TM 11-318

AR DEPARTMENT TECHNICAL MANUAL

ALIGNMENT EQUIPMENT ME 73

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AR DEPARTMENT • 30 JULY 1943

WAR DEPARTMENT TECHNICAL MANUAL

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WAR DEPARTMENT

WASHINGTON 25, D. C., 30 July 1943

TM 11–318 Alignment Equipment ME 73 is published for the information and guidance of all concerned.

[AG 300.7 (30 Jul 43)]

BY ORDER OF THE SECRETARY OF WAR:

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Major General
The Adjutant General

RESTRICTED

TM 11—318

TECHNICAL MANUAL

WAR DEPARTMENT

WASHINGTON, 25, D. C., 30 July, 1943

No. 11—318

ALIGNMENT EQUIPMENT ME-73

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LIST OF ILLUSTRATIONS

DESTRUCTION NOTICE

WHY —To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander, or when you are in immediate danger of capture.

HOW —1. Smash—Use sledges, axes, hand-axes, pick-axes, hammers, crowbars, heavy tools, etc.

2. Burn—Use gasoline, kerosene, oil, flame-throwers, incendiary grenades, etc.

3. Disposal—Bury in slit trenches, fox-holes, other holes. Throw in streams. Scatter.

4. USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—1. Smash—The chest, the adapters, the crystal holders, and the tools.

2. Burn—The instruction books and the smashed chest.

3. Bury or scatter—Any or all of the above pieces after breaking.

DESTROY EVERYTHING

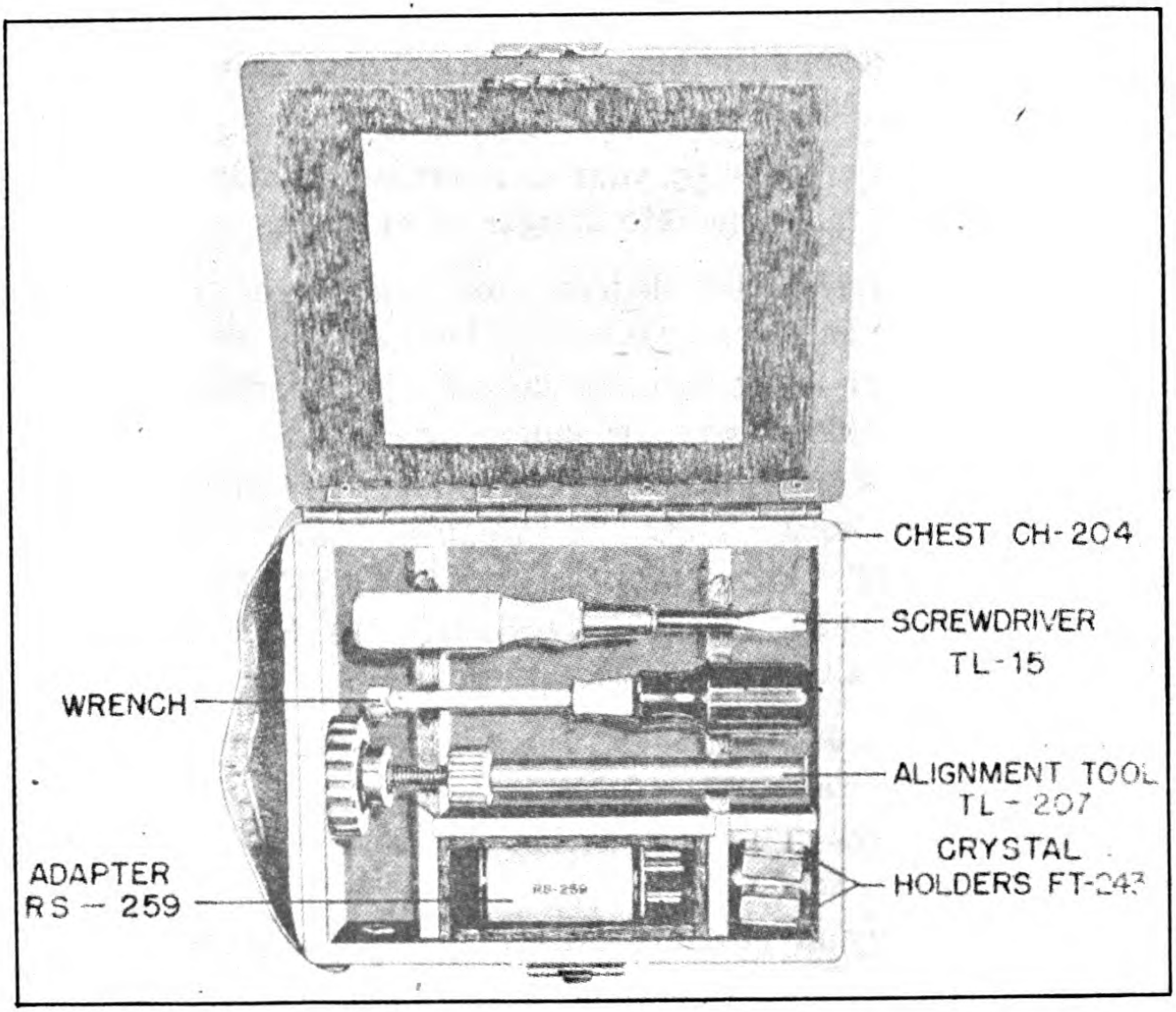


FIG. 1—ALIGNMENT EQUIPMENT ME-73, SHOWING COMPONENT PARTS

SECTION I

DESCRIPTION

1. General.—Alignment Equipment ME-73 consists of instruments and tools to be used with Adapters M-394 and M-399 to adjust and align Radio Sets SCR-509-(*), SCR-510-(*), SCR-609-(*), and SCR-610-(*).

2. List of Components.—The components of Alignment Equipment M-73 are packed in Chest CH-204-(*), and the total weight is 2 lbs., 2 ozs. The dimensions of Chest CH-204-(*) are 6½ x 7¼ x 2½ inches.

Quantity	Article	Stock No.
1	Adapter RS-259	3Z59
1	Alignment Tool TL-207	
1	Chest CH-204	
1	Crystal Holder FT-243, with 2.88 mc. crystal	
1	Crystal Holder FT-243, with 4.3 mc. crystal	
2	Technical Manuals TM 11—318	
1	Screwdriver TL-15	6R15210
1	Wrench, 5/16 inch	

3. Adapter RS-259.—This adapter plug is used when the radio set to be aligned is powered by Battery BA-39. It plugs into the battery and places a 500-ohm, 5-watt resistance in series with the high voltage lead to reduce the current to a safe value for the alignment procedure.

NOTE: *The asterisk within parentheses (*) indicates the applicable issue letter.*

4. Crystal Holders.—

a. Crystal Holder FT-243 with 2.88 mc. crystal is used for checking the discriminator circuit and for complete alignment of Radio Sets SCR-509-(*) and SCR-510-(*). It plugs into the crystal socket of the radio set to replace a channel crystal, and provides the required frequency for aligning the intermediate frequency stages and the discriminator.

b. Crystal Holder FT-243 with 4.3 mc. crystal is used for checking the discriminator circuit and for complete alignment of Radio Sets SCR-609-(*) and SCR-610-(*). It plugs into the crystal socket of the radio set to replace a channel crystal, and provides the required frequency for aligning the intermediate frequency stages and the discriminator.

5. Tools.—

a. Alignment Tool TL-207 is an insulated screwdriver and wrench combination (with screwdriver rotating inside a No. 6 nut size wrench) which fits the top of the trimmer capacitors in the radio sets with which Alignment Equipment ME-73 is to be used.

b. Screwdriver TL-15 is a standard screwdriver with a 2-inch blade, 1/4 inch tip, and a length of 5 3/4 inches overall. It is for general use, such as opening cases of radio sets.

c. Wrench, 5/16-inch, fits the locknuts at the top of the trimmer capacitors in the radio sets with which Alignment Equipment ME-73 is to be used.

SECTION II

INSTALLATION

6. Adapter M-394.—

a. Description.—

(1) Adapter M-394 is used with Alignment Equipment ME-73 for aligning Radio Sets SCR-509-(*) and SCR-510-(*).

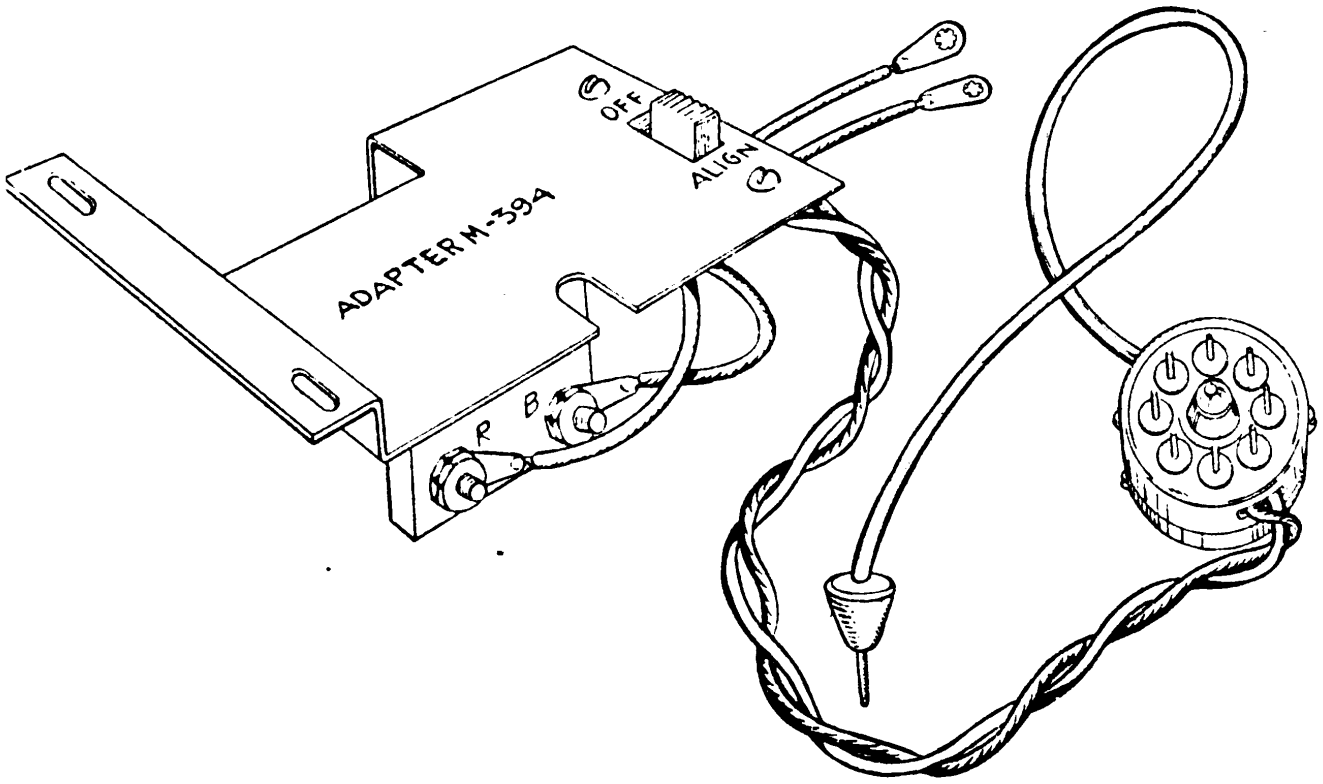


FIG. 2—ADAPTER M-394, TOP VIEW

(2) Adapter M-394, see Figs. 2 and 3, consists of a metal bracket on which is mounted a terminal block and a d.p.d.t., OFF-ALIGN, slide switch that is connected to a sepa-

rate tube-socket-adapter plug having a metering plug lead. The switch also is connected to the terminal block, and has two separate leads.

(3) The bracket of Adapter M-394 is designed for permanent installation in Receiver-Transmitter BC-620-(*). When it is installed, and the connections made properly, the adapter switch at ALIGN converts the receiver-amplifier-stage of the set into a vacuum-tube-voltmeter circuit utilizing the panel meter of the set. This permits the changing of channels as well as complete alignment of the set without using an external meter. With the adapter switch at OFF, Adapter M-394 does not interfere with the ordinary use of the set..

b. Installing Adapter M-394.—

(1) Take the receiver-transmitter from its case, by removing all the screws around the edge of the panel and pulling the chassis forward.

(2) Use a $\frac{5}{16}$" open-end wrench to disconnect the two leads attached to the panel meter of the set, and then connect these leads to terminals B and R of Adapter M-394, Fig. 3, attaching the red lead to R.

(3) Take the two separate leads of Adapter M-394, Fig. 3, and connect them to the meter terminals, attaching the red lead to the meter terminal nearest transformer T_6.

(4) Remove the two screws from the edge of the top cover of battery Box BX-4 that contains Battery BA-41, and mount the bracket of Adapter M-394 there, using the original screws.

(5) Remove the receiver power-amplifier Tube VT-185 from its socket and insert the adapter plug, as shown in Fig. 6. Then insert Tube VT-185 in the adapter plug socket, as shown.

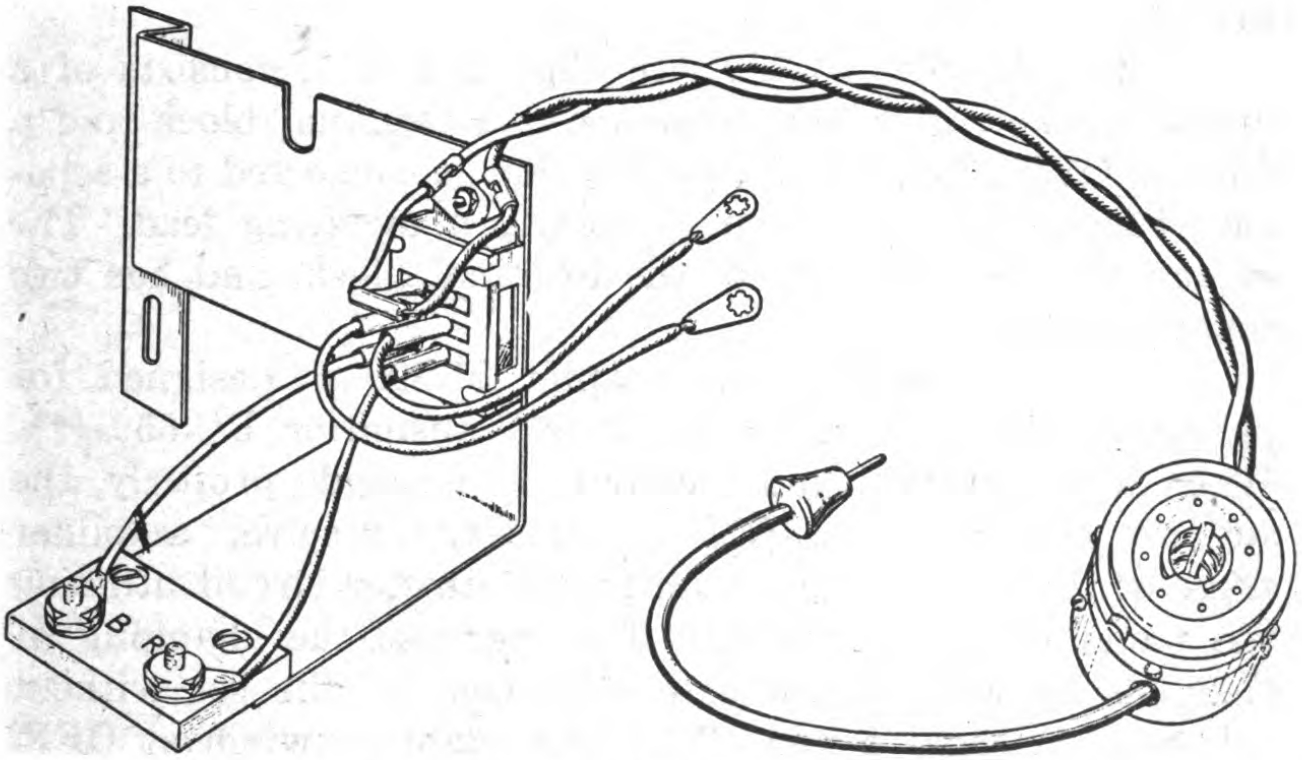


FIG. 3—ADAPTER M-394, BOTTOM VIEW

(6) Insert the adapter metering plug in the center hole of the metering socket, as shown in Fig. 6, and throw the adapter switch to OFF.

(7) Replace Receiver-Transmitter BC-620-(*) in its case, being careful to see that the gasket is properly seated. Tighten the panel screws carefully to put uniform pressure on all screws and prevent leakage through the gasket.

7. Adapter M-399.—

a. Description.—

(1) Adapter M-399 is used with Alignment Equipment ME-73 for aligning Radio Sets SCR-609-(*) and SCR-610-(*).

(2) Adapter M-399, see Figs. 4 and 5, consists of a metal bracket on which is mounted a terminal block and a d.p.d.t., OFF ALIGN, slide switch that is connected to a separate tube-socket-adapter plug having a metering lead. The switch also is connected to the terminal block, and has two separate leads.

(3) The bracket of Adapter M-399 is designed for permanent installation in Receiver-Transmitter BC-659-(*). When it is installed, and the connections made properly, the adapter switch at ALIGN converts the receiver amplifier stage of the set into a vacuum-tube-voltmeter circuit utilizing the panel meter of the set. This permits the changing of channels as well as complete alignment of the set without using an external meter. With the adapter switch at OFF, Adapter M-399 does not interfere with the ordinary use of the set.

b. Installing Adapter M-399.—

(1) Take Receiver-Transmitter BC-659-(*) from its case, by removing all the screws around the edge of the panel and pulling the chassis forward.

(2) Use the $\frac{5}{16}$″ wrench that is part of Alignment Equipment ME-73, to disconnect the two leads attached to

the panel meter of the set, and then connect these leads to terminals B and R of Adapter M-399, Fig. 5, attaching the red lead to R.

(3) Take the two separate leads of Adapter M-399, Fig. 5, and connect them to the meter terminals, attaching the red lead to the terminal nearest the crystal holder.

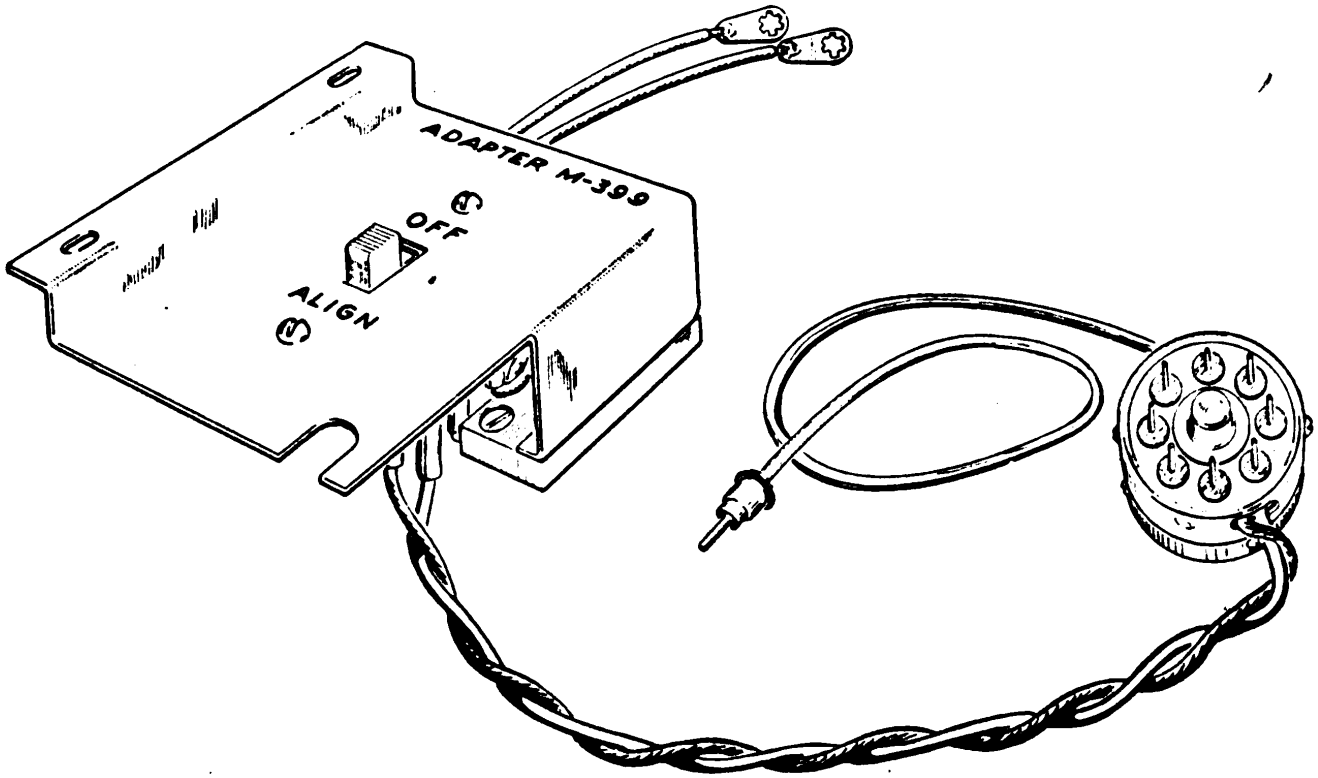


FIG. 4—ADAPTER M-399, TOP VIEW

(4) Remove the two screws from the edge of the top cover of battery Box BX-4 that contains Battery BA-41, and mount the bracket of Adapter M-399, using the original screws.

(5) Remove the receiver-power-amplifier Tube VT-185 from its socket and insert the adapter plug, as shown in

Fig. 6. Then insert Tube VT-185 in the adapter plug socket, as shown.

(6) Insert the adapter metering plug in the center hole of the metering socket, as shown in Fig. 6, and throw the adapter switch to OFF.

(7) Replace Receiver-Transmitter BC-659-(*) in its case, being careful to see that the gasket is properly seated. Tighten the panel screws carefully to put uniform pressure on all screws to prevent leakage through the gasket.

SECTION III

ALIGNMENT PROCEDURES

8. Aligning Radio Sets SCR-509-(*) and SCR-510-(*) with Adapter M-394 Installed.—

a. Preliminary Procedure.—

(1) Remove the chassis of Receiver-Transmitter BC-620-(*) from its case. Place the chassis on a bench and connect it to Plate Supply Unit PE-97-(*), or to Case CS-79-(*) with Batteries BA-39 and BA-40 installed. If Case CS-79-(*) is used, insert Adapter RS-259 that is part of Alignment Equipment ME-73, into Battery BA-39 to protect the transmitter final amplifier tube against possible damage by high plate current.

(2) Insert the proper crystals in the crystal socket.

(3) Preset the tuning capacitors (A_1 through A_6, and B_1 through B_6), and the pins in the antenna loading coil (L_1),

for the channels selected, using the approximate trimmer settings given in the following table:

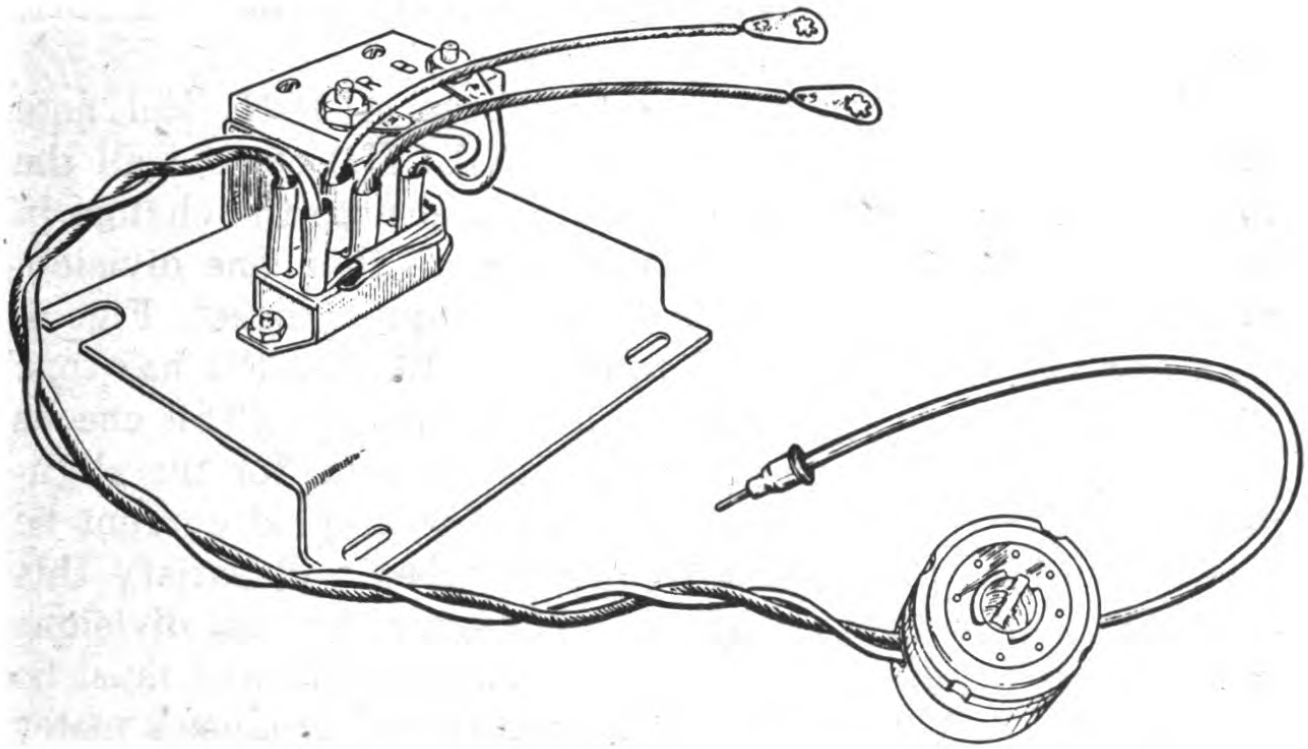


FIG. 5—ADAPTER M-399, BOTTOM VIEW

Channel No.	A-B 1	A-B 2	A-B 3	A-B 4	A-B 5	A-B 6	Position of Pins in L-1
0-19	3.0	2.0	2.0	2.0	1.5	3.0	8
20-29	5.0	2.8	4.0	2.5	2.0	3.8	6
30-39	5.5	5.0	4.5	4.5	4.5	5.0	4
40-54	6.0	5.8	5.5	5.2	5.2	5.8	3
55-74	6.9	6.8	6.5	6.0	6.2	6.5	2
75-80	7.4	7.8	7.2	7.0	7.8	7.2	1

(4) Set switches SW_{10} and SW_{11} to OFF, and turn the panel meter switch to CHECK.

(5) Plug in Handset TS-13-(*), or a headset and microphone.

(6) Put the set in operation by turning the VOLUME control full ON (to the right).

(7) Throw the adapter switch to ALIGN, and note the panel meter reading. Turn the VOLUME control all the way back (to the left) from full ON, and note the change in the meter reading. If the change is more than one division, replace Tube VT-185 that is in the adapter socket, Fig. 6, with another one [Receiver-Transmitter BC-620-(*) has four VT-185's] until one is found that is satisfactory. (This checks the VT-185 for grid current, and it is essential for the alignment procedure that a tube with little or no grid current be used in the adapter socket. Normal tubes will satisfy this condition, but one that produces a change of several divisions in the meter reading has abnormal grid current, and must be replaced.) The VT-185 that is selected should produce a meter reading between 1.5 and 2.5.

(8) Turn the VOLUME control full ON (to the right) again. Note the meter reading with the adapter metering plug held away from the set. Then ground the metering plug to the chassis, and if the meter reading does not increase at lease five divisions, Tube VT-185 and/or Battery BA-40 may be weak. Replace either or both as necessary.

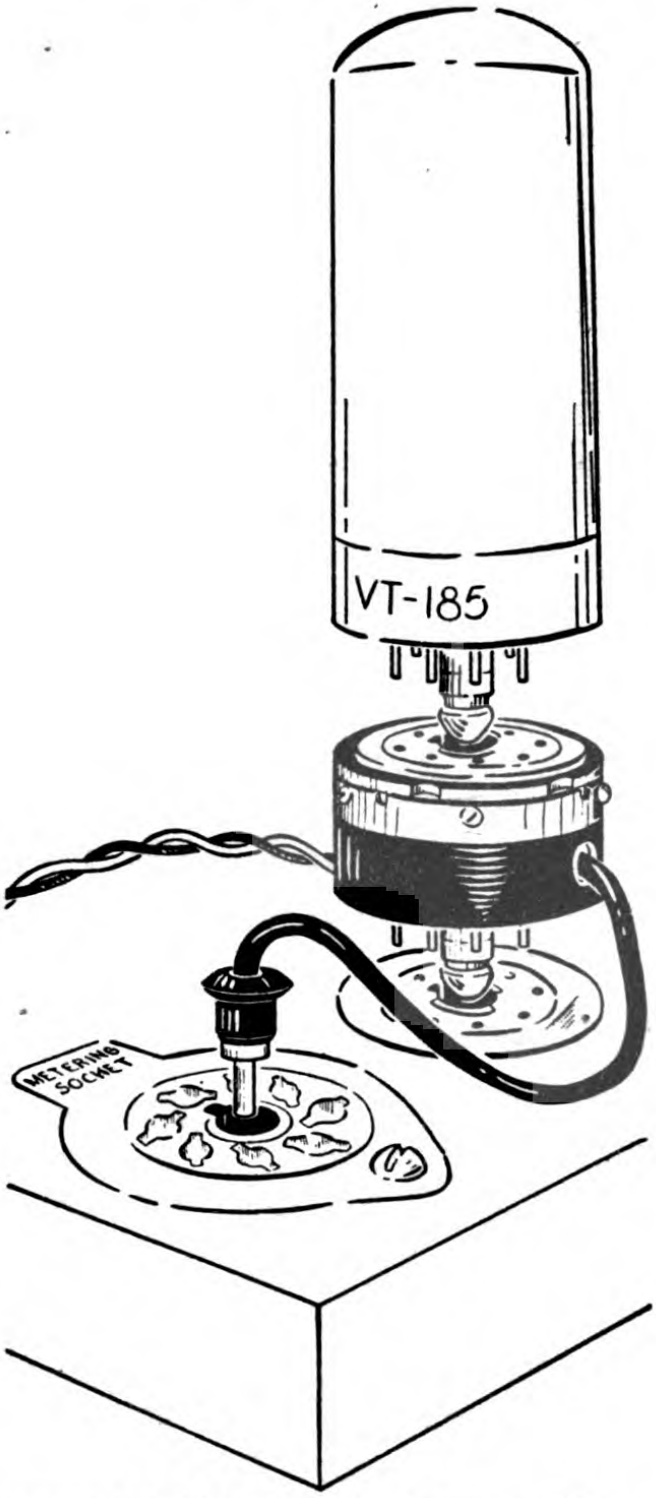


FIG. 6—ADAPTERS M-394, M-399, Adapter Plug—METHOD OF INSERTING IN RECEIVER POWER-AMPLIFIER-TUBE SOCKET

b. Alignment Check of the Discriminator Circuit of Radio Sets SCR-509-(*) and SCR-510-(*).—

(1) Turn the CHANNEL switch to either A or B.

(2) Remove the corresponding (either A or B) crystal from the crystal socket, and replace it with the 2.88 mc. crystal that is part of Alignment Equipment ME-73.

(3) Note the meter reading with the metering plug grounded to the chassis (be certain that the VOLUME control is full ON). Then insert the metering plug in Pin No. 7 of the metering socket, and note the meter reading. The two readings should be within ½ division of each other. *If* they are not, then *carefully* use Alignment Tool TL-207 that is part of Alignment Equipment ME-73, to adjust the secondary trimmer of the discriminator transformer T_6 until the readings are the same. Note that the correct reading is obtained after the alignment tool is removed.

(4) Remove the 2.88 mc. crystal from the crystal socket, and replace the channel crystal.

c. Alignment of Radio Sets SCR-509-(*) and SCR-510-(*) on Assigned Channels.—

(1) Be certain that the VOLUME control is full ON. Then insert the metering plug in Pin No. 1 of the metering socket, and turn the CHANNEL switch first to A and then to B. The meter reading should be approximately zero on both channels for good crystals. If the meter reads more than five divisions on either channel, then a defective crystal, a weak oscillator tube, or a weak Battery BA-40, is indicated.

(2) Insert the metering plug in Pin No. 2 of the metering socket. With the CHANNEL switch at A, adjust trimmer A_1 for a minimum reading on the meter. Then turn the CHANNEL switch to B and similarly adjust trimmer B_1.

(3) Insert the metering plug in Pin No. 7 of the metering socket. Remove Tube VT-177 (1LH4) from the receiver. If the panel meter reads off scale, reduce the VOLUME control setting. With the CHANNEL switch at A, adjust trimmer A_3 for a maximum reading on the panel meter (this also is the point of maximum noise in the phones). Turn the CHANNEL switch to B and similarly adjust trimmer B_3.

(4) Leave the metering plug in Pin No. 7. With the CHANNEL switch at A, adjust trimmer A_6 for a maximum reading on the panel meter (this also is the point of maximum noise in the phones). This adjustment is quite sharp, so carefully watch for it. Turn the CHANNEL switch to B and similarly adjust trimmer B_6.

(5) Repeat operations (3) and (4). Then replace Tube VT-177 (1LH4) in its socket.

(6) The preceding operations completely align channels A and B of the receiver, and must be completed before proceeding further. Also, before undertaking further operations, it is necessary to calibrate the meter as follows:

(a) Note the meter reading with the metering plug held away from the set.

(b) Ground the metering plug to the chassis, and note the meter reading. Reduce the VOLUME control setting until the difference between the two readings is 4½ divisions.

Then do not disturb this setting of the VOLUME control during the following operations.

(7) Insert the metering plug in Pin No. 3 of the metering socket. With the CHANNEL switch at A, press the "push-to-talk" switch and carefully adjust trimmer A_2 for a minimum reading on the panel meter. There may be several different settings of A that give a minimum reading. The correct adjustment is the one that gives the lowest reading and still is close to the reference setting given in the table in Par. 8*a* (3). Then turn the CHANNEL switch to B and similarly adjust trimmer B_2.

(8) Note the meter reading with the metering plug held away from the set. Then insert the metering plug in Pin No. 4 of the metering socket. With the CHANNEL switch at A, press the "push-to-talk" switch and carefully and slowly adjust trimmer A_2 so that the meter reading is one division less than what it was with the metering plug held away from the set. Then turn the CHANNEL switch to B and similarly adjust trimmer B_2. (After completing this operation it should be possible on both channels for you to hear in the phones what is said into the microphone.)

(9) Insert the metering plug in Pin No. 5 of the metering socket. With the CHANNEL switch at A, press the "push-to-talk" switch and adjust A_4 for a minimum reading on the panel meter. Place the CHANNEL switch at B and adjust B_4 as above.

(10) Insert the metering plug in Pin No. 4 of the metering socket. With the CHANNEL switch at A, press the "push-to-talk" switch, and note the meter reading. It should

be the same as in operation (8). If it is not, then repeat operation (8).

(11) Insert the metering plug in the center hole of the metering socket, and throw the Adapter M-394 switch to OFF.

(12) Set switch to SW_{10} to ON. With the CHANNEL switch at A, press the "push-to-talk" switch and adjust trimmer A_5 for a maximum reading on the meter. This reading should be at least 1.5. Then turn the CHANNEL switch to B and similarly adjust trimmer B_5.

(13) Turn the panel meter switch to OPERATE. Set switch SW_{11} to ON. With the CHANNEL switch at A, press the "push-to-talk" switch and note the meter reading. This reading will be 1.5 or less if the correct setting was given trimmer A_2 in operation (7). If the reading is over 1.5, repeat the channel A portions of operations (7), (8), (9), (10), (11) and (12). When the reading is 1.5 or less, adjust trimmer A_6 for a minimum reading on the meter. Then turn the CHANNEL switch to B and similarly check the setting of trimmer B_2 and adjust trimmer B_6.

(14) Disconnect the power cable, and replace Receiver-Transmitter BC-620-(*) in its case, taking care to see that the gasket is properly seated and that the panel screws are tightened to effectively seal the unit. If case CS-79-(*) was used, remove Adapter RS-259 from Battery BA-39.

(15) With the set in its case, connect the power cable, and turn the panel meter switch to OPERATE, and the CHANNEL switch to A. Then press the "push-to-talk" switch, and note the meter reading. Turn the CHANNEL switch to B, press the "push-to-talk" switch, and again

note the meter reading. The correct reading is 1.0 or less on each channel. If the readings are more than 1.0, open the adjustment cover on top of the case and readjust trimmers A_6 and B_6 separately for minimum readings on the meter.

(16) Extend Antenna AN-45-(*), and mount it on the antenna post at the rear of the case. Be certain the panel meter switch is at OPERATE. Throw the CHANNEL switch to A, press the "push-to-talk" switch and note the meter reading. Turn the CHANNEL switch to B, press the "push-to-talk" switch, and again note the meter reading. The new reading should be between 1.8 and 2.5 on each channel. If the readings are less than 1.8, check the antenna spring contact. If the readings are more than 2.5, recheck the adjustment of trimmers A_6 and B_6.

(17) In some vehicular installations, the meter reading with the panel meter switch at OPERATE may be greater than full scale. Whenever this is the case, again adjust trimmers A_6 and B_6 for minimum readings on the meter, with the set in position in the vehicle and the antenna connected. Usually it is not necessary to readjust trimmer A_6 and B_6 after they have been adjusted with the set in the case and no antenna connected.

d. Complete Alignment of Radio Sets SCR-509-(*) and SCR-510-(*).—

(1) For complete alignment it is necessary to adjust the trimmers on transformers T_3, T_4, T_5 and T_6. To do this, remove the set from its case, connect it to its power supply, and proceed as follows:

(1) Turn the CHANNEL switch to either A or B.

(2) Remove the corresponding crystal (either A or B) from the crystal socket and replace it with the 2.88 mc. crystal that is part of Alignment Equipment ME-73.

(3) Set up the alignment unit as instructed in Par. 8*a* (6), (7) and (8).

(4) Insert the metering plug in Pin No. 3 of the metering socket. With the VOLUME control full ON, adjust the adjustment screws (on top of the cans and under the chassis) of transformers T_3, T_4, and T_5 until you get minimum readings on the panel meter.

(5) Insert the metering plug in Pin No. 7 of the metering socket. Use a jumper to short out terminals 3 and 4 of transformer T_6, and adjust the primary trimmer for a minimum reading on the panel meter. Then be sure to remove the jumper from the terminals.

(6) Leave the metering plug in Pin No. 7, and adjust the secondary trimmer of transformer T_6 as described in Par. 8*b* (3).

9. Aligning Radio Sets SCR-609-(*) and SCR-610-(*), with Adapter M-399 Installed.—

a. Preliminary Procedure.—

(1) Remove the chassis of Receiver-Transmitter BC-659-(*) from its case. Connect the chassis to Plate Supply Unit PE-117-(*) or to Case CS-79-(*) with Batteries BA-39 and BA-40 installed. If Case CS-79-(*) is used, insert Adapter RS-259 that is part of Alignment Equipment ME-73,

into Battery BA-39 to protect the transmitter final amplifier tube against possible damage by high plate current.

(2) Insert the proper crystals in the crystal socket.

(3) Preset the tuning capacitors (A_1 through A_7, and B_1 through B_7) for the channels selected, using the approximate trimmer settings given in the following table:

Channel Nos.	A_1-B_1 Osc.	A_2-B_2 Rec. Mixer	A_3-B_3 R.F. Grid	A_4-B_4 Trans. Osc.	A_5-B_5 Buffer	A_6-B_6 P.A. Grid	A_7-B_7 P.A. Plate
270	0.0	1.0	0.8	0.2	0.4	0.0	1.0
280	0.6	1.9	1.4	1.1	1.2	0.7	1.8
290	1.4	2.4	2.0	1.7	1.7	1.3	2.4
300	2.2	3.0	2.4	2.3	2.2	1.8	2.8
310	2.9	3.6	3.1	2.8	2.7	2.3	3.1
320	3.6	4.1	4.1	3.5	3.3	3.0	3.8
330	4.0	4.2	4.2	3.9	3.7	3.4	3.9
340	4.1	4.6	4.5	4.2	3.9	3.7	4.0
350	4.6	5.0	4.7	4.5	4.0	3.9	4.1
360	4.9	5.2	4.8	4.8	4.5	4.2	4.2
370	5.4	5.5	5.2	5.2	4.9	4.6	4.7
380	5.6	5.6	5.3	5.5	5.0	4.8	4.8
389	5.8	5.8	5.4	5.9	5.1	5.0	5.0

(4) Set switches SW_1 and SW_2 to OFF, and turn the panel meter switch to CHECK.

(5) Plug in Handset TS-13-(*), or a headset and microphone. Do not use the internal speaker during the alignment procedure.

(6) Put the set in operation by turning the VOLUME control full ON (to the right).

(7) Throw the adapter switch to ALIGN, and note the panel meter reading. Turn the VOLUME control all the

way back (to the left) from full ON, and note the change in the meter reading. If the change is more than one division, replace Tube VT-185 that is in the adapter socket, Fig. 6, with another one [Receiver-Transformer BC-659-(*) has four VT-185's], until one is found that is satisfactory. (This checks the VT-185 for grid current, and it is essential for the alignment procedure that a tube with little or no grid current be used in the adapter socket. Normal tubes will satisfy this condition, but one that produces a change of several divisions in the meter reading has abnormal grid current, and must be replaced.) The VT-185 that is selected should produce a meter reading between 1.5 and 2.5.

(8) Turn the VOLUME control full on (to the right) again. Note the meter reading with the adapter metering plug held away from the set. Then ground the metering plug to the chassis, and if the meter reading does not increase at least five divisions, Tube VT-185 and/or Battery BA-40 may be weak. Replace either or both as necessary.

b. Alignment Check of the Discriminator Circuit of Radio Sets SCR-609-(*) and SCR-610-(*).—

(1) Turn the CHANNEL switch to either A or B.

(2) Remove the corresponding crystal (either A or B) from the crystal socket and replace it with the 4.3 mc. crystal that is part of Alignment Equipment ME-73.

(3) Note the meter reading with metering plug grounded to the chassis (be certain that the volume control is full ON). Then insert the metering plug in Pin No. 7 of the metering socket and note the meter reading. The two readings

should be within ½ division of each other. *If* they are not, then *carefully* use Alignment Tool TL-207 that is part of Alignment Equipment ME-73, to adjust the secondary trimmer of the discriminator transformer T_5 until the readings are the same. Note that the correct reading is obtained after the alignment tool is removed.

(4) Remove the 4.3 mc. crystal from the crystal socket, and replace the channel crystal.

c. Alignment of Radio Sets SCR-609-(*) and SCR-610-(*) on Assigned Channels.—

(1) Be certain that the VOLUME control is full ON. Then insert the metering plug in Pin No. 1 of the metering socket, and turn the CHANNEL switch first to A and then to B. The meter reading should be approximately zero on both channels for good crystals. If the meter reads more than five divisions on either channel, then a defective crystal, a weak oscillator tube, or a weak Battery BA-40, is indicated.

(2) Insert the metering plug in Pin No. 2 of the metering socket. With the CHANNEL switch at A, adjust trimmer A_1 for a minimum reading on the meter. Then turn the CHANNEL switch to B and similarly adjust trimmer B_1.

(3) Insert the metering plug in Pin No. 8 of the metering socket. With the CHANNEL switch at A, adjust trimmer A_2 for maximum noise in the phones. (The meter reading should decrease slightly at the point of maximum noise.) Then turn the CHANNEL switch to B and similarly adjust trimmer B_2.

(4) Leave the metering plug in Pin No. 8. With the CHANNEL switch at A, adjust trimmer A_3 for maximum noise in the phones. Watch for the dip in the meter reading at the point of maximum noise. Then turn the CHANNEL switch to B and similarly adjust trimmer B_3.

(5) Leave the metering plug in Pin No. 8. With the CHANNEL switch at A, adjust trimmer A_7 for maximum noise in the phones. Watch for the dip in the meter reading, as it is the correct adjustment of the capacitor. Then turn the CHANNEL switch to B and similarly adjust trimmer B_7.

(6) Repeat operations (3), (4), and (5).

(7) The preceding operations completely align channels A and B of the receiver, and must be completed before proceeding further. Also, before undertaking further operations, it is necessary to calibrate the meter, as follows:

(a) Note the meter reading with the metering plug held away from the set.

(b) Ground the metering plug to the chassis, and note the meter reading. Reduce the VOLUME control setting until the difference between the two readings is 4½ divisions. *Then do not disturb this setting of the VOLUME control during the following operations.*

(8) Insert the metering plug in Pin No. 3 of the metering socket. Remove Tube VT-179 (the first radio frequency amplifier tube) from the set. With the CHANNEL switch at A, press the "push-to-talk" switch and carefully adjust trimmer A_4 for a minimum reading on the meter. There may be several different settings of A_4 that give a minimum reading. The correct adjustment is the one that

gives the lowest reading and still is close to the reference setting given in the table in Par. 9*a* (3). Then turn the CHANNEL switch to B and similarly adjust trimmer B_4.

(9) Note the meter reading with the metering plug held away from the set. Then insert the metering plug in Pin No. 4 of the metering socket. With the CHANNEL switch at A, press the "push-to-talk" switch and *carefully* and *slowly* adjust trimmer A_4 so that the meter reading is one division less than what it was with the metering plug held away from the set. Then turn the CHANNEL switch to B and similarly adjust trimmer B_4. (After completing this operation it should be possible on both channels for you to hear in the phones what is said into the microphone.)

(10) Insert the metering plug in Pin No. 5 of the metering socket. With the CHANNEL switch at A, press the "push-to-talk" switch and adjust trimmer A_5 for a minimum reading on the meter. Then turn the CHANNEL switch to B and similarly adjust trimmer B_5.

(11) Insert the metering plug in Pin No. 4 of the metering socket, press the "push-to-talk" switch, and note the meter reading. It should be the same as in operation (9). If it is not, repeat operation (9).

(12) Replace the first radio-frequency amplifier Tube VT-179 in its socket in the set.

(13) Insert the metering plug in the center hole of the metering socket, and throw the adapter switch to OFF.

(14) Set switch SW_1 to ON. With the CHANNEL switch at A, press the "push-to-talk" switch and adjust trimmer A_6 for a maximum reading on the meter. This reading

should be at least 1.5. Then turn the CHANNEL switch to B and similarly adjust trimmer B_6.

(15) Turn the panel meter switch to OPERATE. Set switch SW_2 to ON. With the CHANNEL switch at A, press the "push-to-talk" switch and adjust trimmer A_7 for a minimum reading on the meter. This reading should be less than 1.0. Then turn the CHANNEL switch to B and similarly adjust B_7. These adjustments of trimmers A_7 and B_7 should approximate the settings obtained in operation (5). If they do not, repeat operations (8), (9), (10), and (11).

(16) Disconnect the power cable, and replace Receiver-Transmitter BC-659-(*) in its case, taking care to see that the gasket is seated properly and that the panel screws are tightened to effectively seal the unit. If Case CS-79-(*) was used, remove Adapter RS-259 from Battery BA-39.

(17) With the set in its case, connect the power cable, and turn the panel meter switch to OPERATE. With the CHANNEL switch at A, press the "push-to-talk" switch, and note the meter reading. Turn the CHANNEL switch to B, press the "push-to-talk" switch, and again note the meter reading. The correct reading is 1.0 or less on each channel. If the readings are more than 1.0, open the adjustment cover on top of the case and readjust trimmers A_7 and B_7 separately for minimum readings on the meter.

(18) Extend Antenna AN-29-(*), and mount it on the antenna post at the rear of the case. Be certain the panel meter switch is at OPERATE. With the CHANNEL switch at A, press the "push-to-talk" switch and note the meter reading. Turn the CHANNEL switch to B, press the "push-

to-talk" switch, and note the meter reading. The reading should be between 1.8 and 2.5 on each channel. If the readings are less than 1.8, check the antenna spring contact. If the readings are more than 2.5, recheck the adjustment of trimmers A_7 and B_7.

(19) In some vehicular installations, the meter reading with the panel meter switch at OPERATE may be greater than full scale. Whenever this is the case, again adjust trimmers A_7 and B_7 for minimum readings on the meter, with the set in position in the vehicle and the antenna connected. Usually it is not necessary to readjust trimmers A_7 and B_7 after they have been adjusted with the set in the case and no antenna connected.

d. Complete Alignment of Radio Sets SCR-609-(*) and SCR-610-(*).—

For complete alignment it is necessary to adjust the trimmers on transformers T_2, T_3, T_4, and T_5. To do this, remove the set from the case, connect it to its power supply, and proceed as follows:

(1) Turn the CHANNEL switch to either A or B.

(2) Remove the corresponding crystal (either A or B) from the crystal socket and replace it with the 4.3 mc. crystal that is part of Alignment Equipment ME-73.

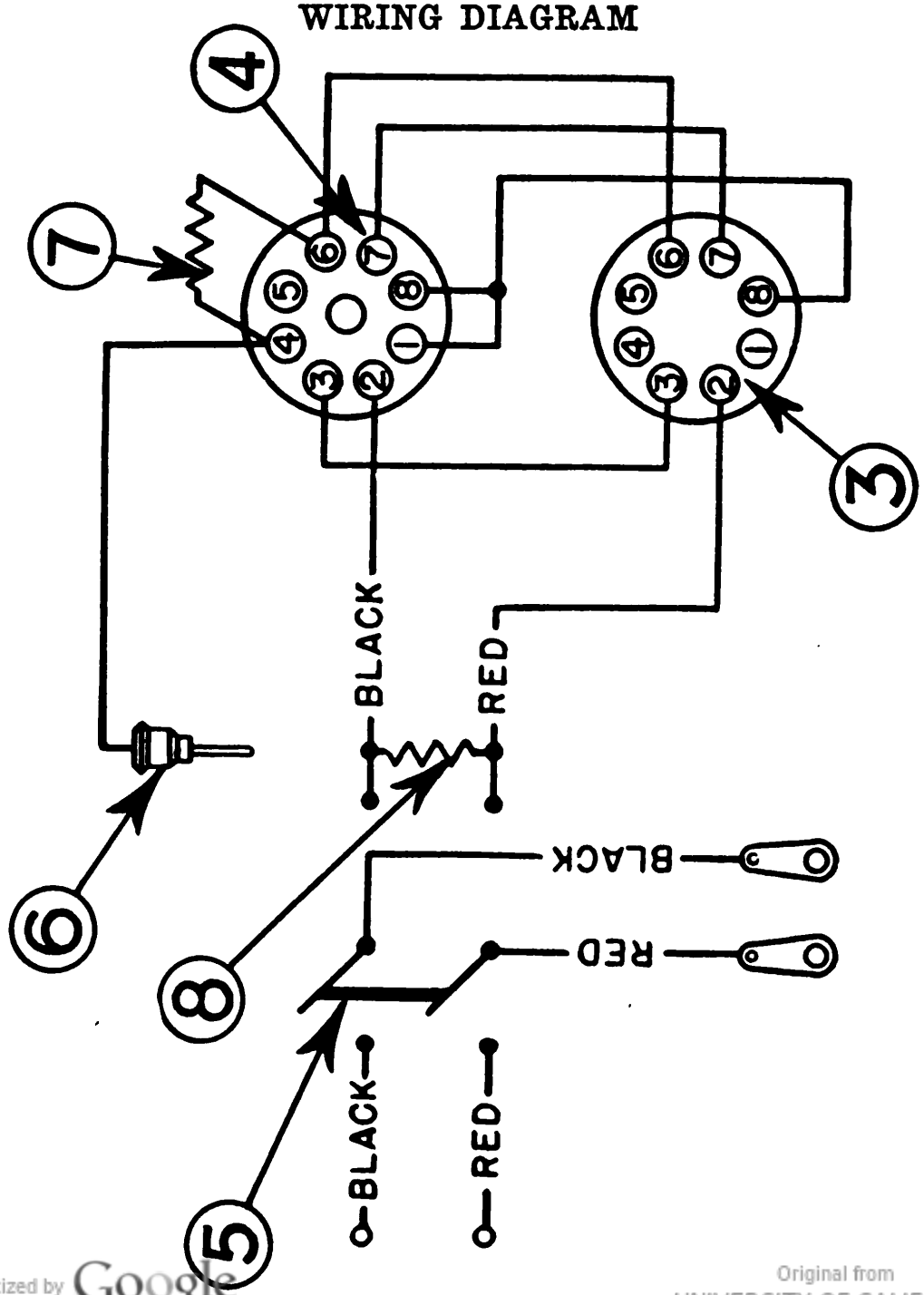
(3) Set up the alignment unit as instructed in Par. 9*a* (6), (7), and (8).

(4) Insert the metering plug in Pin No. 3 of the metering socket. With the VOLUME CONTROL full ON, adjust the adjustment screws (on top of the cans and under the chassis) of transformers T_2, T_3, and T_4 until you get a minimum reading on the meter.

(5) Insert the metering plug in Pin No. 8 of the metering socket, and adjust the primary trimmer of transformer T_5 for a minimum reading on the meter.

(6) Insert the metering plug in Pin No. 7 of the metering socket, and adjust the secondary trimmer of transformer T_5 as described in Par. 9*b* (3).

WIRING DIAGRAM



LIST OF REPLACEABLE PARTS FOR M-394 ADAPTER

Qty. in Equip.	Refr. Symbol	Signal Corps Stock Number	Part Name and Description	Function of Part	Mfgr. Code and Type No.	Contractor's Part Number
1			Bracket #20 Ga. U.S.S.S.	Support of M-394 Components	A	B-3569-A
1			Terminal Block	Connections to Receiver-Trans.	B	A-3570-B
*1	3	2Z7118.17	Plug, 8 Prong Analyzer 1⅛ Dia. x 1⅜	Adapt Loctal Tube to Locktal Socket	C A44-13	A-3572-B
*1	4	2Z8678.37	Socket, 8 Prong Top 1¼ Dia. x ¾	Adapt Loctal Tube to Locktal Socket	C 44-L	A-3575-A
*1	5	3Z9835	Switch, Line, 2 Pole, 2 Position 0.5 Amps. at 125 V.	Line Switch	D SS-3	A-2346
*1	6	2Z7111.23	Plug, Single Prong	Connect Adapter & Metering Socket	A 71-1S	A-3576
*1	7	3Z6801A8-5	Resistor, Fixed Carbon 1.8 Megohm ± 20% 1/10 Watt		E BT 1/10	A-3585-1800
*1	8	3Z6007E11	Resistor, Wire Wound 75 Ohm ± 10% ½ Watt		E BT ½	A-3584-75

* Furnished by Contractor on Maintenance Parts Group.

LIST OF REPLACEABLE PARTS FOR M-399 ADAPTER

Qty. In Equip.	Refr. Symbol	Signal Corps Stock Number	Part Name and Description	Function of Part	Mfgr. Code and Type No.	Contractor's Part Number
1			Bracket #20 Ga. U.S.S.S.	Support of M-399 Components	A	B-3571-A
1			Terminal Block	Connections to Receiver-Trans.	B	A-3570-B
*1	3	2Z7118.17	Plug, 8 Prong Analyzer 1⅛ Dia. x 1⅜	Adapt Loctal Tube to Locktal Socket	C 44-13	A-3572-B
*1	4	2Z8678.37	Socket, 8 Prong Top 1¼ Dia. x ¾	Adapt Loctal Tube to Locktal Socket	C 44-L	A-3575-A
*1	5	3Z9835	Switch, Line, 2 Pole, 2 Position 0.5 Amps. at 125 V.	Line Switch	D SS-3	A-2346
*1	6	2Z7111.23	Plug, Single Prong	Connect Adapter & Metering Socket	A 71-1S	A-3576
*1	7	3Z6803A3-9	Resistor, Fixed Carbon 3.3 Megohm ± 20% 1/10 Watt		E BT 1/10	A-3585-3300
*1	8	3Z5996-9	Resistor, Wire Wound 6.5 Ohm ± 10% ½ Watt		E BT ½	A-3584-6.5

* Furnished by Contractor on Maintenance Parts Group.

TABLE OF STANDARD NUTS, BOLTS, AND WASHERS

Quantity	Description	Size	Length	Thread	Usage
2	Round Head Mach. Bolt	5	5/16	USS 40	To Mount Switch.
2	Hexagon Nut	5		USS 40	Used With Above.
2	Lock Washer	5			Used With Above.
2	Flat Head Mach. Bolt	6	3/8	USS 32	As Terminal on Terminal Board.
4	Hexagon Nut	6		USS 32	Used With Above.
2	Flat Head Mach. Bolt	2	1/4	USS 56	To Mount Terminal Board.
2	Hexagon Nut	2		USS 56	Used With Above.
2	Lock Washer	2			Used With Above.

MANUFACTURER'S NAMES AND ADDRESSES

A Dayton Acme Co., 930 York St., Cincinnati, Ohio
B Spaulding Fibre Co., 310 Wheeler St., Tonawanda, N. Y.
C American Phenolic Corp., 1830 S. 54th Ave., Chicago, Ill.
D Stackpole Carbon Co., St. Marys, Penna.
E International Resistor Co., 401 N. Broad St., Phila., Penna.