 resistors in a 10,000 hour period.

The reliability of a communications unit — transmitter, receiver, or a complete station — is the sum of the failure rate of all its components. You can assemble a transmitter with extremely reliable components but the reliability of the complete transmitter is directly proportional to the number of components employed.

For example, a tantalum capacitor is a mightly reliable component. If you operate 100 tantalums at room temperature, at 60% of rated voltage, you could expect only one failure in 100,000 hours. That's over 10 years. Yet if you put 10,000 tantalum capacitors in a piece of equipment, you could expect a failure in 1,000 hours or about 40 days! There are approximately that many components in a complex station such as those we are supplying for the Titan II Intercomplex radio communications system.

Read this and file!

Save time and money on your next matv or catv installation — Lowest priced quality unit

BLONDER TONGUE

CABLEMATCH

SET OR WALL MOUNTED TRANSFORMER FOR MATCHING 75 OHM COAX TO 300 OHM TV SETS

model 3334

DESCRIPTION

Every master TV or community TV system installation requires one matching transformer for every TV set in the system. Adds up to a considerable number of matching transformers — a great deal of installation time.

Most installers take the matching transformer for granted. Basically, its purpose is to match 75 ohm coax cables to the 300 ohm input of a TV set. This the Blonder-Tongue Cablematch does most efficiently, most precisely. But here the similarity between the Blonder-Tongue Cablematch and all existing matching transformers ends.

First: it is housed in a high-impact plastic case. This eliminates the grounding problem where low cost TV sets (series circuit models) present the problem of a hot chassis. Second: it uses a new type of solderless plug that will save installers many hours of installation time with coax cable. Called the Blonder-Tongue Solderless Autoplug, it ends the need to unbraid coax shielding or to solder the connector. Further, it assures a connection that will stand twisting and tugging, almost any abuse that the cable and connection will be subjected to while the set is being moved. With the Blonder-Tongue Autoplug you simply strip the wire, slide on the connector and crimp it. The special neoprene insert connects the center conductor firmly; teeth pierce the insulation to make contact with the shield. This connector is a time saver on initial installation. It also offers new convenience in easy connect and disconnect for maintenance. No detail has been overlooked in engineering the best matching transformer available today. Instead of the usual twin-lead which must be stripped for connection to the 300 ohm terminals of the TV set, the Cablematch uses heavy duty output leads with spade lugs.

You'd think that a product with so many refinements and innovations would cost more than other matching transformers. Not so. The Blonder-Tongue Cablematch is one of the lowest priced matching transformers available today.

RELATED EQUIPMENT

OUTDOOR PRESSURE TAPS

MT-11, 12, 17 or 23db.
MTO-11, 17db inserts available for 12 and 23db.
ST-4-75MP — 12, 16, 20, 25, 30, 40db. Back matched.

INDOOR SPLITTERS

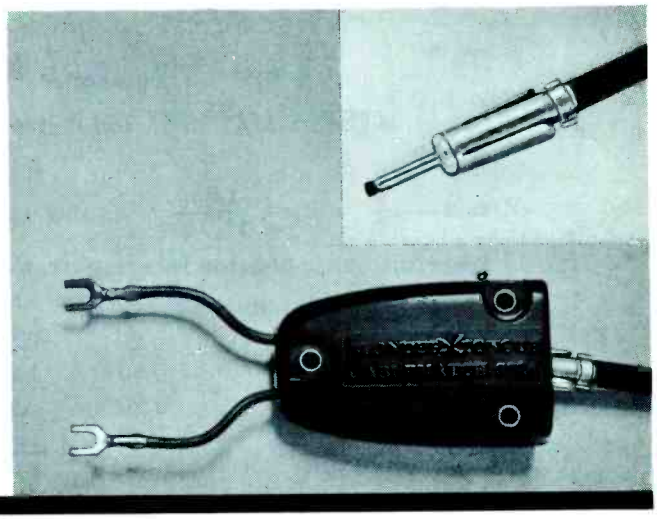
TS-772 — 2-way splitter. Back matched.
TS-774 — 4-way splitter.

SPECIFICATIONS

- **INPUT**—75 ohm Solderless Autoplug.
- **OUTPUT** — 300 ohm 2⅜ inch wires with crimped on lugs.
- **MATCH** —4:1 or better.
- **UNBALANCED COMPONENT REJECTION**—18 db minimum.
- **TRANSMISSION LOSS**—1.5 db maximum (54 thru 103, 174 thru 216 mc).
- **SIZE**—2½"L x 1½"W x 15/16"H.
- **WEIGHT**—2.4 ounces.
- **CASE**—High impact polystyrene.

FEATURES

- **NO GROUNDING PROBLEM WITH HOT CHASSIS** — transformer is housed in non-breakable plastic case for complete isolation.
- **SECURE, RAPID CONNECTION TO COAX** — Blonder-Tongue solderless AUTOPLUG ends need to unbraid coax shielding or to solder. Connection is secure. Easy connect and disconnect from tapoff.
- **EASY CONNECTION TO SET** — spade lugs used to connect to 300 ohm terminals of set.
- **ECONOMICAL** — low cost, saves big money in installation time.



engineered and manufactured by

BLONDER TONGUE

9 Alling St., Newark, 2 N. J.

Canadian Div.: Benco Television Assoc., Ltd., Toronto, Ont.

home TV accessories • closed circuit TV • community TV • UHF converters • master TV

Figure 2 illustrates how the failure rate of a complete sub-assembly may be obtained by summing up the individual component failure rates.

FIGURE 2

Component	Life Test Failure Rate	Total Failure Rate
	%/1000 hrs.	
Receiving Tube (2)	at .400	.800 %/1000 hrs.
Comp. Resistor (6)	at .001	.006 .916%/1000 hrs.
Ceramic Cap. (3)	at .001	.003 MTBF —
Elec. Cap. (2)	at .033	.066 109,000 hrs.
Connector Pins (7)	at .001	.007
Active Socket Pins (10)	at .001	.010
Solder Connections (35)	at .0007%	.0245
		.9165

Figure 3 compares a hypothetical tubed mobile unit versus a transistorized mobile unit. The four individual units comprising the tubed mobile unit total a failure rate of 8.51% per 1,000 hours. The mean or average time between failure (MTBF) is the **reciprocal** of the failure rate. In this case, the MTBF is 11,750 hours. Knowing the MTBF, we can calculate the reliability using the formula shown by assigning a typical 6-months mission time. In the formula:

R=e to the $\frac{-t}{m}$ power, R is the reliability, (the probability of surviving the mission time), e is a constant — the base of natural logarithms with an approximate value of 2.72, t is the mission time, and m is the mean time between failure. Where the ratio of t-m is 0.1 or less, as it is in this case the reliability is approximately one minus the ratio. Applying this formula, the tube set calculates to have an 89.9% probability of achieving a 6-months mission without maintenance attention.

A similar summarization and calculation shows that the transistor mobile unit has about twice the MTBF of the tube unit and a probability of 94.7% of surviving the same 6-months mission. Thus, we have a definite mathematical indication of the superiority of transistorized equipment in terms of reliability.

FIGURE 3

A. Tube transmitter, tube receiver, transistor power supply

Unit	Failure rate per 1,000 hrs.	Duty Cycle	Net failure rate per 1,000 hrs.
Transmitter	8.3%	0.20	1.66%
Receiver	6.0	0.80	4.80
Power Supply	1.7	1.00	1.70
Control	.35	1.00	.35
			8.51%

$\lambda = 8.51\%/1{,}000$ hours

MTBF $= 1/\lambda = 11{,}750$ hours

$$R = e^{-\frac{t}{m}} = e^{-\frac{1{,}250}{11{,}750}} = .899 \quad (89.9\%)$$

B. Hybrid transmitter, transistor receiver, transistor power supply

	per 1,000 hrs.		
Transmitter	7.58%	0.20	1.52% per 1,000 hrs.
Receiver	2.43	0.80	1.94
Power Supply	1.33	0.20	.27
Control	.59	1.00	.59
			4.32% per 1,000 hrs.

$\lambda = 4.32\%/1{,}000$ hours

MTBF $= 1/\lambda = 23{,}150$ hours

$$R = e^{-\frac{1{,}250}{23{,}150}} = .947 \quad (94.7\%)$$

WAYS TO INCREASE RELIABILITY

Inasmuch as the reliability of a piece of equipment or a system is the sum of the individual components failure rates, there are several obvious means to increase reliability.

The circuit may be simplified so that there are fewer components to fail. Components quality may be improved by replacing sub-standard components with those having lower failure rates. The voltage stress, the operating temperature, and other environmental conditions may be improved.

High temperatures and voltage stresses measurably reduce the life of components and improvement in these parameters is one of the great advantages of transistorization. Due to their low heat dissipation and low voltage requirements, transistors are conducive to an environment which tends to lengthen the life of other components in a piece of equipment.

All of these factors were understood before mathematical evaluation of reliability. Reliability engineering simply provides the ability to compare alternative circuits or techniques on a quantitative basis.

Using the intutitive approach to reliability in designing a piece of equipment, the engineer might choose components with a life expectancy spread differing by a factor of 100 to 1. This would indicate to today's reliability engineer that some of the components were too costly while others were inadequate. Appropriate changes could substantially improve the reliability of the product without increasing its cost.

MILITARY SYSTEM AIDED

One of the major problems in measuring reliability is to find sufficient time to permit life testing to a high confidence level. There is a similar time problem in meeting the urgent delivery requirements imposed in contracts for equipment or systems to meet special requirements.

We were able to solve both these

problems in fulfilling our Titan II intercomplex radio communications system contract by making use of a number of standard commercial items as a basis for Titan design. This is an example of a large and important military requirement that was benefitted by our work in the commercial field.

Similarly, today's space programs have had an accelerating effect on the study and improvement of reliability in commercial electronic equipment. Every component in a missile or space vehicle must have a high probability of surviving for the life of its mission. Whether that mission be as short as minutes or as long as years, a great deal is at stake every time one of these vehicles is launched. The research which manufactures have done to make military electronic equipment better is reflected in the increased reliability of commercial electronic gear.

Figure 4 shows a rack of 20 standard Transistorized Progress Line units undergoing life tests in the Titan II reliability study. The other standard commercial items—the transmitters, the Multiplex equipment, and the tone equipment, were similarly evaluated. These units have been evaluated continuously since November 24, 1961. That is 11,680 hours elapsed time or 233,600 unit hours as of March 24, 1963. Since the initial burn-in period, there have been no equipment failures. During the burn-in period there were two failures. One transistor was dead on arrival and another failed at 17 hours.

Does this life test show good performance? We think that it does. 233,600 unit hours of operation is equivalent to operating the receiver in ten base stations for three years without a failure.

In specifying reliability, there is always danger in the use of a single number or in referring to a single component. For example, it would be imprudent to say, "I have here a single resistor. It will operate for 10,000 hours without failing."

Any statement of reliability must be qualified, clearly stated, and should encompass a large number of units over a specified period of time.

The assistance of G. E. Engineers, H. G. Wiest and R. E. Metzler is gratefully acknowledged.

REFERENCE: Handbook MIL 217, dated 8 August, 1962, at $2.50 — U.S. Government, Superintendent of Documents, Washington, D.C.

Continued from Page 18

both, it is doubtful whether any telephone company management would knowingly condone such action in order to prove a particular subscriber was violating a tariff provision.

Violations Punished

The department of Justice, not the FCC, prosecutes violations of Section 605. Complaints of violations of Section 605 are referred to the Federal District Attorney of the district involved. If the complaint warrants it, an indictment is obtained and the violation prosecuted. No one should think that violations of Section 605 have gone unpunished. The Section has been used to prosecute, successfully, persons guilty of an unlawful interception and disclosure of wire or radio communications. In 1956, a seven-day trial before a Federal District Court judge in Baltimore culminated in the conviction of two brothers, who operated a garage in Baltimore, for conspiracy to violate and for violation of Section 605. The defendents, who were indicted for intercepting police calls for the purpose of dispatching towing trucks to the scenes of automobile accidents, were fined $2500. (U.S. v. **Nuckolls,** Criminal No. 23426, U.S. District Court for the District of Maryland — no written opinion issued.) The case is notable for the painstaking efforts taken to gather the evidence necessary to prove the violations. A special six-man police squad was assigned to the case, and worked on it for a period of three months. Photographs were taken to show one of the trucks belonging to the defendants on the scene; and advertising cards given out by the company were collected from those involved in the accident. In addition, the Police Communications Division broadcast reports of three fake accidents and an FBI agent testified at the trial that he went to the scene of the supposed accident and saw defendant's truck pass by and look carefully. Undercover men were stationed in front of the company's garage and heard police broadcast reports of accidents. Then, they testified, they would hear a telephone ring and a tow truck driver would run out and drive off in his tow vehicle. After the gathering of the evidence was completed, the FBI agents, armed with search warrants, went to the residence of the defendants and the company's office and seized radio equipment, books and records, and arrested the defendants.

In 1941, a telephone operator employed by the Securities and Exchange Commission was convicted for conspiracy to aid and abet a violation of Section 605 by using the conference system hook-up to enable a third party, not affiliated with the SEC, to listen to telephone conversations between two SEC employees. **United States** v. **Gruber,** 123 F. 2d 307. It is interesting to note that in this case the SEC operator did not know the contents of the messages overheard by the third person. Nevertheless, the Court held that the act of connecting an unauthorized third party into a telephone circuit was sufficient to constitute a violation of Section 605 and brought the operator's action within the meaning of the words "intercept" and "divulge" as used in the statute.

More recent cases involving prosecution and conviction for intercepting and divulging telephone conversations in violation of Section 605 are **Massengale** v. **United States** (1957) 240 F. 2d 781; **United States** v. **Gris** (1957) 247 F. 2d 860; **Lipinski** v. **United States** (1958) 251 F. 2d 53; **Massicot** v. **United States** (1958) 254 F. 2d 58.

Worthy of specific mention is **Elkins** v. **United States** (1959) 266 F. 2d 588, in which two defendants were convicted of Section 605 by intercepting and recording wire communications and divulging them to others without authority. One of the defendants was sentenced to 20 months' imprisonment and fined $2,000. The other defendant was sentenced to six months' imprisonment and fined $500. This conviction was later reversed by the United States Supreme Court which, in the process, advanced by another step the protection afforded by the Fourth Amendment banning unreasonable searches and seizures (and discussed in Part III of this series of articles). The evidence which led to the conviction in the **Elkins** case was obtained by State officers during a search which was alleged to violate the Fourth Amendment. The admissibility of such illegally obtained evidence was then (1959) governed by the following judicially developed principles: In 1914, the Supreme Court held that in a federal prosecution, the Fourth Amendment barred the use of evidence secured by Federal Agents through an illegal search and seizure. **Weeks** v. **United States,** 232 U.S. 383. Twelve years later in **Byars** v. **United States,** 273 U.S. 28, the Supreme Court allowed the use in federal courts of evidence obtained by state agents in violation of the Fourth Amendment. Based on this principle, the Court of Appeals upheld the conviction in the **Elkins** case. But the lawyers for the defendant felt that this might be a propitious time to obtain a review of the Byars doctrine. The Supreme Court agreed, granted certiorari, and overruled Byars holding that evidence obtained by state officers during a search which, if conducted by Federal officers, would have violated the defendants' rights under the Fourth Amendment is inadmissible in a Federal criminal trial. **Elkins** v. **United States,** 364 U.S. 206.

While on this subject, we may add that two years later the Supreme Court made the protection of the Fourth Amendment still more complete. In 1948, the Supreme Court in **Wolf** v. **Colorado,** 338 U.S. 25, held that in a prosecution in a state court for a State crime, the Fourteenth Amendment (which incorporates the Fourth because "the concept of ordered liberty is implicit in the Due Process Clause") does not forbid the admission of evidence obtained by an unreasonable search and seizure. At that time, 31 states were admitting such evidence; 16 were not, i.e., followed the principle of the **Weeks** case, **supra.** When the **Elkins** case was decided in 1959, 24 states were admitting such evidence and 26 states were excluding it. Then, in 1961, **Mapp** v. **Ohio,** 367 U.S. 643, the **Wolf** case was overruled. The Court announced that all evidence obtained by searches and seizures in violation of the Federal Constitution is

inadmissible in a criminal trial in a State court.

These, of course, are very important developments in the interpretation of the laws safeguarding our liberties. But they do not reach the use of eavesdropping devices such as those discussed in Part III of this series because the Supreme Court has, thus far, refused to consider their use to constitute a violation of the Fourth Amendment. This is also the reason why some states continue to admit evidence obtained by wire-tapping in violation of Section 605 of the Communications Act.

State Wire-tapping Laws and Practices

It will be recalled that in **Olmstead** v. **United States,** 277 U.S. 438, which is still law today, the Supreme Court held in 1928 that wire-tapping as such did not constitute an unlawful search and seizure. Then, after Section 605 was adopted, the Supreme Court held in **Schwartz** v. **Texas,** 344 U.S. 199, that evidence obtained by wire-tapping by state agents was admissible in State courts. Thus, some States continue to admit evidence gathered by wire-tapping. See, for example, **Commonwealth** v. **Voci** (Pa.), 143 A. 2d 652;**State** v. **Tracey** (N.H.), 125 A. 2d 774; **Young** v. **Young** (R. I.), 185 Atl. 901;**State** v. **Raach** (Minn.), 275 N.W. 620.

Many states, in determining whether evidence has been obtained in violation of Section 605 have followed the interpretation of "interception" adopted by the Supreme Court in **Rathbun** v. **United States,** 355 U.S. 107, that one party to a telephone conversation may, without the consent of the other party, have someone else listen on an extension and record the conversation and subsequently use it. See, for example, **People** v. **Dement** (Calif.) 311 P. 2d, 505; **Commonwealth** v. **Brinkley** (Ky.), 362 S. W. 2d 494; **People** v. **Maranian** (Mich.) 102 N. W. 2d 568;**State** v. **Jenner** (Wash.), 361 P. 2d 739.

The following states, by statute, prohibit wire-tapping and/or electronic eavesdropping:

Alabama	Kansas	North Dakota
Alaska	Kentucky	Ohio
Arizona	Louisiana	Oklahoma
Arkansas	Maryland	Oregon
California	Massachusetts	Pennsylvania
Colorado	Michigan	Rhode Island
Connecticut	Montana	South Dakota
Delaware	Nebraska	Tennessee
Florida	Nevada	Utah
Hawaii	New Jersey	Virginia
Idaho	New Mexico	Washington
Illinois	New York	Wisconsin
Iowa	North Carolina	Wyoming

The State of Hawaii also prohibits recording telephone conversations.

The statutes of the 11 States not included above appear to reflect only a concern with physical interference with the wires. These States do not forbid wire-tapping per se, but prohibit only acts, such as injuring, cutting, molesting, or interfering with wires. Wire tapping, apparently, would be punishable only if it resulted incidentally in physical damage in the manner prescribed. These States are:

Georgia	Mississippi	Texas
Indiana	Missouri	Vermont
Maine	New Hampshire	West Virginia
Minnesota	South Carolina	

The Supreme Court of one of these States (New Hampshrie) in construing its State statute said: "This statute — is a typical malicious mischief statute and has no application to the wire tapping involved, in this proceeding" (**State** v. **Tracey**, 125A 2d 774).

States which permit law enforcement officers to use wiretapping are:

Maryland	Louisiana	New York
Massachusetts	Nevada	Oregon

With the exception of Louisiana, the other five states require prior judicial sanction for such use of wiretapping by law enforcement officers.

The following States prohibit, by statute, the use of evidence obtained by intercepting telegraphic or telephone communications in violation of statutory provisions:

Maryland	Illinois	Oregon
Nevada	Rhode Island	Pennsylvaina

Wiretapping and eavesdropping have also been the subject of detailed investigation by Congressional committees which compiled extensive testimony and material on all phases of this important problem, including Federal and State laws and practices.*

Layman's Guide to Section 605

In the first part of this article, we posed several questions regarding the effect of Section 605 of the Communications Act of 1934, as amended, on the use of telephone and radio facilities. These questions have all been answered in some detail for those who may have to dig deeply into a specific problem.

For those who want only a quick reference guide to the protections and exposures rather than the more detailed analysis of the case law dealing with Section 605, the following summary, at the usual risk of over-simplification, may be found useful:

(1) Wire-tapping of all telephone communications, both intrastate and interstate is prohibited by and constitutes a violation of Section 605, punishable by fine and imprisonment.

(2) Wire-tapping is not a violation of the Fourth Amendment of the United States Constitution, prohibiting unreasonable searches and seizures.

* See, Wiretapping, Eavesdropping, and the Bill or Rights Hearing before the Subcommittee on Constitutional Rights, of the Committee on the Judiciary, United States Senate 86th Congress, 1st Sess. (1959); Wire-tapping and eavesdropping, Summary — Report of Hearings 1958-1961 by the Subcommittee on Constitutional Rights of the Committee on the Judiciary, United States Senate, 87th Cong., 2nd Sess.; Wiretapping — The Attorney General's program — 1962, Hearings before the Committee on the Judiciary, United States Senate, 87th Cong., 2nd Sess., on S. 2813 and S. 1495. (Bills to prohibit wiretapping by persons other than duly authorized law enforcement officers engaged in the investigation or prevention of specified categories of criminal offenses, and for other purposes.)

Continued on Page 38

New Product Horizons

COMMUNICATIONS EQUIPMENT

Secode Corporation, 555 Minnesota Street, San Francisco 7, California, now is marketing a fully transistorized, radiotelephone terminal. The compact unit is interconnected with the central office by a two-way, two-wire trunk with reverse battery supervision and controls. Radio connection is by four-wire method with simplexed supervision and controls. Mobile signaling provisions are in the 600/1500 cps transitional mode. Unit is designated Model COT-6. Powered by 48VDC. A test set, Model TS-6, is also available as a companion unit. Complete information upon request.

Communications Company, Inc., 300 Greco Avenue, Coral Gables, Florida, announced the inauguration of a new line of UHF-FM 400-420 Mc and 450-470 Mc two-way radio equipment.

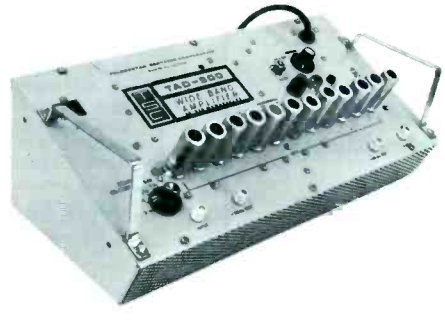
One of the new series, Model 684, is available in several types for base, mobile and portable operation. Some of the features of the Model 684 are 20 to 25 watts output; all stages protected by fixed bias; new and improved audio limiting circuit; transmitter meets FCC and E.I.A. specifications; receiver sensitivity of 0.5 microvolt; hermetically sealed ceramic IF filters. The mobile units are compact, light-weight, and combine the control head, speaker, and transistor power supply in one small, easily mounted case assembly no larger than a conventional speaker case. An all-transistor mobile power supply is available for operation from 6/12 VDC, 12 VDC, or 24 VDC. Literature available upon request.

General Radiotelephone Company, Burbank, California, has announced a new FM combination base or mobile, business-industrial, two-way radio, known as the FM-120. The FM-120 is a compact 60 watt input FM transceiver designed to operate in the 150-174 Mc band. It includes such features as a dual power supply, 115 VAC or 12 VDC, a size of 4½" x 8" x 10½" that permits installation in the smallest of places and the exclusive "Snap-Rak" mounting which allows replacement and interchange of units in 30 seconds without the need of any tools. The FM-120 is designed as a quality unit to provide reliable communication at low cost.

CATV-CCTV

Viking Cable Company, 830 Monroe St., Hoboken, New Jersey, now has 2-way and 4-way back-matched directional couplers available. 30 db isolation of all output terminals over a frequency range of 54-88 Mc and 174-216 Mc is a feature of the 4-way splitter, Model 933. VSWR of all terminals is less than 1.2/1. Fittings are "F" type, 75 ohm. Units are plated and weatherized for support wire or pole mounting. Cases are rugged zinc casting. 2-way splitter, Model 932, offers identical features of the larger splitter. Price of the 932 is $4.00 and the 933 is $7.00.

Telesystem Services Corporation, 113 S. Easton Road, Glenside, Pennsylvania, has introduced a wideband trunk amplifier, Model TAD-500, with a band width of 40-220 Mc. Designed to exacting and rugged CATV standards, the TAD-500 has many important features developed to simplify maintenance and operation. Electrical features include: 28 db gain at Channel 13, built-in equalizer, voltage regulated provision for plug-in AGC. Mechanical features include: adaptability to 19" rack mount, easily accessible connectors and controls, heat dissipating tube shields with sloped panel for maximum cooling, removeable handles. Price of the TAD-500 is $325.00.

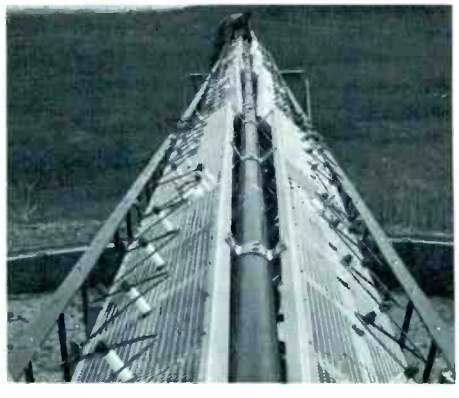


Another product available from Telesystems is the new Calhoun Uti-lift, first shown at the NCTA Convention in Seattle. The lift is easily installed on a standard ½ or ¾ ton pick-up truck and enables CATV operators to rapidly service or install house drops, pole-mounted equipment, and many other construction and maintenance jobs. Uti-lift is operated by only one man and can be utilized in any kind of weather. TSC is sole CATV distributor for the Calhoun Uti-lift in the United States.

From the **British Information Services** comes the word that low-cost equipment for home taping of television programs has been developed in Britain and is expected to be on the market before the end of the year. Called Telcan, it works the same way as a sound tape recorder, recording both sound and vision simultaneously on standard quarter-inch magnetic tape. Replay procedure is the same, and tapes can be erased and used again. The recorder is expected to cost about as much as a sound-only model in the medium price range and can be used simply as a sound recorder. The unit can be made to operate on the 405-line British system, the 525-line American and the 625-line continental systems. The equipment is 17" long by 9" wide by 2" deep, with a 4" protrusion for the motor housing. Weight is 15 pounds. Playing time is 20 minutes each side with a maximum reel size of 11". Resolution is 300 lines peak white with a signal to noise ratio of 28 db. System rise rate is 0.2 microseconds. Manufacturer of the recorder is Telcan, Ltd., Main Street, East Bridgford, Nottinghamshire, England.

ANTENNAS-HARDWARE

General Electric, Technical Products Operation, 212 W. Division St., Syracuse 8, New York, is now testing one of their new Zig-Zag panel antennas. This particular array will be installed at KERO-TV, Bakersfield, California to provide an ERP of 1.76 megawatts and a modified cardioid pattern to cover the rich southern San Joaquin Valley. Antenna gain is 74.4 in the maximum lobe. The KERO-TV transmitter-antenna site is 22 miles east of Bakersfield, on Mt. Breckenridge almost 3,700 feet above average terrain. The planned 1.76 megacycle ERP at this altitude is equivalent to a five-megawatt ERP at 2,000 feet above average terrain.



A new VHF antenna has been marketed by **Jerrold-Taco.** Termed the Paralog (JTP series), the new antennas combine log periodic principles and innovative modular parasitic element systems. The addition of these modular parasitic elements to a log periodic antenna produces an unamplified TV antenna gain of up to 16 db, while retaining the log periodic characteristics of bandwidth and impedance, for extra gain in the high VHF TV band. Eleven Paralog antenna models are available: 7 are non-amplified types (gain to 16 db), and 4 are electronically amplified with a gain up to 28 db. Three Paralog FM antennas are also offered, featuring a gain figure of up to 12 db. Jerrold uses a totally different dipole mounting and inter-connecting method to obtain constant impedance lines. The plastic insulating mounts do away with the familiar criss-cross affairs interconnecting the dipoles. The wheel like insulators perform the transposed interconnections without crossing the transmission line conductors. The impedance remains constant. Line losses due to reflections are reduced to a negligible figure. Paralog antennas have dual square boom construction for greater strength and long service life. For further information contact: Distributor Sales Division, Jerrold Electronics Corporation, 15th and Lehigh Avenue, Philadelphia 32, Penn.

Continued from Page 6

munications System. His positions before that were with Motorola Overseas Corporation where he was Government and Industrial Accounts Manager and Motorola Communications and Electronics as a Zone Sales Manager.

Winner of Outercom Electronic Corporation's national sales contest was **Al Weiner**, of Kenilworth, New Jersey, reports Walter Shapiro, president of the company. Mr. Weiner as recipient of the award won a trip to Europe for himself and his wife.

H. Ronald Levine has been named as vice-president of the Hammarlund Manufacturing Company, a Giannini Scientific Company, reports Stuart Meyer, company president. In his new post, Mr. Levine will direct sales and marketing activities of the company, which is engaged in the manufacture of communications equipment for government and commercial users; amateur radio, citizen's band equipment and variable air capacitors.

Mr. Levine was founder and chief executive officer of Polytronics Laboratories, Inc. He is a

member of the bar of the State of New Jersey. He also holds Bachelor of Science and Bachelor of Law degrees from New York University.

The appointment of **John F. Gault as** New England regional manager of TeleVision Communications Corporation (formerly Televents Corporation), was announced by Carl M. Williams, TVC president.

For the past seven years, Gault has been with TelePrompter Corporation in various capacities. His most recent assignment was as manager of the Elmira CATV system.

PLACES . . .

Shippensburg, Penn. should have its new CATV system completed and underway about now according to Edgar Rosenberry, **Shippen TV and Cable Co.** Edgar reports they now have a new 250' tower with antennas mounted for 11 channels.

Construction Electronics, San Jose, California says they have added 12 more MATV taps to bring the total to 150 taps. New B-T and Delta equipment has been added recently.

Dublin, Texas has just had a complete system installed using 40 Series cable and CAS transistorized amplifiers says C. E. Tabor of **TV Cable Serivce.** First two weeks saw 36 connections on the Dublin system. Also an application has been filed for private carrier microwave to connect Dublin and Comanche, another area that TV Cable Service is serving. According to Tabor, they are now planning to connect their two systems with 2-way radio.

Charles Beard of **Becom Co.,** Seminary Heights, Weatherford, Texas, reports that he has had a busy month with the installation of 10 General Radiotelephone, 3 Hartman and 6 Sonar units. Charles also

is looking for a 2-way technician with a 2nd or 1st Class ticket.

Lowry AFB, Colorado, will be the site of the **Fourth Armed Forces Television Conference,** sponsored this year by the U.S. Air Force. The conference, to be held on October 24-26, will concern itself primarily with educational and technical uses of TV by the military services, but will include a series of presentations on programmed learning and audio-visual techniques. A field trip to the Air Force Academy closed-circuit television installation is also planned.

The Air Force has announced that free space will be available for manufacturing and distributing firms to display conference-related equipment. Information regarding the conference agenda, exhibit space and other details may be obtained by written request to: Fourth Armed Forces Television Conference (OP-PC), Lowry AFB 30, Colorado.

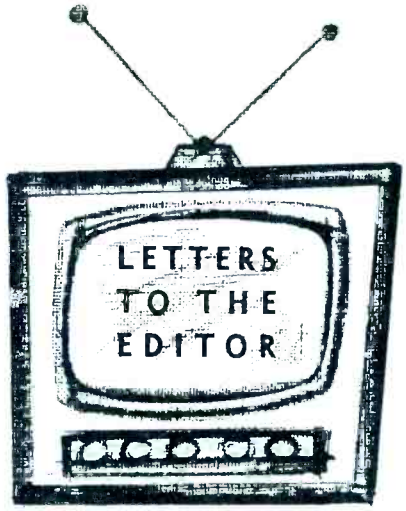
THINGS . . .

New-Tronics Corporation, Cleveland, Ohio, has acquired the business of Continental Electronics Company of Dayton, Ohio. Continental's line, marketed nationally under the CESCO trademark, consists of RF measuring equipment such as reflectometers, fieldometers, filters, RF probes and many other electronic devices which will complement the New-Tronics line of antennas.

Ben Adler, president of **Adler Electronics, Inc.,** announced that the company will apply for listing on the American Stock Exchange. The company, which has plants in New Rochelle and Pelam Manor, New York, is a producer of telecommunications systems and communications equipment. Its stock is currently traded over the counter. In another Adler Electronics, Inc. announcement it was stated that a wholly owned subsidiary, I.M.&O. Corporation, has been formed to handle the company's growing activities in the field installations, maintenance and operation of communications systems.

The **State of Connecticut** has enacted a new law giving the State PUC the authority to license CATV systems. The new legislation also empowers the State PUC to require telephone and electric power companies to lease space on their pole lines for CATV facilities.

The law finally brings to an end many years of legal battling aimed at securing better lease rates.



Dear Sir:

"I have been directed by the Association of Electronic Systems Contractors to request information and any comments that your organization may wish to offer.

We are presently involved in a study of MATV systems in the hope that the information we compile may be used to educate builders, developers, architects, electrical engineers and the general public in systems quality and performance. We would like to directly receive the pros and cons from the different manufacturers of MATV equipment and related items regarding coaxial systems versus open-line systems. Since in any problem there must be certain known factors, let me outline a typical systems needs in a given area. Let us take a building structure requiring 40 TV outlets in an area which presently provides seven channels of VHF reception, transmitting in both monochrome and color. The levels of input that can be received on a given antenna or antennas range from 200 microvolts to 100,000 microvolts. Let us also add one channel of CCTV as a possible incorporation into the MATV system.

From the known factors as stated above would you please send your analysis of the two systems. We will gratefully receive any and all comments you may wish to voice. Thanking you in advance, we are"

Sincerely yours,
A.E.S.C.
Richard E. Linebarger,
Secretary
P.O. Box 1001
San Carlos, California

Mr. Linebarger:

I feel that the best way to answer your questions is to throw the subject open to all our readers and the various equipment manufacturers.

Dear Sirs:

"As you may know, one of the hardest parts in starting a new business is to find a directory of manufacturers covering your exclusive interest. I recently ran across a February issue of your magazine and was very impressed with its contents. It appears to be just what I've been looking for.

I am especially interested in any issues, back or forthcoming, describing in detail commercial equipment used in CATV i.e.; amplifiers, tap-offs, cable, and antennas. If any issues, concerning the above mentioned equipment, are not covered by my present subscription I will gladly pay for those issues on an individual basis.

In closing I would like to make one final request; that is, if any of your advertisers maintain a mailing list I would certainly like to be included. Thank you."

With regards,
James T. Tuell
717 Lakechime Dr.
Sunnyvale, California

Mr. Tuell:

Thank you for your kind comments. Regarding back issues, our Circulation Department is seeing to it that you receive those requested. Concerning mailing lists, I feel sure you will be included when our advertisers read your letter,

The Editor

(Continued from Page 11)

generator, this is an indication that the piece of line you inserted is too short. If the voltage is dropping, the line length is too long. The use of an adjustable length coaxial fitting will compensate for minor errors.

After you have reached a point where you are satisfied that the Reflected voltage is sufficiently reduced, remove the Fluted Line and pull the feedline up to the TEE and you are through. With a few practice sessions, you can completely eliminate any reflections. For practice sessions, try using light bulbs for dummy loads.

More line trickery! Just about everyone in the TV or Mobile communications industry has heard of "Baluns". It is used when we have a coaxial (unbalanced) line feeding a balanced (Half-wave dipole) antenna. There are several types of Baluns. First we have the Linear Balun. It's impedance ratio is 1:1. It is required in this "unbalanced line to balanced load" condition to correct a certain effect. If it is not used, the condition (unbalanced line - balanced load) will cause RF currents to flow on the braid of the coax cable. These currents will radiate, causing interference (possibly) to nearby equipment, they can also distort the antenna radiation pattern.

In Figure 4 two types of linear "baluns" are shown.

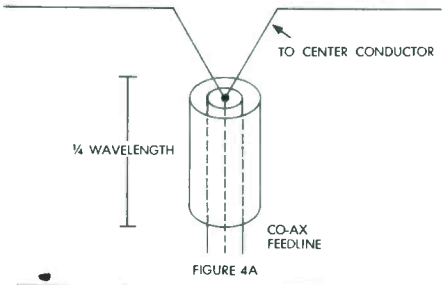


FIGURE 4A

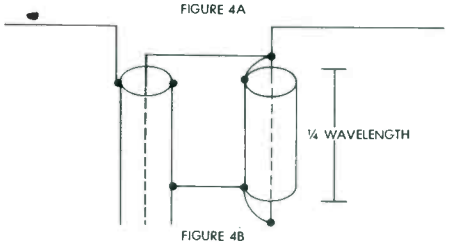


FIGURE 4B

Note that in Figure 4 A the bottom of the cylinder is connected to the coax braid. It is a quarter-wave in length so that at the open end, it is a high impedance. The center conductor of the coaxial line is already at a high impedance with respect to ground and the same is true of Point X. We connect the balanced antenna to the center conductor and to Point X and our problem is solved.

Another type of balun is the Half-wave Balancing section. This breed has a 4 to 1 impedance transforming ratio. That is, if we took a 300 ohm folded dipole (balanced load) added a Half-wave Balun, the input end of the Balun would look like 75 ohms which is a very nice match indeed for RG-59 and also eliminates the disparity of unbalanced line feeding a finicky balanced load. This little electrical gadget is simplicity exalted! It works on the basis that a

half-wave line repeats itself. That is; what is at the load end is also at the input end. When connected to the load, it effectively splits the load into two equal parts and then electrically parallels the two halves. Since the load has been split in half and the two halves paralleled, the impedance of the load is now ¼ its original value and in addition the mating up of the two systems has been accomplished.

Figure 5 show a typical Half-wave Balancing section.

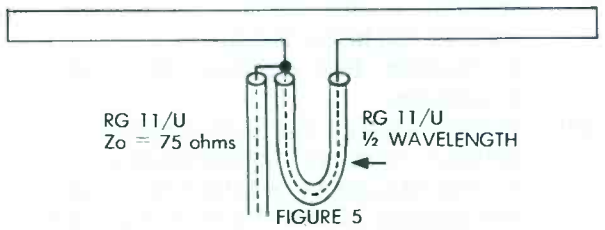


FIGURE 5

There are many ways of accomplishing a load to line match. In most cases, the type of matching system to be used will be governed by other conditions such as manufacturers directions or the personal likes or dislikes of the technical personnel involved If antenna work involving parasitic arrays is contemplated, you will encounter items like the "gamma" match. This is used to match unbalanced lines to a balanced driven element. There is also the "Omega" match. The "Omega" is an improvement over the "Gamma". No dimensions are given as this is governed by the band of operation and any reputable antenna book published in the past 5 years will undoubtedly carry an excellent description of these systems. One thing is certain, these past articles have only scratched the surface. The individual who wants to specialize in transmision lines must be prepared to become involved with a certain amount of math. He must be prepared to expend some cash for good reference material and above all, he should devise some means of running some of the basic experiments if for no other reason than to prove that the basic concepts are true. Even though a technician may be almost exclusively dealing with coaxial lines, the basic concepts apply alike to open wire or coaxial systems. It is well worth the effort to construct a set of Lecher Lines and a source of VHF energy and by a little judicious reading of the various textbooks, you can set up various conditions on the Lecher Lines and with the most basic of equipment, for example, a neon lamp, a fluorescent tube, or a simple RF voltmeter, and prove that these theoretical statements are more than just words.

One of the frustrating things about starting from scratch with a goal of becoming an "expert" on transmission lines is that you mostly acquaint yourself with the facts of just how little you do know. Personally, I turn pale when some misguided soul calls on me as an "expert" because this is one area where it is extremely easy to talk yourself into a corner. But with every error comes some knowledge. To paraphrase an old adage, "Better to have tried and goofed, then never to have tried at all".

Section 605 and You

Continued from Page 32

(3) Evidence obtained by wire-tapping will not be received in Federal courts, but may be received in State courts.

(4) Eavesdropping by electronic methods other than wire-tapping — a detectaphone in an adjoining room, a concealed pocket recorder or transmitter on the person, for example, of an Internal Revenue agent admitted to your office or home — are not covered by Section 605 and are not prohibited by the Fourth Amendment.

(5) Listening to a telephone conversation on an extension with the consent of one party to the conversation does not constitute interception and is not prohibited by Section 605.

(6) Recording another's telephone conversation by your secretary, or by a mechanical recorder, and using it later against the other party is not prohibited by Section 605. The FCC specifically permits the use of recording devices, if identified by a "beep", on interstate telephone calls. Only one State (Hawaii) prohibits recording of telephone conversations. This prohibition would apply to intrastate calls. The statutes of the other 49 states do not appear to deal with this question. Recording of intrastate calls would therefore seem to be permitted in the other 49 states.

(7) Monitoring a shared radio channel, for the purpose of effective shared use, and reporting to the FCC improper use by other sharers, does not appear to constitute a violation of Section 605.

(8) Any use of information obtained by such monitoring for your own purpose, such as pirating the others user's business, is prohibited.

(9) Any illegal radio use, such as transmitting without a valid station or operator license (where the latter required), is not protected by Section 605 against interception and disclosure.

(10) Interception of the radio transmissions of a private user or miscellaneous common carrier station by a telephone company for the purpose of proving that interconnection contary to the telephone company's tariff is practiced, appears to constitute a violation of Section 605.

(11) The FCC may intercept your radio calls and use the information so obtained for the purpose of enforcing the Communications Act and the Commission's rules, but not for general crime detection purposes.

(12) If your state has an anti wire-tap or eavesdropping statute, any conduct which violates Section 605 may also constitute a violation of the state law.

Continued from Page 23

all services" — has been proposed by the American Petroleum Institute's Central Committee on Communication Facilities.

The proposal came in a petition to the FCC to "sever" the agency's consideration of secondary fixed use of the band from omnibus 450 mc "split channel" proposals issued by the Commission three years ago.

The portion of the overall rulemaking proposals which would be given separate consideration by the Commission under the API Committee's recommendation is one which, as proposed by the FCC, would prohibit the use of frequencies in the 450-470 mc band by any class of fixed station other than a control station used in the secondary control of a mobile relay station, except in the citizens service, and except outside the continental limits of the United States.

The petition for severance asked that the Commission "issue a separate rulemaking so as to permit the use of frequencies in the 450-470 mc band by fixed stations for point-to-point communications on a secondary, non-interference basis only," and pointed to the "immediate" and "increasing" need by the petroleum industry for such operations, "primarily in the offshore, swamp and other remote and inaccessible areas in which the petroleum industry operates."

The Committee expressed its belief that "it will be some time before the Commission will implement its channel-splitting proposals relative to this band," and declared that "satisfaction" of its needs for 450-470 mc point-to-point operations can not "await the final resolution" of the "principal proposals" in the FCC docket. The Committee recalled the technical difficulties which have been often referred to in connection with the splitting of the 450-470 mc channels, particularly for mobile service.

It noted that "it is quite apparent" that the FCC's motivation for proposing the 450 mc band fixed prohibition "is that it believes such use compromises and degrades mobile service in this band," but that the API-recommended plan "will, in fact, in no way compromise its primary use for mobile service."

"Because of the fact that the use of these frequencies for mobile purposes in most of the other (non-petroleum) services to which these frequencies are allocated are primarily in urban areas with very little, if any, use in the special areas in which the petroleum industry operates," it said, "it seems logical to the Central Committee that in the interest of full frequency utilization these same frequencies in the 450-470 mc band could well be effectively used in the petroleum radio service for fixed point-to-point service operations, but solely on a secondary, non-interference basis."

"Accordingly," the API group said, it is proposing "that the frequencies assigned to each service be retained solely for mobile use within that service on existing standards until such time as suitable equipment is available for split-channel mobile operations.

"At the same time, the Central Committee recommends that the frequencies of all services, except the service in which an applicant is eligible for mobile service, be made available to each service solely for point-to-point use on a secondary non-interference basis. Although applicable to the petroleum radio service, such a concept would probably apply across the board to all services."

"In effect," the Committee said, "this would be a kind of pooling of the frequencies in the 450-470 mc band whereby an applicant eligible in, for example, the petroleum service, would be able to utilize the frequencies in this band allocated to other services," but protecting "the primary mobile use of frequencies by licensees in the other services."

The Committee summarized the petroleum industry's needs as "that of low-density single and multihop radio circuits, both duplex and simplex, which can be multiplexed with either tones or voice or both and used for the following purposes: (1) equipment alarms; (2) equipment shutdown; (3) continuous and on-call telemetering; (4) data transmission — meter reading as well as test results; (5) gas well choke adjustments; (6) remote control of valves; (7) voice communications; and (8) facsimile."

It emphasized that it is "convinced" that "such multiplexed operations . . . can be done successfully by employing narrow bandwidth techniques which will not produce modulation deviation in excess of that permitted for normal single voice channel use."

Los Angeles Petitions For TV Channel— The City of Los Angeles has petitioned the FCC for the allocation of "an additional television channel" to the Los Angeles area, or, alternatively, for the reallocation of TV channel 40 from Riverside to Los Angeles, to permit the establishment of a direct link between the city government and the people of the city.

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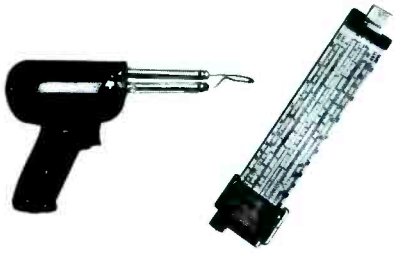

Horizons Lab Report

A LOOK AT THE CYLINDRICAL CAVITY

The elementary cavity appears to many as an undefinitive device bearing no relationship to the L-C network. This is far from the truth, however, since in pure theoretical form the cavity is much alike a rudementary L-C device except that it is analyzed in a rather unique manner. Perhaps it is the analytical descriptions that have caused the cavity to be highly mis-understood.

It is easiest to consider the basics of a cavity when the reason for its ability to be a resonant device is understood. To best describe this ability, we will want to start with the construction of a cavity. At this point, it is necessary to visualize a quarter-wavelength section of open-wire transmission line with one end shorted such as shown in Figure 1A. If this section were to be connected across a similiar transmission line, Figure 1B, it would act merely as an insulator

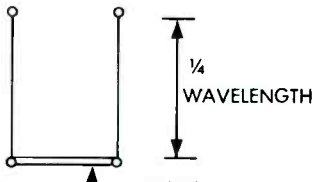

FIGURE 1A

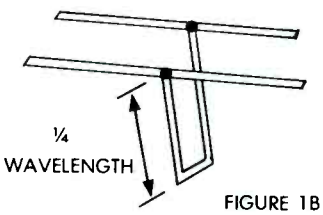

FIGURE 1B

since the open-end has an impedance that is extremely high and for all practical purposes causes no effect when added. To carry this further, a series of these shorted, quarter-wavelength sections of line could be grouped about one spot with a result that would be the same as obtained with a single section except for reduced conductor resistance and higher "Q". Taking this example, Figure 2, a fundamental cavity is formed from this group. Closing in the sides completes the formation.

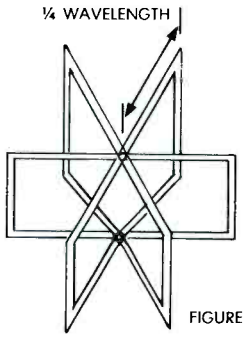

FIGURE 2

Using the idea of shorted, quarter-wavelength sections of transmission line to define the physical layout will help in calculating the resonant frequency of a completely cylindrical cavity. To determine the resonant frequency it is only necessary to measure the diameter. As it can be seen, in order to change the resonant frequency of a cavity it would be necessary to change its physical size. This is wholly impractical because it does not allow for the useage of a cavity over a band of frequencies.

There are several ways by which the resonant frequency may be altered without having to change the overall dimensions. One means is the introduction of a gap in the center of the cavity. This is illustrated in Figure 3. The addition of this gap and its effect upon the E

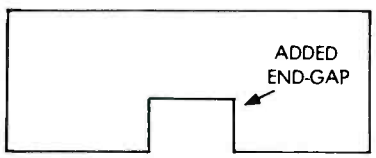

FIGURE 3

field is the same effect as would be found when adding more capacity to an L-C network. The result is the lowering of the resonant frequency. Making this gap variable then allows the cavity to be used over a range of frequencies.

Another way to change the resonant frequency is the introduction of slugs into the wall of the cavity as shown in Figure 4. These slugs will effect a change upon the H field and consequently raise the resonant frequency of the cavity by reducing the volume. Here, this effect is the same as changing the inductance in an L-C network.

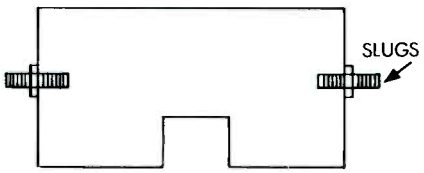

FIGURE 4

Taking both the slug and the gap, a cylindrical cavity's resonant frequency may be altered by either to cause a change that will raise the resonant point of the cavity or lower it. Comparing this back to a single, quarter-wavelength section of transmission line, we would have the arrangement shown in Figure 5A and 5B.

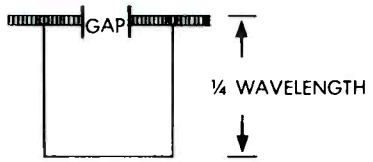

FIGURE 5A

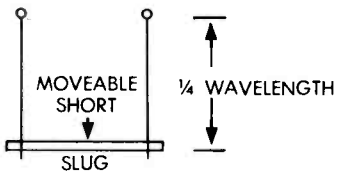

FIGURE 5B

In most cases, the analysis of a cavity is applicable back to a simple section of transmission line. This includes such items as coupling to a cavity by probes or loops. Although this is an oversimplified method, it is easier to see and understand than talking about E and H fields, permittivity, permeability and flux density.

In talking about cavities we should interject one important factor, this is "Q". The inherent nature of a cavity allows the development of extremely high "Q"'s. As we already know, at VHF and UHF frequencies there is a peculiar behavior that is termed "skin-effect".

Major Samuel Wm. Yorty said the projected television stations, which would be similar in many respects to the municipally-operated TV station in New York City, originally sponsored by the FCC for UHF television tests, is planned "for use by the city to meet an immediate need in discharging its responsibilities to its citizens."

"It is proposed to use this channel," Major Yorty said, "to provide authentic and official information on city government functions and operations to the citizens of the city. Use is also planned in the various phases of training the more that 32,000 city employees. This will result in better services to the citizens at a reduction in present training costs.

"Information to be disseminated to the citizens will also assist them in their general welfare and education in special fields such as public health, sanitation, emergency conditions, and police, fire, and traffic information affecting the safety of large portions of the general public." Among other things, the major pointed out, "Police line-up procedures are carried, in scrambled form, by the City of New York, and it is contemplated that L.A. would make similar use of the facility."

He added that "Important governmental meetings, involving critical City Council decisions, zoning matters which involve the welfare of large groups of citizens, and similar functions could also be brought directly to the eyes and ears of the public in this vast 450-plus square mile area through use of this municipal television channel. Information and guidance on matters of public health and sanitation would be carried, as well as the fast dissemination of developments in the event of flood, fire, traffic, or other emergencies handled by city forces and calling for the cooperation of an informed citizenry."

Mayor Yorty noted that the city does not contemplate selling "time" on the station to others, "although it is intended that the city will seek station authorization the same as that authorized stations operating on a regular commercial basis."

Mobile Microwave Allocations — In completing action on rulemaking proposals which it instituted just over a year ago, the FCC has marked the 6425-6525 and 11700-12200 megacycle bands for common carrier mobile microwave use, and the 6525-6575 and 10550-10680 mc bands for mobile microwave communications of private users. The only change from the original proposals related to amortization of newly out-of-band equipment.

The agency noted that it had originally proposed to permit existing assignments "which would become out-of-band upon conclusion of the proceedings to remain indefinitely on a non-interference basis to stations authorized pursuant to the reallocations proposed," but that the Electronic Industries Association recommended "that a limit of five to seven years should be placed on such assignments."

The Commission held that its 'policy has normally permitted a five-year period for amortization of equipment in similar cases," and "Upon reconsideration of the matter, the Commission is of the opinion that the public interest can best be served by imposing a definite limitation on out-of-band operation by existing licensees. "Accordingly," it said, "such operation is being authorized for a period of five years from the effective date of the action in this proceeding (Aug. 19), after which operation must be restricted to the bands designated for the particular service."

The amendements — to Parts 2, 4, 7, 8, 9, 10, 11, 16 and 21 of the agency's rules — provide:

(1) Allocation of the 10550-10680 mc band exclusively to the mobile service.

(2) Allocation of 6425-6525 and

11700-12200 mc to common carrier mobile services, and 6525-6575 and 10550-10680 mc to private mobile services, excluding broadcast services.

(3) Elimination of existing restrictions on television pickup operations by common carriers in the 6425-6525 and 11700-12200 mc bands.

(4) Elimination of the provision in section 4.602(a) of the broadcast rules under which the 7050-7125 mc band was reserved for use by communications common carriers to provide television pickup, television STL service to television broadcast stations for assignment to television pickup, television STL and television intercity relay stations.

(5 Elimination of the 10550-10680 mc band from the frequencies available under 4.502(a) for assignment to TV broadcast stations for TV pickup, STL and intercity relay.

(6) Making the private mobile bands available for all mobile purposes, including temporary service between fixed points, such as police "stake outs" or other closed circuit TV operations; to bridge temporary breaks in an established point-to-point microwave communications system; etc. However, the private mobile bands will not be available for auxiliary broadcast uses. Further, the 6525-6575 mc band will not be available in the business radio service.

(7) Prohibition of use of the 6525-6575, 10550-10680 and 11700-12200 mc bands by stations in the aeronautical mobile service. And

(8) Adoption of four new definitions of stations which can use frequencies in the bands involved — common carrier land, common carrier mobile, operational land, and operational mobile stations.

Hallicrafters To Enter FM Two-Way Market — Formal announcement of its "plans to enter the FM two-way radio market with a complete line of units for business and industrial applications" has been made by The Hallicrafters Co., a pioneer producer of short wave radio equipment. Delivery on the firm's first two models is scheduled to begin in September — narrowband FM transceivers for mobile and base station use in the 158-174 megacycle range.

Hallicrafters said the new models represent its "first major step toward a complete line of industrial two-way radio products," with plans also calling for "hybrid transistorized equipment as well as tubed units to operate in all of the available frequency ranges."

Expanded Railroad Uses Asked — Reporting outstanding success in its developmentally-licensed operation of automatic, unattended base radio stations actuated by hot box detectors, the Seaboard Air Line Railroad Co. has asked the FCC to change its railroad radio service rules to permit such operations on a regular basis, and to expand the permission to allow use of other train or right-of-way inspection devices, using voice, tone, or impulse emissions.

The railroad noted that its first heat-actuated hot box detector radio station was installed in 1960, and that "approximately 50 such stations are now in service," representing an investment "in excess of $1,500,000" in the detectors and associated apparatus. Plans are also in the mill, it said, for ten additional such installations "which will cost approximately $320,000." Transmissions from the stations are on 161.00 megacycles, the same frequency used by the railroad for end-to-end train communications, it said, and "no problems" have arisen with respect to interference.

Continued from Page 27

along with Commissioners Bartley, Cox and Loevinger. Commissioner Cox endorsed the proposal for such a committee adding that he is "becoming fast aware of the important and crucial needs of mobile radio."

During his comments Commissioner Lee stated:: "I know that many radio user groups feel that in docket 11997 the FCC was given enough information to enable us to take remedial action. I should perhaps mention, at this point, that the staff is now reviewing the material in docket 11997 and that the Commission will soon have an opportunity to consider a number of suggestions regarding possible areas for relief. However, it is my view that you are not likely to have the major problems solved on the basis of information in docket 11997 without devoting substantial further time and effort to the project."

For the record, docket 11997 took two years and 2500 pages of testimony. Almost all user groups participated in the hearings but apparently they were too cautious in their proposals. To some of us, it was obvious that the only solution to the land-mobile problem was to move television broadcasting to UHF. Former Chairman Minow conceded that point in a letter to Senator Magnuson.

Now both representatives of the land mobile radio industry and FCC Commissioners are telling us that only an organized, concentrated effort will produce results. The next move is up to all of us who use land-mobile radio.

CLASSIFIED SECTION

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Aug. 1—New private line communication services rates of AT&T and Western Union become effective.

Aug. 1—Comment deadline for FCC rule proposals looking toward setting up an "intruder alarm" service, using ISM microwave bands, within Part 15 regulations.

Aug. 13-16—National APCO Conference. Leamington Hotel. Minneapolis.

Aug. 16-19—Annual Convention of National Mobile Radio System. Disneyland, Calif.

Sept. 10 — Comments due on FCC-proposed rules and regulations to govern the procurement of apparatus, equipment and services for the establishment and operation of a commercial communications satellite system.

Sept. 16 — Comment date on FCC proposals which would allocate the 1485-1535 mc band for use by telemetering mobile stations aboard high altitude balloons engaged in astronomical observations.

Oct. 1 — Comment date on FCC proposals to allocate frequencies in the 72-76 megacycle band in the manufacturers radio service for "flea power" radio operations. Docket 15131.

Oct. 7-9 — Ninth National Communications Symposium sponsored by Institute of Electronical & Electronic Engineers' Professional Group on Communications System. Utica, N.Y.

Oct. 9-11 — Annual Meeting of Communication & Signal Section of Association of American Railroads. Chicago.

Oct. 24-25 — Annual Meeting of Executive Committee of Forest Industries Radio Communications. Washington.

Oct. 31 — Mobile radio users must meet full narrow band technical standards of FCC.

Oct. 31 — Licensees in the railroad radio service on 452.65-457.65 mc, 452.75-457-75 mc, or 452.85-457.85 mc must vacate these channels.

Nov. 1 — Fire radio systems must move off frequencies allocated to the police radio service.

Nov. 1 — Licensees in the motor carrier radio service operating low band duplex systems must adhere to frequency chart in Section 16.252(d) of the rules.

Nov. 3 — Last date when FCC Form 505 may be used for applying for new citizens radio stations (except class A).

Jan. 1, 1964 — FCC — announced date for beginning of requirement for payment of "filing fees" along with applications to Commission.

March 1, 1964 — Comment date in FCC's inquiry into the reliability and related design parameters of microwave radio relay communication systems and resultant impact upon spectrum utilization. Docket 15130.

March 31, 1965 — Licensees in the citizens radio service operating on frequencies in the 460.00-461.00 mc band move to other frequencies.

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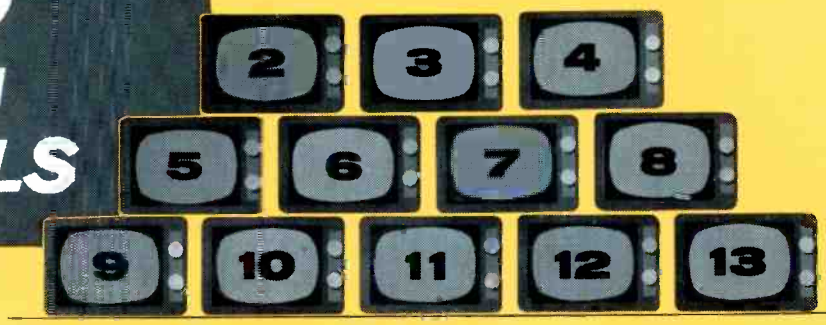

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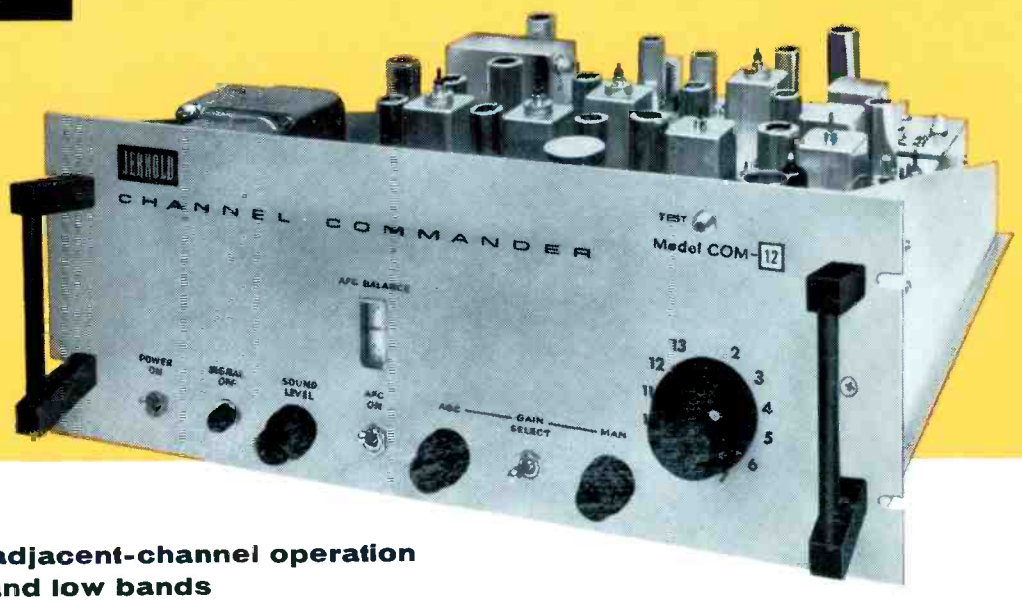

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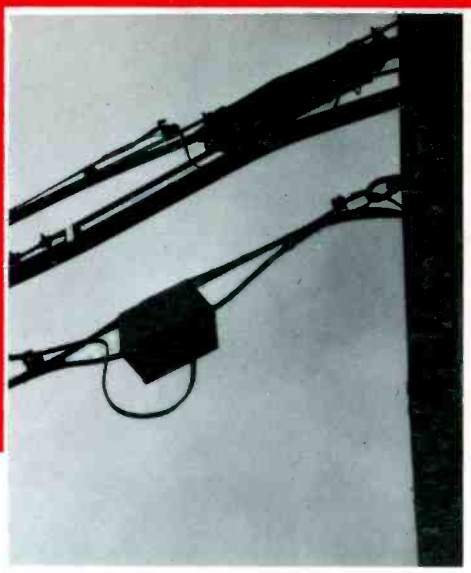

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