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PRELIMINARY INSTRUCTIONS
FOR
RADIO SET SCR-585-A

MANUFACTURED BY
GALVIN MANUFACTURING CORPORATION
CHICAGO, ILL.

20,000,000

RESTRICTED

Shop
7-10-42
[Signature]

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PUBLISHED BY AUTHORITY
OF
THE CHIEF SIGNAL OFFICER

ORDER No. 1146-WF-42

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NOTICE

The voltages used in this radio set are not high enough to be injurious. A slight shock, of negligible magnitude, may be obtained by touching the antenna and case at the same time when the set is transmitting.

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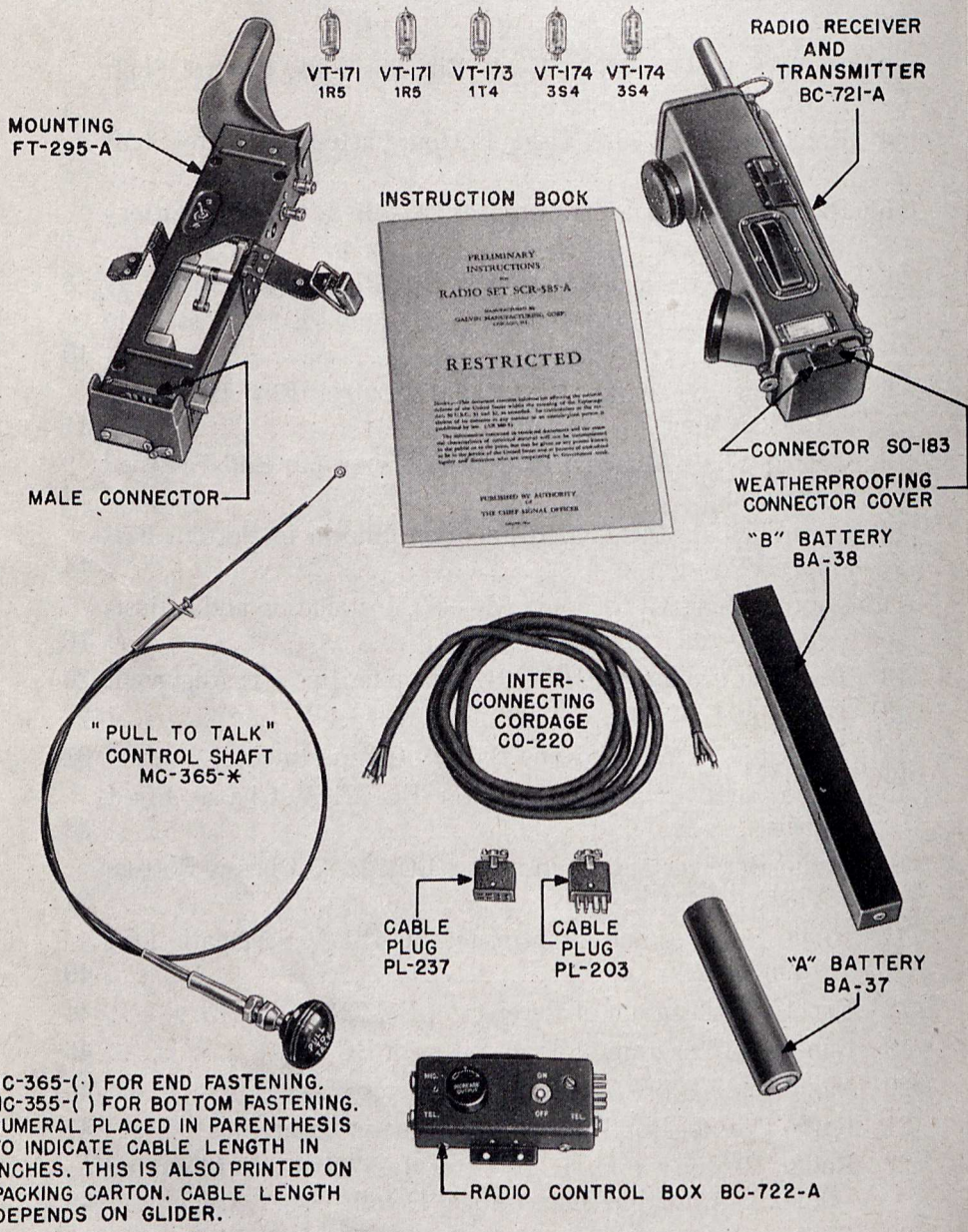


FIG. 1. RADIO SET SCR-585-A, COMPONENTS

* MC-365-() FOR END FASTENING.
 MC-355-() FOR BOTTOM FASTENING.
 NUMERAL PLACED IN PARENTHESIS
 TO INDICATE CABLE LENGTH IN
 INCHES. THIS IS ALSO PRINTED ON
 PACKING CARTON. CABLE LENGTH
 DEPENDS ON GLIDER.

SECTION I

DESCRIPTION

1. GENERAL.

a. Radio Set SCR-585-A is a dual purpose radio receiver and transmitter, designed for two-way conversation over distances up to one mile. Descriptively, it is a portable radio telephone, receiving and transmitting on the same frequency.

b. For use in a glider it is placed on a Mounting FT-295-A, installation to be made as specified for the particular type of glider used. Radio Receiver and Transmitter BC-721-A when installed on Mounting FT-295-A is remotely controlled by "pull-to-talk" Control Shaft MC-355 or MC-365, and Radio Control Box BC-722-A.

c. For operation in the glider, headphones and a throat microphone are used. Both pilot and co-pilot have headphones available, but provision is made for only one microphone. The Radio Control Box BC-722-A contains jacks for two sets of headphones, a jack for a microphone, an "ON-OFF" switch, a volume control, and a microphone matching transformer.

d. By unbuckling the strap and buckle assembly, shown in Fig. 3, and pushing the connector release lever, Radio Receiver and Transmitter BC-721-A is released and becomes a "press-to-talk" self-contained portable radio telephone with attached earphone and microphone resembling an ordinary hand telephone set. Radio Receiver and Transmitter BC-721-A when operated in this manner is automatically turned on when the self-contained telescopic antenna is fully extended. No volume control is used with the radio receiver and transmitter when it is used as a portable radio telephone. See Fig. 2.

2. FREQUENCY COVERAGE.—The unit is crystal controlled on both reception and transmission, and will operate over the frequency range of 3500 to 6000 kilocycles. However, each unit is adjusted to operate at only one frequency at a time in this band. Reception and transmission are on the same frequency. The set can be made to operate at any frequency in the band by proper choice of crystals and coils. For correct performance, each set must have coils adjusted to the crystals used. The coils and crystal changes and their adjustments cannot be made by the operator, but are set by the manufacturer or by maintenance men at authorized repair depots.

The bottom of the case of Radio Receiver and Transmitter BC-721-A has a hinged cover which permits access to the batteries and the radio chassis. See Fig. 5.

3. WEIGHTS AND DIMENSIONS.—Total weight of the Radio Set SCR-585-A is approximately $11\frac{1}{2}$ lbs. depending on cable length required in glider. Total weight of Radio Receiver and Transmitter BC-721-A is 6 lbs. Overall dimension of the Radio Receiver and Transmitter BC-721-A on Mounting FT-295-A is approximately 6" high, $5\frac{1}{2}$ " wide, $17\frac{1}{16}$ " long. See Fig. 22.

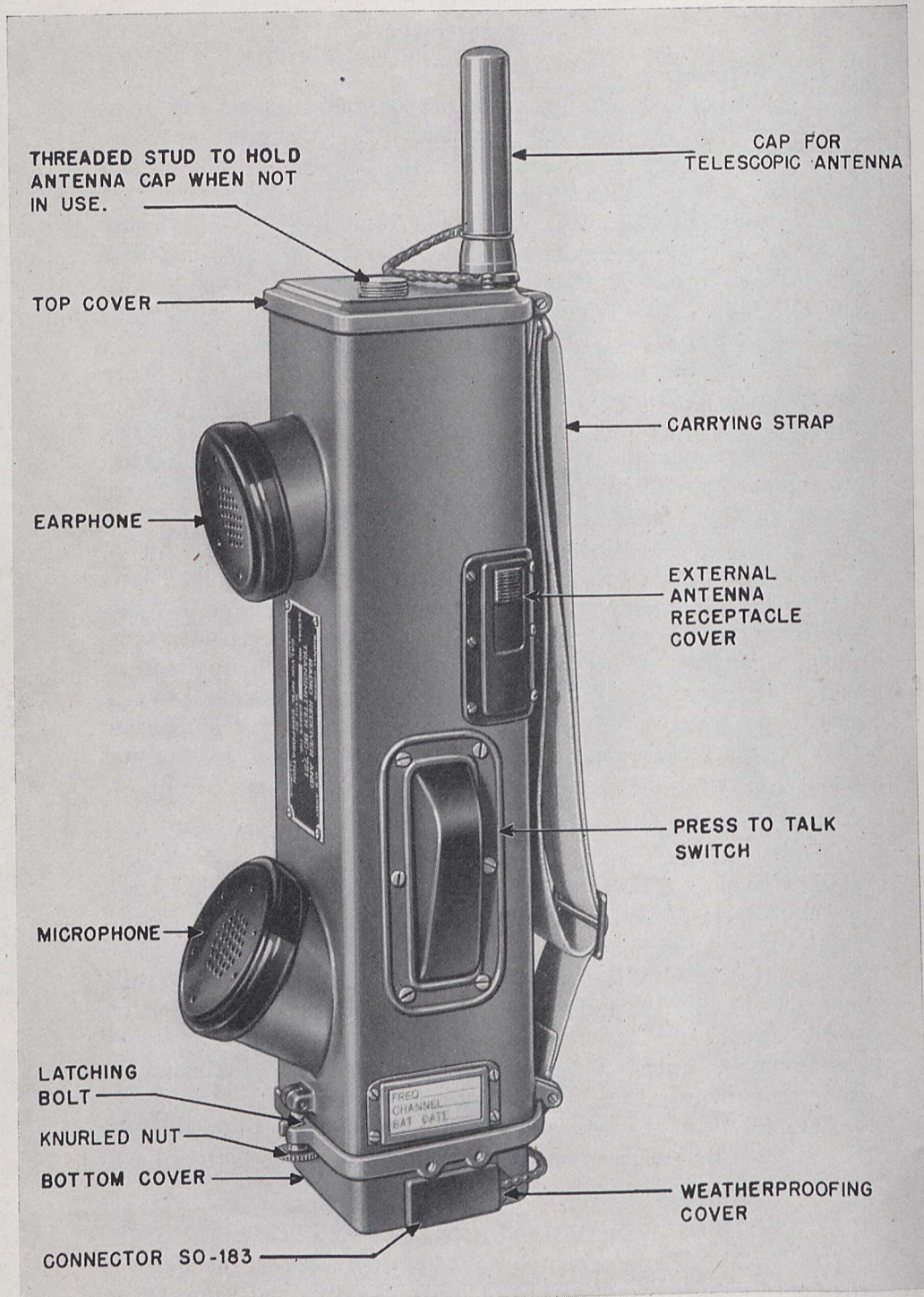


FIG. 2. RADIO RECEIVER AND TRANSMITTER BC-721-A

4. SOURCE OF POWER.—The Radio Receiver and Transmitter BC-721-A is battery powered. Space for both “A” and “B” batteries is provided in the housing.

The filament or “A” Battery BA-37, rated at 1.5 volts, is cylindrical in shape and fits into the round compartment in the housing.

The “B” Battery BA-38, rated at 103½ volts, is oblong in shape and fits into the oblong compartment in the housing.

	<i>Drain Receiving</i>	<i>Drain Transmitting</i>
“A” Battery BA-37		
1.5 volts	0.35 amps.	0.30 amps.
“B” Battery BA-38		
103.5 volts	11 milliamperes (max.)	35 milliamperes (max.)

5. DESCRIPTION OF COMPONENTS

a. Housing for Radio Receiver and Transmitter BC-721-A.—The housing which encloses Radio Receiver and Transmitter BC-721-A is an aluminum casting. Its interior is divided into three compartments, one for the radio chassis, one for the “A” Battery BA-37, and one for the “B” Battery BA-38. Two projections from the housing contain the earphone and microphone units. These projections are so spaced and of such length that when the unit is held with the earphone against the ear of the operator, the microphone or mouthpiece is in the proper position for talking.

A “press-to-talk” switch is mounted on the side of the case, and operates the change-over switch on the radio chassis which converts the set from a receiver to a transmitter. This switch is so located that when the set is held in the left hand, the switch may be operated easily with the fingertips. See Fig. 2.

The bottom cover hinges to the housing and is provided with a slot into which a latching bolt fits. It is through this end of the housing that the chassis and batteries are inserted or removed. A contact terminal board inside the bottom cover provides the connections between the batteries and the radio chassis, as well as to the Connector SO-183 which makes the necessary electrical connection with Mounting FT-295-A. See Fig. 5.

A small card holder below the “press-to-talk” switch contains a plastic card on which the frequency and battery dates are marked. This card is protected from wear by a transparent cover. To remove the card from its container the bottom cover must be opened.

The top cover of the set contains an opening for the antenna rod. This cover is held in place by a mounting screw which holds the chassis securely in the housing. Spring battery contacts and a spacer for the “A” Battery BA-37, fastened to the top cover, make electrical connections to the batteries. See Fig. 6.

An antenna cap, attached to the top cover on the outside by a chain, protects the telescopic rod antenna against weather conditions when the set is not in use, and when the unit is carried, or mounted on Mounting FT-295-A.

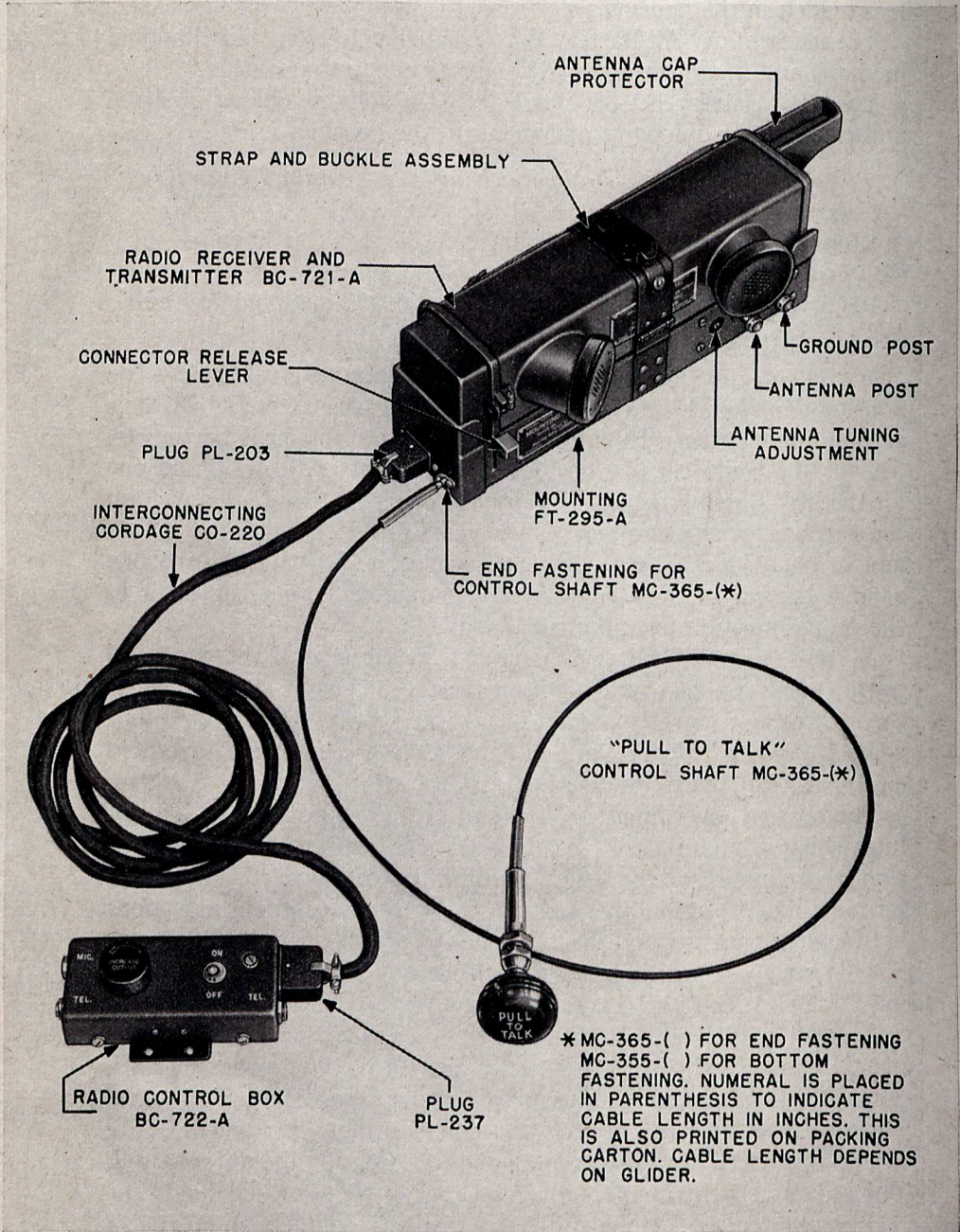


FIG. 3. RADIO SET SCR-585-A USING END FASTENING CONTROL SHAFT MC-365

b. Cordage CO-220.—This is a seven-conductor cable used to connect Radio Control Box BC-722-A to Mounting FT-295-A. Due to different types of glider installations, the cordage is furnished in running lengths and should be cut to the length desired for each type of installation. Fig. 7 shows the color code connections to the plugs. Care must be used when assembling Plugs PL-203 and PL-237 to the cordage to prevent short circuiting the conductors.

c. Mounting FT-295-A.—This mounting contains an antenna tuning capacitor to tune the antenna circuit of Radio Receiver and Transmitter BC-721-A to the external antenna used in the glider.

A headset matching transformer is mounted inside of Mounting FT-295-A. This transformer matches the output circuit of Radio Receiver and Transmitter BC-721-A to one or two pair of either high or low impedance Signal Corps headsets. Terminals for making the proper impedance connections are provided on the transformer which is normally supplied with connection made for high impedance Headsets (HS-23).

An eight-terminal male connector mounted on the base makes contact with the Connector SO-183 when the Radio Receiver and Transmitter BC-721-A is clamped in Mounting FT-295-A. See Fig. 8.

The external antenna connection to the radio set is made through an antenna plug assembly installed in the Mounting FT-295-A. This plug is self-centering on its mounting to assure perfect alignment with the antenna receptacle in Radio Receiver and Transmitter BC-721-A. When the antenna plug passes into the external antenna receptacle, it actuates a switch in the Radio Receiver and Transmitter BC-721-A. This switch transfers the radio antenna connection from the internal telescopic rod antenna to the external antenna.

A strap and buckle assembly attached to the mounting holds the Radio Receiver and Transmitter BC-721-A securely in position.

d. "Pull-to-Talk" Control Shafts MC-355 or MC-365.—This assembly consists of a flexible housing and Bowdin wire, together with the necessary mounting fittings and control knob. It is fastened at either the end or bottom of Mounting FT-295-A and actuates the Send-Receive switch in Radio Receiver and Transmitter BC-721-A. See Figs. 3 and 4.

e. Radio Control Box BC-722-A.—This box contains the ON-OFF power switch, INCREASE OUTPUT volume control (receiver volume), jacks for the headphones and microphone, a microphone transformer, and male Connector SO-217. See Figs. 4 and 8.

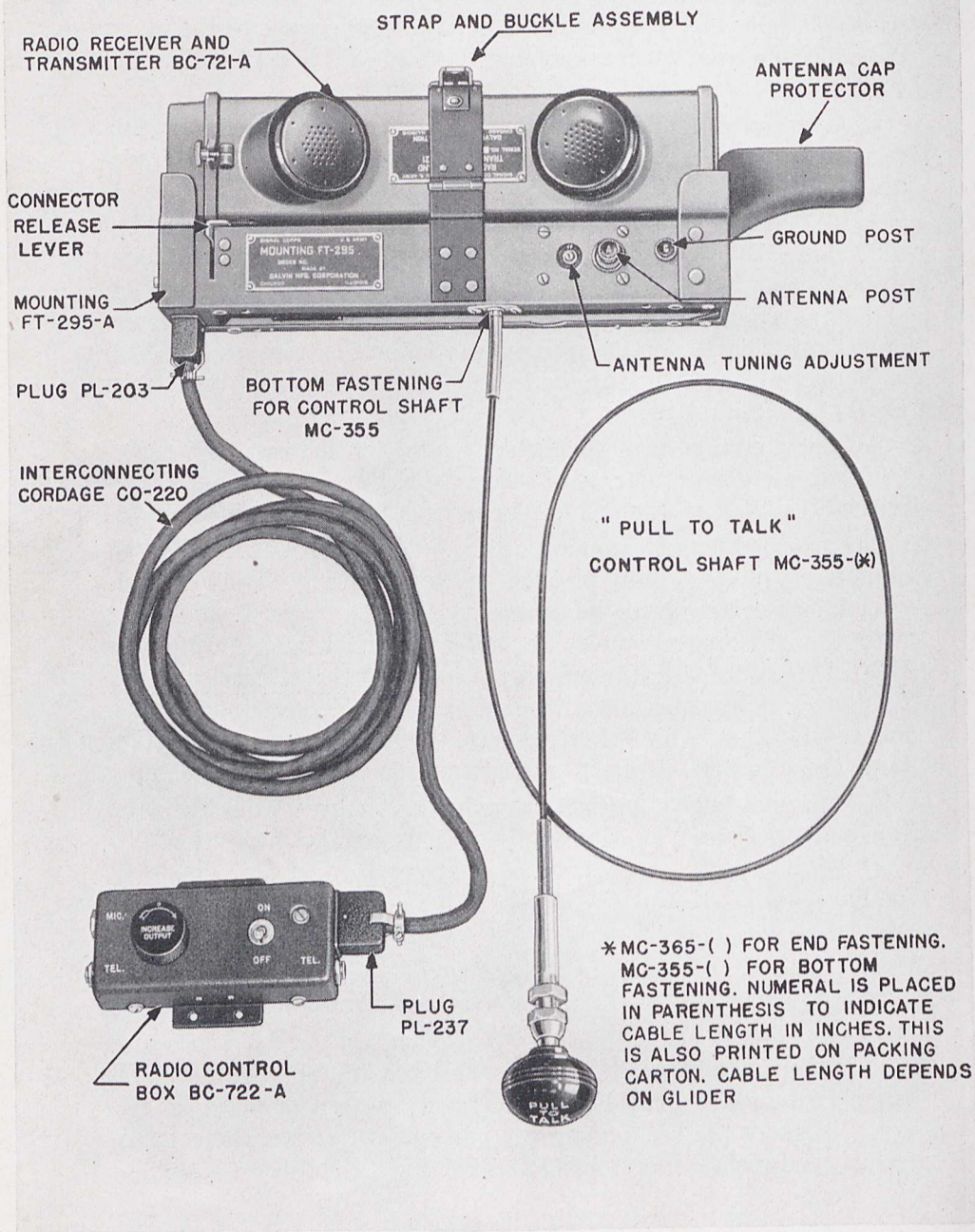


FIG. 4. RADIO SET SCR-585-A USING BOTTOM FASTENING CONTROL SHAFT MC-355

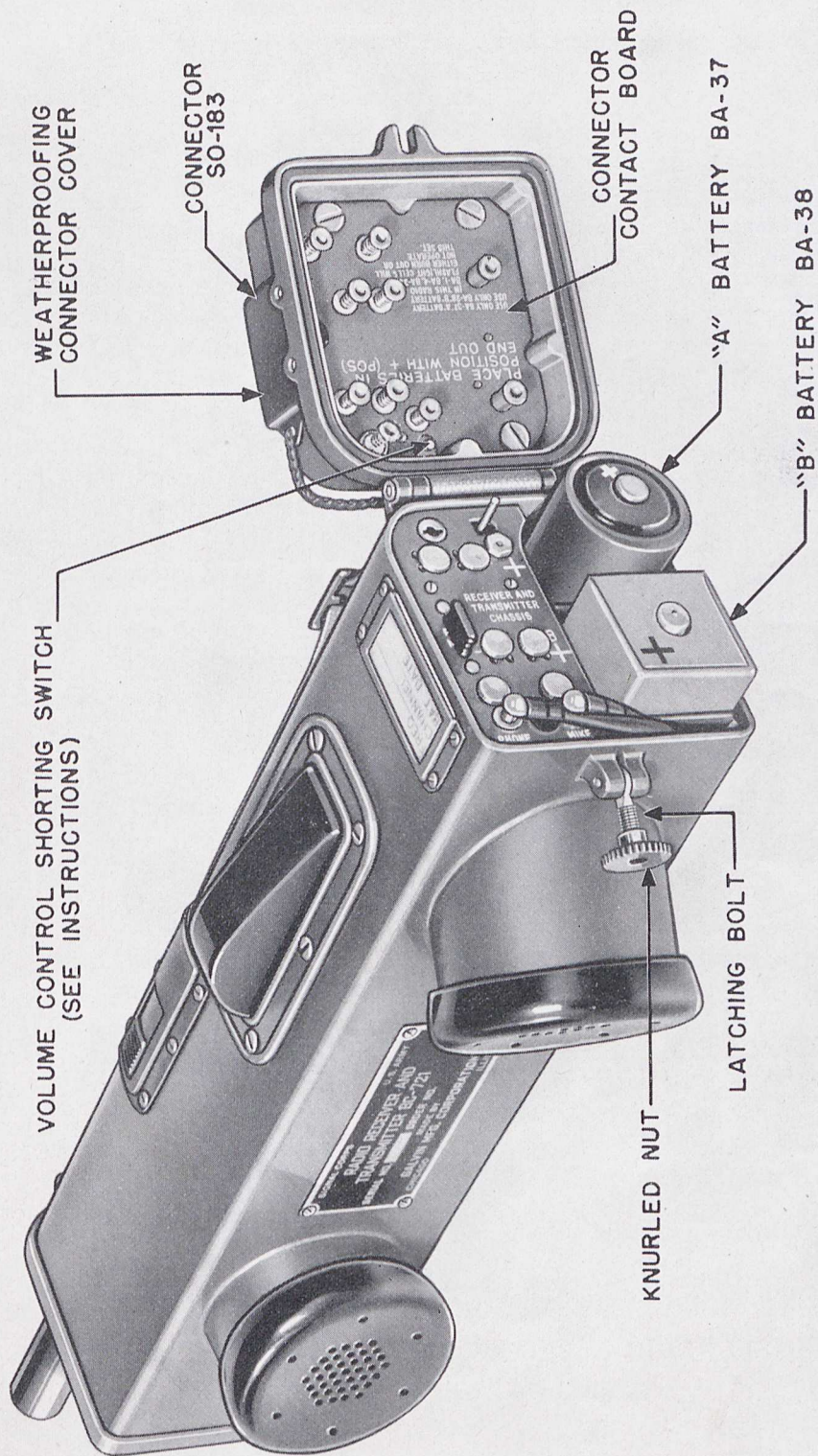


FIG. 5. RADIO RECEIVER AND TRANSMITTER BC-721-A, SHOWING BATTERY COMPARTMENT

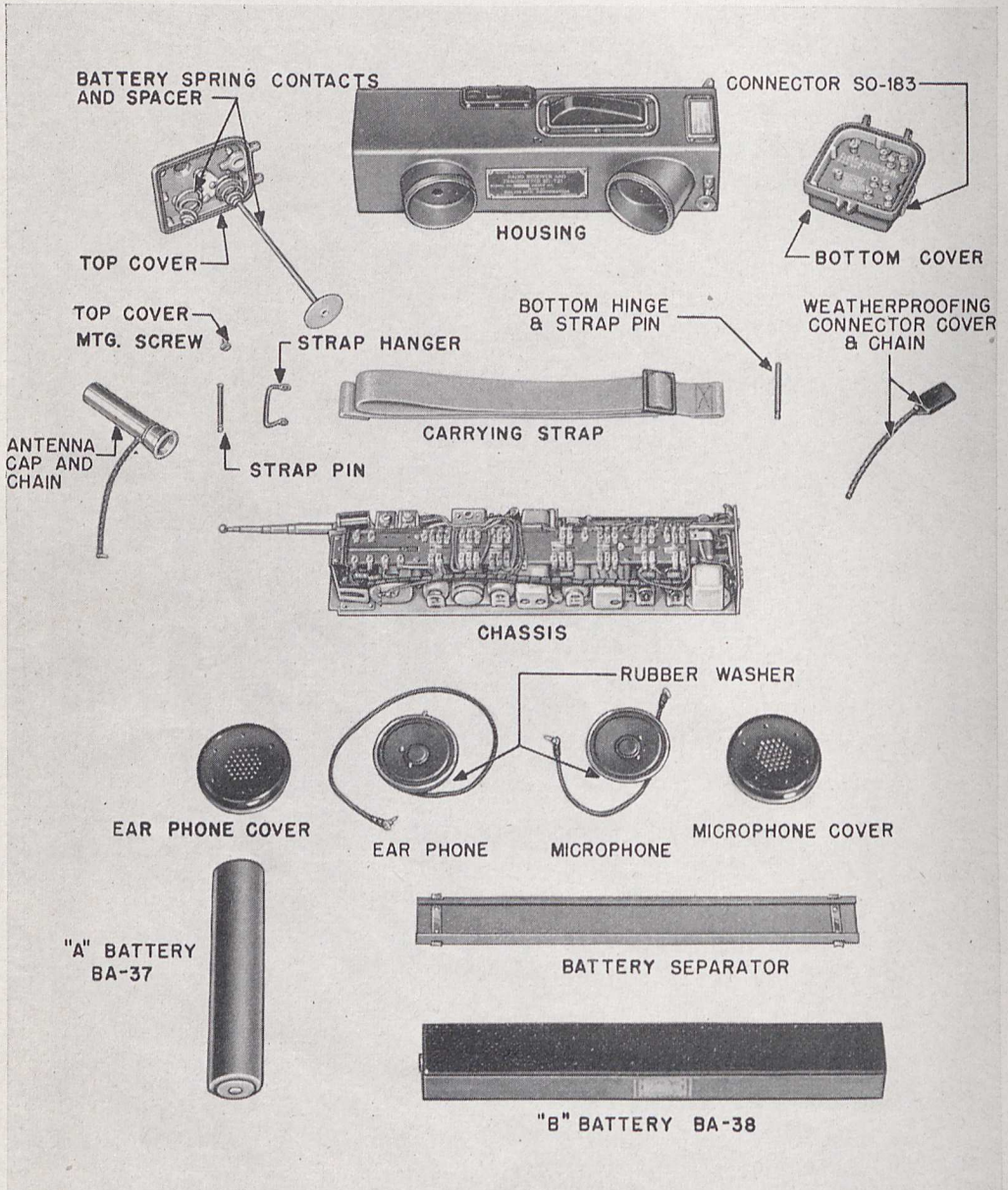


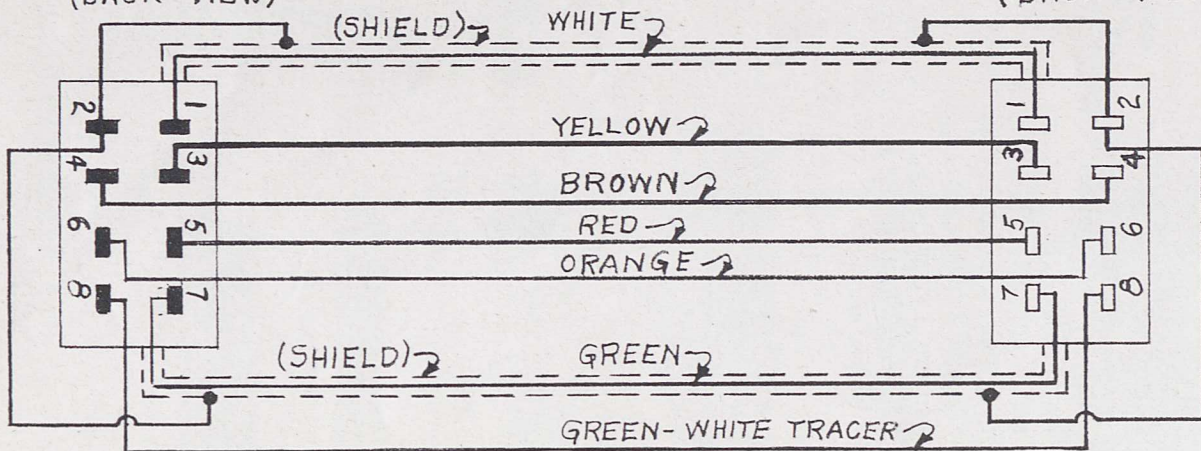
FIG. 6. RADIO RECEIVER AND TRANSMITTER BC-721-A DISASSEMBLED

6. LIST OF COMPONENTS OF RADIO SET SCR-585-A.

<i>Quantity</i>	<i>Article</i>	<i>Unit Weight</i>
1	("A") Battery BA-37, 1.5 volts.....	.65 lb.
1	("B") Battery BA-38, 103½ volts.....	1.10 lb.
1	Control Shaft MC-355 or MC-365.....	approx. .50 lb.
1	Cordage, CO-220.....	per ft. .06 lb.
1	Mounting, FT-295-A.....	3.30 lbs.
1	Plug, PL-203.....	.05 lb.
1	Plug, PL-237.....	.05 lb.
1	Preliminary Instructions for Radio Set SCR-585-A.	.10 lb.
1	Radio Control Box BC-722-A.....	.87 lb.
1	Radio Receiver and Transmitter BC-721-A (With Coil Sets and Crystals but less batteries).....	4.25 lbs.
4	Tubes VT-171 (2 in use, 2 spare).....	.10 lb.
2	Tubes VT-173 (1 in use, 1 spare).....	.10 lb.
4	Tubes VT-174 (2 in use, 2 spare).....	.10 lb.

PLUG PL-203 (MALE)
(BACK VIEW)

PLUG PL-237 (FEMALE)
(BACK VIEW)



INTERCONNECTING CORDAGE CO-220

LEADS TO BE SECURELY AND NEATLY
SOLDERED TO TERMINALS. LEADS TO
BE CAREFULLY DRESSED TO AVOID
SHORTING IN ASSEMBLY.

WEIGHT OF CABLE COMPLETE -
.06 LB. PER FOOT + .1 LB. FOR
PLUG AND SOCKET.

FIG. 7. CORDAGE CO-220 AND PLUGS PL-203 AND PL-237, ASSEMBLY DETAIL

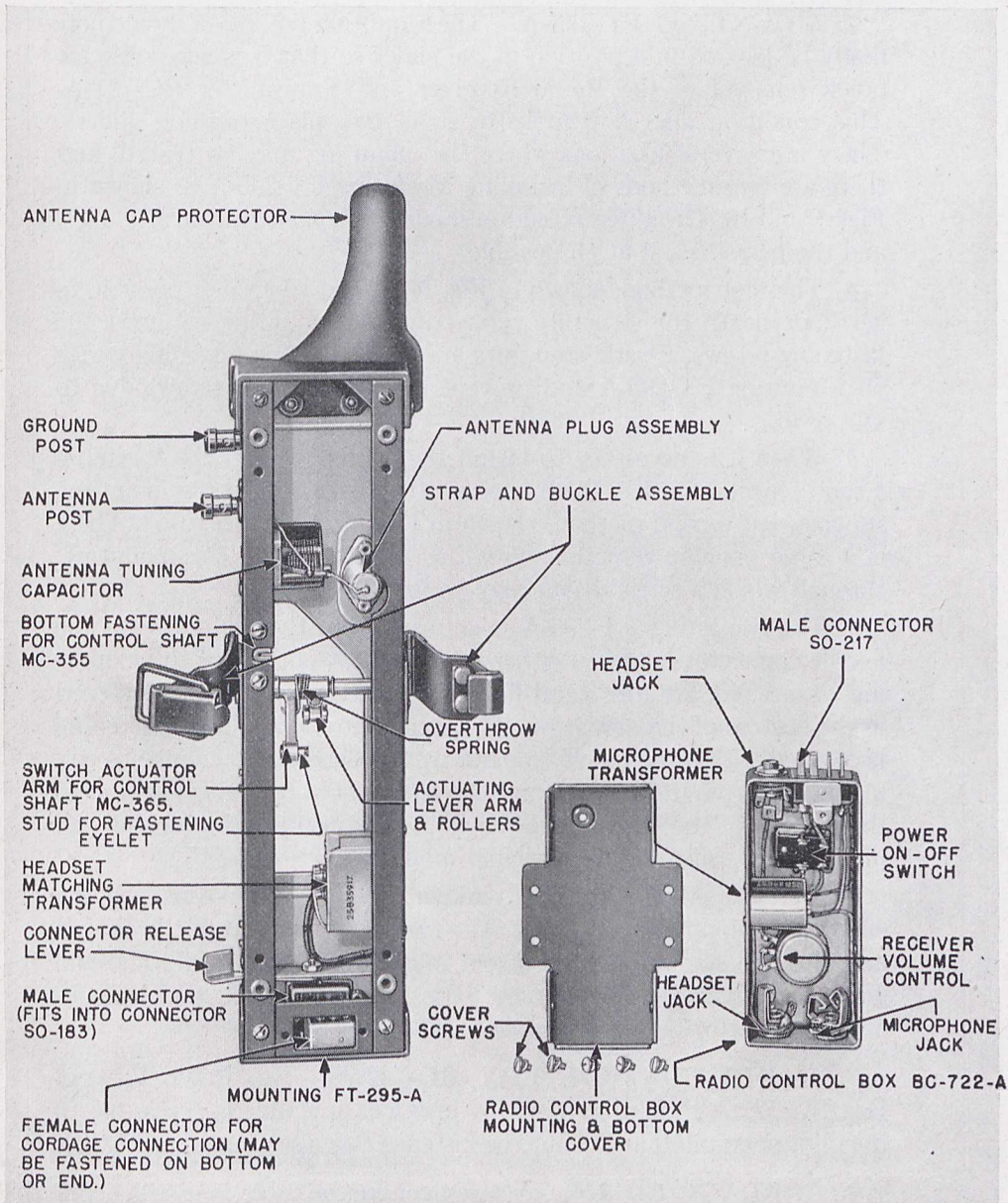


FIG. 8. MOUNTING FT-295-A AND RADIO CONTROL BOX BC-722-A (BOTTOM VIEW)

SECTION II

INSTALLATION

7. MOUNTING FT-295-A.—The Mounting FT-295-A should normally be located in a position in the glider so that it is accessible for quick removal of the Radio Receiver and Transmitter BC-721-A. This condition does not apply to small two place training gliders. There are several locations where the mounting may be placed, and there are two methods of installing Mounting FT-295-A as shown in Figs. 9 and 10. The antenna lead-in should be *kept away* from all cables, and the personnel, if at all possible.

a. The first method, shown in Fig. 9, is used when it is possible to get underneath the structure supporting the mounting to insert the fastening screws. Elastic stop nuts are riveted to the fastening flange on Mounting FT-295-A and prevent loosening of the screws due to vibration.

b. When it is necessary to install the Mounting FT-295-A against a solid object, or where there is very little space behind the mounting support, the second method, shown in Fig. 10, should be used. There is a large opening directly above the screw holes in the mounting, through which a screw driver may be inserted.

c. The Mounting FT-295-A is shipped from the factory with the female connector mounted either in the end or bottom of the mounting, as ordered. See Fig. 3 and Fig. 4. When this connector is fastened in the bottom of the mounting, the opening provided for end fastening is covered with a plate held in place by two screws. To change to end mounting, remove the plate and the screws holding the connector on the bottom of the base. Move the connector into position on the end of the base, using the two original mounting screws.

An easier method is to first remove the rear guide flange on the end of the Mounting FT-295-A. The two screws on top of the chassis and the two screws on the bottom must first be removed. The end guide flange can then be worked loose from the chassis and transfer of the connector be readily made.

8. RADIO CONTROL BOX BC-722-A.—The Radio Control Box BC-722-A should be mounted in a location that is accessible to the pilot or co-pilot, and should be fastened down securely. See Fig. 24.

9. CORDAGE CO-220.—A seven-conductor cable is used to connect the Radio Control Box BC-722-A to the Mounting FT-295-A. Due to different types of installations, the cordage is furnished in running length and must be cut to the length desired for each individual installation. Fig. 7 shows the color code connections to the Plugs PL-203 and PL-237, male and female respectively. Care must be used, when assembling plugs to cordage, to prevent short circuiting of conductors.

10. INSTALLATION OF BATTERIES BA-37 AND BA-38.—

The set is furnished by the manufacturer with everything contained in the housing except batteries. However, the necessary batteries to put the set into operation must be in place. To install the batteries, open the bottom cover by turning the knurled nut on the latching bolt counter-clockwise, until the nut begins to turn with difficulty. Then press the cover against the case and push the bolt away from the housing. Release the cover and it will open. See Fig. 5.

a. The filament or "A" Battery BA-37, which is cylindrical in form, fits into the round compartment in the housing. The battery should be inserted into the housing with the positive contact facing out. The positive end of the battery is marked with a large positive (+) sign. Another means of identifying the positive end of the battery is the small raised metal button. If the light is insufficient to read the marking on the battery or that on the battery contact board in the bottom cover of the housing, as would occur when changing batteries in the dark, this button can be used to identify the positive end of the battery.

b. The "B" Battery BA-38, is oblong in shape and fits into the oblong compartment in the housing. It must be placed into the compartment with the positive end out. This end of the battery is marked with a large positive (+) sign. This battery also has a small raised metal button, which may be used to identify the positive terminal.

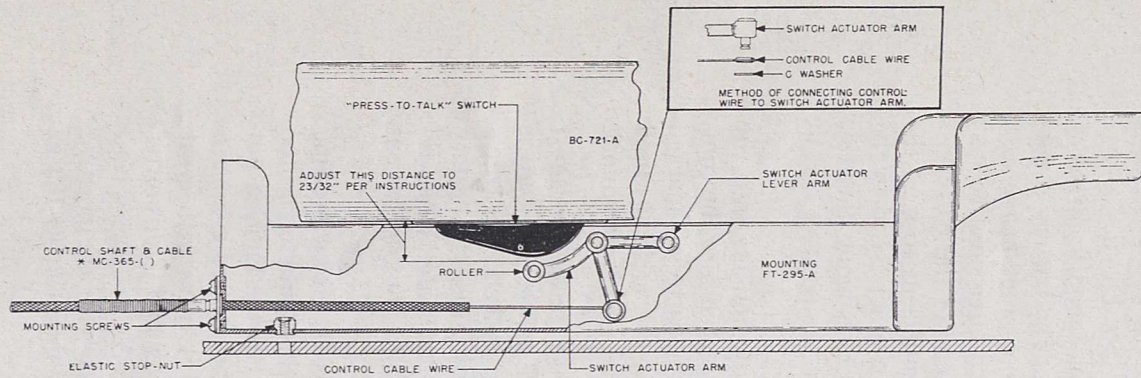
NOTE.—*Before closing the cover, mark the date of the battery change on the card in the pocket below the "press-to-talk" switch.* The card is removed by sliding it out of the bottom of the pocket. The transparent cover piece will also come out with the card. Erase the battery date that is marked on the card and put on a new date. When reinserting the card into the pocket, remember to place the transparent protecting piece over the card.

c. After the batteries are inserted, the cover is closed by pressing it against the housing with one hand, while the other hand moves the latching bolt into the slot in the cover and tightens the knurled nut by turning it clockwise. The cover should then be pressed against a solid object and the knurled nut tightened until it turns with great difficulty. This is necessary so that Radio Receiver and Transmitter BC-721-A will properly fit into Mounting FT-295-A. The spring contacts in the hinged cover will then make contact with the positive terminals of the batteries, the chassis, and the Connector SO-183 in the base.

11. PREPARING RADIO RECEIVER AND TRANSMITTER BC-721-A FOR MOUNTING FT-295-A.

a. Slide the external antenna receptacle cover down, exposing the antenna receptacle. See Fig. 2.

b. Be sure that the telescopic antenna is pushed down into position and the antenna cap is in place, as shown in Fig. 2.



METHOD OF MT'G FROM BOTTOM (2 MOUNTING ASSEMBLIES ON EACH FLANGE)

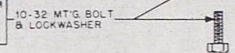
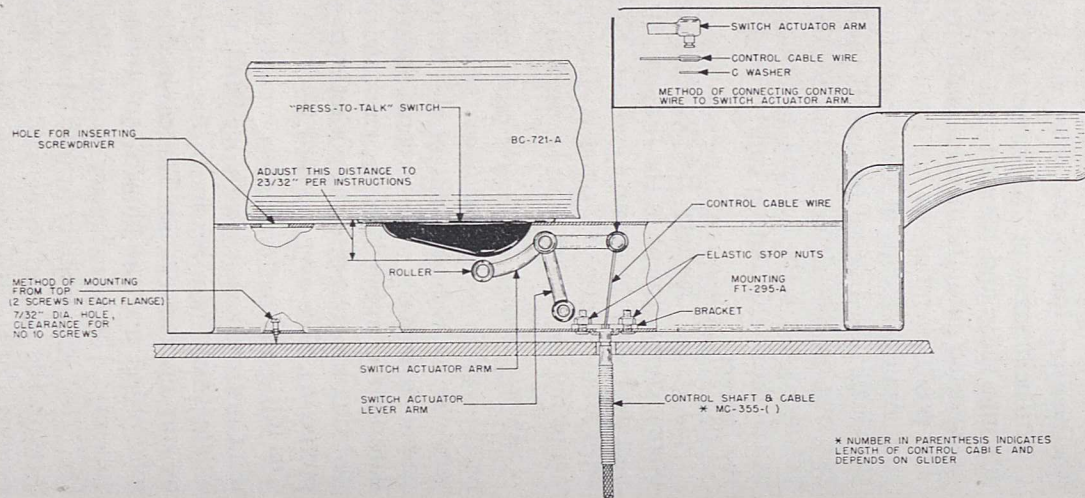


FIG. 9. CONTROL SHAFT MC-365 INSTALLATION—SHOWN IN END FASTENED POSITION



METHOD OF MOUNTING FROM TOP (2 SCREWS IN EACH FLANGE) 7/32\"/>

* NUMBER IN PARENTHESIS INDICATES LENGTH OF CONTROL CABLE AND DEPENDS ON GLIDER

FIG. 10. CONTROL SHAFT MC-355 INSTALLATION—SHOWN IN BOTTOM FASTENED POSITION

c. Remove the waterproof protective cover from the hinged base connector SO-183. See Fig. 6.

d. Place Radio Receiver and Transmitter BC-721-A on Mounting FT-295-A, as shown in Fig. 3, and fasten the strap and buckle assembly. Care should be used when placing the unit on Mounting FT-295-A to keep the antenna cap chain clear of the antenna cap protector casting. This may be done by keeping the chain on the carrying strap side of the antenna guard.

Installation of Radio Receiver and Transmitter BC-721-A on Mounting FT-295-A will be made easier if the eight contact connector SO-183 in the Radio and Transmitter BC-721-A is guided into the connector of Mounting FT-295-A before connection is made with the antenna plug.

e. Connect the glider antenna to the antenna binding post marked "A" on the Mounting FT-295-A. See Fig. 3.

f. Connect a wire from the ground binding post marked "G" on the Mounting FT-295-A to the metal structure part of the glider. This ground wire should be as short as possible and the paint and scale must be completely removed from the grounding point on the metal structure before the clamp is applied.

12. CONTROL SHAFT MC-355 AND MC-365.—There are two types of control shafts designed to provide remote control of the "transmit" and "receive" functions of Radio Receiver and Transmitter BC-721-A through operation of a "pull-to-talk" knob.

Control Shaft MC-365 is for end fastening to Mounting FT-295-A. Control Shaft MC-355 is for bottom fastening to Mounting FT-295-A. See Figs. 3 and 4.

These two types are furnished in various lengths depending on the type of glider. To identify them, a code is used on the packing carton as follows:

Control Shaft MC-365-() is the code used for the end fastening type having the length in inches indicated in the brackets. Control Shaft MC-355-() is identified similarly.

a. Mount the "pull-to-talk" control shaft in the position specified by the plans and installation specifications of the particular glider. Installation of the control in any other position will require a "pull-to-talk" control shaft of different length. The control should be mounted in such a position that the engraving "Pull-to-Talk" can be easily read by the pilot.

b. Run the flexible control shaft to the Mounting FT-295-A avoiding any bends of less than 6-inch radius. A radius smaller than 6 inches causes too much friction on the inner Bowdin wire. On long runs where no other means of anchoring the cable are used, the outside casing should be fastened securely to the glider structure but care must be taken so as not to crimp cable.

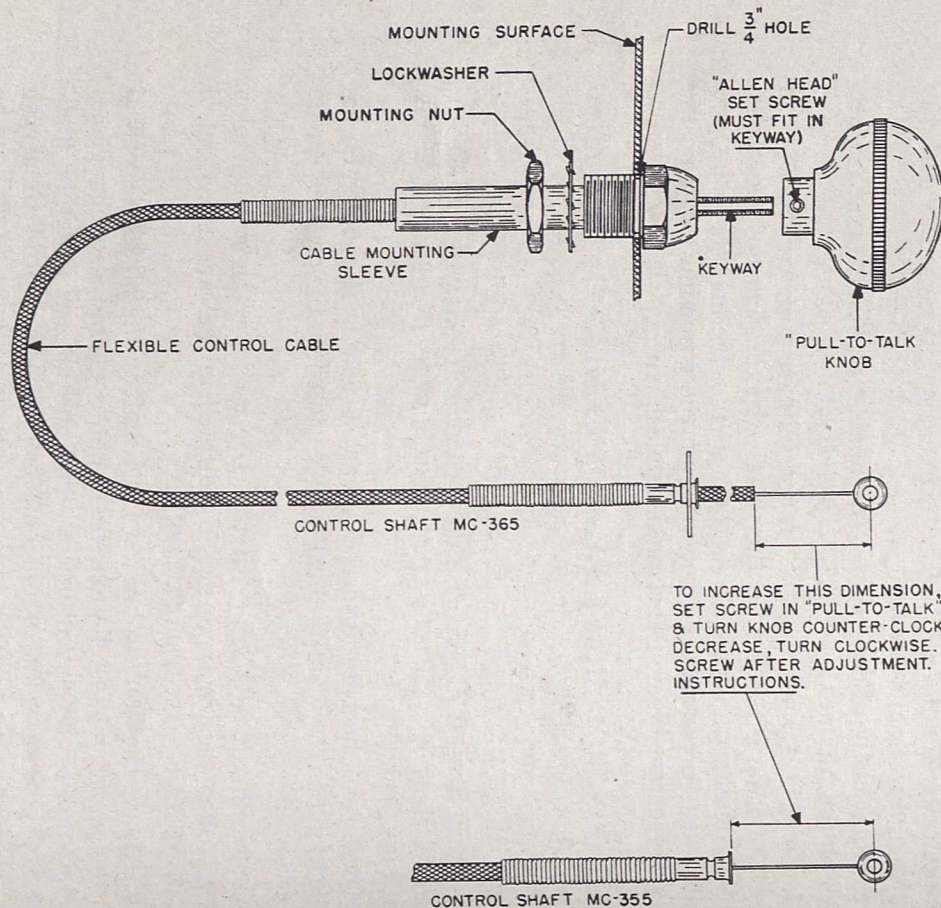


FIG. 11. CONTROL SHAFT MOUNTING MC-365 AND MC-355, INSTALLATION AND ADJUSTMENT DETAIL

c. Refer to Fig. 9 if the end fastening method is used, or to Fig. 10 if the bottom fastening method is used. Place the eyelet of the Bowdin wire over the stud on the actuating arm of the lever and place the retaining "C" washer in position. See Fig. 8. This washer is in an envelope marked "C" washers.

d. The adjustment for the control shaft cable is then made by loosening the set screw on the "pull-to-talk" knob with a $\frac{1}{16}$ " Allen set screw wrench and turning the knob clockwise to shorten the distance between the arm and top of Mounting FT-295-A. The distance should be $2\frac{3}{32}$ inches from the top. To increase the distance, turn counterclockwise. See Fig. 11.

The adjustment for the control shaft can also be made by fastening a Radio Receiver and Transmitter BC-721-A on Mounting FT-295-A and then adjusting the "pull-to-talk" knob until there is $\frac{1}{16}$ " of slack in the control before the lever arm engages the rubber covered change-over switch. The point at which the lever arm engages the change-over switch can be felt at the "pull-to-talk" control knob if it is slowly pulled upward.

After the adjustment of the control shaft has been made, the Allen set screw should be tightened down only on the keyway portion of the control shaft—never on the threads.

SECTION III PREPARATION FOR USE

13. GLIDER.—After making the installation as described in Section II, plug the throat microphone (T-30 type) into the MIC jack and the headphones (HS-23 type) into the TEL jacks in Radio Control Box BC-722-A.

14. ADJUSTMENT OF THE ANTENNA TUNING CAPACITOR.—Place an 0-100 r-f milliampere meter (See Note) in series with the antenna external lead at the "A" binding post on Mounting FT-295-A, keeping all connecting wires as short as possible. Snap on the ON-OFF switch on Radio Control Box BC-722-A to the "ON" position and pull out the "pull-to-talk" knob. Adjust the capacitor located near the antenna binding post for maximum deflection on the meter, using an insulated screw driver. With a $\frac{5}{16}$ " wrench tighten the cap nut to lock the capacitor securely in place. See Figs. 4 and 8. The "pull-to-talk" knob should not be held out longer than is necessary to adjust the antenna tuning capacitor, as this shortens the life of the batteries. Disconnect the r-f meter and replace the antenna lead on binding post "A" on Mounting FT-295-A. The radio set is now ready for use in the glider. NOTE: A 0-50 ma r-f meter will be satisfactory for antenna capacitor adjustments in most cases. *If no other meters are available, the 50 ma r-f meter supplied as part of Test Equipment IE-17-B can be used for this adjustment. The range can be extended to 100 ma by shunting the meter with a 5 ohm non-inductive resistor.*

15. PORTABLE.—For use as a portable radio telephone, unsnap the buckle clasp on Mounting FT-295-A, push the connector release lever, and remove Radio Receiver and Transmitter BC-721-A.

Close the opening to the external-antenna receptacle by sliding the waterproof retainer up over the opening, Fig. 2, and put the weatherproof connector cover, which is held to the hinged bottom cover by a chain, in position over the receptacle. The weatherproof cover must be pressed on very tightly taking care that it seats uniformly around the edges.

Unscrew the antenna cap located on top of the housing. This cap is attached to the housing by a small chain to prevent its loss. Screw the cap on the threaded metal stud on the top of the housing. This will prevent the cap from rattling against the housing when walking with the set. See that the chain IS NOT wrapped around the antenna rod and that there is no chance of it touching the rod.

Pull out the antenna gently until all four sections of the rod are fully extended. The antenna will then be about 39 inches long. The unit is now held in the left hand in the same manner as a telephone handset and is ready for use as a portable radio telephone set.

CAUTION: A stop at the lower end of the antenna rod prevents it from being pulled completely out of the case but the bottom section of the antenna must be fully extended, since it operates the power switch on the chassis.

SECTION IV OPERATION

16. NORMAL OPERATION IN GLIDER

a. Plug the microphone into the MIC jack in Radio Control Box BC-722-A. Any throat microphone model T-30 may be used.

b. Plug the headsets into the TEL jacks on the ends of the Radio Control Box BC-722-A. Use type HS-23 headsets.

c. *To Start the Set.*—Push the “ON-OFF” switch of the Radio Control Box BC-722-A to the “ON” position. *Do not turn on radio set with “pull-to-talk” knob in transmit position.*

d. *To Receive.*—The set is normally in the Receive position. Volume is controlled by the INCREASE OUTPUT control knob. Leave the control in the maximum position until contact is established with the transmitter desired. It can later be adjusted for suitable volume. NOTE: *If it is desirable to hear communications from other gliders or from weak ground transmitters while in tow, the volume control should always be turned clockwise to the maximum volume position immediately after completing conversations with the tow plane. After tow is broken between the glider and the tow plane, the volume control should always be advanced to maximum volume position, as otherwise the pilot may not hear a transmitter trying to communicate with him from any great distance.* THE GLIDER RECEIVER IS PRE-TUNED CRYSTAL CONTROLLED, AND THEREFOR ANY TRANSMITTER USED TO COMMUNICATE WITH IT (SUCH AS IN THE TOWING AIRPLANE) MUST BE TUNED EXACTLY TO THE RECEIVER FREQUENCY.

e. *To Transmit.*—Pull the “pull-to-talk” control knob. This operates the change-over switch on the radio set chassis and converts the receiver into a transmitter. THE KNOB MUST BE HELD OUT DURING TRANSMISSION, AND RELEASED WHEN TRANSMISSION IS COMPLETED. Best results will be obtained if the voice is held at a normal level when using a throat microphone. The microphone should be adjusted to a comfortable fit on the throat, neither too tight nor too loose. Speak clearly and distinctly and not too fast.

f. *To Turn the Set “OFF.”*—Push the “ON-OFF” switch of Radio Control Box BC-722-A to the “OFF” position. THE SET SHOULD BE TURNED “OFF” WHEN THE GLIDER IS NOT IN USE. OTHERWISE THE BATTERIES IN THIS SET WILL RUN DOWN.

17. OPERATION AS A PORTABLE RADIO TELEPHONE.

a. Remove the Radio Receiver and Transmitter BC-721-A from the Mounting FT-295-A, as described in Section 1, d.

b. *To Start the Set.*—Remove the antenna cap by turning it counter-clockwise, and place it on the stud provided for it. The set is turned

on when the antenna is fully extended. This is accomplished by a small lever attached to the antenna rod which operates the power switch on the radio chassis.

CAUTION: A stop at the lower end of the antenna rod prevents it from being pulled completely out of the case but the bottom section of the antenna must be fully extended since it operates the power switch on the chassis.

c. To Receive.—The set is normally in the Receive position, so that the operator can hear another unit if it is transmitting on the same frequency. The antenna should extend above the head in an approximate vertical position. This is important for best reception and transmission.

d. To Transmit.—In order to transmit, the “press-to-talk” switch on the side of the housing must be depressed. This is done by the fingers of the hand holding the unit. The “press-to-talk” switch operates the change-over switch on the chassis which makes the necessary circuit changes to convert the receiver into a transmitter. The “press-to-talk” switch must be released when transmitting is completed, in order to receive. When speaking into the microphone, the speech level should be somewhat louder than normal and the operator should talk close to the microphone. For short distances between radio sets, it is advisable to speak at a lower level. The operator should speak clearly, and should make sure that the “press-to-talk” switch is depressed before starting to speak and that it is released immediately upon completion of conversation. There is a natural tendency to hold the switch down after the operator has finished speaking, and to forget to press the switch before he starts speaking. It is good practice to pause for a moment after pressing the “press-to-talk” switch.

e. To Turn the Set Off.—The set is turned off when the antenna is telescoped into the case. The bottom section of the antenna rod must be pushed into the case as far as it will go to turn the set off. The operator can hear the toggle switch snap over. The antenna cap weatherproofing cover for sealing the telescopic antenna against weather conditions should be in place when the set is not in use. See Fig. 2.

f. Operation Over Long Periods.—When operating the portable radio set for long periods, it will be found less tiring to carry the set slung over the shoulder rather than in the hand. To carry it in this manner the strap must be lengthened. The strap can be lengthened by pulling the slide toward the antenna end of the case. The reverse action will tighten it. The left arm is then placed between the strap and the housing so that the set rests on the shoulder. The set is slung to the front, not the back of the operator. The set can then be held there with a slight pressure from the arm, or by permitting it to rest in the crook of the arm. When the operator is called, the sound will be loud enough for him to hear even though the earphone is several inches from his ear. The unit can then be brought into position for use.

18. OPERATION IN THE RAIN.—The portable radio set is designed to exclude water, but if operated during the rain it may be found that the water film covering the antenna insulator at the base of the antenna acts as a short between the telescopic antenna and case, making the set weak or inoperative. Wiping the insulator frequently with a dry cloth should improve operation.

CAUTION: Be certain that the external antenna receptacle cover is closed and weather-proofing cover in position over Connector SO-183 when the set is not in use.

19. POOR RECEPTION.

a. When operated in a glider, poor reception may be due to having the volume control turned so high that it causes distortion. When several gliders are flying in tow formation the shielding effect of one glider or more on the other may cause poor reception. The transmitter of the tow plane must also be tuned exactly to the glider receiver frequency for best reception.

b. When operated as a portable radio telephone, poor reception may be caused by signal absorbing objects, such as steel buildings, trees, hills, power and telephone lines, and large metal objects, between the two units. The straight line distance between units should be as clear as possible of such objects. Moving one or both units over to new locations will often improve the operation.

20. LOCATING TROUBLE.

a. If the set does not work when installed in a glider, that is, no sound is heard in the pilot or co-pilot's headset, first make certain that the switch is "ON" and that the volume control is turned "full-on" in a clockwise direction. Then check to see that the headset and microphone plugs are inserted in their proper receptacles in the Radio Control Box BC-722-A. Check the Cordage CO-220, and make sure that the plugs PL-203 and PL-237 are properly inserted into the Mounting FT-295-A and the Radio Control Box BC-722-A. Check the antenna lead-in to see that it is connected to the antenna binding post on Mounting FT-295-A. Also check the adjustment of the "pull-to-talk" control shaft as specified under Section 12. Be sure that the hinged cover on the radio housing is fastened tightly. If the set still does not work, remove the Radio Receiver and Transmitter BC-721-A from the Mounting FT-295-A and test as outlined in paragraph (*b*) of this section.

b. If the set does not work as a portable radio telephone when the antenna is extended, that is, no sound is heard in the earphone, check to see that the bottom section of the antenna extends out of the case to its full length. This is necessary to operate the power switch on the chassis.

If the antenna rod is extended properly and the set still does not work, check to see that the batteries are placed in the compartment properly.

c. If the unit still does not work, refer to Maintenance Section for further corrective measures.

d. Operating the unit as high as possible, as on top of a hill or building, will help increase the distance of operation. Be sure that the antenna is fully extended, held in a vertical position and clear of obstructions for several feet around it. When operating the unit in the underbrush, keep the antenna from coming in contact with branches or green foliage of any kind. Precautions should be taken particularly in the early morning when the dew is on the ground, or after a rainfall as conditions of this kind may render the unit inoperative.

21. USABLE COMMUNICATION DISTANCE.—The unit is designed to operate over distances from 100 feet to 1 mile when operated as a portable radio telephone. The dependability of operation at the greater distances will depend on the terrain and the freedom from signal absorbing objects, such as steel buildings, trees, hills and telephone and power lines between the two sets. This is particularly true for units operating at the higher frequencies in the band.

When installed in a glider, the usable communication distance is somewhat increased because of the larger antenna and greater freedom from signal absorbing objects.

22. OPERATION COMMON TO GLIDER AND PORTABLE RADIO TELEPHONE.

a. *Change of Frequency.*—Changing the operating frequency of the unit requires a change of the two crystals and the coils. Coil and crystal equipment is available to cover the frequency range of 3.5 megacycles to 6 megacycles if required. Special equipment is required for retuning of the sets and a trained technician must do the job. The realignment and coil changing procedure will be found in the Maintenance section of this book.

b. *Replacement of Batteries.*—See procedure given in Section II, paragraph 10. Both batteries should be replaced even though one may be in better condition than the other.

NOTE: When sets are to be placed in storage for long periods of time, the batteries should be removed from the case. This will prevent the batteries from becoming wedged in the battery compartment, should they swell when aging.

c. *Netting.*—For a two-way conversation, two units adjusted to operate on the same frequency are required. Two units operating at different frequencies will be unable to converse with each other.

More than two operators can engage in conversation by the use of more units operating on the same frequency. Because of the receiver arrangement used, it is possible to operate several receivers at the same frequency and in close proximity, without interference.

d. There are no limitations on the number of glider radios that may be operated together without interference in any one flight group or series of flight groups. However, it will be necessary to restrict communication to a minimum as more than one glider transmitting at the same time on the same frequency is apt to cause confusion in orders.

SECTION V

MAINTENANCE

23. LOCATING TROUBLE WHEN SET DOES NOT OPERATE.—Usually this is a sign of weak batteries or a burned out tube, although this could be caused by the batteries being placed in the battery compartment with negative ends up.

24. REPLACEMENT OF THE BATTERIES.—See Paragraph 10 Section II.

25. REPLACEMENT OF TUBES.—Remove the chassis from the housing. To do this unlatch the bottom cover of the housing and remove the batteries. Disconnect the microphone and earphone plugs from the terminal board on the ends of the chassis. Remove the mounting screw in the top cover of the housing, and the chassis can be slid out of the bottom of the housing. Lift the clamp at the top of the tube and remove the shield, if there is one. Insert a narrow rod through the bottom in the center of the tube socket and gently force the tube out. A small narrow blade screw driver will be found useful for this purpose. When replacing the tube, be sure that you have the right type, that the base of the tube is so oriented that the pins fit into the socket properly, and the pins are straight. The wide space between pins No. 1 and No. 7 of the tube can be used as a guide to line the tube with the socket. See Fig. 25.

26. REPLACEMENT OF THE ANTENNA COIL.—The antenna coil is of the “plug-in” type. It can be easily removed and replaced. See Fig. 15.

27. REPLACEMENT OF THE R-F TANK COIL.—To remove the coil, loosen the screw holding down the spring clip on top of the coil; then swing the clip free of the coil. The coil can then be lifted out of the socket. When replacing, fit the coil carefully over the two pins projecting up from the socket so that the pins fit into the holes in the coil form and the coil adjustment fits into the hole in the socket. Gently press the coil into the socket and replace the spring clip on top of the coil. See Fig. 15.

28. REPLACEMENT OF THE MICROPHONE.—Remove the batteries, cardboard separator, and chassis from the case. Then unscrew the bakelite microphone cover on the housing. The unit can now be lifted out of the housing. To detach the microphone unit from the housing, it will be necessary to remove the screw which grounds one of the two leads to the housing. The lead with the connecting plug (green dot), which fits into the jack on the terminal board, is withdrawn through the hole in the housing. See Fig. 6.

29. REPLACEMENT OF THE EARPHONE.—The earphone is replaced in the same manner as the microphone.

30. REMOVAL AND REPLACEMENT OF A CRYSTAL.—The crystals are mounted in “plug-in” type holders. To remove a crystal, lift up the clamp located on top of the crystal holder. This clamp pivots on a stud fastened to the chassis. Place a screw driver between the crystal holder and the socket and gently pry it up. See Fig. 15.

The receiver crystal, which is 455 kc above the frequency of the transmitter crystal, is placed in the crystal socket marked “Rec” and should be placed so that the arrow on the holder points in the same direction as the arrow on the socket.

The transmitter crystal should be placed in its socket in the same manner as that of the receiver crystal.

31. POOR RECEPTION AND TRANSMISSION.—If the distance between units in operation is within the limits of 100 feet to one mile, and the transmission is poor, the batteries may be weak. The batteries are designed to give about 15 hours of operation, assuming that the unit is on for long periods of time, and that the operator is transmitting a great deal. They will last much longer if used intermittently. A sign of weak batteries is a very low noise level in the earphone when the set is in the Receive position with no incoming signal.

a. Set Inoperative.

(1) If the batteries are placed in the battery compartment, with the negative ends up, the set will not operate. If the batteries are inserted correctly and the set does not operate, the batteries may be dead. Replace them with a new set of batteries.

(2) A tube may be burned out or shorted. Remove the chassis from the housing. See paragraph 25, Section V. Locate the defective tube and replace it. Install the chassis in the housing. Take care that the chassis fits between the guides provided for it in the case. If the set still does not operate, it should be turned over to a maintenance man for further inspection.

**32. ALIGNMENT PROCEDURE USING TEST EQUIPMENT
IE-17-B**

a. Test Equipment Required.

1 Test Equipment IE-17-B consisting of:

- (a) Test Stand FT-252-B includes dummy antenna
- (b) Test Case CS-81-A
- (c) Test Unit I-135-B contains multi-range meter, harness, r-f and a-f oscillators.

1 Tuning Screw Driver

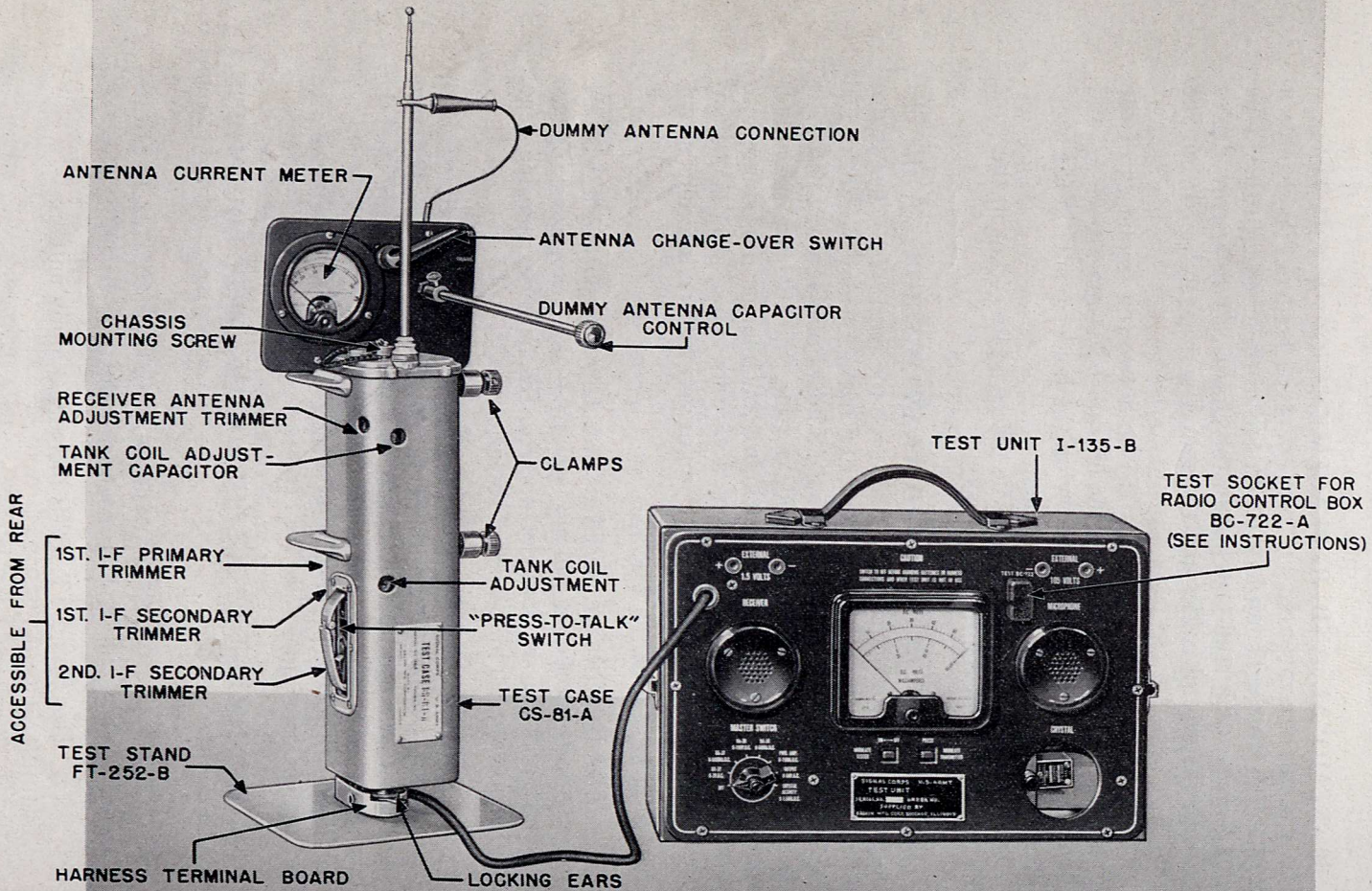


FIG. 12. TEST EQUIPMENT IE-17-B, SET-UP FOR RECEIVER ALIGNMENT

b. Test Case CS-81-A.—As the tuning adjustments are inaccessible because of their location on the chassis, which is covered by the case or housing, special apparatus (Test Equipment IE-17-B) is required to make these adjustments. See Fig. 12. The Test Case CS-81-A is similar to a chassis housing except for the holes that have been provided to permit access to the adjustments. This apparatus permits tuning the set under conditions identical to those of normal operation. The tuning adjustments should not be made on the set without the housing around the chassis, because the set would become detuned when inserted into the housing. Detuning or misalignment would result from the additional capacity introduced into the circuit by the housing.

c. Test Stand FT-252-B.—The test stand contains clamps to hold the unit, a 50 ma r-f milliammeter to measure antenna current, and a receiver and transmitter dummy antenna, consisting of a receive-transmit switch, a 56 ohm resistor and a variable capacitor of 8 μf . maximum capacity.

d. Test Unit I-135-B.—See Fig. 13. This unit is a multi-range voltmeter and milliammeter, a crystal tester, and an r-f and a-f signal source. Test Unit I-135-B is used for the measurement of battery voltage, battery current, r-f amplifier plate current, audio output voltage, and crystal activity. It is used as a modulated r-f signal source for the alignment of the receiver and as an a-f signal source for determining the modulation capability of the transmitter.

The r-f signal source is a Pierce crystal oscillator and makes use of the transmitter crystal contained in Radio Receiver and Transmitter BC-721-A or one of the same frequency. It generates a signal of the carrier frequency. This r-f oscillator also serves to check both the receiver crystal and the transmitter crystal for activity.

The a-f signal source is a Colpitts oscillator generating a signal of 1000 cps. This tone is used to modulate the r-f oscillator and can also be applied to the microphone input terminals of the transmitter to test for modulation capability.

A test harness attached to the test unit provides the means of connecting to the chassis. See part f (4) of this paragraph.

The batteries contained in Radio Receiver and Transmitter BC-721-A provide the power for operating the r-f and a-f oscillator in Test Unit I-135-B. Connections are also provided for connecting external batteries of equivalent voltages.

The Positions of the master switch of the test unit are as follows:

(1) "OFF" disconnects "A" Battery BA-37 and "B" Battery BA-38 from Radio Receiver and Transmitter BC-721-A and from the r-f and a-f oscillators in Test Unit I-135-B. Set and oscillators are ON in all other positions of the master switch.

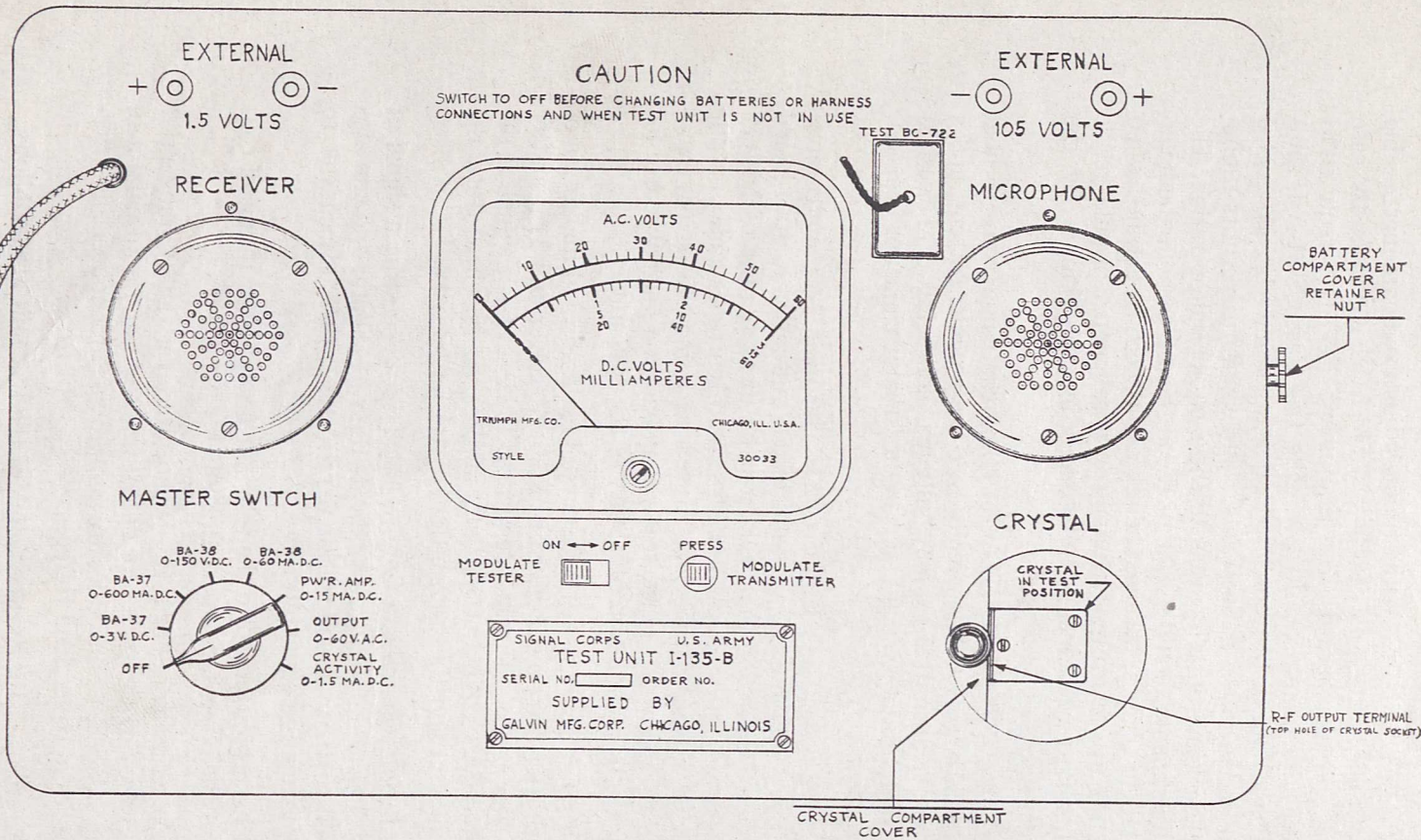


FIG. 13. TEST UNIT I-135-B

(2) "BA-37" 0-3v d-c Meter reads "A" Battery BA-37 voltage. Nominal reading 1.5 volts. This is voltage to BC-721-A.

(3) "BA-37" 0-600 ma d-c Meter reads "A" Battery BA-37 current. Nominal reading 350 ma in receive and 300 ma in transmit position.

(4) "BA-38" 0-150v d-c Meter reads "B" Battery BA-38 voltage. Nominal reading 103.5 volts in receive and 90-95 volts in transmit position. This is voltage to BC-721-A.

(5) "BA-38" 0-60 ma d-c Meter reads "B" Battery BA-38 current. Nominal reading 7 ma in receive and 30 ma in transmit position.

(6) "PWR AMP" 0-15 ma d-c Meter reads r-f power amplifier plate current in transmit position. Nominal value 7 ma.

(7) "Output" 0-60v ac. Meter reads audio output voltage of receiver and is connected across phone in Test Unit I-135-B.

(8) "Crystal" Activity 0-1.5 ma Meter reads grid current of crystal tester. A good crystal will give a current reading of .3 to .8 ma. A transmitter or receiver crystal which does not produce a current within this range is defective and should be replaced.

e. A switch marked "Modulate Tester" is provided to modulate the r-f oscillator in Test Unit I-135-B when it is to be used for alignment purposes. Turning on the modulation will lower the crystal current. This lowering of crystal current is normal and does not mean that the crystal is defective; however a weak crystal will probably stop oscillating when modulation is turned on.

Test Unit I-135-B contains an earphone and microphone which are mounted in the front panel of the case. Compartments for "A" Battery BA-37 and "B" Battery BA-38 are also provided in the test unit. Terminals for external batteries of equal voltages are also provided.

An eight-prong plug is installed on Test Unit I-135-B. It is so positioned and connected that Radio Control Box BC-722-A can be plugged therein. An auxiliary plug is furnished and so connected that the alignment test can be conducted without the use of a radio control box.

f. Setting Up the Alignment Equipment.

(1) Remove the chassis of the Radio Receiver and Transmitter BC-721-A to be aligned from its housing. To do this unlatch the bottom cover of the housing and remove the batteries. Place the batteries into their respective compartments in Test Unit I-135-B. See Figure 14. Disconnect the microphone and earphone plugs from the terminal board on the end of the chassis. Now remove the screw in the top cover of the housing, and the chassis will slide out of the bottom of the housing.

(2) Remove the transmitter crystal from the chassis or use an extra crystal of the exact carrier frequency and place it in the crystal socket on the front panel of the test unit. Set the master switch of the test unit to the "OFF" position.

(3) Place the chassis into Test Case CS-81-A housing. The chassis must be inserted into the test case through the bottom, as is done when inserting the chassis into its own housing. Take care that the chassis fits between the guides provided for it in the case. It should not be necessary to force the chassis. If force is necessary, withdraw the chassis and check to see that no parts are catching on the test case or that the chassis has not jumped the guides. Slip the top cover over the antenna rod and fasten the chassis to it with the $\frac{8}{32}$ mounting screw. The chassis will now be held securely in the test case. *Now remove the plate current meter jumper from the terminal board at the end of the chassis.* CAUTION: Do not misplace.

(4) Pull out the antenna rod and then attach the terminal board of the harness to the terminal board of the chassis, so that the two small pins on the harness terminal board fit into the plate current meter jacks, and that the two large locking pins, one on each end of the terminal board, fit into the holes provided for them. Lock the two terminal boards together by a sideward movement of the levers attached to the locking pins.

(5) Next clamp the Test Case CS-81-A into the Test Stand FT-295-A with the antenna end up, and the housing in such position that the change-over switch is opposite the left side of the operator as he faces the stand. The upper clamp should grasp the housing on the edges of the top cover. The lower clamp should not be made too tight as the pressure may crack the housing.

(6) *Extend the antenna rod to its full length which is about 39 inches above the top cover.* This will turn on the power switch on the chassis; however, the Master Switch of Test Unit I-135-B should be turned to any position other than the OFF position to connect the batteries to the chassis. When measuring voltages or currents, keep modulation switch in the OFF position.

g. Procedure for Receiver Alignment.

(1) Turn the Master Switch of Test Unit I-135-B to the "Crystal Activity" position. The modulation switch should be in the OFF position. The meter in the test unit should read between 0.3 and 0.8 milliamperes. Replace the crystal if it does not. As the signal for alignment of the receiver is generated by this crystal, the activity check will assure that a signal of the carrier frequency is being generated. The r-f signal for alignment is fed into the receiver by radiation.

(2) Set the "Modulate Tester" switch on Test Unit I-135-B to "ON". The 1000 cps tone will now modulate the carrier signal. Turning on the modulation will lower the crystal current. This lowering of crystal current is normal and does not mean that the crystal is defective; however a weak crystal will probably stop oscillating when the modulation is turned on.

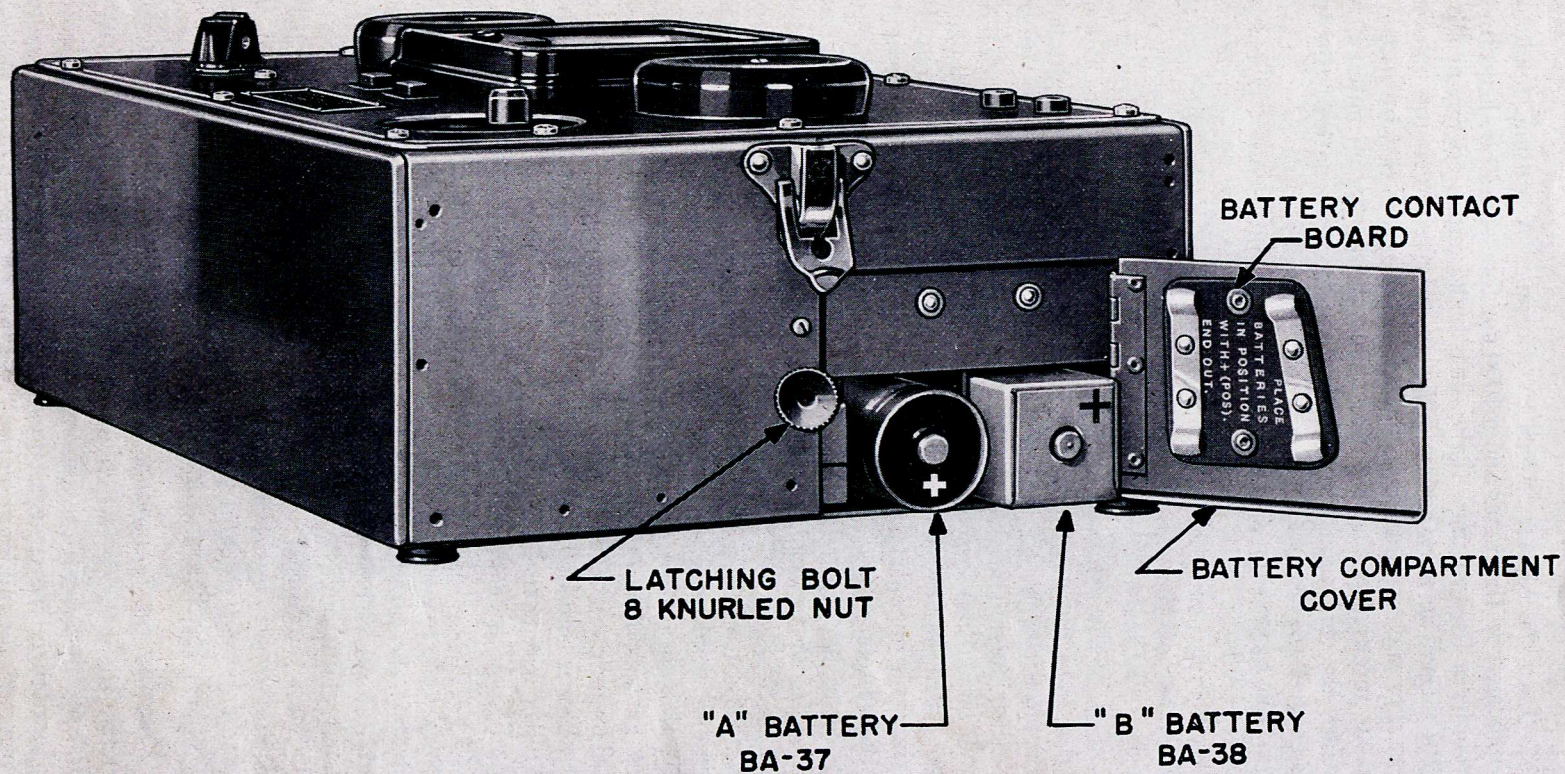


FIG. 14. TEST EQUIPMENT I-135-B, SHOWING BATTERY COMPARTMENT

(3) Turn the Master Switch to "Output." A reading should now be indicated on the meter and a 1000 cps tone should be heard in the earphone of the test unit. If the set is badly out of alignment the r-f signal picked up may not be sufficient to give a readable measurement. For such a condition, connect a short piece of wire to the r-f Output terminal of the test unit. This will act as an antenna and increase the radiation. Varying the position and length of this wire will control the strength of the signal radiated.

(4) The location of the tuning adjustments on the radio chassis are shown in Figures 12, 15 and 16. With the screw driver turn the "Receiver Antenna Trimmer" clockwise. Notice the effect of this adjustment on the output meter reading. If the meter reading increases, continue to tighten the screw until a maximum reading is obtained. If the reading decreases, turn the screw counter-clockwise until a maximum reading is obtained. Be careful not to tighten the screw after it begins to turn hard as the threaded base of the trimmer will be stripped. The setting of the trimmer screw for maximum audio output should fall somewhere between the point of hard turning and that of a minimum pressure on the upper plate of the trimmer. If a maximum is not reached in these limits of the screw adjustment, try another antenna coil.

Be sure that the r-f signal input is not strong enough to cause overloading of the amplifier. If this condition exists, adjustment of the antenna trimmer will have little or no effect on the audio output reading. Best results will be obtained if r-f input is adjusted so that the meter reading on the 60 volt scale does not exceed 10 volts.

(5) *With the insulated screw driver* turn the "Tank Coil Adjustment" screw for maximum output using the same method employed in step (4). This screw which is made of bakelite fits into a powered iron core which is threaded. The movement of the screw changes the position of the core in the coil. If the screw is turned too far clockwise, the core will ride up against the screw head and the threads in the core will be stripped. If the screw is turned too far counter-clockwise, the core will come in contact with the coil socket and further turning will again strip the core threads. The screw setting for maximum output should fall somewhere between these two limits of adjustment. If it does not, the wrong "Tank Coil" may be in the set.

(6) Turn the Master Switch of Test Unit I-135-B to the "OFF" position. *Remove the chassis from Test Case CS-81-A and replace the transmitter crystal.* Put the chassis back in Test Case CS-81-A and the unit is ready for the transmitter adjustments.

h. Procedure for Transmitter Adjustments

(1) Set the Master Switch of Test Unit I-135-B to the "PWR AMP." position. With the antenna fully extended and the "press-to-talk," switch in the transmit position, adjust the "Tank Capacitor Adjustment" for minimum current reading on the meter in the test unit.

6 m / 9
5 m

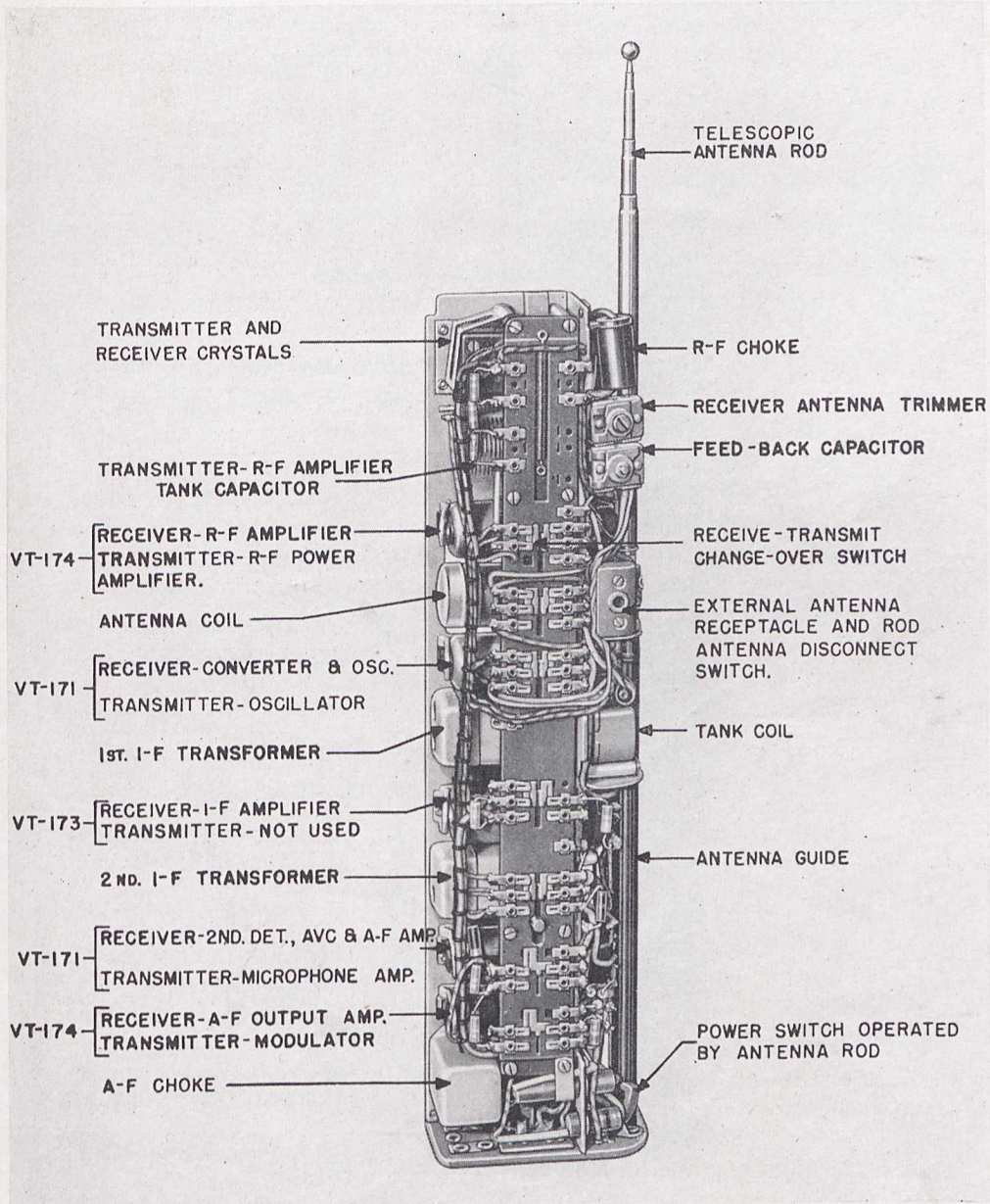


FIG. 15. RADIO RECEIVER AND TRANSMITTER BC-721-A CHASSIS (FRONT VIEW)

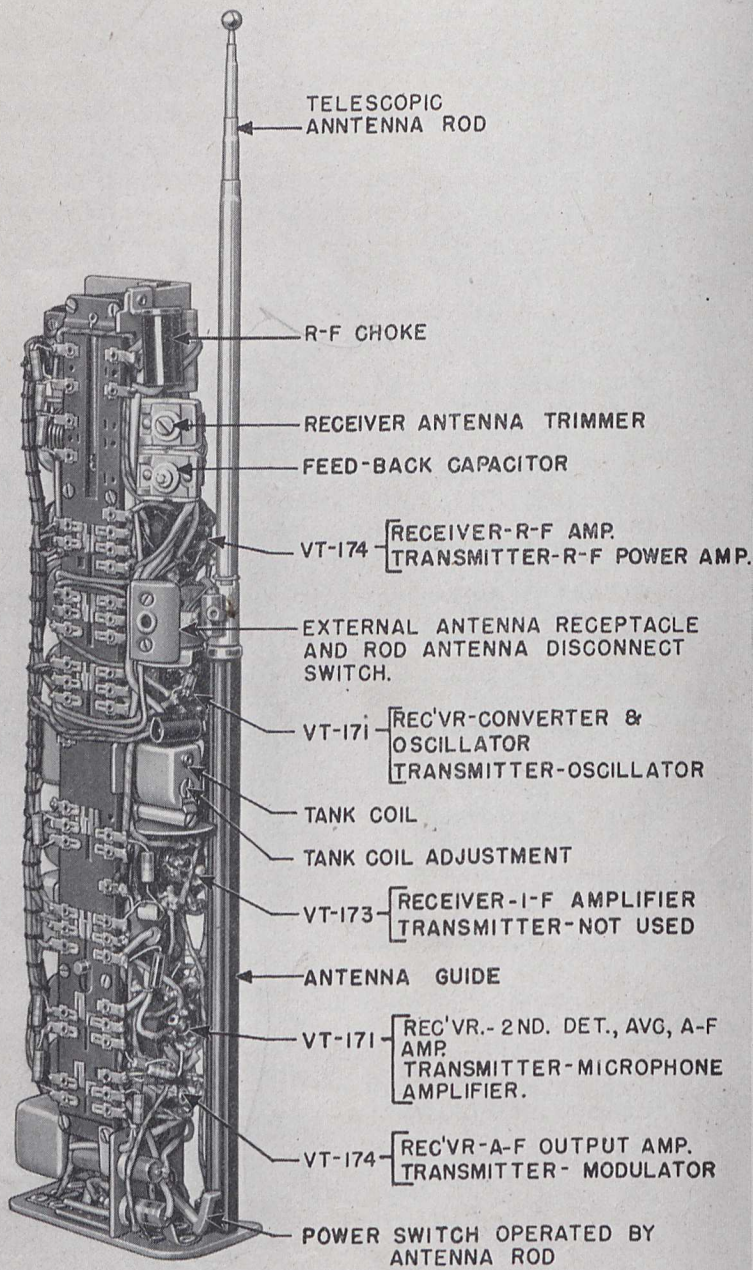


FIG. 16. RADIO RECEIVER AND TRANSMITTER BC-721-A CHASSIS (BOTTOM VIEW)

(2) Telescope the upper three sections of the antenna rod, leaving only the bottom or fourth section fully extended from the housing. Next clip the "Dummy Antenna Connection" to the upper part of the antenna rod.

(3) Set the dummy antenna switch to "transmit" and adjust the "Dummy Antenna Capacitor" for minimum current reading on the meter in the test unit. This adjustment of the dummy antenna capacity for minimum power amplifier plate current is necessary because of the change in antenna capacity caused by telescoping the upper three sections of the antenna rod. Note the antenna current reading on the r-f meter on Test Stand FT-252-B. This is the unmodulated antenna current.

(4) Press in the "Modulate Transmitter" button on the test Unit, which places a 0.2 volt 1000 cps signal across the microphone terminals. Note the modulated antenna current. The antenna meter reading should increase at least six per cent over the unmodulated current reading. A six per cent increase in antenna current indicates fifty per cent modulation. To determine the percentage increase, subtract the meter reading obtained with modulation. This gives the increase in antenna current due to modulation. Divide this value by the current obtained without modulation and multiply the answer by 100. The answer will be the percentage modulation. For an example, assume that the unmodulated current is 20 ma, and that the modulated current is 22 ma.

The increase in current is then:

$$22 - 20 = 2 \text{ ma}$$

The percentage increase will be:

$$2/20 \times 100 = 10 \text{ per cent.}$$

Another method is to divide the antenna current obtained with modulation by the antenna current without modulation; the answer should be greater than 1.06. For an example, take the values of current previously given. Dividing the modulated current by the unmodulated current gives $22/20 = 1.10$.

33. PROCEDURE IF BADLY OUT OF ALIGNMENT.—If the i-f transformers have been carelessly detuned and are badly out of alignment, it may be impossible to get a carrier frequency signal through the receiver as outlined. For such a condition, the i-f transformers must be aligned first and an r-f signal generator will be required. To do this, the chassis must be removed from the test housing so that connection to the signal grid of the mixer tube can be made. The frequency of the signal generator should be checked with a Frequency Meter Set SCR-211.

a. Procedure for Alignment.

(1) Remove the chassis from the test case, and fasten it to the top cover of the housing with the mounting screw. Then place the chassis in the test stand in the same relative position as when in the test housing, and hold it there by gripping the housing cover with the upper clamp of the test stand.

(2) Connect the ground lead of the signal generator to the Test Stand FT-252-B. Connect a .05 μ f capacitor in series with the output lead of the signal generator, and connect the other end of the capacitor to the No. 6 pin of the Tube VT-171, used as a converter-oscillator. Set the signal generator frequency to 455 kc and then adjust the generator output until a 10 volt reading is obtained on the output meter of the receiver. Considerable generator output will be required when the set is badly out of alignment.

(3) Adjust the trimmer on the second i-f transformer for maximum audio output. Reduce the generator output as the audio output increases above 10 volts. Next peak the secondary on the first i-f transformer and then peak the primary trimmer. After these adjustments have been made, put the chassis back into Test Case CS-81-A and align the set as given in the regular alignment procedure, paragraph 32.

If a frequency Meter Set SCR-211 is not available, the i-f transformers can be accurately aligned to 455 kc by aligning them on the carrier signal radiated from the oscillator in the test unit. This method is satisfactory so long as the transmitter crystal and receiver crystal are exactly 455 kc apart in frequency.

34. CHANGE OF FREQUENCY.—To cover the range of frequencies from 3.5 to 6 megacycles, antenna coils, tank coils, and crystals are available. Each coil is marked with its frequency and part number so that errors of coil selection will be minimized.

To change the operating frequency of a Radio Receiver and Transmitter BC-721-A, obtain a "Coil and Crystal Equipment" of the desired frequency. The "Coil and Crystal Equipment" comes in an individual carton marked with the frequency and contains the transmitter crystal, the receiver crystal, the antenna coil, and the tank coil.

The antenna coil is larger and of a different shape than the tank coil. Its base connections also differ, so there can be no possibility of getting the coils in the wrong sockets. Both coils are of the plug-in type to simplify replacement. See Fig. 15, and Fig. 16.

Place the coils in their respective sockets. Then put the crystals in their proper place on the crystal socket. The crystal clamp must be lifted before removing the crystals in the set. The crystal is then easily removed by inserting a small screw driver between the crystal holder and socket and prying. The transmitter crystal should be placed in the socket so that the frequency printed on the metal face of the

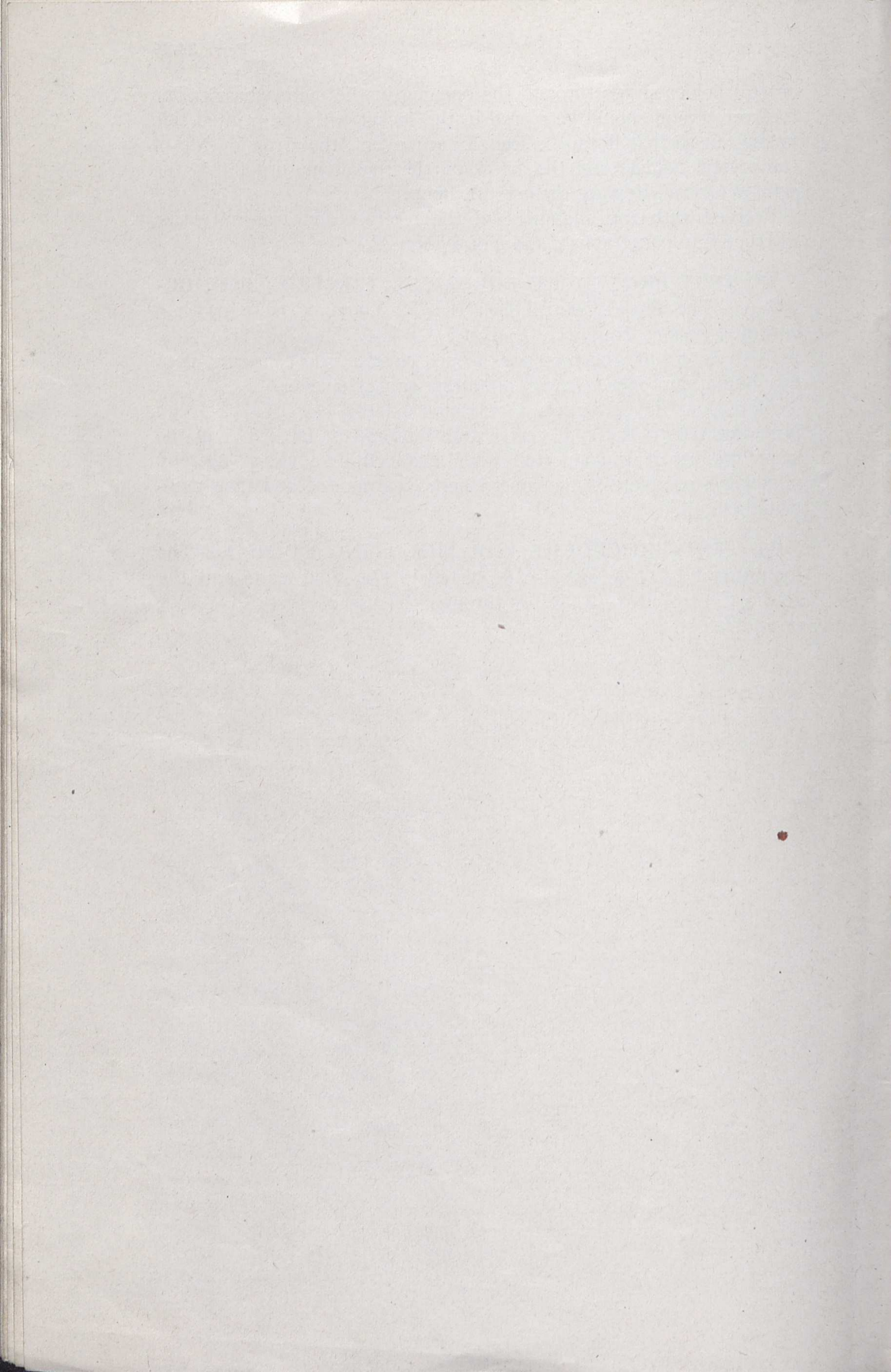
crystal holder shows through the opening in the metal chassis. The receiver crystal should be placed in the socket with the printed side facing out so that it can be seen. In any event, the arrow on top of the crystal holders and the arrow on the socket must point in the same direction. Replace the crystal clamp.

Proceed with the alignment of the receiver and transmitter as instructed in paragraphs *g* and *h* of section 32.

35. TEST PROCEDURE FOR RADIO CONTROL BOX BC-722-A.—The Radio Control Box BC-722-A can be tested with a continuity tester, equivalent to Test Set I-56-A. This Test Set can be used to determine the presence of open circuits, short circuits, poor grounding, improper voltages, and other similar defects.

As outlined in paragraph 32 *e*, Radio Control Box BC-722-A can be connected to Radio Receiver and Transmitter BC-721-A in the same manner it is connected when installed in a glider, thereby allowing a complete test of microphones, earphones, and their associated circuits.

36. TEST PROCEDURE FOR MOUNTING FT-295-A.—The mounting FT-295-A can also be tested in the same manner as the Radio Control Box BC-722-A through the use of Test Set I-56-A or equivalent.



APPENDIX

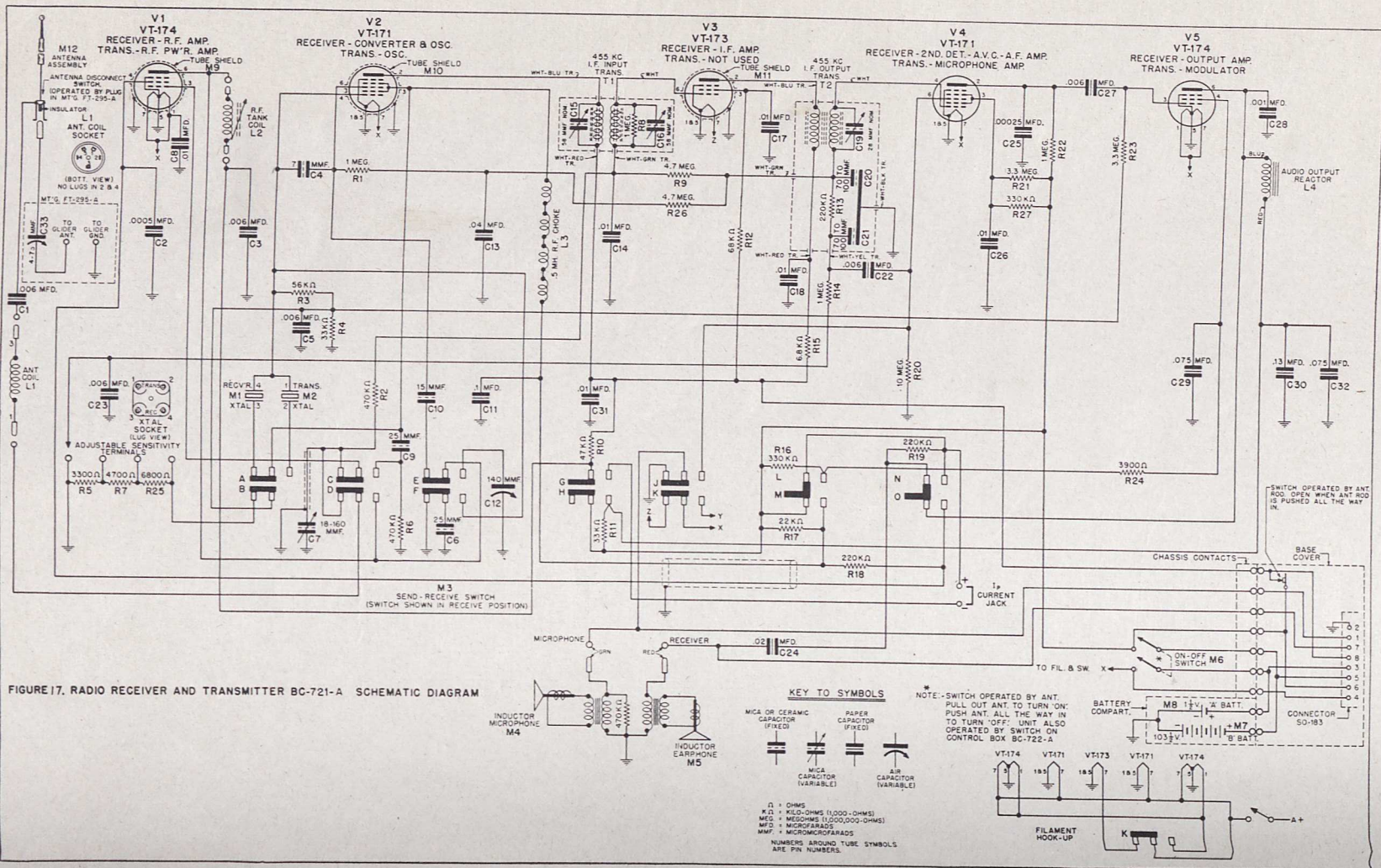


FIGURE 17. RADIO RECEIVER AND TRANSMITTER BC-721-A SCHEMATIC DIAGRAM

RADIO RECEIVER AND TRANSMITTER BC-721-A SCHEMATIC DIAGRAM LEGEND

Diag.

<i>No.</i>	<i>Name of Part</i>	<i>Description</i>
C ₁	Capacitor	Fixed paper, .006 $\mu\text{f.}$ $\pm 10\%$, 100 w-v
C ₂	Capacitor	Fixed paper, .0005 $\mu\text{f.}$ $\pm 10\%$, 100 w-v
C ₃	Capacitor	Fixed paper, .006 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₄	Capacitor	Fixed ceramic, 7 $\mu\mu\text{f.}$ $\pm 5\%$
C ₅	Capacitor	Fixed paper, .006 $\mu\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₆	Capacitor	Fixed mica, 25 $\mu\mu\text{f.}$
C ₇	Capacitor	Variable mica, range 18-160 $\mu\mu\text{f.}$
C ₈	Capacitor	Fixed paper, .01 $\mu\text{f.}$ $\pm 10\%$, 100 w-v
C ₉	Capacitor	Fixed ceramic, 25 $\mu\mu\text{f.}$ $\pm 10\%$
C ₁₀	Capacitor	Fixed ceramic, 15 $\mu\mu\text{f.}$ $\pm 5\%$
C ₁₁	Capacitor	Fixed paper, .1 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₁₂	Capacitor	Variable air, range 7-140 $\mu\mu\text{f.}$
C ₁₃	Capacitor	Fixed paper, .04 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₁₄	Capacitor	Fixed flat paper, .01 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₁₅	Capacitor	Variable mica, 58 $\mu\mu\text{f.}$ nominal value
C ₁₆	Capacitor	Variable mica, 58 $\mu\mu\text{f.}$ nominal value
C ₁₇	Capacitor	Fixed paper, .01 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₁₈	Capacitor	Fixed paper, .01 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₁₉	Capacitor	Variable mica, 28 $\mu\mu\text{f.}$ nominal value
C ₂₀	Capacitor	Fixed mica, 100 $\mu\mu\text{f.}$
C ₂₁	Capacitor	Fixed mica, 100 $\mu\mu\text{f.}$
C ₂₂	Capacitor	Fixed paper, .006 $\mu\text{f.}$ $\pm 10\%$, 100 w-v
C ₂₃	Capacitor	Fixed paper, .006 $\mu\text{f.}$ $\pm 10\%$, 100 w-v
C ₂₄	Capacitor	Fixed paper, .02 $\mu\text{f.}$ $\pm 10\%$, 100 w-v
C ₂₅	Capacitor	Fixed paper, .00025 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₂₆	Capacitor	Fixed paper, .01 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₂₇	Capacitor	Fixed paper, .006 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₂₈	Capacitor	Fixed paper, .001 $\mu\text{f.}$ $\pm 10\%$, 100 w-v
C ₂₉	Capacitor	Fixed paper, .075 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₃₀	Capacitor	Fixed paper (strap mtg.), .13 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₃₁	Capacitor	Fixed paper, .01 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₃₂	Capacitor	Fixed paper, .075 $\mu\text{f.}$ $\pm 20\%$, 100 w-v
C ₃₃	Capacitor	Variable air, 4-75 $\mu\mu\text{f.}$ (part of BC-722-A)

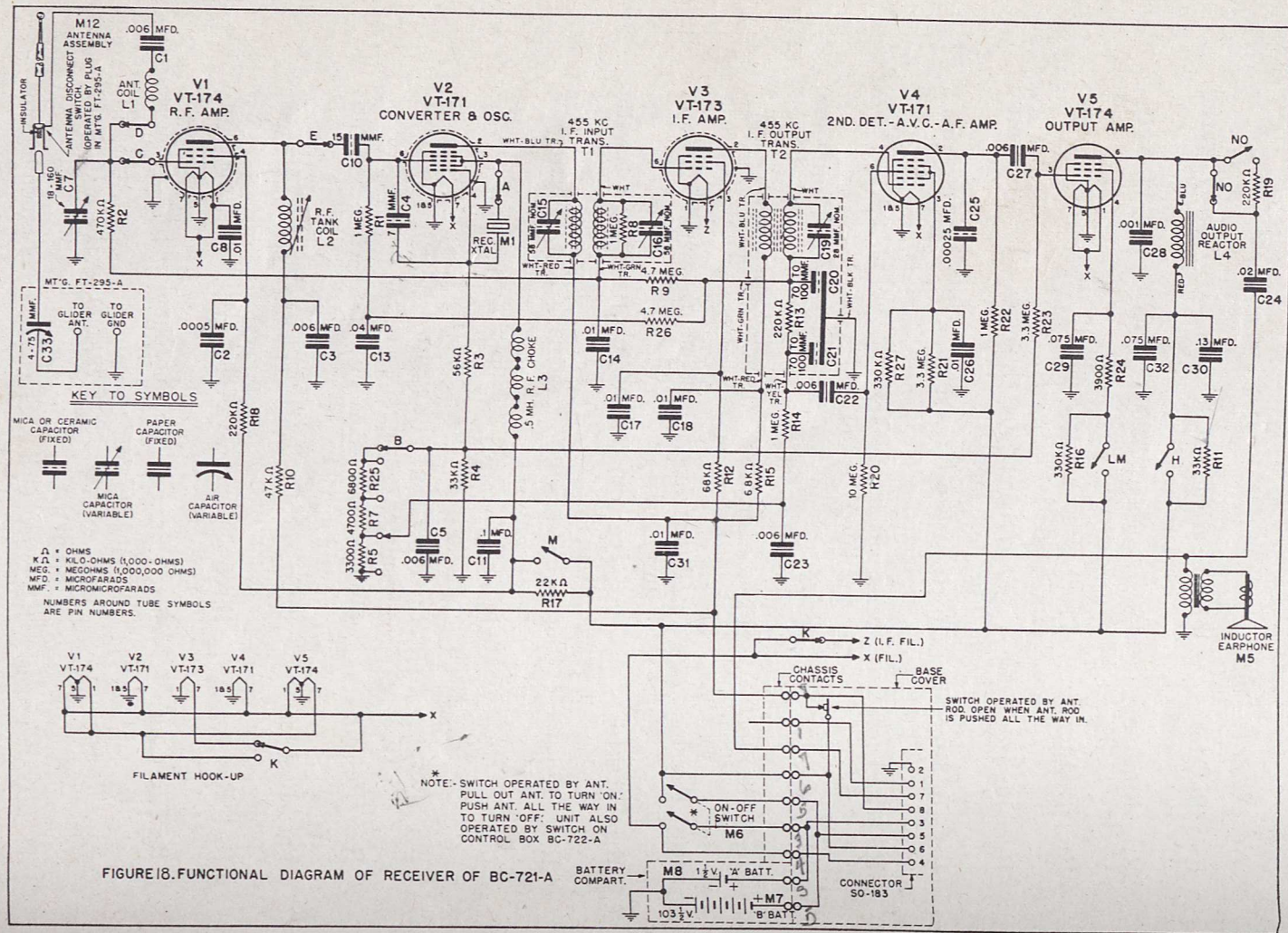
RADIO RECEIVER AND TRANSMITTER BC-721-A
SCHEMATIC DIAGRAM LEGEND (Continued)

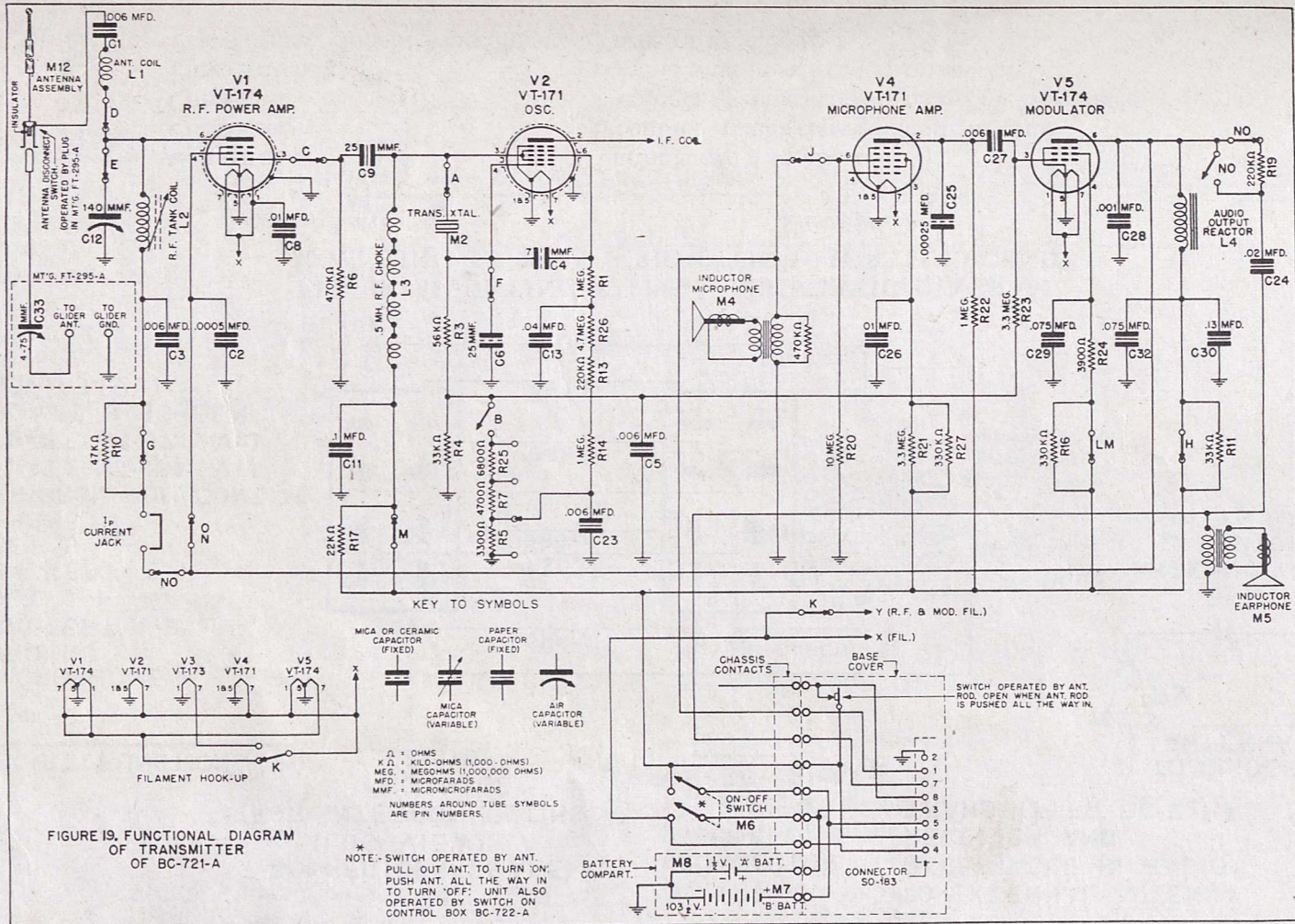
Diag.

<i>No.</i>	<i>Name of Part</i>	<i>Description</i>
L ₁	Coil	Antenna coil, 3995 kilocycles, No. C-414-A
	Coil	Antenna coil, 4845 kilocycles, No. C-416-A
	Coil	Antenna coil, 5500 kilocycles, No. C-418-A
L ₂	Coil	R-F tank coil, 3995 kilocycles, No. C-415-A
	Coil	R-F tank coil, 4845 kilocycles, No. C-417-A
	Coil	R-F tank coil, 5500 kilocycles, No. C-419-A
L ₃	Choke	R-F. .5 millihenry
L ₄	Reactor	Audio output reactor (d-c resistance 590-850 ohms)
M ₁	Crystal	Receiver crystal (specify frequency)
M ₂	Crystal	Transmitter crystal (specify frequency)
M ₃	Switch	Changeover switch (8P.D.T.)
M ₄	Microphone	Microphone and leads assembly (dynamic)
M ₅	Earphone	Earphone and leads assembly (dynamic)
M ₆	Switch	Toggle, D.P.S.T.
M ₇	Battery BA-38	"B" battery (103.5-109v)
M ₈	Battery BA-37	"A" battery (1½v) leakproof
M ₉	Tube shield	Metal shield
M ₁₀	Tube shield	Metal shield
M ₁₁	Tube shield	Metal shield
M ₁₂	Antenna	4-section collapsible antenna assembly
R ₁	Resistor	Fixed carbon, 1 megohm ±10% ½ watt (insulated)
R ₂	Resistor	Fixed carbon, 470,000 ohms ±10%-½ watt (insulated)
R ₃	Resistor	Fixed carbon, 56,000 ohms ±10%-½ watt (not insulated)
R ₄	Resistor	Fixed carbon, 33,000 ohms ±10%-½ watt (not insulated)
R ₅	Resistor	Fixed carbon, 3,300 ohms ±10%-½ watt (insulated)
R ₆	Resistor	Fixed carbon, 470,000 ohms ±10%-½ watt (insulated)
R ₇	Resistor	Fixed carbon, 4,700 ohms ±10%-½ watt (insulated)
R ₈	Resistor	Fixed carbon, 1 megohm ±10%-½ watt (not insulated)
R ₉	Resistor	Fixed carbon, 4.7 megohms ±10%-½ watt (not insulated)

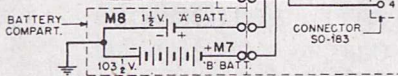
RADIO RECEIVER AND TRANSMITTER BC-721-A
SCHEMATIC DIAGRAM LEGEND (Continued)

<i>Diag.</i>	<i>No. Name of Part</i>	<i>Description</i>
R10	Resistor	Fixed carbon, 47,000 ohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R11	Resistor	Fixed carbon, 33,000 ohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R12	Resistor	Fixed carbon, 68,000 ohms $\pm 10\%$ - $\frac{1}{5}$ watt (not insulated)
R13	Resistor	Fixed carbon, 220,000 ohms $\pm 10\%$ - $\frac{1}{5}$ watt (not insulated)
R14	Resistor	Fixed carbon, 1 megohm $\pm 10\%$ - $\frac{1}{5}$ watt (not insulated)
R15	Resistor	Fixed carbon, 6,800 ohms $\pm 10\%$ - $\frac{1}{5}$ watt (not insulated)
R16	Resistor	Fixed carbon, 330,000 ohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R17	Resistor	Fixed carbon, 22,000 ohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R18	Resistor	Fixed carbon, 220,000 ohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R19	Resistor	Fixed carbon, 220,000 ohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R20	Resistor	Fixed carbon, 10 megohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R21	Resistor	Fixed carbon, 3.3 megohms $\pm 10\%$ - $\frac{1}{5}$ watt (not insulated)
R22	Resistor	Fixed carbon, 1 megohm $\pm 10\%$ - $\frac{1}{5}$ watt (not insulated)
R23	Resistor	Fixed carbon, 3.3 megohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R24	Resistor	Fixed carbon, 3,900 ohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R25	Resistor	Fixed carbon, 6,800 ohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R26	Resistor	Fixed carbon, 4.7 megohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
R27	Resistor	Fixed carbon, 330,000 ohms $\pm 10\%$ - $\frac{1}{3}$ watt (insulated)
T1	Transformer (1st)	I-F Input Coil & Shield Assembly mounted in can
T2	Transformer (2nd)	I-F Output Coil & Shield Assembly mounted in can





SWITCH OPERATED BY ANT. ROD. OPEN WHEN ANT. ROD IS PUSHED ALL THE WAY IN.



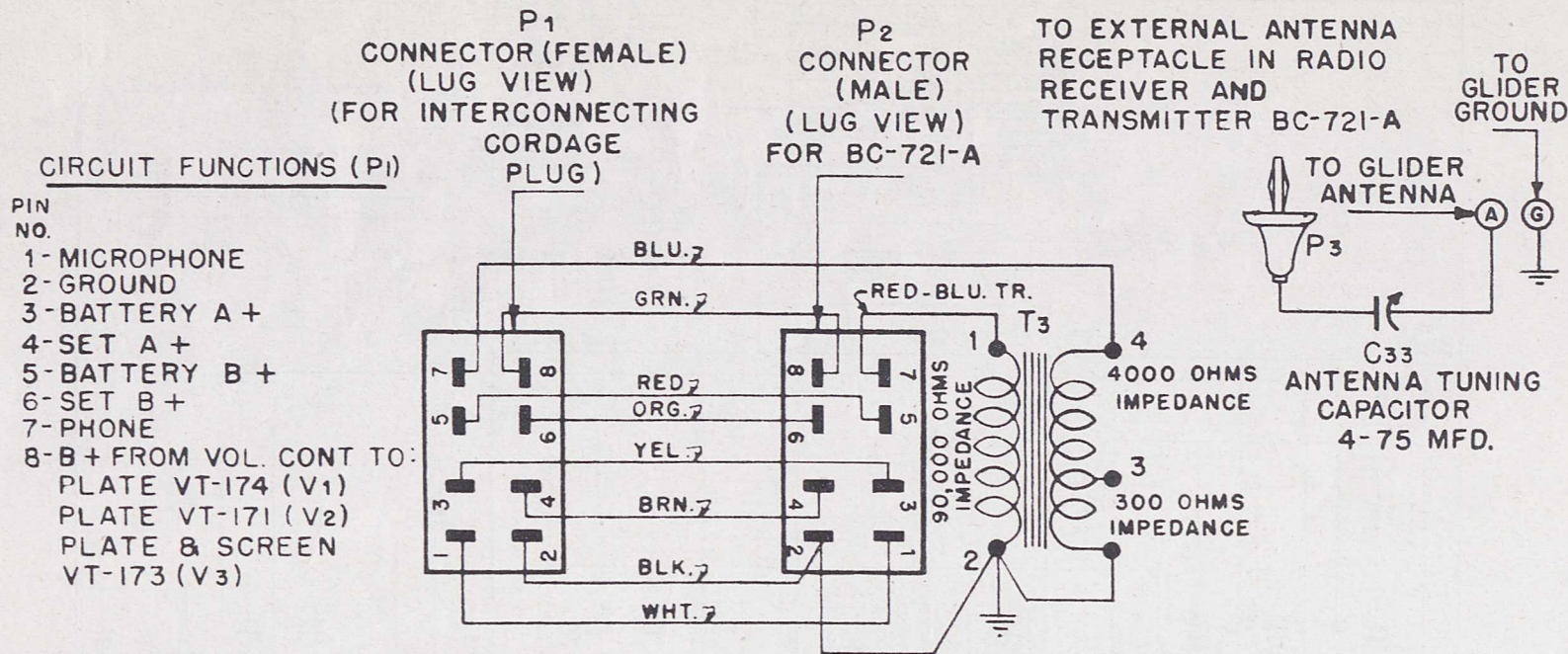


FIG. 20. MOUNTING FT-295-A, SCHEMATIC DIAGRAM
MOUNTING FT-295-A, SCHEMATIC DIAGRAM LEGEND

Diag. No.	Name of Part	Description
C ₃₃	Capacitor	Variable air, 4 to 75 μf .
P ₁	Connector	8 contact (male) chassis mounting plug
P ₂	Connector	8 contact (female) chassis mounting receptacle
P ₃	Plug, Antenna	Banana plug in self-centering mount
T ₃	Transformer, Output Matching	Turns ratio: 4.84 to 1

CIRCUIT FUNCTIONS

- PIN NO.
- 1- MICROPHONE
 - 2- GROUND
 - 3- BATTERY A+
 - 4- SET A+
 - 5- BATTERY B+
 - 6- SET B+
 - 7- PHONE
 - 8- B+ FROM VOL. CONT. TO:
 PLATE VT-174 (V₁)
 PLATE VT-171 (V₂)
 PLATE & SCREEN
 VT-173 (V₃)

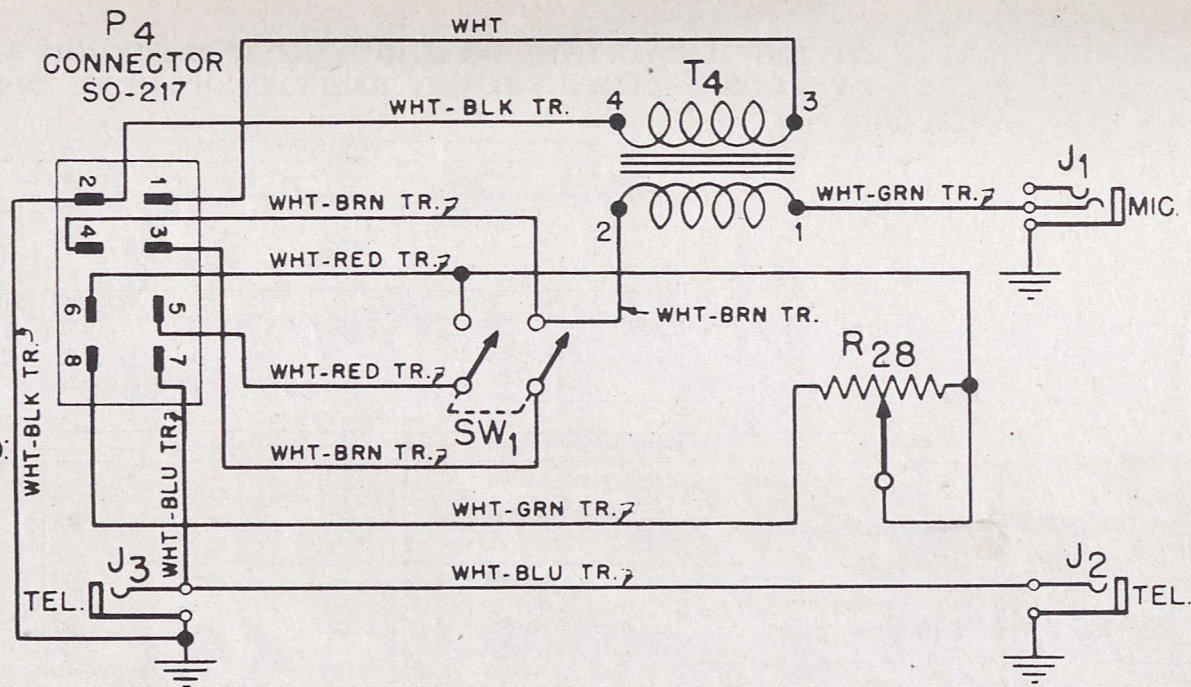


FIG. 21. RADIO CONTROL BOX BC-722-A, SCHEMATIC DIAGRAM
 RADIO CONTROL BOX BC-722-A SCHEMATIC DIAGRAM LEGEND

Diag. No.	Name of Part	Description
J ₁	Jack	3 contact (microphone)
J ₂	Jack	2 Contact (telephone)
J ₃	Jack	2 contact (telephone)
P ₄	Connector SO-217	8 contact (male) chassis mounting plug
R ₂₈	Potentiometer	500,000 ohms (volume control)
SW ₁	Switch, Toggle	Double pole-single throw (power ON-OFF)
T ₄	Transformer, Microphone	Turns ratio: 8.8 to 1

- SYMBOLS
- A ELASTIC NUTS #10-32
 - A HOLES - CLEARANCE FOR IN ID SCREW
 - FITTING FOR CONTROL SHUNT MOUNT (BOTTOM FASTENING)
 - ELECTRICAL CABLE SOCKET FOR
 - FITTING FOR CONTROL SHUNT MC-365 (END FASTENING)
 - E ELECTRICAL CABLE FITTING
 - AT ANTENNA CAPACITOR ADJUSTMENT

TABLE OF WEIGHTS

RADIO RECEIVER AND TRANSMITTER BC-721-() COMPLETE - 620 LBS.
MOUNTING FT-295-() 33 LBS.

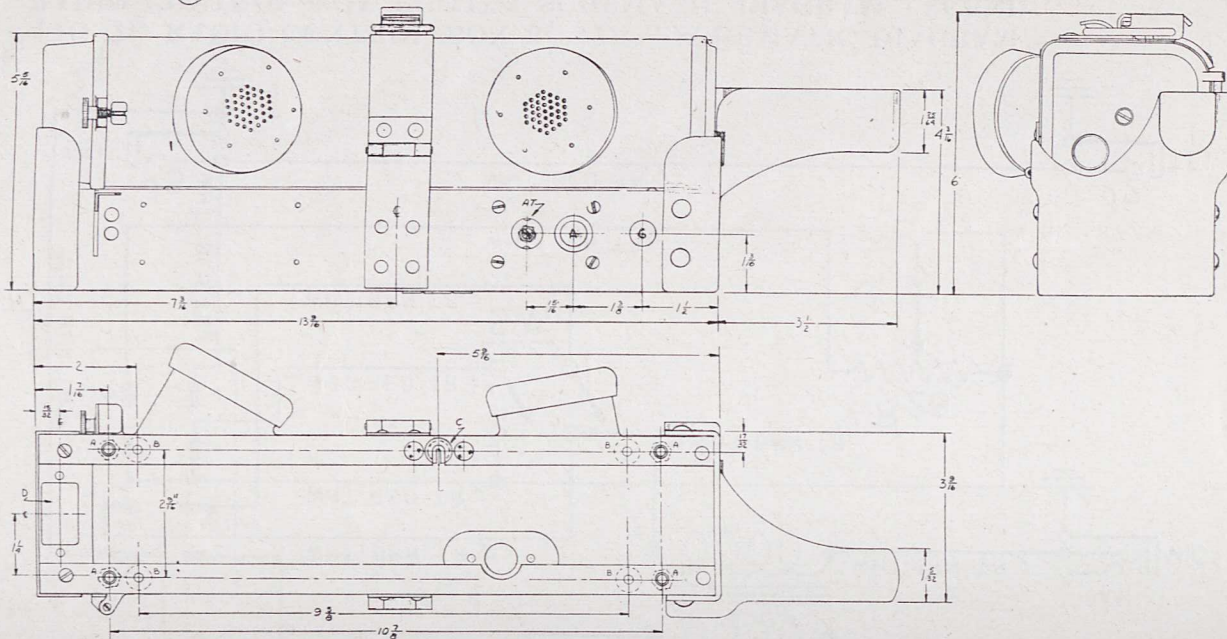
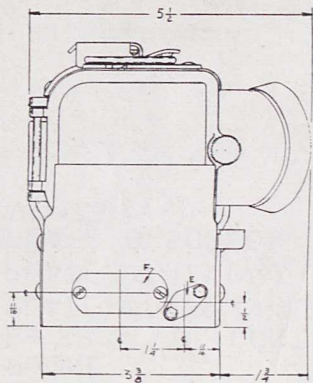
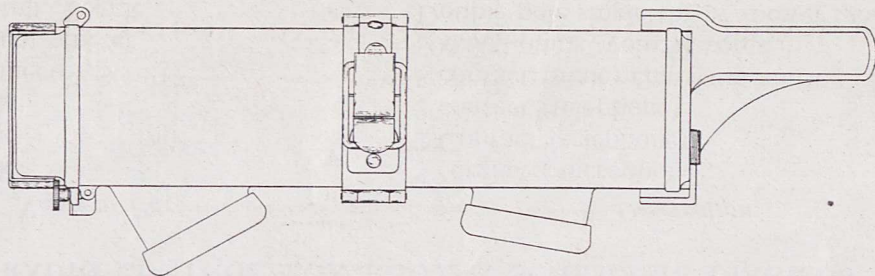


FIG. 22. RADIO RECEIVER AND TRANSMITTER BC-721-A
ON MOUNTING FT-295-A, OUTLINE DIMENSIONAL DETAIL

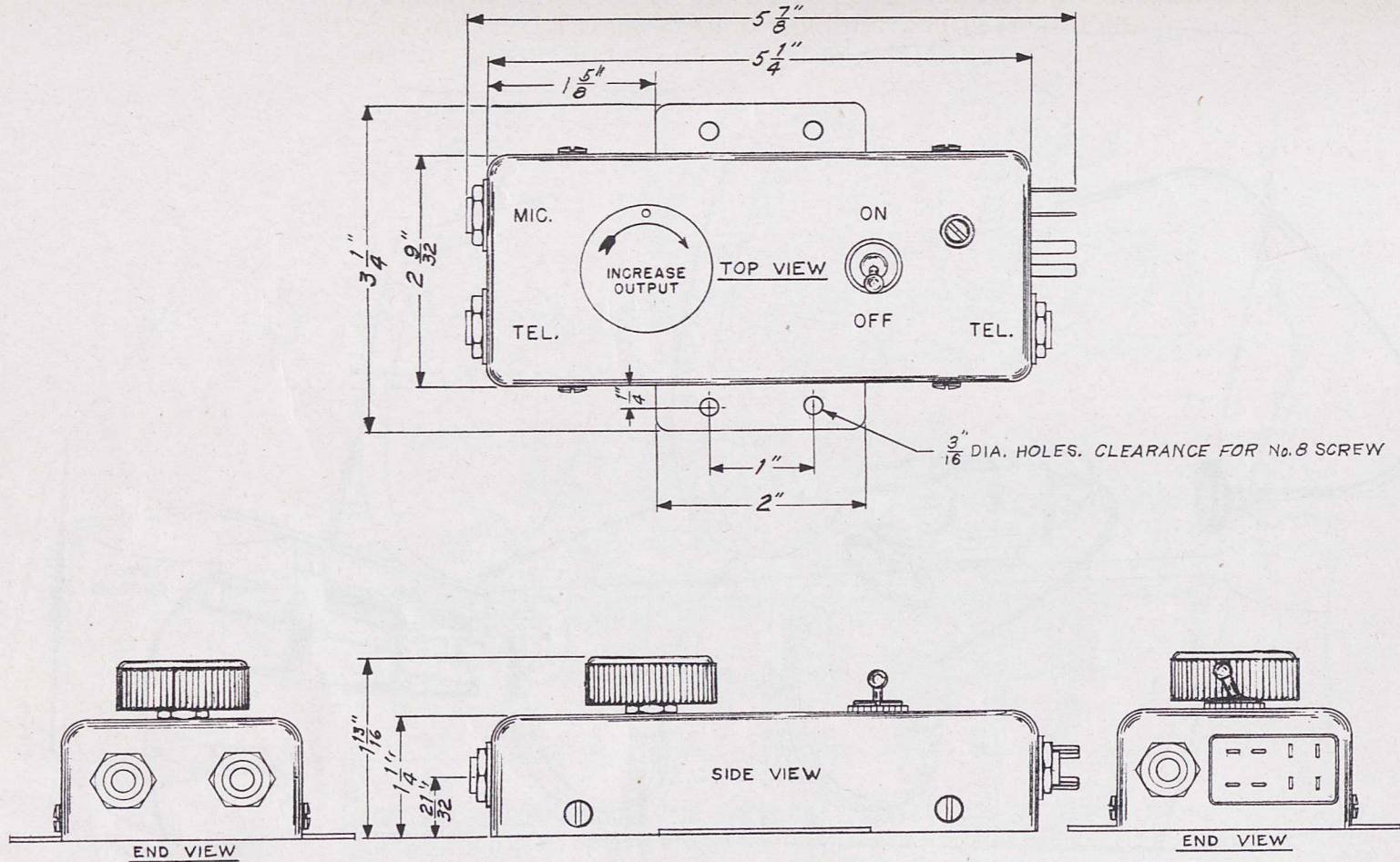


FIG. 23. RADIO CONTROL BOX BC-722-A OUTLINE DIMENSIONAL DETAIL

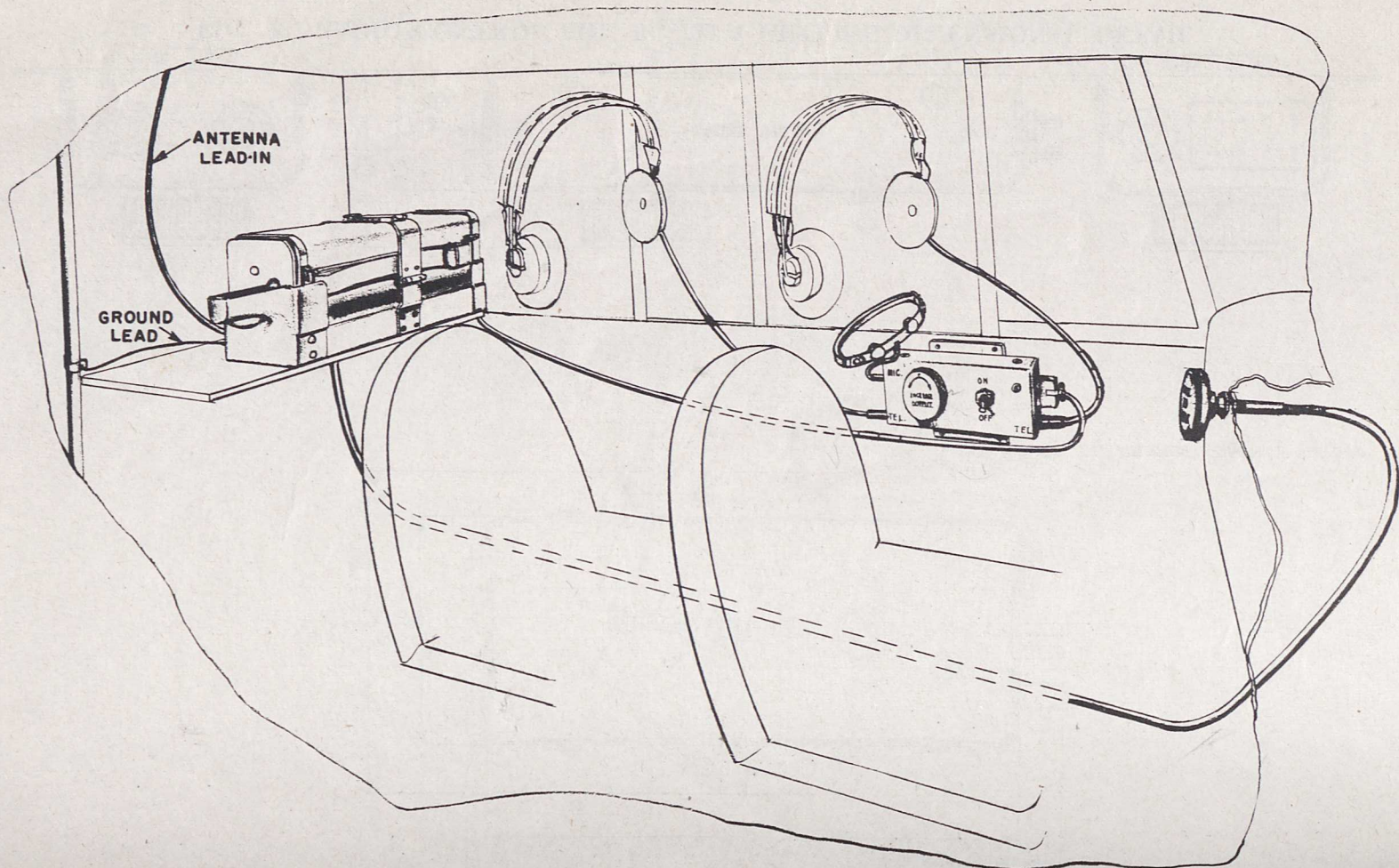
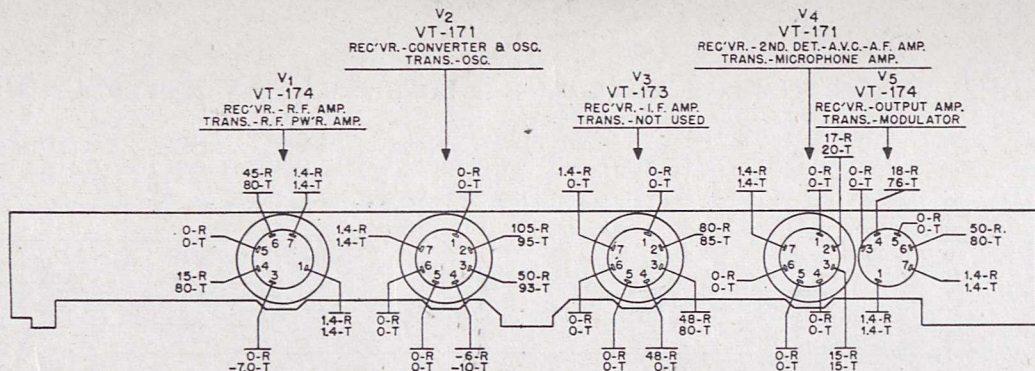


FIG. 24. TYPICAL INSTALLATION OF RADIO SET SCR-585-A IN GLIDER



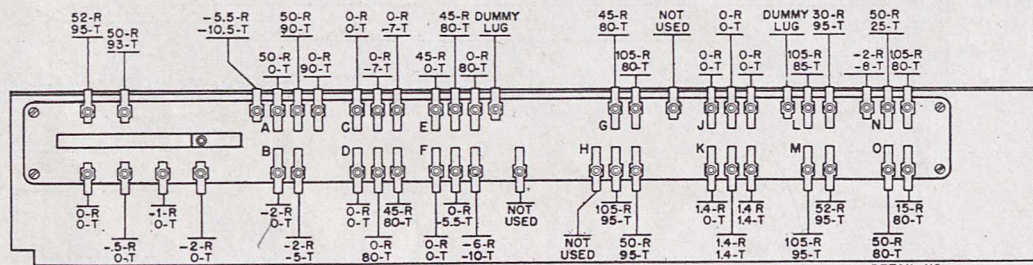
BOTTOM VIEW OF CHASSIS

NOTE:- VOLTAGES WITH SUFFIX 'R' MEASURED IN RECEIVE POSITION.
VOLTAGES WITH SUFFIX 'T' MEASURED IN TRANSMIT POSITION.

BIAS VOLTAGES MEASURED ON 30 VOLT RANGE OF VOLT-OHMETER
UNIT OF 'SIGNAL CORPS. TEST SET I-56-A'. ALL OTHER VOLTAGES
MEASURED ON 300 VOLT RANGE.

'A' BATTERY VOLTAGE 1.4 V.

'B' BATTERY VOLTAGE (NEW BATTERY)-RECEIVE - 105 V.
TRANSMIT - 95 V.



FRONT VIEW OF CHASSIS

DETAIL NO.

FIG. 25. RADIO RECEIVER AND TRANSMITTER BC-721-A
TUBE SOCKET AND TERMINAL VOLTAGE DIAGRAM

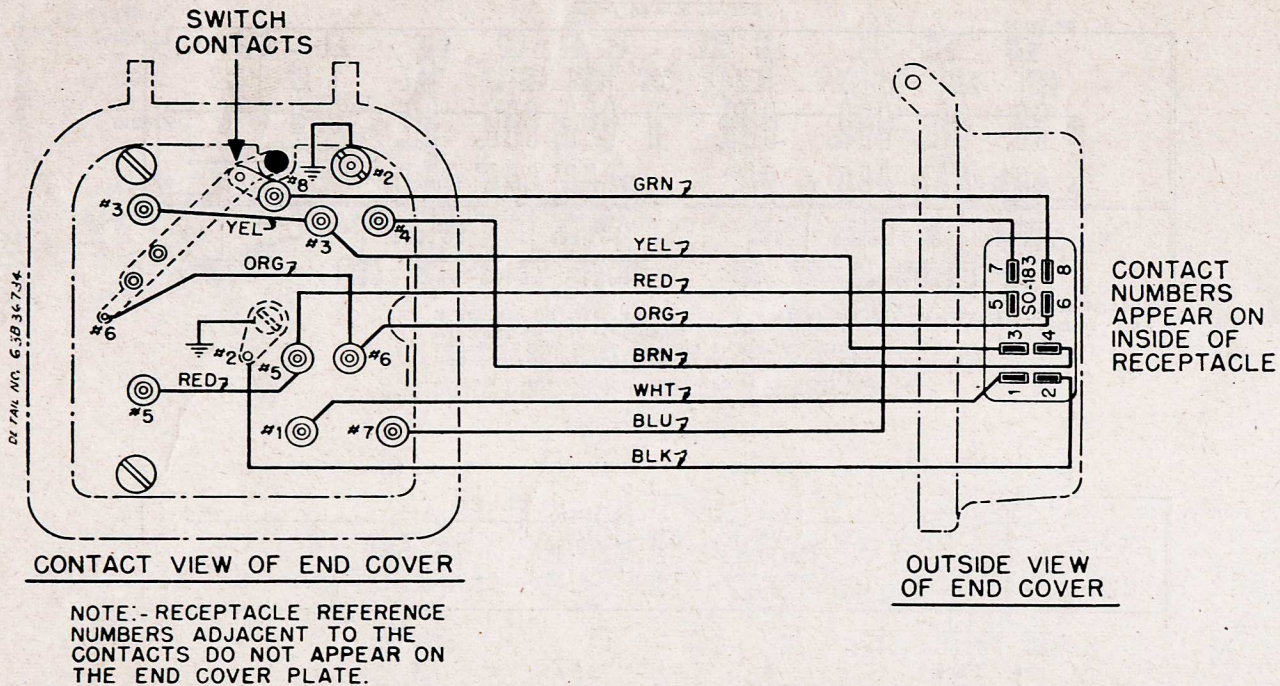


FIG. 26. RADIO RECEIVER AND TRANSMITTER BC-721-A, BOTTOM COVER WIRING DIAGRAM

