*RESTRICTED*

# BUREAU OF SHIPS

# RADIO AND SOUND BULLETIN

## No. 11

(NAVSHIPS 903)




## JULY 1, 1943


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**Restricted**

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# RADIO AND SOUND BULLETIN

NAVY DEPARTMENT,
BUREAU OF SHIPS,
*July 1, 1943.*

## NOISE AND INTERFERENCE IN AIRCRAFT RECEIVERS

Noise voltages spuriously generated by the power equipment aboard an airplane are conductively coupled with the electrical system of the communications receiver unless precautionary measures are taken to block these undesirable voltages before they enter the receiver and excite any of the tuned circuits. When these noise voltages leave their point of origin they have a sharply peaked impulsive wave form. However, when they are allowed to enter the receiver through the numerous entry paths, their wave form is changed from sharply peaked impulses to sinusoidal fourier components which are very difficult to discriminate against.

The most natural solution of the noise problem would probably, at first thought, seem to be a method of source suppression. A quantitative analysis of the over-all problem has led to a compromise solution of filtering and shielding at the source as well as at the sink. This seems to lead to an optimum solution as far as economy of space and communications performance is concerned.

However, in numerous installations it is impracticable and sometimes impossible to prevent the source from emitting interfering radiation, especially ultra high frequency radiation. In a case of this sort very strict tolerances have to be made in regards to the shielding integrity of the receiver case, since at these high frequencies the short length of the waves enables them to pass into the receiver through any discontinuity that may exist in the aluminum case.

The remedial measures developed to protect the receiver from conductively entrant R. F. noise voltages are essentially filter networks that attenuate the undesired voltages and pass the desired ones. In the case of power input leads a relatively simple pi-section band rejection filter or the more elementary simple capacty to ground filter can be used. Of course, these filters are crude and have not the characteristics that the conventional telephone filters display, but in spite of this a remarkably appreciable decrease in noise is experienced.

The noise that enters the receiver via the phone leads can be attenuated by shunting a capacitor across the secondary of the audio output transformer or by using a Faraday shield between the primary

and secondary turns of this transformer. The Faraday shield helps to eliminate the interturn *spurious* capacitance which offers a low impedance path to R. F. noise voltages.

Interference that is incident upon the antenna enters the receiver and if its frequency is of the order of magnitude of the frequency of the desired signal, nothing can be done to reject the noise. However, if the interfering signal is not adjacent to the desired signal, an acceptor-rejector filter of the conventional type is very helpful.

In order to prevent ultra high frequency radiated waves from passing through the receiver case, it is necessary to maintain the shielding integrity very tight. This can be done by using serrated shims between any two surfaces that have a discontinuous junction. All openings that are necessary for ventilation should be covered with expanded copper mesh or banded screening. If none of these schemes is practicable, nothing can be done except remove the source to a point remote with respect to the receiver.

It will sometimes be found that in spite of all these protective measures, the receiver will still be noisy. This residual noise then has to be blamed upon the power equipment and not the communications gear. In other words, there is just so much filtering and shielding that you can do on a receiver before the receiver becomes all filter and no radio. When your receiver is noisy be sure it is not the power equipment's fault before you condemn the communications gear as "too damned noisy."

## RADAR PLOTTING BOARD

A radar plotting board has been developed suitable for use in plotting surface vessels or aircraft. The design was modified by Lt. (jg) C. A. Miller, U. S. N. R., of the Sub Chaser Training Center, Miami, Fla., to adapt it for use in DE's and other smaller ships. The board is designed primarily for ease in plotting, so that the plotter may concentrate on solving the problem with minimum distraction from mechanical detail.

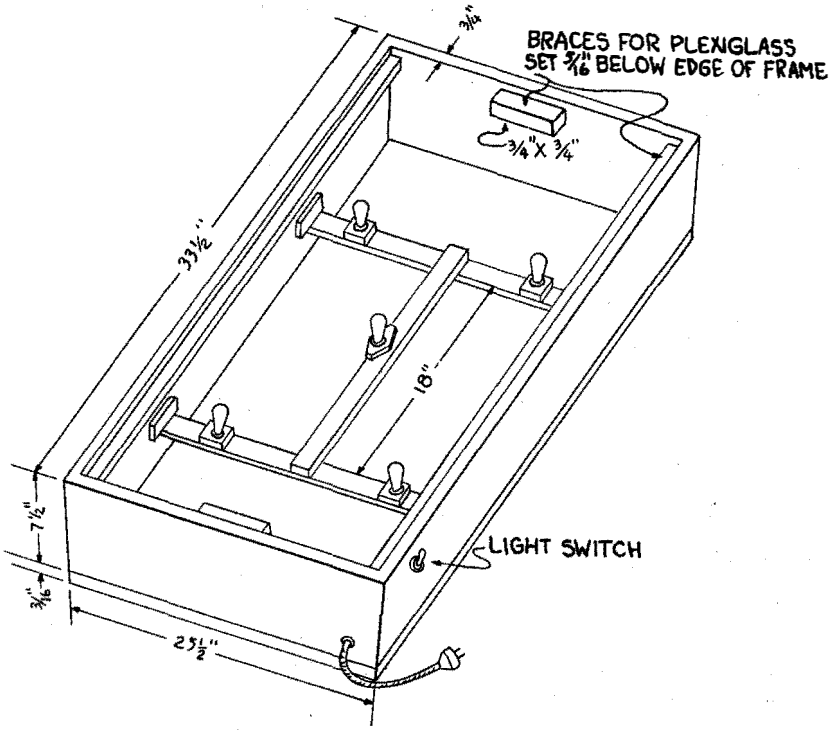


FIGURE 1.—Dimensions of plotting board frame, showing arrangement of illuminating lamps.

A wooden box is built according to the dimensions given in figure 1. Brackets to carry plexiglass are placed 5/16 inch below the top of the frame. This provides a clearance of 1/16 inch between the surface of the glass and the top of the box. Five 6-watt lamps are installed near the bottom of the frame as shown in the figure. The light of the center bulb may be diffused by covering it with a sheet of white paper. The bottom of the box should be hinged and painted white to improve the illumination.

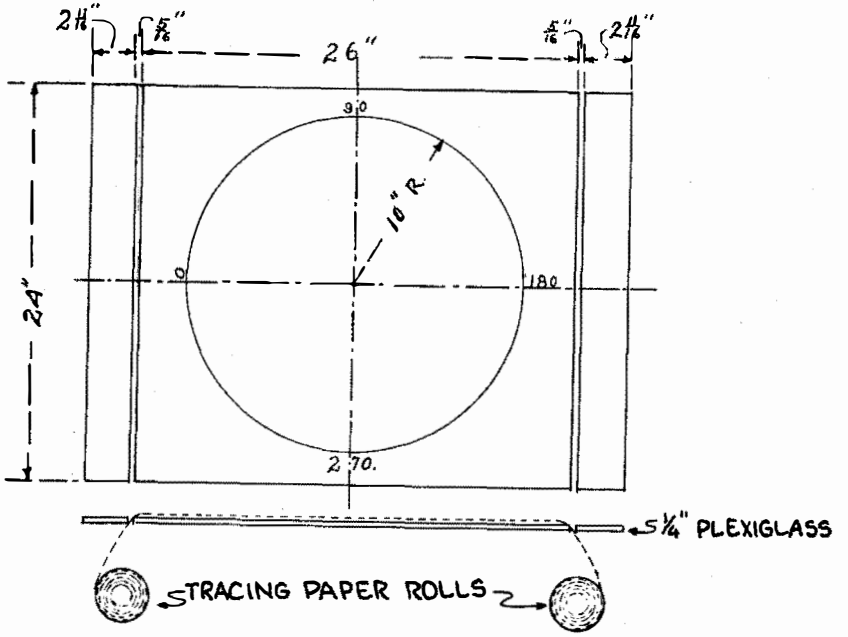


FIGURE 2.—Diagram of plexiglass, showing dimensions of three pieces. A 20" diameter maneuvering board is traced on the center piece. Paper passes from rollers over this piece.

Into the box thus constructed are fitted three pieces of plexiglass cut according to the dimensions of figure 2. The 5/16-inch clearance between the center piece and the two end pieces permits tracing paper to pass from the two rollers in the box over the glass. The large piece of glass should be roughened with sandpaper and on this surface a standard Navy 20-inch maneuvering board is traced in ink. To facilitate plotting the "5" circle should be inked in red; all other lines in black ink. Bearings and degrees may be indicated on the "1", "5", and "10" circles.

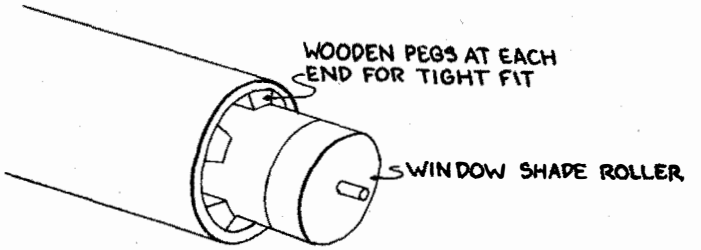


FIGURE 3.—Detail showing tracing paper held firm on roller by means of wooden wedges.

Navy standard tracing paper is obtained in 48-inch width and cut on a band saw to the required 22-inch width. An ordinary window shade roller is used to carry the tracing paper. To eliminate the necessity of rerolling the paper, the original roll of paper may be



fitted over the shade roller and held firm by small wooden pegs at each end. (See fig. 3.)

The roller is now mounted in the box as indicated in figure 4. In order to provide friction on the paper roll, a strap of canvas is passed over the roller at one end. Tension is maintained on the roll by a small spring.

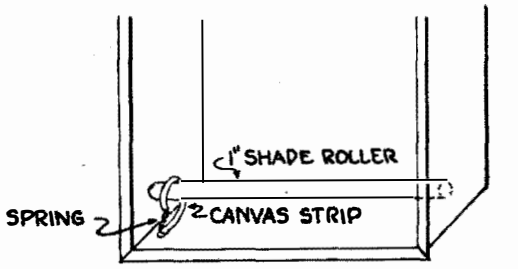


FIGURE 4.—Diagram showing roller mounted in box. Friction is provided by means of the canvas strap and spring as shown.

Another roller is mounted at the other end of the box and has a crank attached to provide a means of changing the tracing paper. The details of the crank are given in figure 5. The collar is mounted outside of the box and the entire assembly is held snug by means of a crank lock fastened to the side of the box. This bracket swings down over the shaft of the crank and secures the outer surface of the collar.

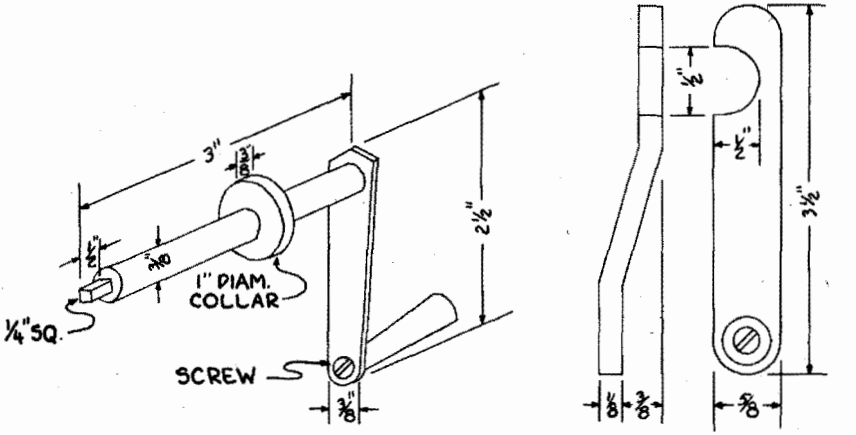


FIGURE 5.—Diagram showing dimensions of crank and crank lock.

A mask of 3/16-inch stock is cut according to the dimensions of figure 6. This mask is mounted on top of the box by means of hinges. Clearance of 1/16 inch between the top of the glass and the under surface of the mask assures that the tracing paper can be cranked off without binding.

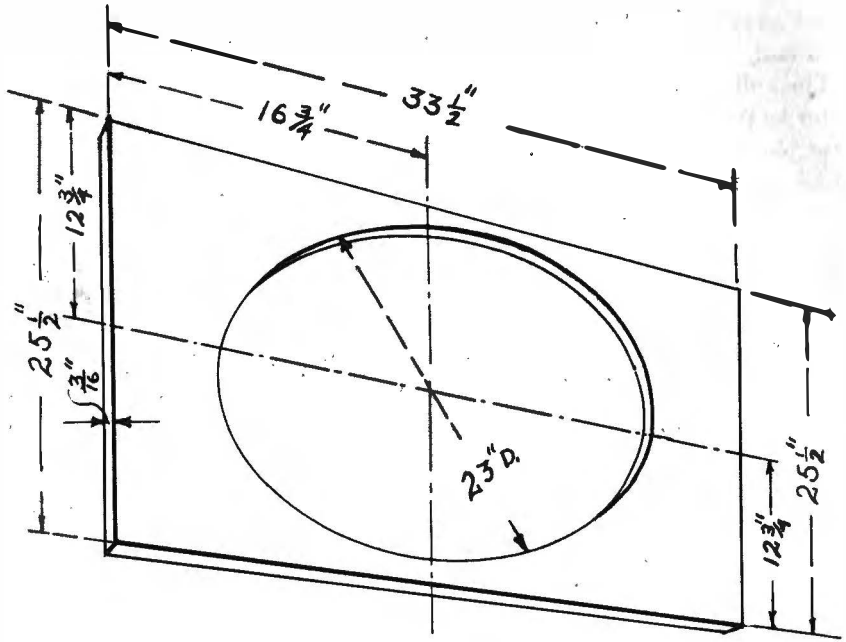


FIGURE 6.—Drawing of mask for top of the box.

A movable bearing circle is now constructed according to figure 7. It rides in the mask and provides a means of maintaining a true plot even though the ship's course may be changed.

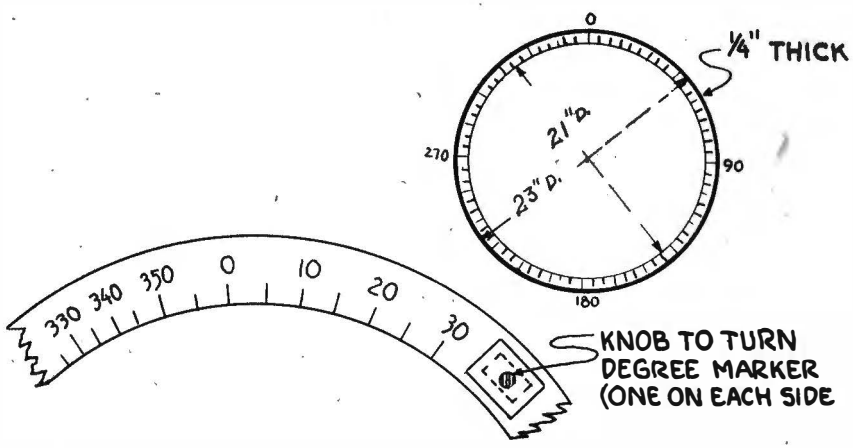


FIGURE 7.—Movable bearing circle with detail showing handle for turning.

The plotting board can be mounted on the bulkhead with the bottom edge about 14 inches from the bulkhead. This provides a convenient angle for the working surface. The mounting should be sufficiently high so that the plotter's knees are under the board when in a normal sitting position.



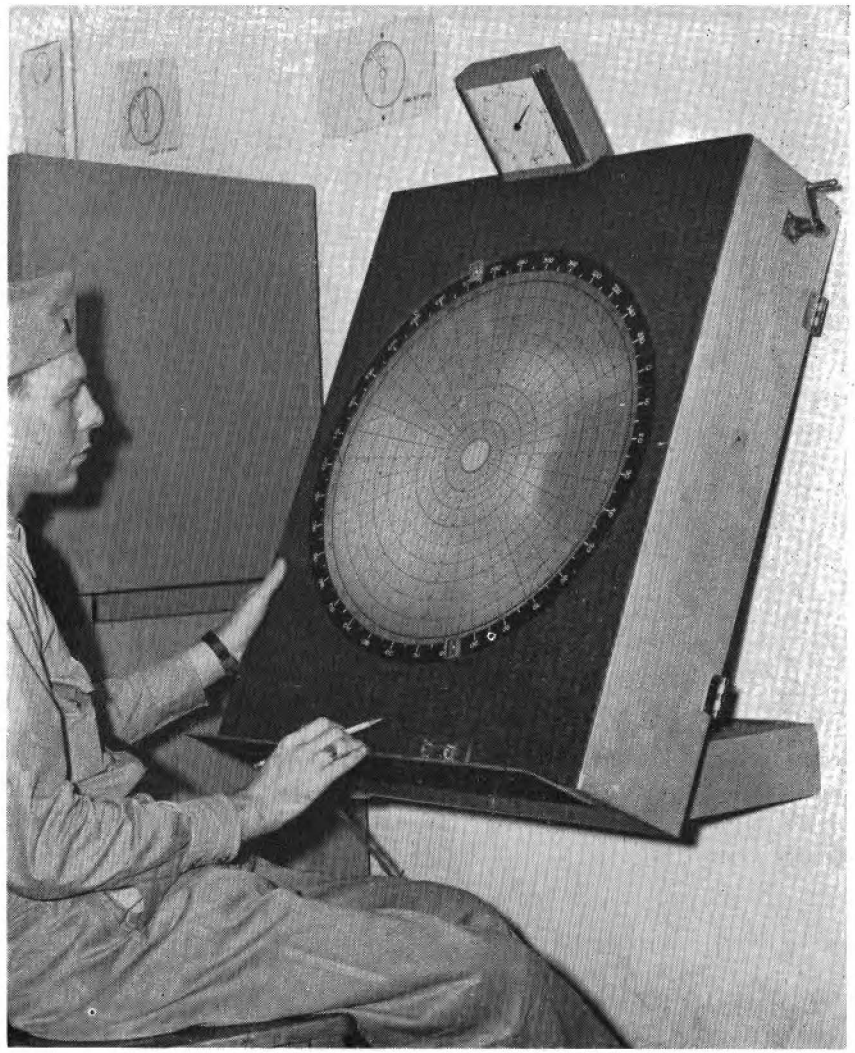

FIGURE 8.—Photograph showing entire plotting board assembly.

A pencil rack and clock can be mounted for added convenience. The entire board is pictured in figure 8.

The clock used with this board requires special mention. The hour hand is removed and a new face is made as shown in figure 9. It will be noted that the hour is divided into one hundred parts.[1] This method of division has two important advantages. First it provides a unit of time which is smaller, and therefore more accurate, than the minute. Second it facilitates calculations of target speeds.

[1] The designers of the plotting board have named this unit of time, that is one-hundredth of an hour, a "snerd." The name was arbitrarily selected as one easy to remember and use, and derives from the radio character of the same name.

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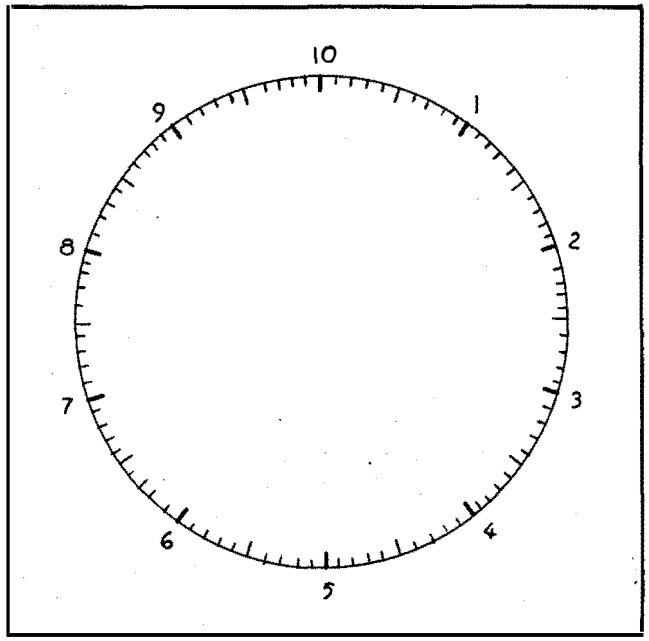


FIGURE 9.—Diagram of special clock face. The hour is divided into one hundred parts.

The calculation of speed is often difficult to perform mentally using minutes, especially when distance and time are not whole numbers. For example, if the distance traversed is 1½ miles in a time of 5½ minutes, the following process is required to determine the speed.

$$\text{speed} = \frac{1.5}{5.5} \times 60$$

$$= 16.3 \text{ knots}$$

A clock face divided into hundredths of an hour would read the time as 9 units. The calculation would then reduce to multiplying the distance by one hundred and dividing by the clock reading.

$$\text{Speed} = \frac{1.5 \times 100}{9} = 16.6 \text{ knots}$$

Such calculations are readily performed mentally.

## MODIFICATION OF MODEL TBP, TBY, TBY–1, AND TBY–2 ULTRA PORTABLE EQUIPMENTS

Recent tests conducted at the Naval Research Laboratory have indicated that grounding the open end of the regeneration control (R8) on Model TBP, TBY, TBY–1, and TBY–2 ultra-portable equipments results in an improvement of their sensitivity. The most noticeable improvement is on band 4 (65–80 megacycles). In addition the range of the control is increased so that the operator can throw the receiver in and out of superregeneration. It also gives better control of the level of regeneration.

In view of the improved performance resulting from the grounding of this potentiometer, it is desired that all TBP, TBY, TBY–1, and TBY–2 equipment be modified in accordance with figure 1. The modification is indicated by the dotted line.

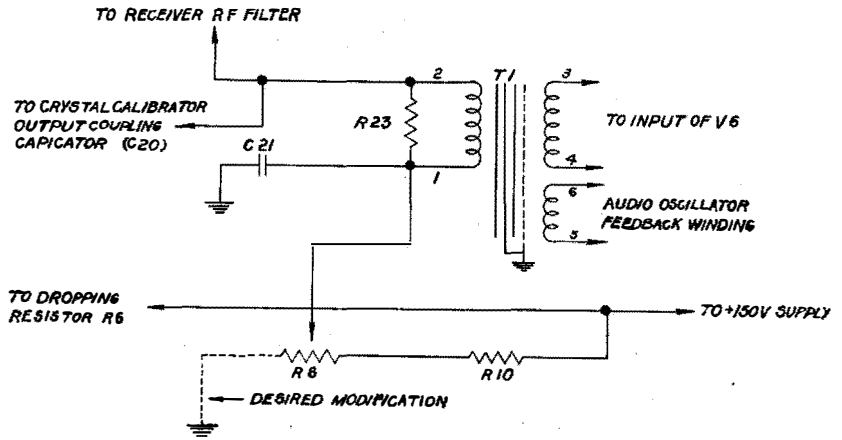


FIGURE 1.—Portion of schematic diagram of TBP, TBY, TBY–1 and TBY–2, showing desired modification.

The modified circuit, however, introduces one undesirable condition. The dry-battery pack supplying the plate voltage is grounded through the two resistances R8 and R10 regardless of the position of the power ON–OFF switch (S6) in the filament line. This results in a continuous discharge of the battery. Although the rate of discharge is small (less than 0.3 milliampere), a battery strapped in place would be completely discharged in about three months. Therefore, keeping the battery in place while the equipment is not actually in use will result in a decrease in the battery's normal life.

In order to prevent this undesirable condition, it is recommended that the battery pack be removed from the transmitter-receiver unit case when the equipment is not in actual operation. As a further precaution, it is requested that when the modification has been made a suitable warning as to the condition of continuous discharge be placed in the instruction books.

This condition is not encountered when a storage battery vibrator power unit is employed. Also removal of the battery is not required in model TBY–4 equipments, since a plate voltage switch operates with the filament switch through mechanical linkage.

## SECURITY CLASSIFICATION OF VACUUM TUBES

In order to assist radio personnel in the handling of classified vacuum tubes and in the transmittal of information pertaining thereto, the Bureau of Ships and the Army Signal Corps have prepared a list of tubes whose classification is "Confidential." These tubes appear in table I following. While this list is believed to be complete as of April 22, 1943, the possibility of omissions must be recognized. The constant development of new tubes by the many separate activities working in the electronics field precludes the preparation of any definitely final list of classified tubes. Therefore, any tubes appearing in table I are to be considered as confidential, but the omission of a tube from this list does not necessarily indicate that it is unclassified.

TABLE I.—*Tubes classified as confidential*

| | | | |
|---|---|---|---|
| K–O Series. | 5J21 Thru 5J25. | HK–227. | 702A. |
| J–1 Series. | REL–5. | 227A. | 706 Series. |
| 1B23 (729A). | 7BP7. | 327A. | 707A, B. |
| 1N21. | K–7 Series. | 417. | 708A. |
| 1N22. | REL–7. | 417A. | 709A. |
| 1P24 (936, ZJ–516). | 8B. | 419, A. | 710A. |
| D–2 Series. | 9EP7. | 421, AA. | 714 Series. |
| GY–2. | 9FP1. | 434, A. | 715A, B. |
| 2B24 (QF–197). | 9GP7. | WL–441 Series. | 718 Series. |
| 2C27 (QF–200C). | 9HP7. | WL–442. | 719A. |
| 2C28 (SA–780). | 9MP9. | WL–443 Series. | 720 Series. |
| 2D29 (SA–782B). | 12DP7. | 446, A, B. | 721A. |
| 2E27 (QF–206). | 12HP7. | 447. | 722A. |
| 2E28 (HY–145ZT). | 15E. | ZP–449. | 723A. |
| 2E29 (SA–781A). | REL–21. | GL–455. | 724A. |
| 2J21 Thru 2J34. | 53A. | 464, A. | 725 Series. |
| 2JB51. | CU58. | GL–471, A. | 726A, B, C. |
| 2KB72. | VR78. | GL–484. | 728 Series. |
| 3BX. | CV92. | GL–485. | 729A. |
| 3CP1. | 100R. | GL–486. | 730AY. |
| 3CP1–S1. | 100TS. | GL–488. | SA780. |
| 3DP1. | VT–127, A. | ZG–489. | SA781 Series. |
| 3DP1–S1. | HY–145YT. | ZJ–516. | SA782 Series. |
| 3FP7. | HY–145ZT. | WL–530. | 933. |
| 3HP7. | VT–158. | 530A. | 936. |
| GA–4. | QF–196. | ZG–530. | 1636. |
| 4C27 (CV92). | QF–197. | GL–531 (ZG–531). | 1860. |
| GA–5. | QF–200 Series. | ZG–532. | 1960. |
| GA–5A. | QF–202. | WL–532, A. | WX–3074. |
| 5CP7. | QF–206. | WL–538. | 8011. |
| 5D21. | QF–213. | GL–541 (ZG–541). | 8014A. |
| 5EP1. | QF–214. | 700 Series. | 8023. |
| 5EP7. | QF–215. | 701A. | 8026. |
| 5FP7. | | | |

Certain tubes for which technical data have been published and generally distributed and which were formerly considered "confidential" are now to be treated as unclassified. A list of these tubes is given in table II.

TABLE II.—*Unclassified tubes previously classified*

| | | | |
|---|---|---|---|
| C1B. | EF50. | 393A. | 832. |
| 2E22. | TS–70. | 450TH. | 953B. |
| C5B. | 72R (RKR72). | 451. | 1000UHF. |
| 3B24. | 73R (RKR73). | HY615. | 1630. |
| 3FP1. | 100TH. | 703A. | 7193. |
| 5BP1. | HY114B. | 704A. | 8012. |
| 5BP4. | RX233. | 705A. | 8013A. |
| 5CP1. | 274B. | 713A. | 8016. |
| 5CP4. | 304TH. | 716A. | 8020. |
| 5GP1. | 313CC. | 717A. | 8021. |
| 6C21. | 316A. | 727A. | |
| 9EP1. | 326A. | 732A. | |
| 15R. | 371A. | 829A. | |

Technical data and information concerning tubes under development which discloses application, operating frequencies, and novel design are to be considered "Secret." In addition, information, photographs, or drawings of which reveal the frequencies of any vacuum tube used in ultra-high frequency applications shall be "Secret."

The use of type numbers of classified tubes does not in itself require classification. This permits reference to confidential tubes in failure report forms, correspondence, or other unclassified documents; providing no information is disclosed as to frequency, construction, or similar detail of a confidential nature. A further discussion on the general subject of the security of failure report forms is contained in another article in this Bulletin.

## SECURITY OF FAILURE REPORT FORMS

The security classifications assigned to failure reports forwarded on such forms as NBS 383, NEng. 204 and NBS 304 seem to vary widely. This may be attributable to the common impression that a report concerning the failure of classified equipment must bear the same classification as the equipment itself. This impression is not correct.

The Navy regulations permit the classification of any document in accordance with the actual information contained on its face. Consequently, unless a report sets forth frequencies, operating data, details of the equipment itself, or other facts which would be of assistance to the enemy, it need not be classified even though it refers to classified material by model letters or in some other manner.

It is felt that, by using some care, the great majority of failure reports can be filled out without including such information as will require them to be classified. If such information must be included, it should be limited so as to permit the lowest classification possible. This will make it easier for all activities to handle them and will expedite any action required to be taken.

## MODIFICATION OF MODEL TBX–2 EQUIPMENT

In some of the type CG–43005 transmitter-receiver units of model TBX–2 portable radio equipments having serial numbers between 509 and 800, capacitors C313 and C314 were inadvertently transposed in manufacture. Under certain conditions of operation (if operated below 2200 kc. on "ant. coarse" adjustment on tap No. 1), the performance of the unit will be impaired due to this transposition. All units bearing serial numbers from 509 to 800, inclusive, should therefore be examined and any necessary corrective action taken, in accordance with the following instructions:

(1) Examine the serial number of the transmitter-receiver unit. If it does not fall between 509 and 800, both inclusive, no further action is necessary.

(2) Locate and examine fixed mica capacitor C313, mounted on top side of transmitter chassis immediately below the "send-receive" switch. When located, note the part number that is stamped on the edge of the capacitor nearest the panel. If this number is 7761328–27, assembly has been properly made, and no further action is necessary. If the number is 7761328–16, however, C314 has been used in place of C313, and the two capacitors must be interchanged. C314 is mounted on the same posts as C313, but is on the underside of the transmitter chassis.

(3) After it is definitely ascertained in accordance with (2) above that correction must be made, the procedure should be as follows:

(*a*) Carefully remove all wiring to the lower capacitor by heating with a soldering iron and at the same time using a small screw driver to pry open the loop in the end of the wire. On the capacitor mounted above the chassis, the wire leading from the lug nearest the p–a tuning capacitor should be unsoldered at the variable capacitor and ammeter junction, the other lead at the Send-Receive switch.

(*b*) Remove the No. 6–32 hex nuts, 1⅛-inch bolts, aluminum spacers, and finally the capacitor. The upper capacitor may be removed by slightly bending the wire removed from p–a ammeter junction and sliding it toward edge of set in back of panel bracket.

(*c*) Check the rating of 7761328–27 as 0.00008 mfd. Check the rating of 7761328–16 as 0.01 mfd.

(4) Remount capacitors. Be sure that the shorter wire of C313 is connected to left-hand lug facing nameplate side (this assures maximum clearance between lugs and shield) and that the red color-coded wires at C314 are not short circuited to ground.



## STANDARDIZATION OF MICROPHONES AND MICROPHONE CIRCUITS

The Bureau of Ships has recently issued Specification RE 8944A in an effort to standardize radio microphone assembly circuits and characteristics.

In the Specification are shown microphone circuits designated as "standard" or "preferred," and circuits designated as "nonstandard." All microphone circuits will be of the "preferred" types in future applications where adherence to the standard is possible.

Microphones used in naval radio service are generally of the single button carbon type. The new specification establishes requirements as to electrical characteristics to which future microphones shall conform, such as button resistance, operating voltage and current, frequency response, and fidelity.

In order to facilitate choice of an appropriate microphone for a particular equipment or unit, color coding is required on microphone plugs and receptacles. The color depends upon the circuits employed, each circuit having a color code assigned it. The circuits described in the specification, together with their applicable color coding, are shown in figures 1, 2, 3, and 4.

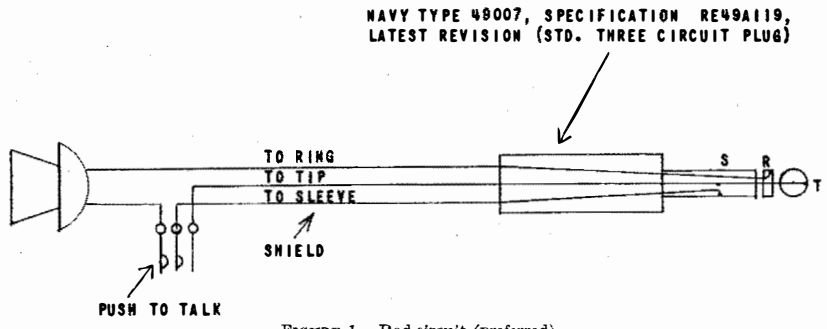


FIGURE 1.—Red circuit (preferred).

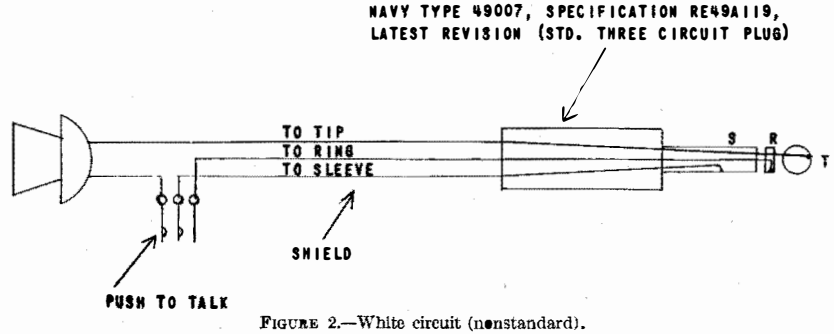


FIGURE 2.—White circuit (nonstandard).

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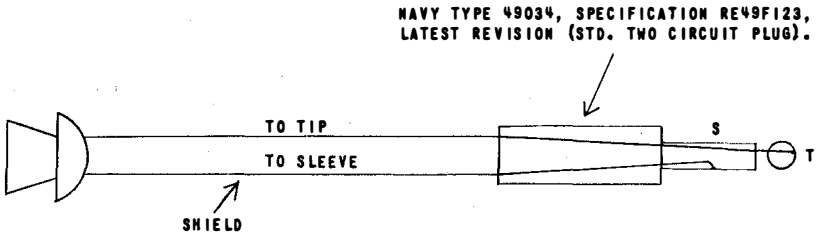


FIGURE 3.—Blue circuit (nonstandard).

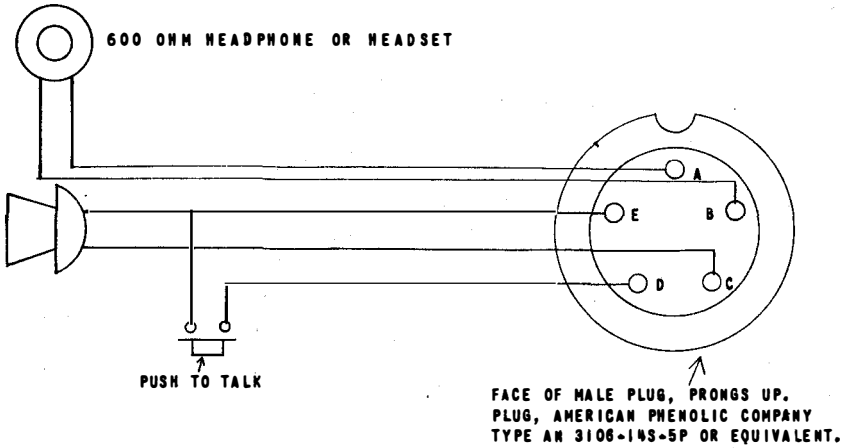


FIGURE 4.—Green circuit (preferred).

Wherever practicable, each future radiotelephone transmitting equipment, control unit, modulator, etc., will incorporate a three-circuit microphone jack wired to accept microphones using circuit "A" Red (fig. 1). Equipment circuits and speech amplifier characteristics will provide satisfactory modulation and carrier control when microphones having the general characterics of the Navy aircraft type micropnone "213264" ("RS38A") are employed. The circuit of this type corresponds to circuit "A," Red, and was established as the principal standard for Navy radiotelephone equipment because of its wide application in both Navy and Army aircraft equipments.

## SHIPBOARD USE OF MODEL SSD–1 CODE PRACTICE EQUIPMENT

The model SSD–1 (Navy model OAH) code practice equipment is used extensively by the Marine Corps as a portable training device in radio code and procedure. One of its principal uses is in training personnel while aboard ship. This shipboard use has in some cases been curtailed due to the fear that radiation of radio frequency energy by the equipment might compromise the ship's security.

The model SSD–1 code practice equipment has been designed to be definitely free of radiation in the radio frequency range. It uses a tuned-plate, grid-tickler coil oscillator with a frequency range of from 100 to 1,000 cycles per second. The output wave form is sufficiently sinusoidal to assure a low harmonic content. In addition the oscillator is followed by two stages of resistance coupled amplification which further reduces any existing harmonics. As a further measure to eliminate radiation the external circuit is balanced and shielded.

The equipment has been submitted to the Naval Research Laboratory for test and the following excerpt from the Laboratory's report is quoted:

> After inspecting the equipment itself and the instruction book furnished, certain conclusions were reached which, in opinion of the Laboratory, should complete this problem. An external audio signal may be introduced into a receiver under some conditions. Under no condition of operation is any radio frequency produced by this equipment. There is no basis for the slightest apprehension over the use of the type SSD–1 code practice oscillator as regards any hazard to security.

The Bureau concurs with the Laboratory in its conclusion that this equipment does not radiate radio frequency energy and that its use aboard ship does not constitute a hazard to security during periods of radio silence.

## COMMENTS ON TBW SERIES TRANSMITTING EQUIPMENTS

Failure of the I. F. oscillator of the model TBW series transmitting equipment to oscillate in the region of the 600 kc when fully loaded is due to too close coupling of capacitor C–108 between the master oscillator and the intermediate amplifier stage. The adjustment is critical, and proper operation may be obtained by making adjustments as follows:

(*a*) Decrease the coupling between the master oscillator and the intermediate amplifier by reducing the capacity of the capacitor C–108 slightly, using a screwdriver in the slotted shaft of the capacitor.

(*b*) Set all controls for 600 kc with the antenna coupling control "G" set to 0.

(*c*) Increase the antenna coupling by means of control "G", retuning the P. A. and I. A. stages as necessary until optimum coupling is obtained. Optimum coupling will be indicated either by a maximum antenna current or the plate current limiting value of 175 milliamperes, whichever occurs first. Should oscillation cease before optimum coupling is reached, coupling capacitor C–108 should be decreased by an additional small amount.

(*d*) Condenser C–108 should then be increased until oscillation stops, and then slowly decreased until oscillation just begins. This is the final adjustment, and a drop of glyptol should be added to the shaft of C–108 to maintain the adjustments.

Model TBW–3 equipments delivered after approximately April 10, 1943, and all subsequent model TBW series are being modified to eliminate the above condition by changing the intermediate amplifier grid choke (L–105) from 2.5 to 5.5 millihenries. Modification kits will be supplied to the field at an early date to modify model TBW–3 series equipments delivered prior to the change.



## ERRORS FROM IMPROPER USE OF LD SERIES HETERODYNE FREQUENCY METERS

Recent information from a naval station indicates that a few cases of "off frequency" operation of transmitters have resulted from the failure to turn off the crystal calibrator of the model LD heterodyne frequency meters when setting up a frequency on the transmitter. This error is caused by setting up the transmitter on a crystal calibrator reference frequency instead of on the desired heterodyne frequency.

Suppose, for example, that the desired transmitter frequency is 11175 kc. Since the top limit of the frequency meter is 5000 kc., this would require setting up a heterodyne frequency of 2793.75 kc. and using the fourth harmonic of that frequency. In order to obtain the proper heterodyne setting the crystal calibrator is used. The nearest bracketing reference frequencies obtainable for this purpose would be 2780 and 2800 kc.

If the calibrator is not turned off, the transmitter may be inadvertently heterodyned against one of these reference frequencies instead of against the proper frequency of 2793.75 kc. As a result the transmitter may be tuned to the incorrect frequency of 11120 or 11200 kc. depending upon whether the fourth harmonic of the upper or lower bracketing calibrating frequency was used.

To make a repetition of this type of error less likely, the station has installed under the crystal calibrator switch an engraved bakelite name plate reading "Turn calibrator off after bracketing."

In the model LR series, the possibility of this type of error does not exist since the crystal calibrator, even if turned on, is disconnected from the detector circuit when the switch S–103 is in the "Match" position; that is when the incoming signal is being compared with the heterodyne frequency oscillator.

## ANTENNA LOADING COIL FAILURES IN MODEL TCS EQUIPMENT

The Bureau has received several reports of failures in the Model TCS transmitter because of arcing between the two leads on the antenna loading coil (L–108). When this equipment is used with a short antenna, at certain frequencies there is a high voltage gradient between these two leads. The leads cross each other through the inside of the coil form as shown in figure 1. To prevent arcing the leads can be bent in order to create a half inch separation. This should be done in all TCS equipments to forestall the occurrence of this trouble.

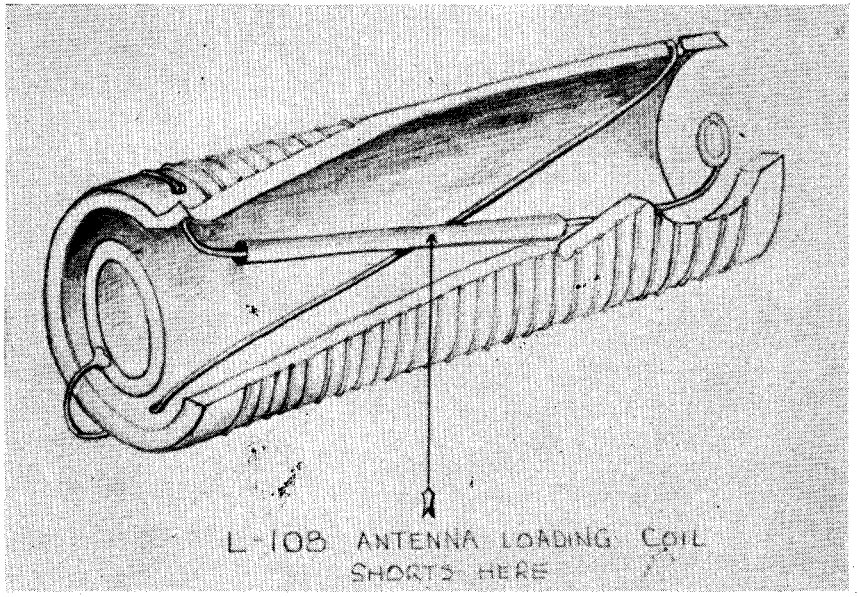


FIGURE 1.—Drawing of antenna loading coil cut away to show lead arrangement.

Steps are being taken by the Bureau to correct this fault in future production.



## EFFECTIVE EMPLOYMENT OF RADIO MATERIAL

Circular letter No. 26 is reprinted for the information of those who may not have seen it at the time of its issue.

S67–A2–11(980–250) (C/L 26)

BUREAU OF SHIPS,
*December 10, 1942.*

CIRCULAR LETTER NO. 26

1. The radio, radar, and underwater sound requirements of the various military services have placed a heavy load upon the radio industry. Production at present is just able to keep up with the more urgent demands. The accelerating shipbuilding program is further complicating the situation, and as a result, it is impossible to build up adequate reserve stocks. This critical material situation makes it necessary to give almost every type of equipment personal attention to insure that it reaches the right spot in time.

2. It is realized that in handling the enormous amount of equipment involved there will be numerous cases in which material will be shelved, misrouted, misplaced, or otherwise prevented from being utilized as a result of inaccurate or inadequate interchange of information between interested parties.

3. In order that subject equipments, associated spares, and test equipment may be employed to the fullest extent, it is directed that all activities concerned take immediate steps to insure that no items of equipment which might be effectively employed be allowed to remain in idle storage.

4. It is directed that the Bureau be advised in all cases where such equipment is on hand and instructions as to its ultimate destination or use are not available or are no longer applicable.

5. Commanders afloat are requested to indicate to their subordinates whether such reports are to be forwarded via the chain of command or direct to the Bureau, with copies as desired.

E. L. COCHRANE,
*Chief of Bureau.*

# THE FORUM

## AN INFORMAL DISCUSSION OF COMMUNICATION MATERIAL MATTERS OF INTEREST TO THE SERVICE

***The purpose of THE FORUM is to provide a means for publishing informal comments by members of the naval service on matters of interest to others in the radio field. These contributions need not have official status, and thus a medium is offered for the expression of personal opinion and observation. Comments, suggestions, experiences, difficulties, and other items concerning radio equipment are welcome at all times. Material of this kind is not only interesting to other radio personnel but is of great value to the Bureau.***

***Contributions may be prepared as informally as desired. They should be forwarded via the commanding officer to the Radio and Sound Bulletin, Bureau of Ships (Code 903), Navy Department, Washington, D. C.***

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## COMMENTS ON THE PERFORMANCE OF MODEL RBA, RBB AND RBC RECEIVERS AND MODEL TBK–10 TRANSMITTER

ELLIS H. AVERILL, Radio Electrician, USN, U. S. S. *Birmingham*

1. (*a*) *Model RBA, RBB, RBC receivers.*—Subnormal performance has been traced to failure of installation personnel to connect the "antenna input matching links" properly. This is particularly true in new construction vessels on account of the newness of these equipments. When the antenna input matching links were properly set according to the RBB/RBC instruction book, figure 37, the receivers were found to be actually superior to the RAL–RAK models in performance.

Since one antenna will not serve satisfactorily all three RBA–RBB–RBC receivers, the antenna input matching links were adjusted for proper operation of model RBB, RBC, and, if necessary, RAL equipments, from a single antenna transmission line; and all RBA plus RAKmodels on one of the other 3-inch coaxial lines. This arrangement has been found to be very satisfactory.

(*b*) *RBA–RBB–RBC rectifier power unit.*—Failure of this unit (type CRV–20130) was traced to the filter choke, symbol L 406. The nuts on the underside of the terminals appeared to be inadequately insulated from the core of the choke. Repairs were effected by unsoldering the top of the choke container and placing a sheet of plastic on top of the core under the terminals, then resealing the can. No further trouble has been experienced.





2. (*a*) *Model TBK–10 transmitter.*—When the first and second IPA stages show abnormally low plate current, although both tune through resonance, and even a small amount of antenna current may be obtained, a blown fuse (F205) in the screen grid supply is indicated. This fuse is located in the terminal box on the high voltage generator. Almost everything except this fuse is usually suspected due to the above symptoms and due to the absence of any meters directly in the circuit.

(*b*) When the 6-wire control system is used and the second set of control line fuses (F102 and F103) blow, the arbitrary link from 5K to 6K, which grounds one side of the control line, should be removed. During gunnery exercises in this vessel the opposite side of the control line intermittently grounded and consistently carried away the above fuses. The exact point of grounding has not been definitely located, but no further trouble has been experienced since removing the indicated link.

*Bureau Comment*—1 (*b*).—The failure of the filter choke has been reported to the manufacturer, and steps will be taken to correct the fault in later equipments.

2 (*a*). The failure of the 1,500-volt fuse (F–105) located in the terminal box of the high voltage generator supplying screen grid current to the I. A. stages and the power stage is not readily recognized, since the screen grid supply is not completely interrupted when the fuse blows. The high voltage bleeder resistors will act as a voltage divider and reduced screen grid voltage will be supplied by the 3,000-volt generator. The plate current meters of the first and second I. P. A. will indicate abnormally low values, and it may be possible to tune both stages through resonance and also to obtain a small amount of antenna current. Fuse (F–205) should be checked when these symptoms appear. A similar situation in connection with the TAJ series was reported in RADIO and SOUND BULLETIN No. 7.

2 (*b*). On sets employing 6-wire control, the blowing of control line fuses (F102) and (F103) during gunfire may be due to intermittent grounding of the side of the control line in which fuse (F102) is located. Removing the optional ground link (5K to 6K) on terminal board K will permit operation until the point of grounding is located.

★ ★ ★

## USE OF MODEL MZ EQUIPMENT IN AMPHIBIOUS OPERATIONS

E. C. HOLTZWORTH, Lt. Cmdr., USN

I have recently returned from the Acorn Training Detachment, Port Hueneme, Calif., where I was assigned temporary duty for some weeks in connection with certain amphibious operations.

It was thought that a recent Marine Corps development in the form of a ¼-ton jeep equipped with a model TCS–5 receiver and transmitter powered by a generator driven from the jeep's engine (model MZ equipment) might be of value to the projected operations. Tests proved them to be outstandingly successful.

The model MZ equipment was successful in our particular operations with LST vessels for the following reasons:

(1) *Range is 30 miles.*—Sufficient to maintain communication channels over a comparatively wide area of operations. Our particular area of operations extended over a coastline distance of about 8 miles.

(2) *Reliability.*—On test they were found to be extremely reliable with a minimum amount of upkeep required.

(3) *Mobility.*—Being mounted in a jeep the equipment is highly mobile, can be landed in the first wave and is immediately available without the necessity of a time interval for assembly.

(4) *Flexibility.*—Frequency range provides for both voice and code channels.

(5) *Use with LST vessels.*—The MZ equipment is a "natural" for use with LSTs inasmuch as each LST is equipped with a TCS–5 transmitter and receiver with a portable loudspeaker and microphone which can be rigged either in the pilot house or conning station atop the pilothouse. This provides an instantly available means of reliable communication between the beach forces and successive waves of LSTs. The importance of this point cannot be overstressed.

It is realized of course that TCS equipment cannot be used where radio silence is required. However, this consideration is infrequently of importance in this type of operation.

## TECHNICAL PAPERS

The following technical papers on radio and sound subjects have been listed by the Navy Research Laboratory as received from January 15, 1943, to March 15, 1943. Requests are received from time to time by the Bureau and the Naval Research Laboratory for copies of these papers. However, there are no provisions for circulating the publications containing these articles. This list is published for the purpose of keeping interested personnel informed on the current literature in the field.

(NOTE—Asterisk (*) preceding entry indicates that an abstract only is available in the library.)

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