Symptom	Probable trouble	Correction
12. Excessive signal grid current, as evidenced by abnormally high voltage from 5 to 7 on the metering socket.	Screen grid supply voltage too low. Check voltage between 3 and 7 of metering socket on PHONE position of control Ⓓ. If an abnormal reading is obtained, check resistors R124, R117, and R118. Capacitor C116 may be shorted.	Replace defective components.
	Plate supply voltage may be too low. Check variable tuning capacitor C101C for leakage. Capacitor C121 may be leaking.	Clean capacitor C101C. Replace capacitor C121.
	Overload relay K102 contacts open.	Refer to symptom 28 of this chart.
13. Improper suppressor grid bias, as evidenced by voltage reading from pins 7 to 4 on metering socket, on PHONE and MCW.	Incorrect signal grid current. The suppressor grid receives its dc bias from across relay coil K102A and resistor R107.	See symptom 12 above.
	Capacitor C117 may be shorted.	Replace capacitor C117.
14. Incorrect voltage from plate cap of tube to ground. *Caution:* There are 500 volts to ground on the plate cap of tube V103 (2E22).	Resistor R108 open.	Replace resistor R108.
	Capacitor C121 shorted.	Replace capacitor C121.
	One of coils T107, T108, and T109 may be open.	Check resistance of the coils.
15. Incorrect dc supply voltage on pin 1 of tube.	If the condition is only at PHONE, contacts 14 and 15 of relay K101 are defective.	Clean contacts of relay K101.
	Switch S105–3 is open or dirty.	Repair switch S105–3.
	Capacitor C115 is shorted.	Replace capacitor C115.
MODULATOR 3A4 (V105):		
16. No modulator voice output. No sidetone signal.	Resistor R111 or R112 open.	Check resistor R111 or R112.
	Open circuit in primary or secondary of transformer T112 or T113.	Check for continuity of transformer T112 or T113.
	Defective tube V105.	Replace tube V105.
	Jack J104 defective.	Repair and clean the jack.
17. Modulator inoperative on MCW position only of control Ⓓ. Tube dc supply voltages are normal.	Capacitor C143 defective.	Replace capacitor C136.
	Defective tube V105.	Replace tube V105.
18. No sidetone signal sent to receiver. Otherwise, modulator operates normally.	Potentiometer R115 (control Ⓖ) open or dirty.	Replace potentiometer R115.
19. Incorrect dc supply voltage on pin 3.	Resistor R113 open.	Replace resistor R113.
	Capacitor C137 shorted.	Replace capacitor C137.
	Switch S3–3 in *receiver* is defective.	Inspect and repair switch S3–3.
20. Incorrect dc supply voltage on pins 2 and 6.	Transformer T113 open between terminals 3 and 4. Choke coil L103 open.	Check for continuity.
	Capacitor C138 shorted. Capacitor C143 shorted.	Replace defective components.
	Relay K101 contacts 17 and 18 are defective.	Repair and clean the contacts.
21. Incorrect dc supply voltage on pin 7.	Resistor R110 open.	Check resistor R110.

Symptom	Probable trouble	Correction
KEYING RELAY K101:		
22. Relay does not operate when key is pressed.	Relay coil is open.	Disconnect one end of resistor R125 and test for continuity through coil of relay K101.
	Switch S101N defective.	Inspect and clean switch S101N.
	Capacitor C133 shorted.	Replace capacitor C133.
	Defective relay.	Replace defective relay.
23. Relay, contacts chatter.	Contacts do not close in the proper sequence.	Refer to paragraphs 244 through 253.
	Contacts defective.	Replace defective relay.
ANTENNA SWITCHING AND TUNING CIRCUITS:		
24. No signal fed to antenna.	All continuity checks for each position of control Ⓐ can be made with the aid of figures 81 through 84.	Replace or repair defective component.
25. INDICATOR neon bulb will not light. Signal is known to be radiated.	Resistor R122 or R123 open.	Check resistance and replace faulty unit.
	Coil L104 open.	Check continuity of coil L104.
	Defective neon indicator I101.	Replace neon indicator.
OVERLOAD RELAY K102:		
26. Overload relay fails to open.	Contacts jammed or bent.	Replace relay K102.
27. Overload relay fails to close.	Coil K102A open.	Disconnect the lead from pin 1, and check resistance between terminals 1 and 2.
28. Relay chatters.	Contacts 15 and 16 of keying relay K101 are defective.	Clean and repair the contacts.
	Overload relay coil K102B is open.	Turn control Ⓔ to OFF. Turn control Ⓓ to PHONE. Check resistance between pin 3 and ground. It should be 67 ohms; if not, coil K102B is open.

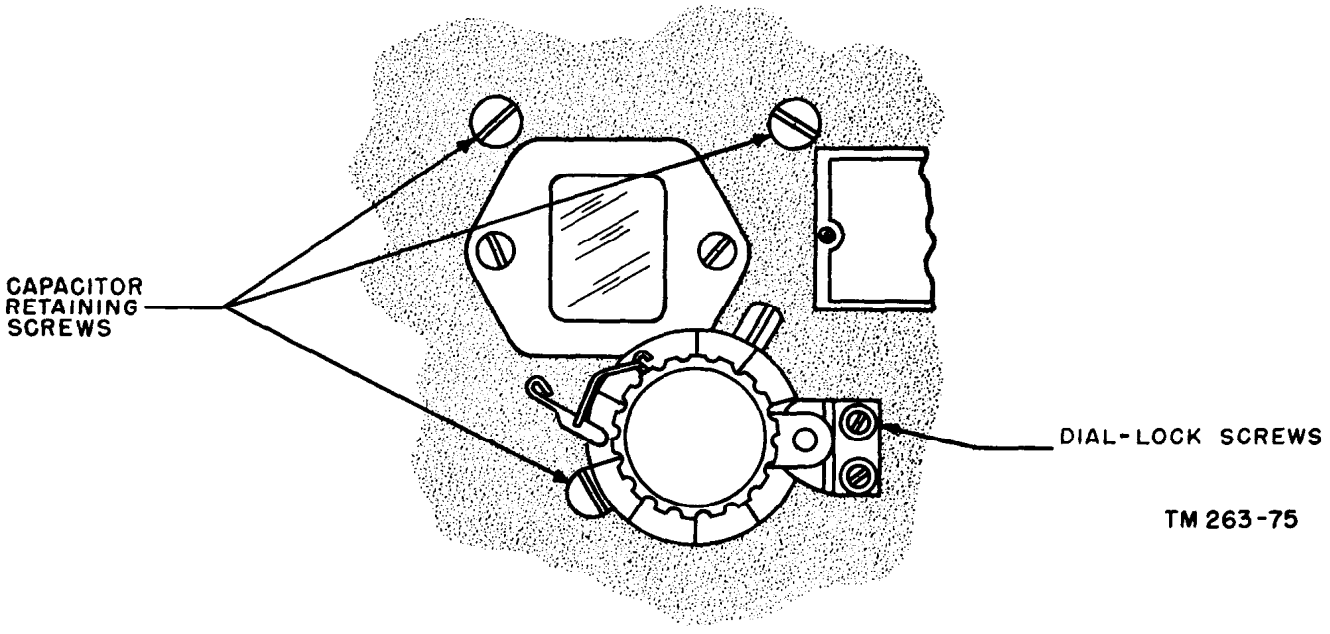


Figure 117. Transmitter capacitor and dial retaining screws.

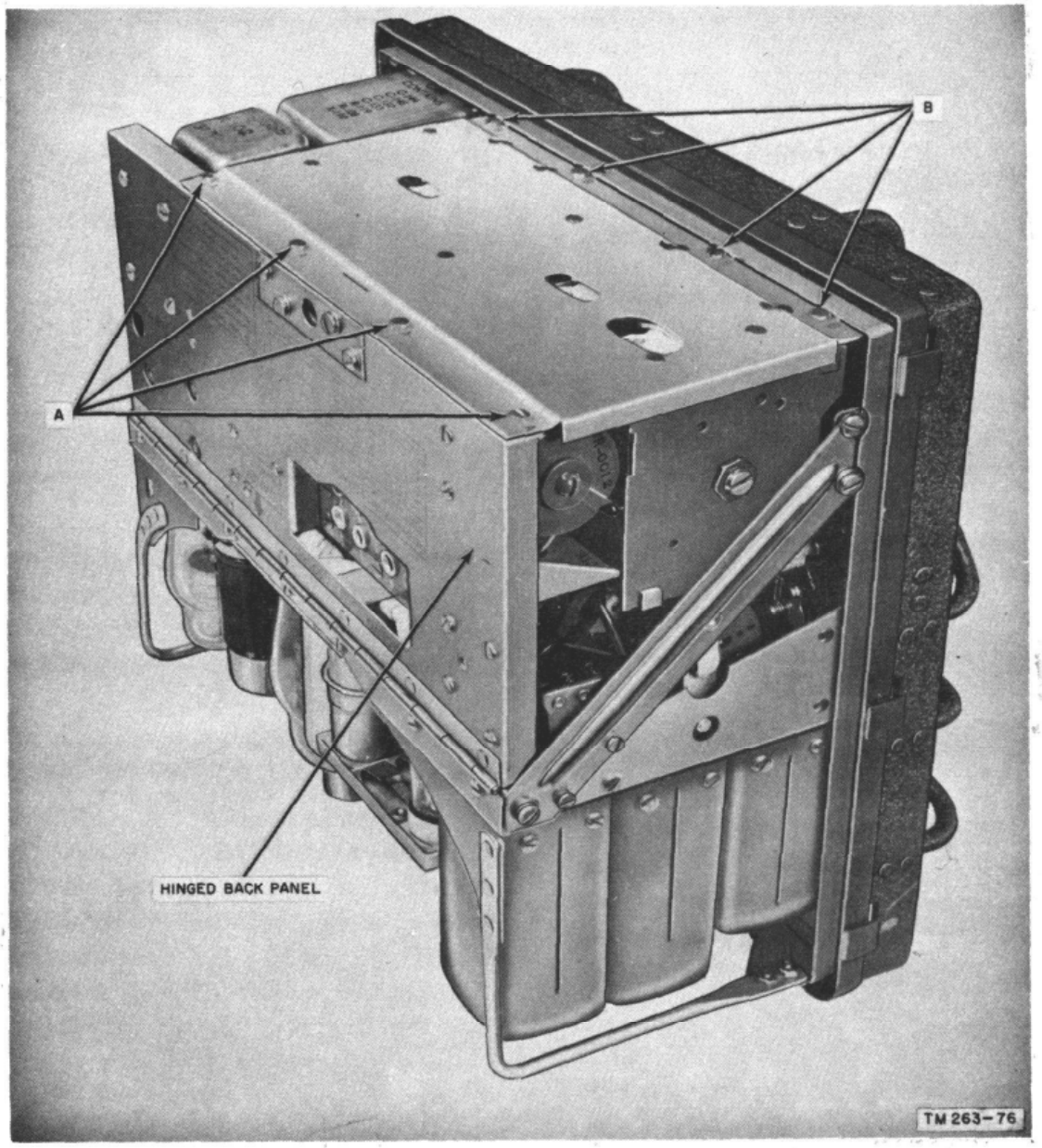


Figure 118. Location of screws A and B.

181. Transmitter Tube Socket, Voltage, and Resistance Diagram (fig. 124)

The dc voltage values given in the following diagram were made with the 20,000-ohm per volt range of the multimeter (par. 165), except those readings marked with an asterisk (*) which are measured with a vtvm. The following control settings were used:

a. Control Ⓕ at BAND 2–MO.

b. Control Ⓓ at CW–HI.

c. Control Ⓔ at SEND.

d. Supply voltage 500 and 105 volts to the plates and screen grids, and 6.3 volts to the filaments.

e. Control Ⓐ, at WHIP position, is tuned to the antenna being used. The resistance values given in the diagram were measured under the same switch conditions as the voltage charts except that the transmitter was disconnected from the receiver and *power supply*, and the mike and key were disconnected. Variations in switch positions are given in the chart at the bottom of the figure.

182. Resistance of Transmitter Coils and Transformers

To measure the resistance between several of the contacts listed, first it will be necessary to perform the steps given in the *condition* column. If these steps are not performed before the reading is taken, the value found will be in error.

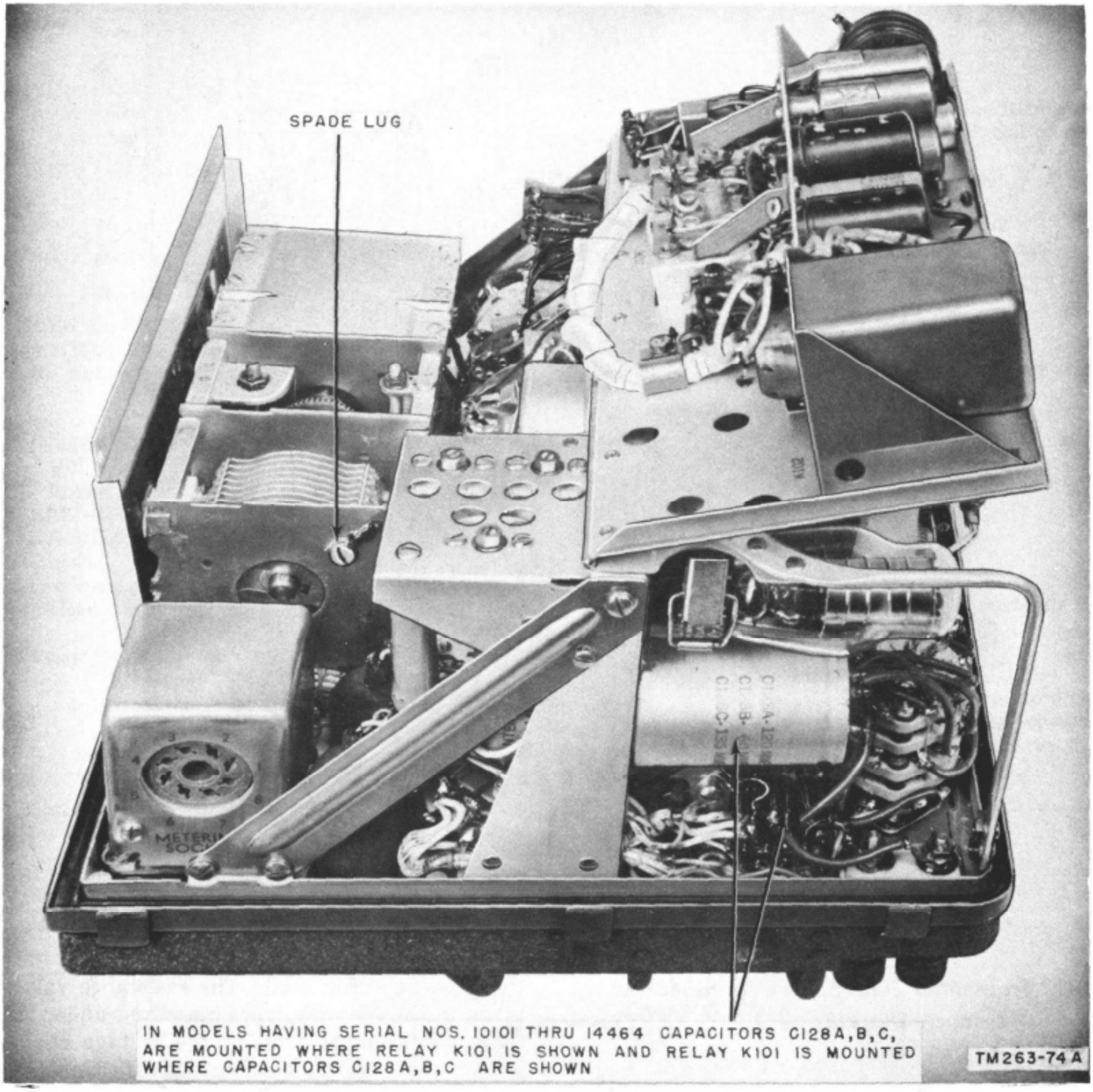


Figure 119. Back panel of transmitter shown swung up to expose tuning capacitor.

Transformer or coil	Terminals	Ohms	Condition
T101	1–3	.5 or less	Control Ⓕ in BAND 1 position.
	4–5	.5 or less	
T102	1–3	.5 or less	Control Ⓕ in BAND 2 position.
	4–5	.5 or less	
T103	1–3	.5 or less	Control Ⓕ in BAND 3 position.
	4–5	.5 or less	
T104A BAND 1	1–3	.5 or less	Control Ⓕ in BAND 1 position.
T104B BAND 2	1–3	.5 or less	Control Ⓕ in BAND 2 position.
T104C BAND 3	1–3	.5 or less	Control Ⓕ in BAND 3 position.

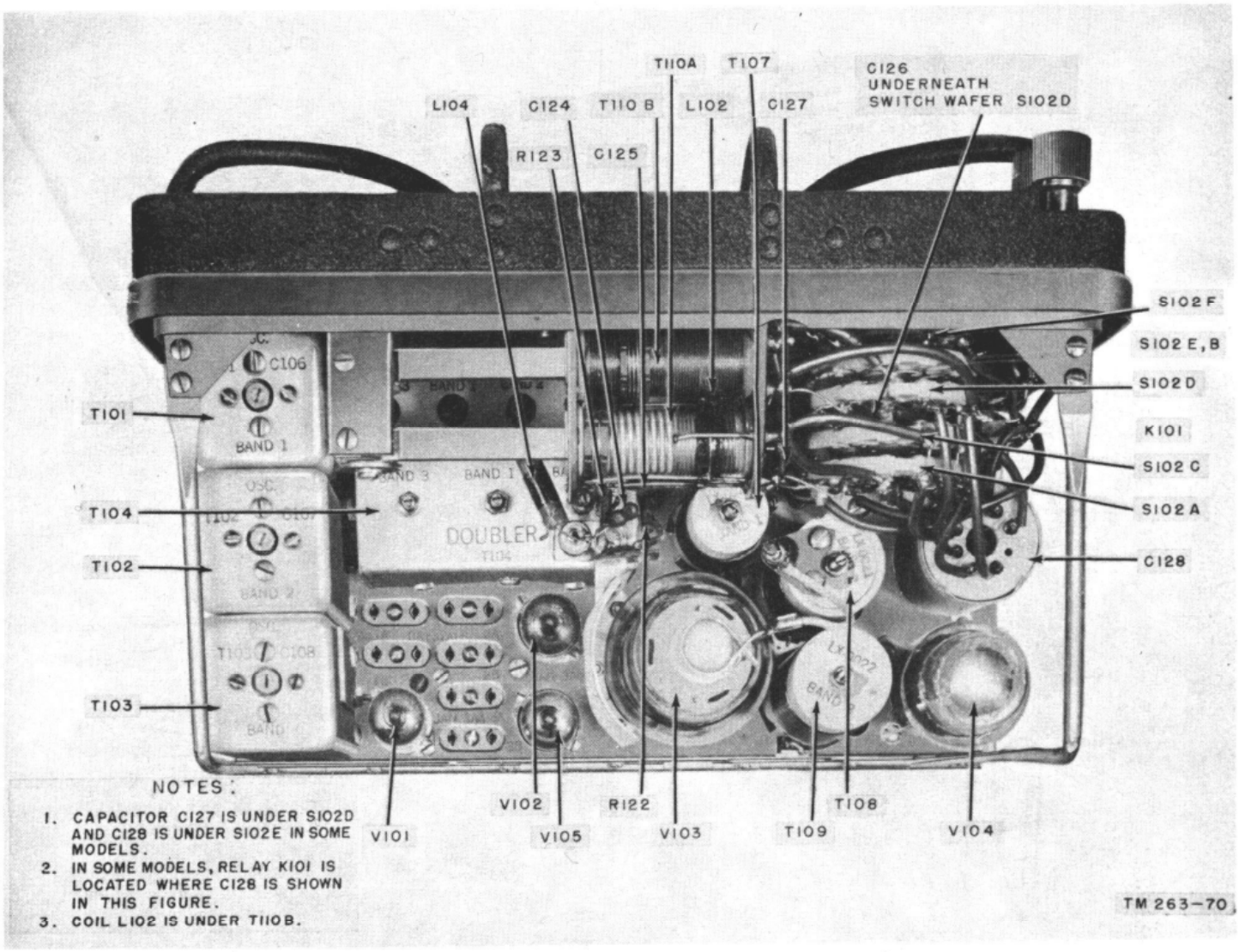


Figure 120. Transmitter parts location (top).

Transformer or coil	Terminals	Ohms	Condition
T107	1–3	.5 or less	Control Ⓕ in BAND 1 position.
T108	1–2	.5 or less	Control Ⓕ in BAND 2 position.
	3–4	.5 or less	Control Ⓕ in BAND 2 position.
T109	1–2	.5 or less	Control Ⓕ in BAND 3 position.
	3–2	.5 or less	Control Ⓕ in BAND 3 position.
T110A	1–2	.5 or less	
	3–4	.5 or less	
	1–3	.5 or less	
	5–6	.5 or less	
	6–7	.5 or less	
	5–8	.5 or less	
T112	1–2	30	Remove microphone plug from MIKE jack.
	3–4	1,100	
T113	1–2	725	Unsolder all leads to terminal 1.
	3–4	425	
T114	1–5	.5 or less	Control Ⓐ turned to position 11.
	3–4	2.0	
L101		10	
L102	1–2	.5 or less	

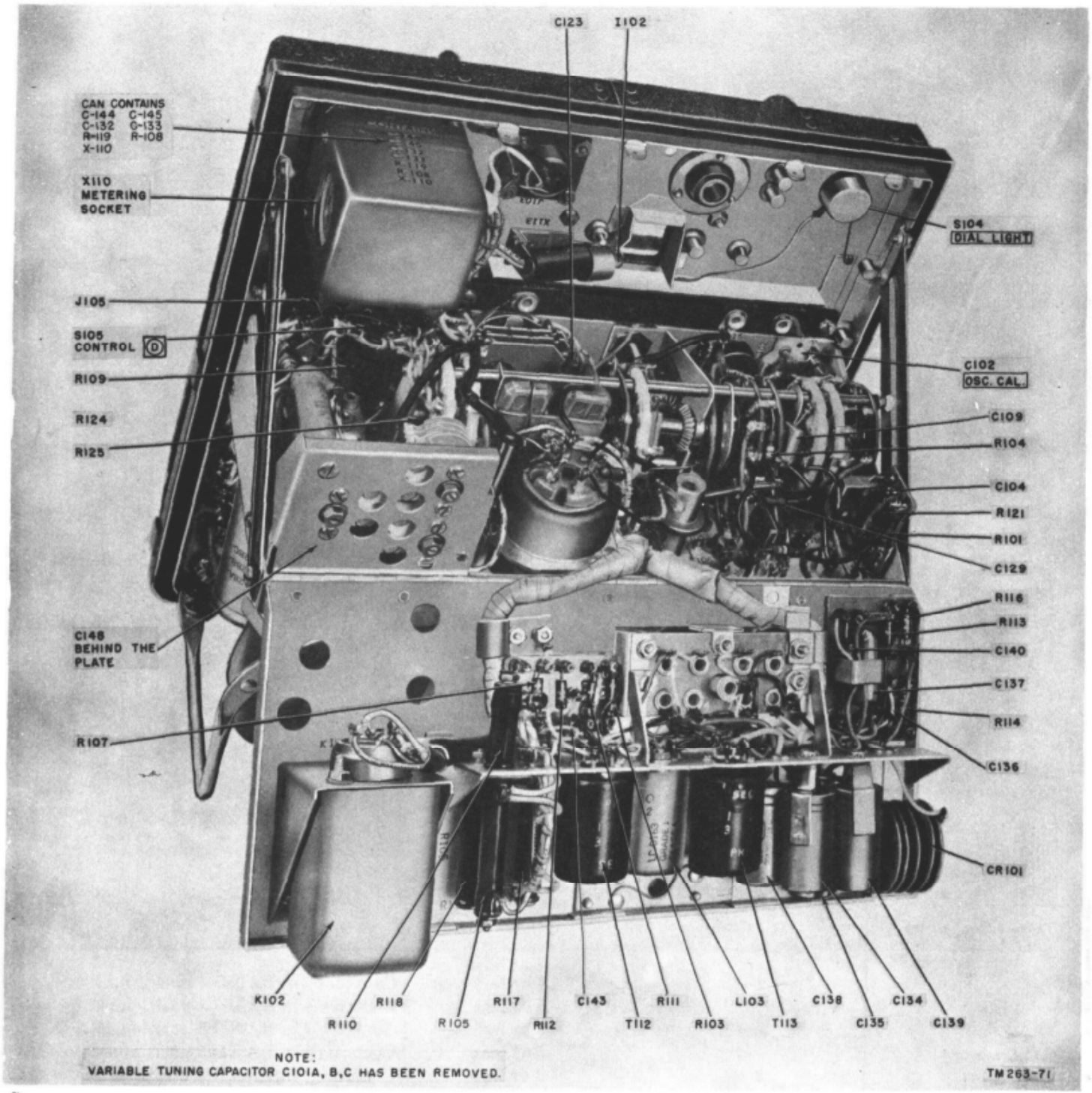


Figure 121. Transmitter parts location (bottom).

Transformer or coil	Terminals	Ohms	Condition
L103	1–2	600	
L104		1.0	
K101		11	Disconnect the lead to one of the K101 coil terminals.
K102A	1–2	5,400	Disconnect the lead to terminal 1 of relay K102.
K102B	3-chassis	67	Control Ⓔ at OFF position. Control Ⓓ at PHONE postion.

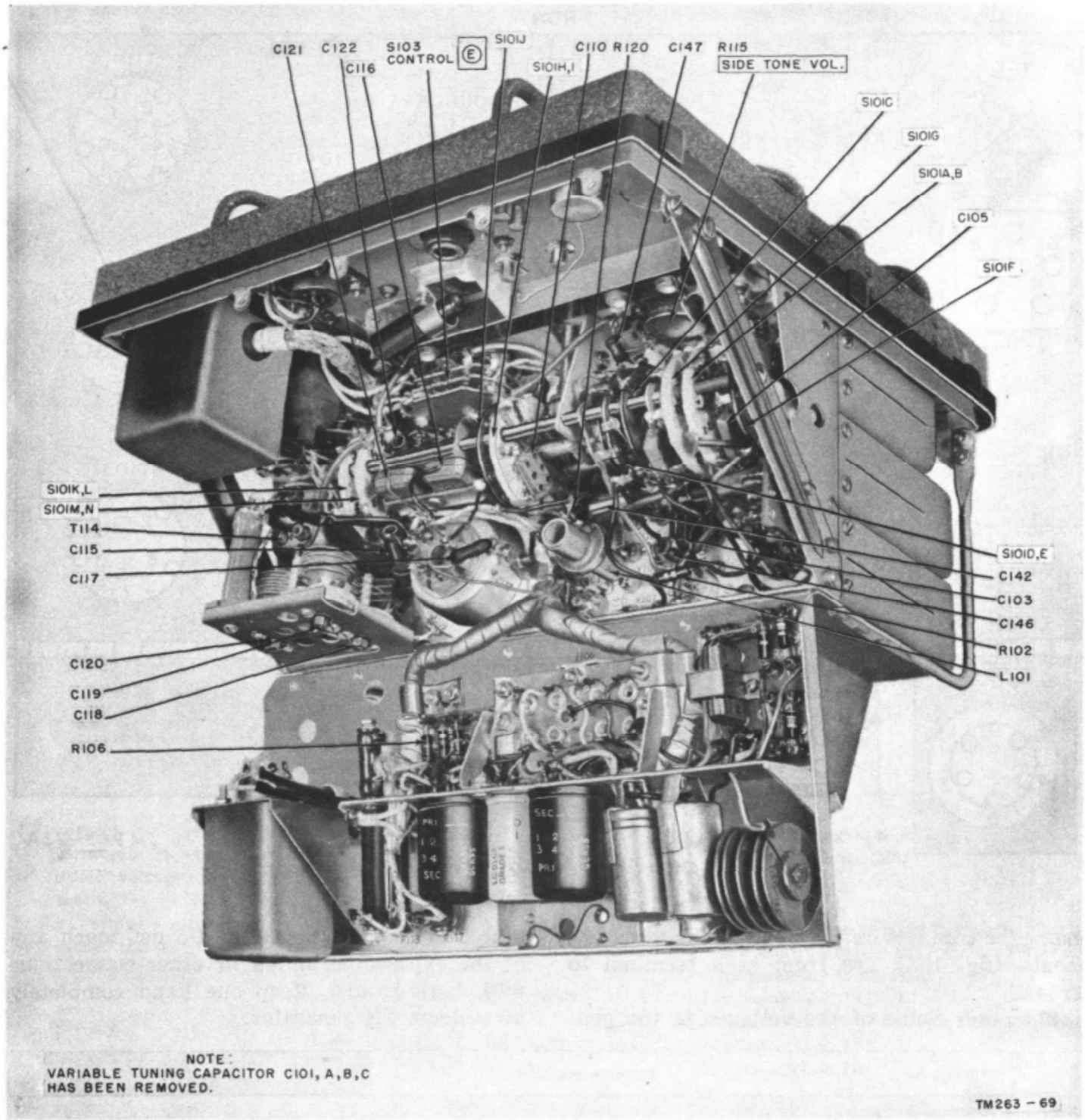


Figure 122. Transmitter parts location (bottom).

183. Sectionalizing Trouble in Generator GN–58–(*)

To test the generator under load conditions, it will be necessary to remove the top part of the housing. To accomplish this, remove the cover clamp lockscrews which fasten the cover clamps to the side of the housing. After opening the cover clamps, the top of the housing should come off easily when lifted straight up. Figure 126 shows Generator GN–58–A with the top cover removed. Next, loosen the screw which holds the terminal strip insulating cover in front of panel board 239 (fig. 128). This will expose the terminal board, and all voltage measurements can be made at full or no load,

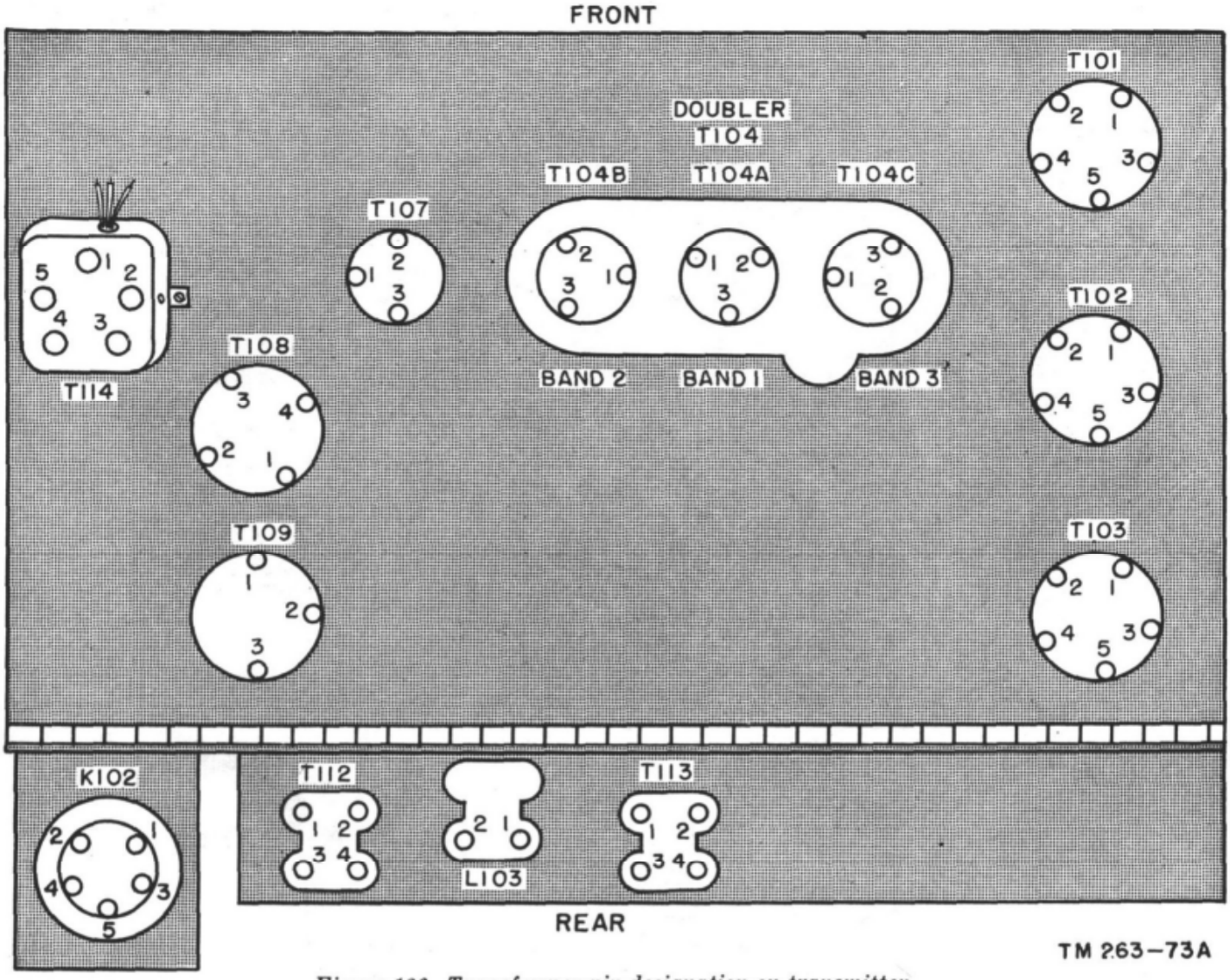


Figure 123. Transformer pin designation on transmitter.

using the contacts on the board. The measurements (fig. 168) are from each terminal to ground.

Warning: Some of the voltages in the generator are up to 425 volts. Do not touch any of the exposed terminals or other connections with both hands. Keep one hand completely away from the generator.

Symptom	Probable trouble	Correction
1. Incorrect voltages from terminals 32 and 21 to terminal 24. All other voltages are normal.	Brushes on hv armature are worn, and springs have lost their tension.	Check brushes and springs. Replace defective components. Be sure to fit new brushes (par. 184).
	Choke coil 228–1 is open.	Remove the brush to which coil 228–1 is connected and check the resistance of the coil.
Warning: There are 425 volts across terminals 32 and 24.	Capacitor 233–1 or 233–2 is shorted.	Further disassembly of generator is necessary. See paragraph 184.
	Choke coil 228–2 is open.	Further disassembly is necessary. See paragraph 184.
2. Incorrect voltage from terminals 21 to 24. Other voltages are normal.	Resistor 229 is open.	Check resistance of resistor 229.

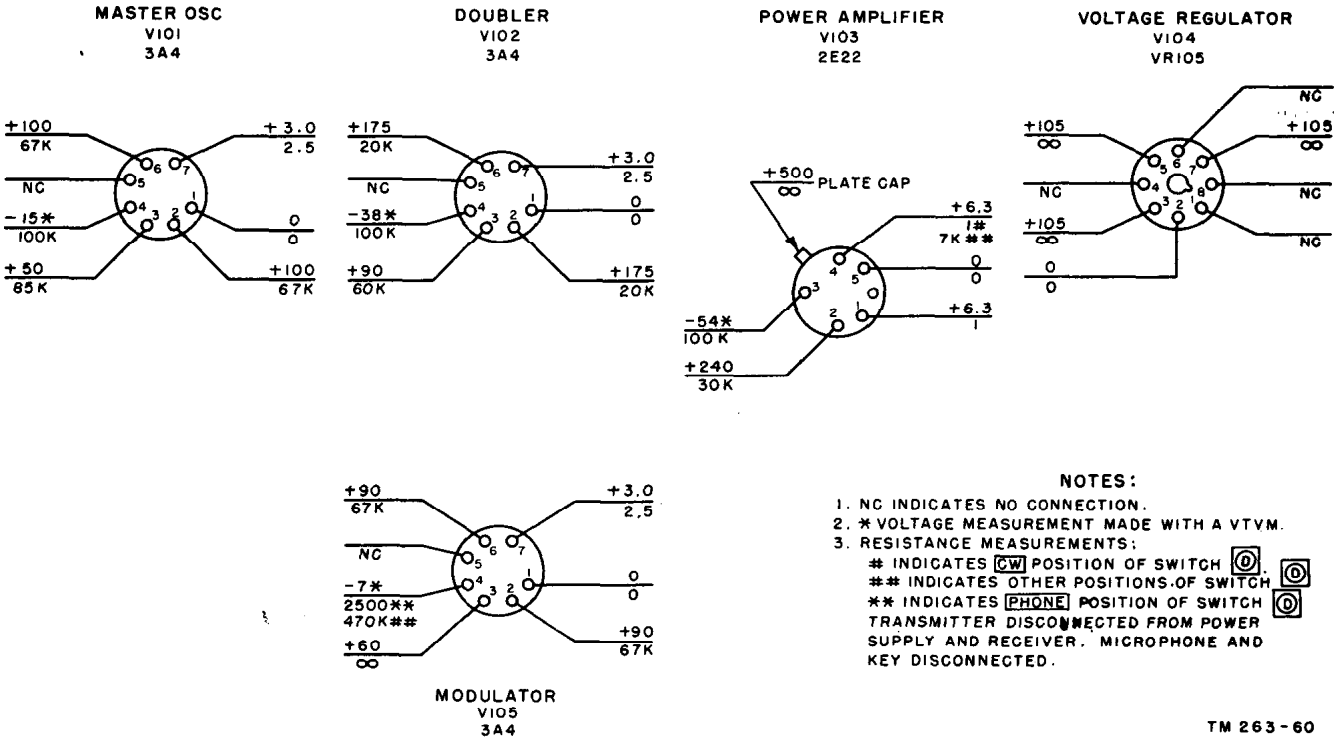


Figure 124. Transmitter tube socket voltage and resistance diagram.

Symptom	Probable trouble	Correction
3. Incorrect voltage between terminals 20 and 24.	Check the hv circuits (symptoms 1 and 2 above). If they check normal, then the lv circuit is defective, and further disassembly is necessary.	Refer to paragraph 184.
4. Incorrect voltage between terminals 23 and 24. All other voltages are normal.	Choke coil 225 open.	Refer to paragraph 184 and check continuity of choke 225.
5. No voltage output from any of the terminals.	Field coil 237–2 or 237–1 open.	Remove voltage regulator then check for continuity of field coils. Further disassembly is necessary.
	Voltage regulator is defective.	See paragraph 184.
	Resistor 245 open.	Check resistance of resistor 245.
	Resistor plaques 1 and 2 may be open.	See paragraph 184.
6. Voltage output varies within wide limits.	Voltage regulator defective.	See paragraph 184.

184. Disassembly of Generator Power Supply

To determine which component in the generator power supply is at fault, it may be necessary to remove the generator and chassis from the bottom half of the housing. The procedure is as follows:

a. Remove the crank handles and take the generator off its leg supports.

b. Remove the screws located around the flange of the right crankshaft coupling housing.

c. Insert the tip of a screwdriver between the generator housing and the coupling housing flange. Pry the assembly away from the housing as shown in figure 154.

d. Pull the crankshaft coupling (fig. 127) through the hole in the housing.

e. Remove the screws around the flange of the left crankshaft coupling housing.

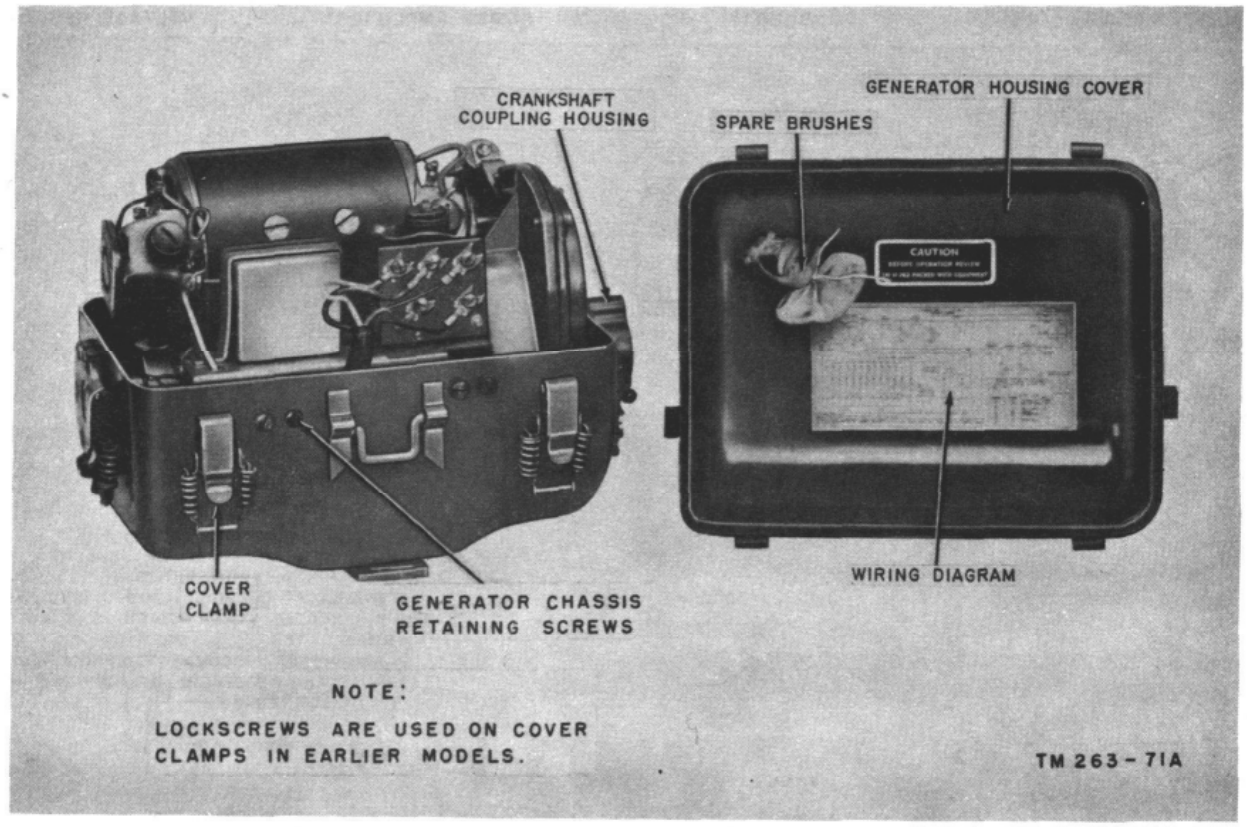


Figure 126. Generator GN–58–(*), top cover removed.

185. Localizing Trouble in Generator GN–58–(*)

Symptom	Probable trouble	Correction
1. Hv circuit defective.	Choke coil 228–1 or 228–2 is open.	Remove the positive hv brush. Check resistance of these coils.
	Capacitor 223–1 or 233–2 is shorted.	Replace capacitor.
2. Lv circuit defective.	Choke coil 225, 226, or 227 is opened.	Remove the positive lv brush. Check resistance of these coils.
	Capacitor 230 or 231 is shorted.	Replace capacitor.
3. Excessive sparking under brushes.	Worn, dirty, or cracked brushes.	Replace defective brushes. Be sure to fit new brushes to commutator. See figure 149.
4. Both high and low output voltages vary within wide limits.	Resistor 245 (fig. 169 and 170) defective.	Replace resistor 245.
	Voltage regulator defective.	Replace voltage regulator.

186. Resistances of Generator GN–58–(*) Choke Coils

Note. Remove Cord CD–1086 from power output receptacle 240 before taking resistance readings.

Coil	Ohms
225	10.5
226	.03
227	.12
228–1	7.
228–2	7.

187. Sectionalizing Trouble in Vibrator Power Supply PE–237

a. To check the voltage outputs of the power supply under load, remove the top cover and make measurements on the terminal board to which power output receptacle 734 is connected.

b. Set VOLTAGE CHANGE SWITCH 735 to the proper setting corresponding to the voltage of the battery to be used.

c. Remove the terminal board cover plate

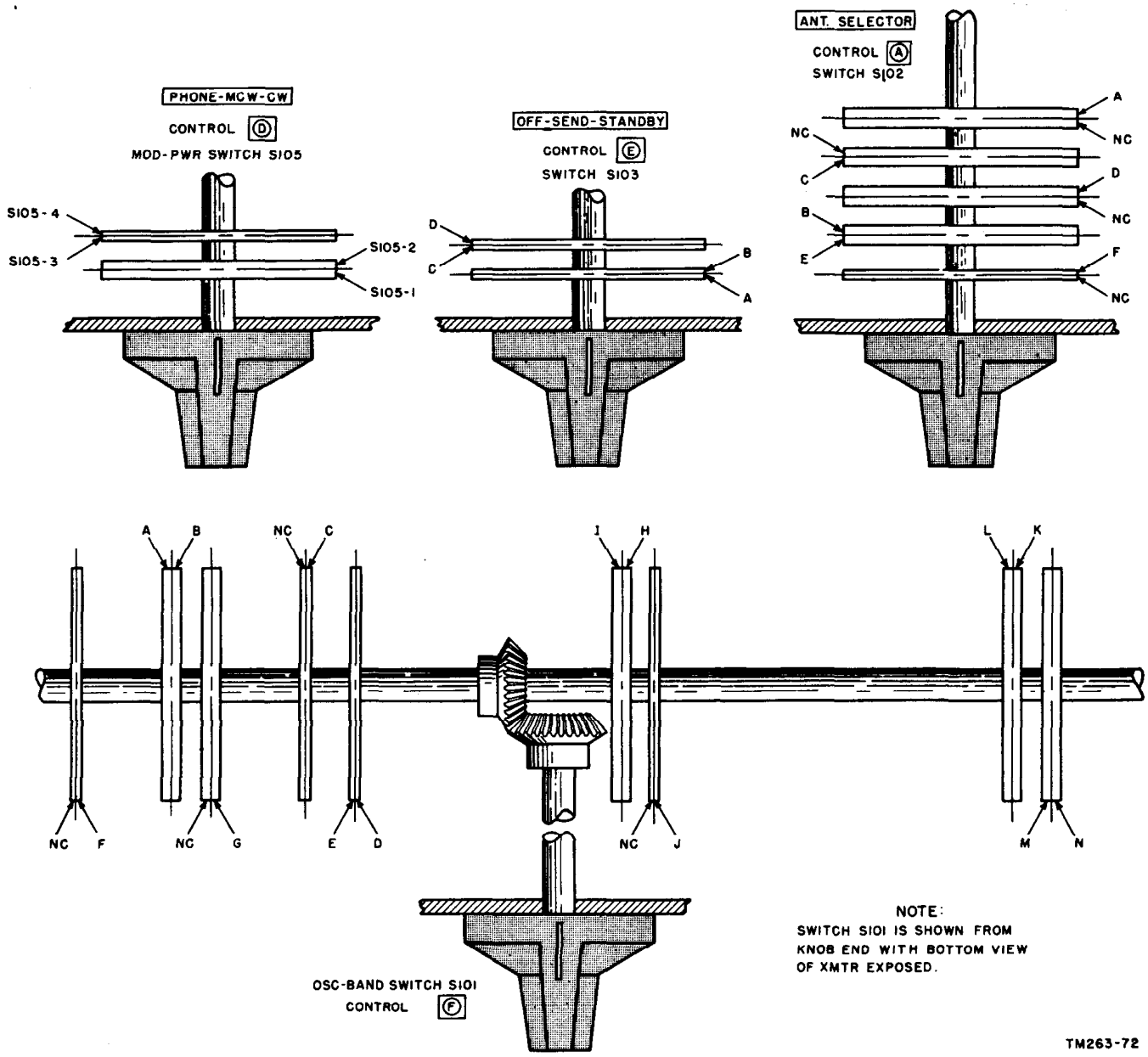


Figure 125. Transmitter wafer switch sections.

f. Repeat *c* above except to pry away the left crankshaft coupling.

g. The hole in the housing is not large enough for the left crankshaft coupling to be passed through it and out of the housing.

h. Remove the terminal strip insulating cover from in front of panel board 239, exposing the spade lug connections on the board (fig. 126).

i. Loosen the screws and remove the spade lugs completely from the board. Make a written note on the color coding of the wires connected to the terminals so that correct reconnection can be effected.

j. Remove the *chassis retaining screws* around the top of the lower half of the housing (fig. 126).

k. Again, with the screwdriver, pry the chassis away from the sides of the housing. Lift out the generator and filter assembly. With the generator removed from the housing, all the components are easily located (figs. 127–129).

Note. The spring that is attached to the Negative Temperature Coefficient resistor (par. 127*e*) is not to be adjusted unless the proper equipment is used, and then only when absolutely necessary. In no case is it a field adjustment.

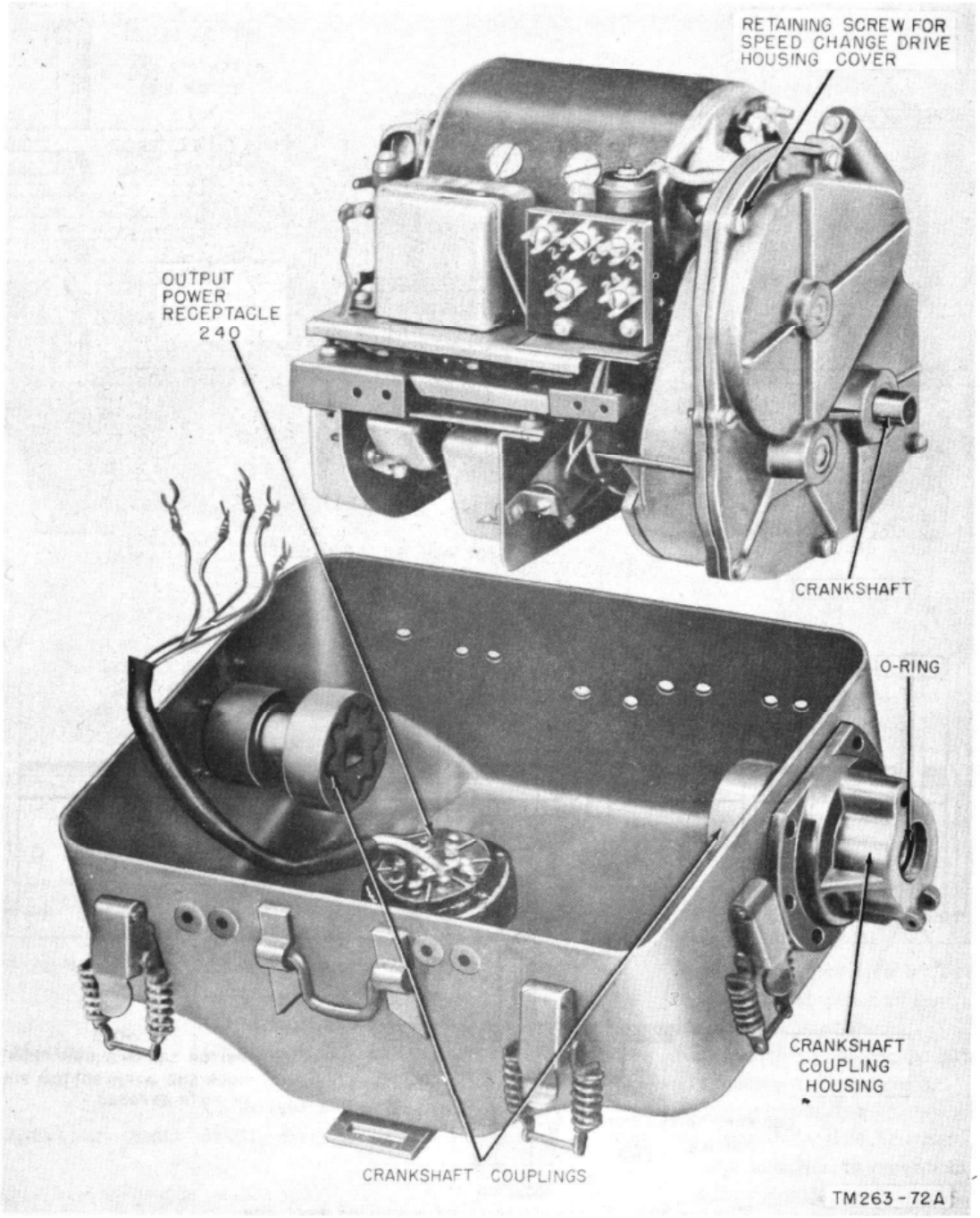


Figure 127. Generator GN–58–A, bottom half of housing removed.

(fig. 130), exposing the terminal board spade lug connections. The numbers on the board correspond to those on power output receptacle 734.

Warning: There are potentials up to 500 volts across some of the terminal board contacts. Be extremely careful when taking the following measurements.

Symptom	Probable trouble	Correction
1. No voltage output from any terminal of power output receptacle 734. No vibrator hum is heard. Control Ⓔ in transmitter on SEND or STANDBY.	Circuit breaker 728 is open or defective. Relay 726 contacts defective.	Further disassembly of power supply is necessary to check circuit breaker. See paragraph 189.

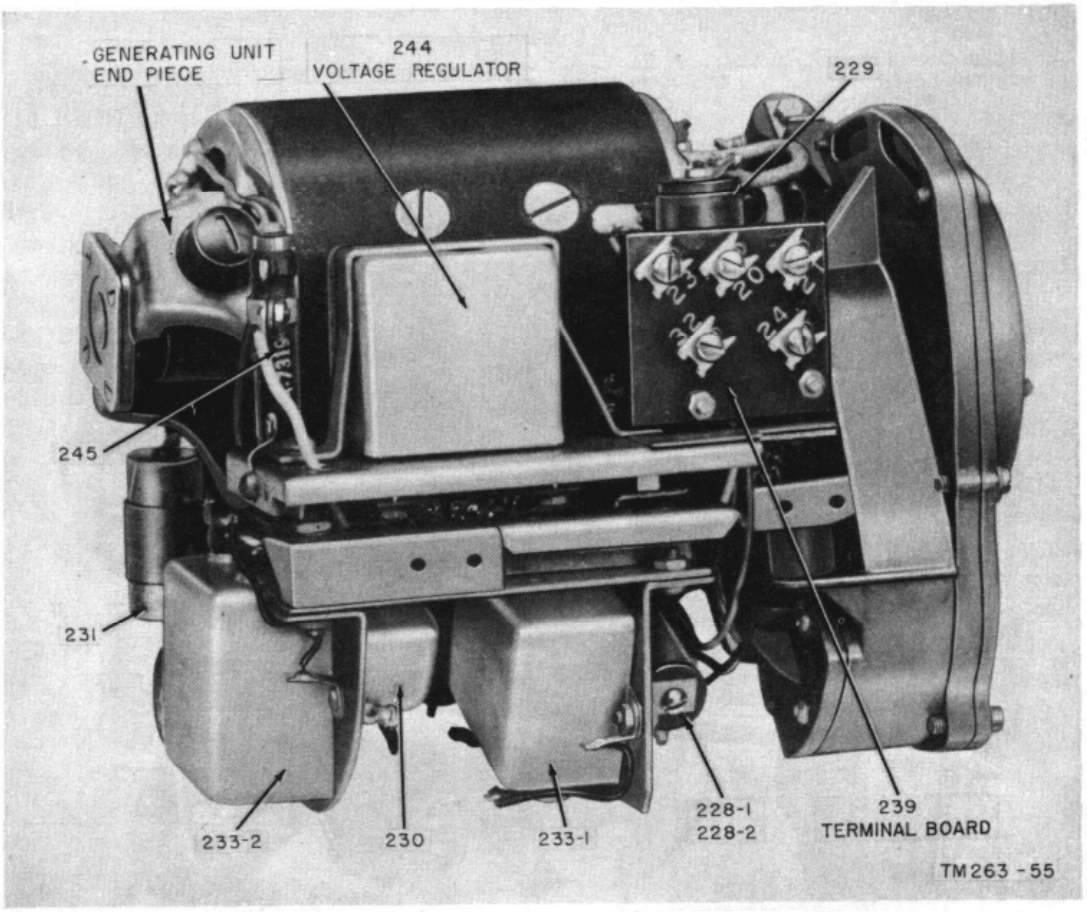


Figure 128. Generator GN–58–A, parts location (front).

Symptom	Probable trouble	Correction
2. Control Ⓔ on SEND position. No output voltage to ground terminals 20, 21, and 32. No loud hum is heard from the hv vibrator. Tube 1006 does not light. When no voltage appears on terminal 34, see item 2*b* in probable trouble column.	Vibrator VB16 is defective. Coil or relay 726 open. If low hum is heard from STANDBY vibrator, and there is normal voltage from terminals 23 and 33 of receptacle 734 to ground, then the contacts of relay 726 definitely have not been actuated, and relay coil 726 is probably open.	Replace vibrator VB16. Check continuity by: Removing Cord CD–1086 connector from output receptacle 734. Pressing ON button. Turning voltage selector switch to 6V. position. Placing one ohmmeter test prod on the positive (+) battery cable and the other in terminal 35 of power output receptacle 734. Reading should be 30 ohms. Infinite reading (∞) indicates (coil 726) is open. Refer to paragraph 189.
3. Control Ⓔ in SEND position. No voltage to ground on power output receptacle 734 terminals 20, 21, and 32. No hum heard. Voltages on terminals 22, 23, and 34 are normal.	Faulty vibrator VB16. If no vibrator hum is heard and vibrator has been replaced, something is defective in components leading to vibrator. Choke coil 704, 705–11, or 705–12 leading to vibrator VB16 may be open, if voltage outputs are normal on only one or two voltage selector switch positions.	Replace vibrator VB16. Check continuity of these coils. Remove battery. Remove Cord CD–1086. Remove vibrator VB16. Place one ohmmeter test prod on terminal 34 of power output receptacle 734. For the other test prod and also the position of the voltage selector switch, use the following table:

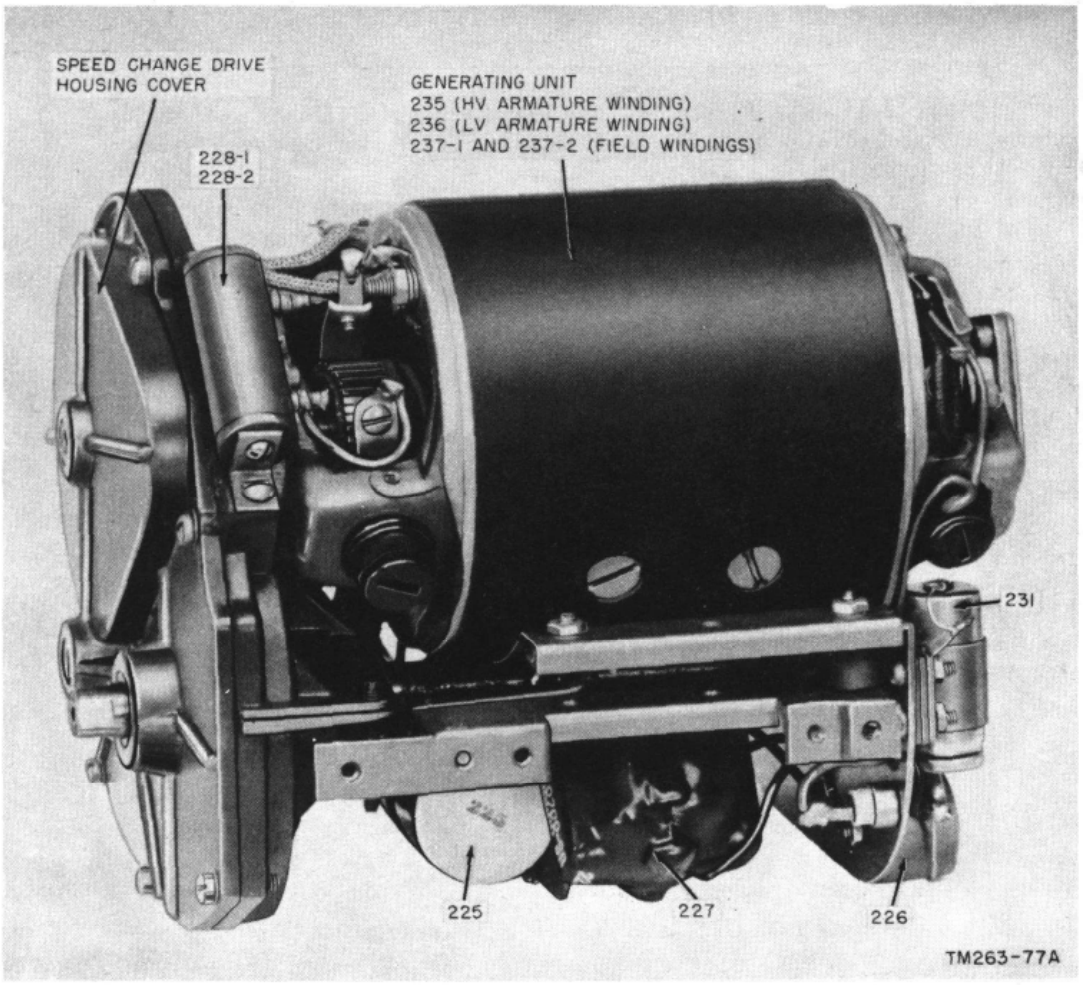


Figure 129. Generator GN–58–A, parts location. (rear).

Symptom	Probable trouble	Correction			
		Coil	Position of switch 735	Other test prod	Reading
		704	24V.	Terminal 16 of vibrator VB16 socket.	4 ohms
		705–11	6V.	Terminal 11 of vibrator VB16 socket.	1 ohm
		705–12	12V.	Terminal 16 of vibrator VB16 socket.	1 ohm
		If reading of infinity (∞) is obtained for a coil, that coil is open. Further disassembly is necessary. See paragraph 189.			

Symptom	Probable trouble	Correction
4. Control Ⓔ in SEND position. Loud hv vibrator hum heard. Tube 1006 does not light.	Faulty hv rectifier Tube 1006. Major internal defect.	Replace tube. See paragraph 189.
5. Control Ⓔ on STANDBY. No voltage output on terminals 22, 23, and 33. On STANDBY, no vibrator hum is heard. Voltage outputs are normal in SEND position of control Ⓔ.	Relay coil 727 open.	Check continuity of coil 727. Disconnect battery and press ON button. Remove Cord CD–1086. Turn voltage selector control to 6V. position. Place one ohmmeter test test prod on the positive (+) battery lead and the other prod into terminal 23 of power output receptacle 734. Reading should be approximately 10.5 ohms. If infinite reading (∞) is obtained, then relay coil 727 is open.
6. Control Ⓔ on STANDBY. No voltage output on terminal 33. Normal voltage on other terminals.	Defective standby rectifier tube 1005. Major internal defect. Vibrator VB1 defective. Choke coil 705–13 open.	Replace tube. See paragraph 189. Replace vibrator VB1. See paragraph 189.

188. Disassembly of Vibrator Power Supply PE–237

Before any further troubleshooting is at tempted, remove the unit from the housing. Proceed as follows:

a. Remove the rubber-covered cables which connect the power supply to the vehicular battery.

(1) Unscrew the clamp nuts on the battery cable bushings (fig. 130).

(2) Remove the nuts holding the battery cable lugs to the terminals on the vibrator chassis.

(3) Lift the lugs off the screws and pull the cables through the bushings, completely out of the vibrator housing (fig. 131).

Note. On some models, the bushing, gasket, flat washers, and the hexagonal nut holding these components, must be removed to pull the cable out.

b. Remove power output receptacle 734.

(1) Loosen the screws on the terminal board numbered from 20 to 35, and remove the spade lugs secured by these screws. Do not remove the screws or they may be lost. Make a written note of the color coding on the wires so that reconnection will be simplified. The color coding of the wires on top and bottom of the terminal board are identical for some units.

(2) Remove the screws around the outside flange of receptacle 734. Gently pry the flange away from the housing, and pull the entire receptacle out, including the wires attached to its terminals (fig. 131).

c. Remove the bushings, washers, and hexagonal nuts.

(1) Remove two hexagonal nuts and two flat washers from the threaded bushings.

(2) Remove two threaded bushings with the neoprene and flat washers.

d. Remove the power unit chassis from the housing.

(1) Turn Vibrator Power Supply PE–237 upside down and unscrew the six nuts on the bottom of the housing.

(2) The chassis should no longer have any connections to the housing. Lift the housing up and away from the chassis.

e. The bottom of the chassis has metal cross bracing members screwed to it. The bracing is held by screws along the sides of the chassis and two screws in the middle of the bracing (fig. 132).

(1) Unscrew the 12 screws along the sides of the chassis which hold the ends of the bracing bands. For some units, also remove the 6 flat washers and 6 neoprene washers.

(2) Unscrew the two screws in the center cross brace.

(3) Lift the bracing completely off the bottom of the chassis, exposing the wiring underneath.

189. Localizing Trouble in Vibrator Power Supply PE–237

Symptom	Probable trouble	Correction
STANDBY CIRCUIT:		
1. No voltage output on terminal 33. Voltage normal on terminals 22 and 23. Hum is heard from vibrator VB1. Control Ⓔ on transmitter is set at STANDBY.	*a.* There may be a disconnection between primary of power transformer 702–1 and contacts 2 and 3 of vibrator VB1.	*a.* Remove vibrator VB1, and check continuity of choke coils 705–13, 705–14, and 705–15. Check primary of transformer 702–1 (approximately 27 ohms). To check for continuity of switches 735–2C and 735–3A, place one test prod in contact 2 and the other in contact 3 of vibrator socket 731.
	b. Defective secondary coils of transformer 702–1.	*b.* Remove tube 1005, and check for continuity at socket 730 between pins 3 and 5 (approximately 1,500 ohms) and pins 6 and 8 (approximately 3 ohms).
	c. Defective standby rectifier tube 1005.	*c.* Replace tube.

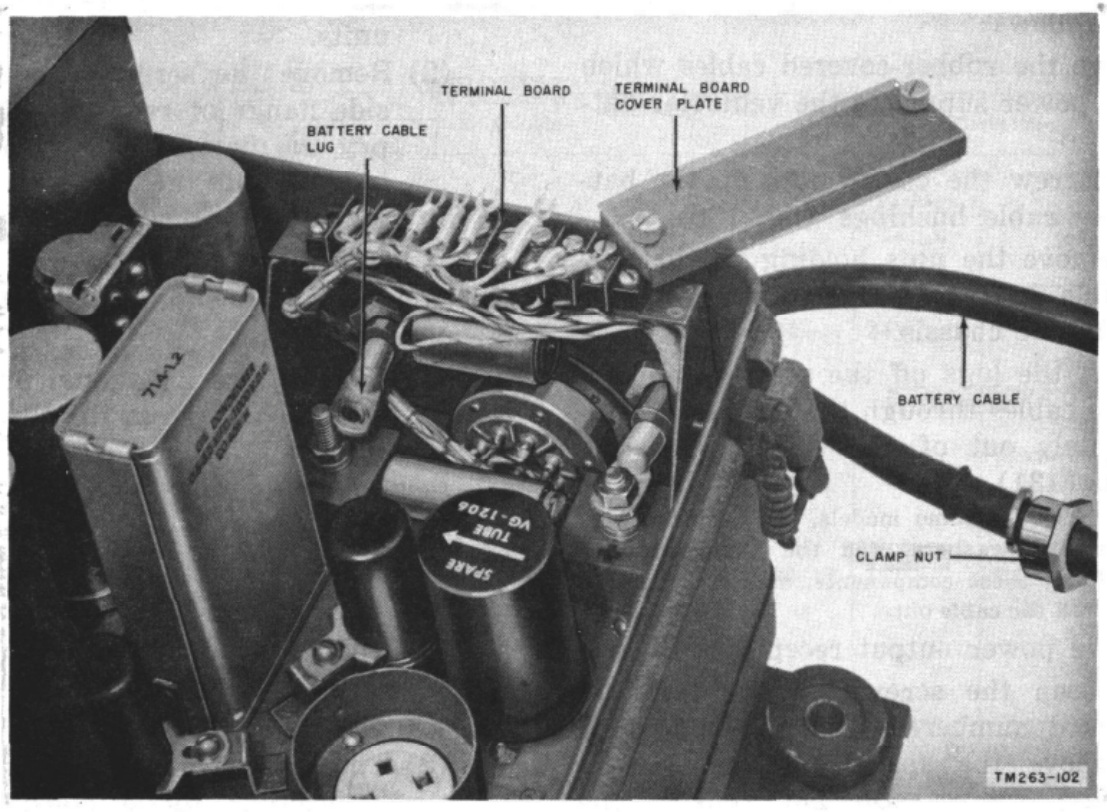


Figure 130. Vibrator Power Supply PE–237, terminal board and battery cable connections.

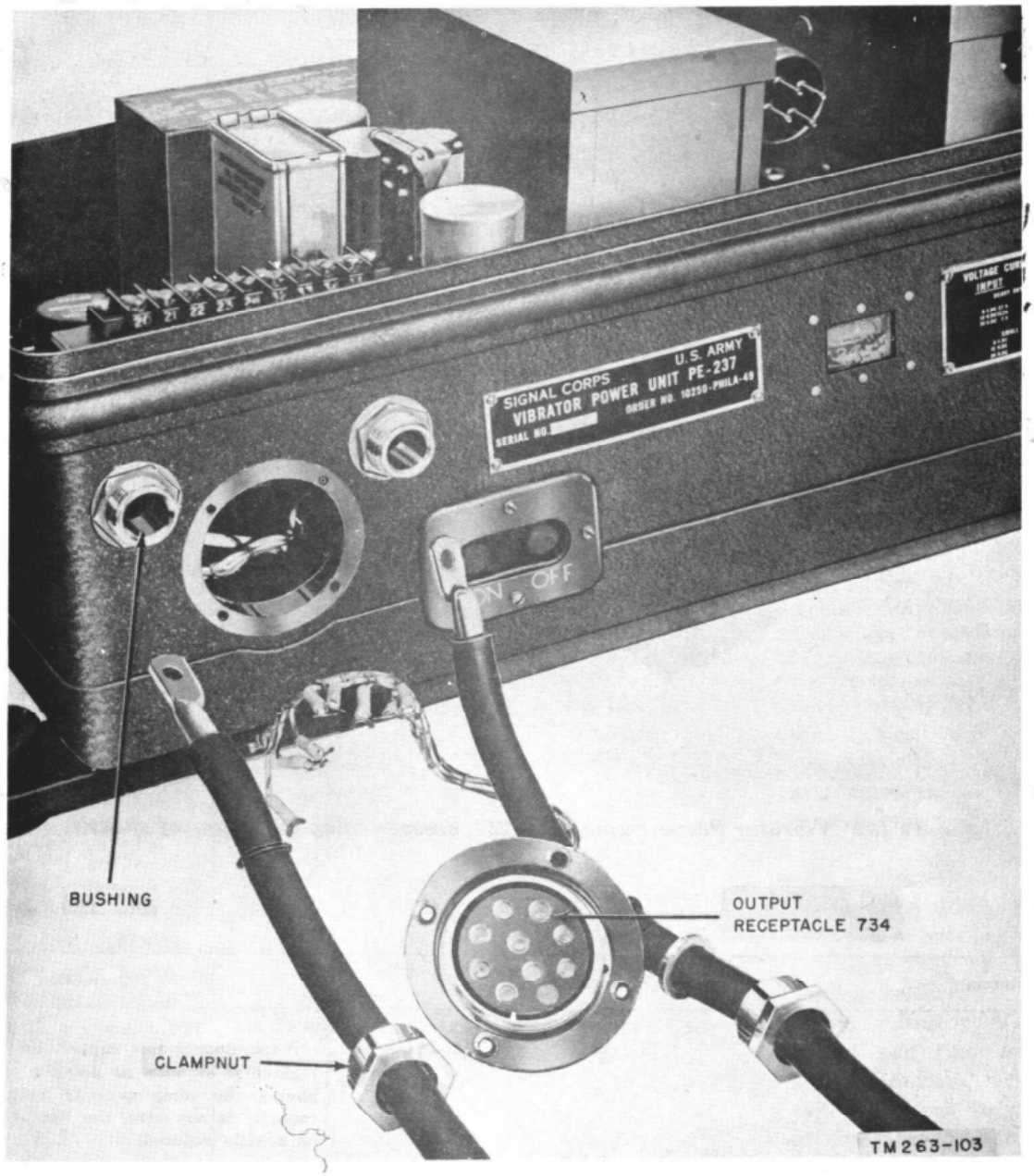


Figure 131. Vibrator Power Supply PE–237, battery cables and power output receptacle 734.

Symptom	Probable trouble	Correction
	d. Choke coil 702–4 or resistor 737 may be open.	*d.* Remove standby rectifier tube and check continuity by placing one test prod on terminal 33 of the terminal strip and the other prod at contact 6 of socket 730. A reading of 2,000 ohms should be obtained. If an infinite (∞) reading is found, check choke coil and resistor individually. If short is found, replace capacitors 707–1, 707–2, and 707–3.
	e. Shorted buffler capacitor 711.	*e.* Replace capacitor 711 with one of exactly the same capacity.

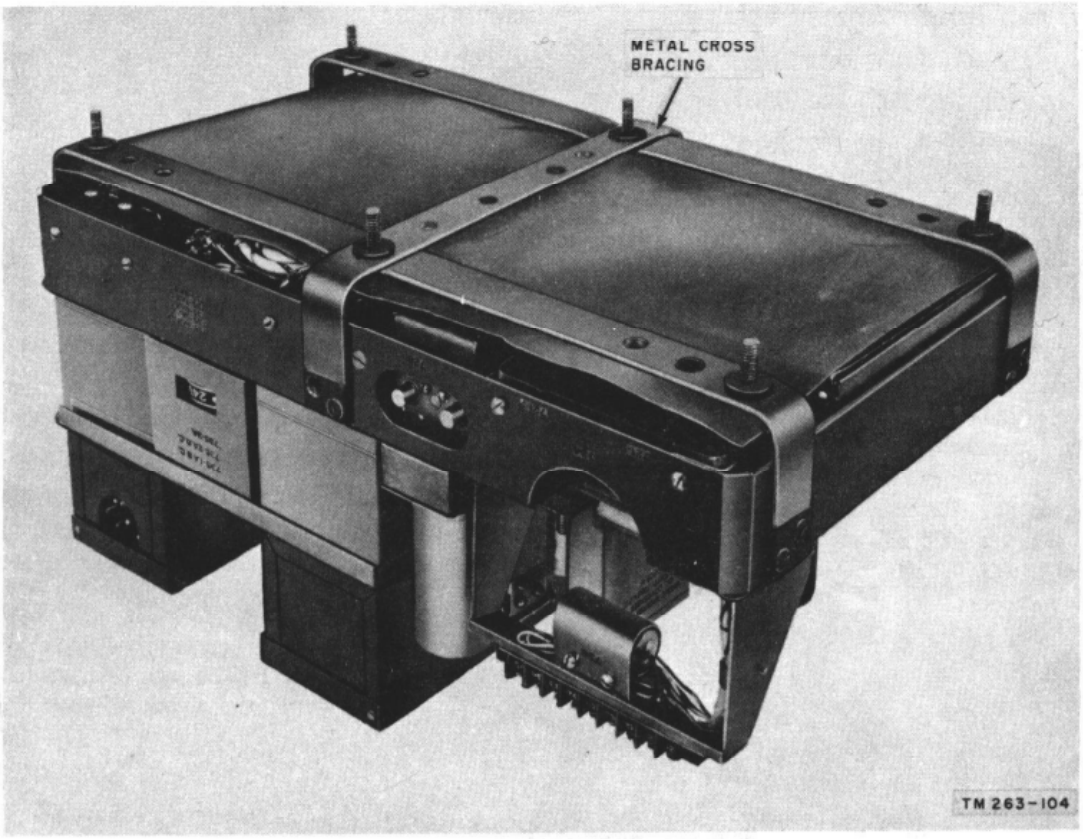


Figure 132. Vibrator Power Supply PE–237, cross bracing on bottom of chassis.

Symptom	Probable trouble	Correction
		Note. Should this capacitator become defective, replace it as soon as possible with a capacitator having the same capacity rating. If the same capacity is not used, the life of the vibrator will be greatly reduced.
RECEIVER FILAMENT SUPPLY:		
2. No voltage on terminals 22 and 23 on SEND position only of control Ⓔ.	2*a*. The 3.6-ohm section of resistor 719 is probably open.	2*a*. Check resistance of the 3.6-ohm section by placing the test prods directly across it.
	b. If the voltage output of terminal 33 is not normal, then relay coil 727 is probably open.	*b*. Check the resistance of coil of relay 727.
3. No voltage on terminal 22 and 23 on SEND or STANDBY position of control Ⓔ. No voltage on terminal 33.	3*a*. The 2.71-, 13.3-, or 26.7-ohm section of resistor 719 is open.	3*a*. Check resistance of resistor 719.
	b. Choke coil 703 is open.	*b*. Check resistance of choke coil 703.
4. No voltage on terminals 22 and 23 in SEND or STANDBY position of control Ⓔ. Voltage on terminal 33 is normal.	4. Capacitor 708–1 or 708–2 is shorted.	4. Replace capacitors 708–1 and 708–2.

Symptom	Probable trouble	Correction
KEYING RELAY SUPPLY CIRCUIT:		
5. No voltage on terminal 34, in SEND position of control Ⓔ. All other voltages are normal.	5*a*. Contacts of relay 726 are defective. *b*. Capacitor 707–1 is shorted.	5*a*. Inspect contacts. *b*. Replace capacitor units 707–1, –2, and –3.
PLATE AND SCREEN GRID VOLTAGE SUPPLIES:		
6. No voltage output on terminals 20, 21, and 32. Hv rectifier tube 1006 does not light. No hv vibrator VB16 hum is heard. Voltage output is normal on STANDBY position of control Ⓔ.	6*a*. It is assumed that relay 726 contacts and choke coils 704, 705–11, and 705–12 have been checked. *b*. Vibrator VB16 is defective. *c*. Capacitor 709–1, 709–2, 710–11, 710–12, 710–13, or 741 may be shorted. *d*. Contacts of time relay delay 743 shorted out (24V. position of switch 735).	6*a*. See paragraphs 187, symptom 2. *b*. Replace vibrator VB16 (*c* below). *c*. Remove vibrator VB16 and check the capacitor for shorts. *d*. Replace relay 743. *Note.* Vibrator VB16 may be damaged permanently if an attempt is made to operate this unit on the 24V. position with the contacts of the time delay relay shorted out.
7. No voltage output on terminals 20, 21, and 32. Tube 1006 does not light. Loud hum is heard from vibrator VB16.	7. There may be a break in the line between terminals 4 of transformers 700–1, –2, –3, –4, and 738, and switch 735–4A, –5A, –6A, –7A, and –8A.	7. Remove battery and press ON button. Check for continuity between positive (+) battery cable and terminal 4 of each of the transformers.
8. No voltage output on terminals 21 and 32. All other terminal voltages are normal. Hv rectifier tube 1006 filament does not light.	8*a*. Defective tube. *b*. Defective filament circuit. Choke coil 705–16 or 705–17 may be open. Secondary of transformer 738 may be open. *c*. Primary of transformer 738 may be open. Choke coil 705–3 or 705–4 may be open. *d*. One of capacitors 716–1 through 716–5, 739–1, and 739–2 may be shorted.	8*a*. Replace tube. *b*. Remove tube 1006, and check the resistance between pins 1 and 4 of socket 733. The reading should be close to zero. *c*. Remove vibrator VB16 from its socket and turn voltage selector switch to 24V. Check the resistance between terminals 3 and 4 of the vibrator socket. The reading should be approximately 2.5 ohms. If not, check each item individually. *d*. Replace capacitors. *Note.* If capacitators 716–1 through 716–5 become defective replace them with others of exactly the same capacity rating; otherwise, the vibrator contacts will be subjected to severe arcing.
9. No voltage output on terminals 21 and 32. Hv rectifier tube filament lights up. All other voltages are normal.	9*a*. Discontinuity in hv rectifier plate circuit. Choke coil 725–1 or 725–2 may be open. One of the secondary windings of transformer 700–1 through 700–4 may be open. *b*. Choke coil 725–3 may be open. *c*. Choke coil 702–3 may be open.	9*a*. Remove tube 1006 from socket 733. Check resistance between terminals 2 and 3 of the socket. The reading should be approximately 200 ohms. If this is not obtained, check each choke and plate circuit secondary coil individually. *b*. Check resistance of coil 725–3. The reading should be approximately 10 ohms. *c*. Check resistance of coil 702–3. The reading should be approximately 20 ohms.

Symptom	Probable trouble	Correction
	d. Capacitors 714–1, 714–2, 715, or 736 may be shorted.	*d.* Replace capacitor.
10. No voltage output on terminal 21. All other voltage outputs are normal.	10. Resistor 721–1 or 721–2 is open.	10. Check resistance from terminal 21 through terminal 32.

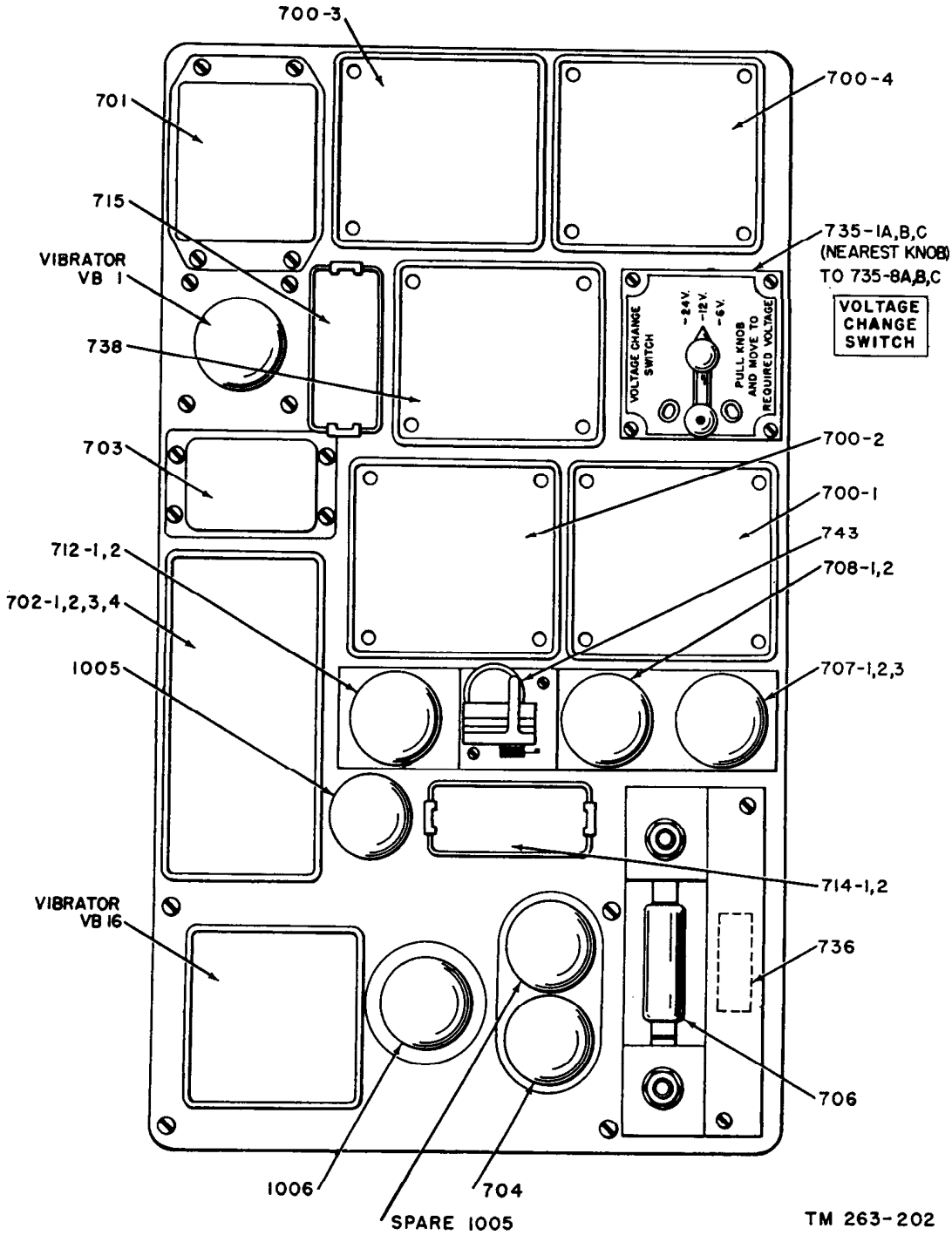


Figure 133. Vibrator Power Supply PE–237 (later models), top view, for parts identification purposes.

Symptom	Probable trouble	Correction
TRANSMITTER FILAMENT VOLTAGE SUPPLY CIRCUIT:	See figure 99.	
11. No voltage on terminal 20. All other voltage outputs are normal.	11*a*. Resistor 724 open. *b*. Choke coil 702–2 open. *c*. The selenium rectifier circuit may be open.	11*a*. Check resistance of resistor 724. *b*. Check resistance of coil 702–2. *c*. Using the lowest ohmmeter range only, place the test prods on terminals 20 and 24 on the terminal strip. The reading should be about 13 ohms. When the test leads are reversed, the reading should be above 1,000 ohms.

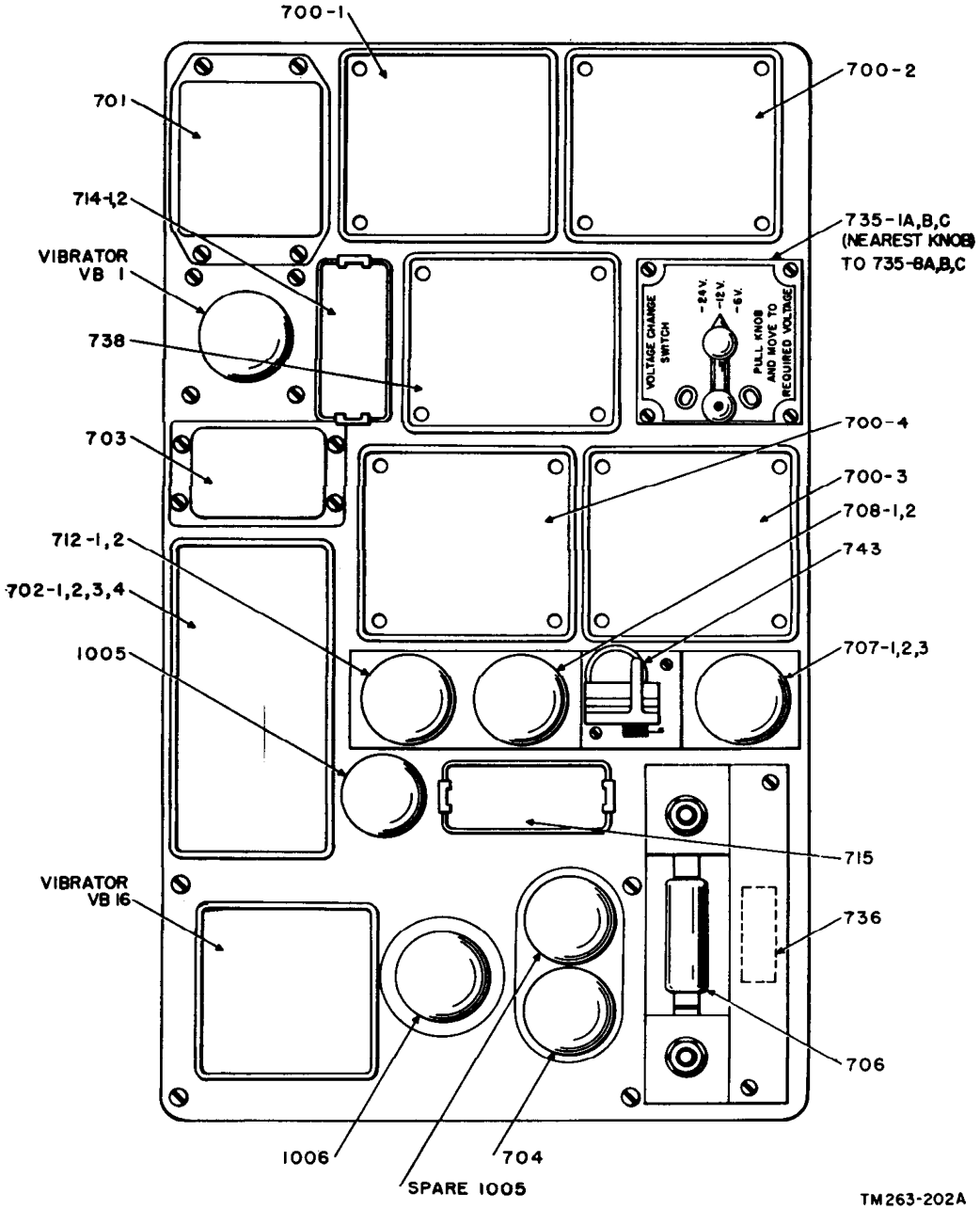


Figure 134. Vibrator Power Supply PE–237 (early models), top view for parts identification purposes.

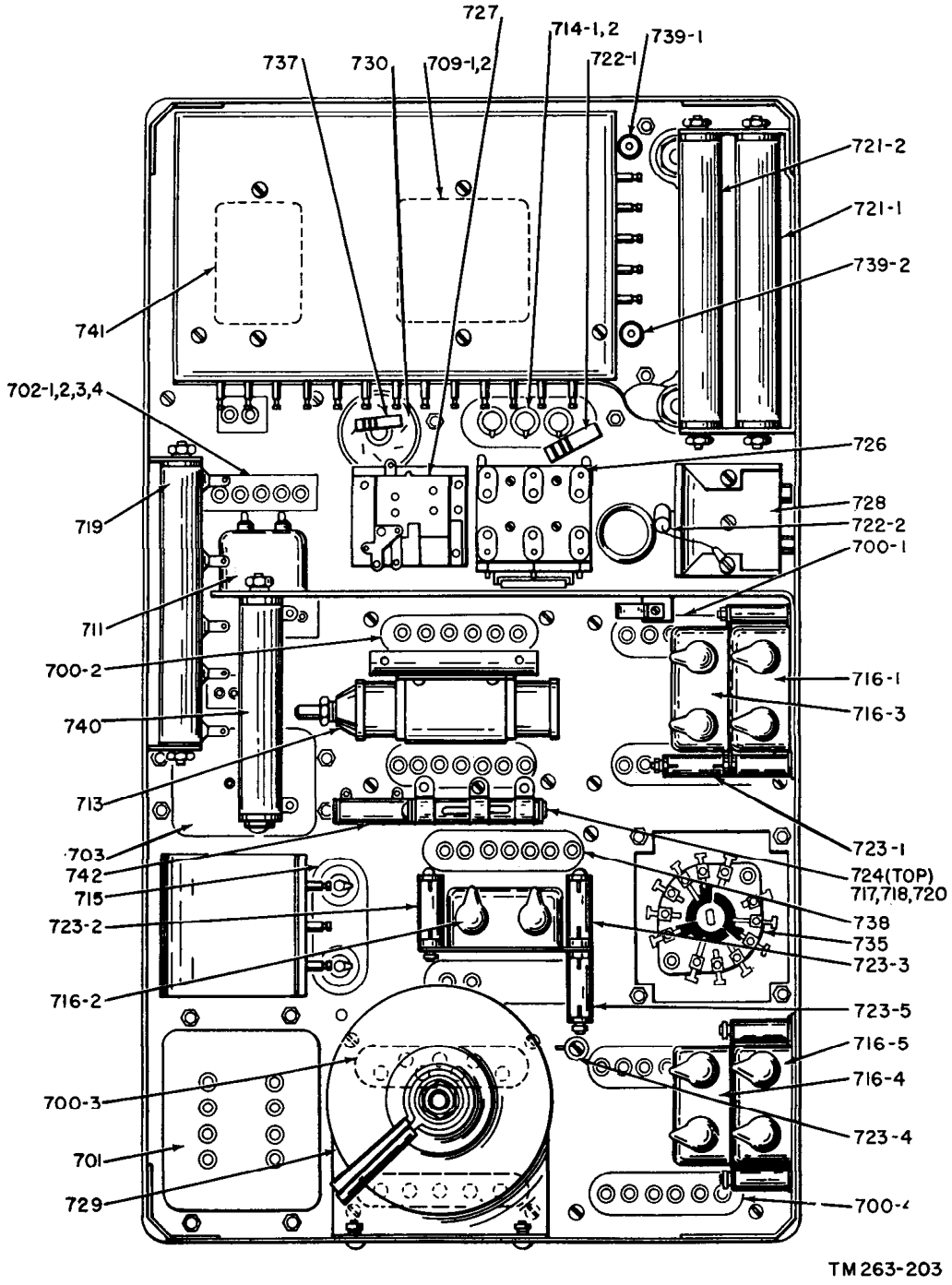


Figure 135. Vibrator Power Supply PE–237 (later models), bottom view, for parts identification purposes.

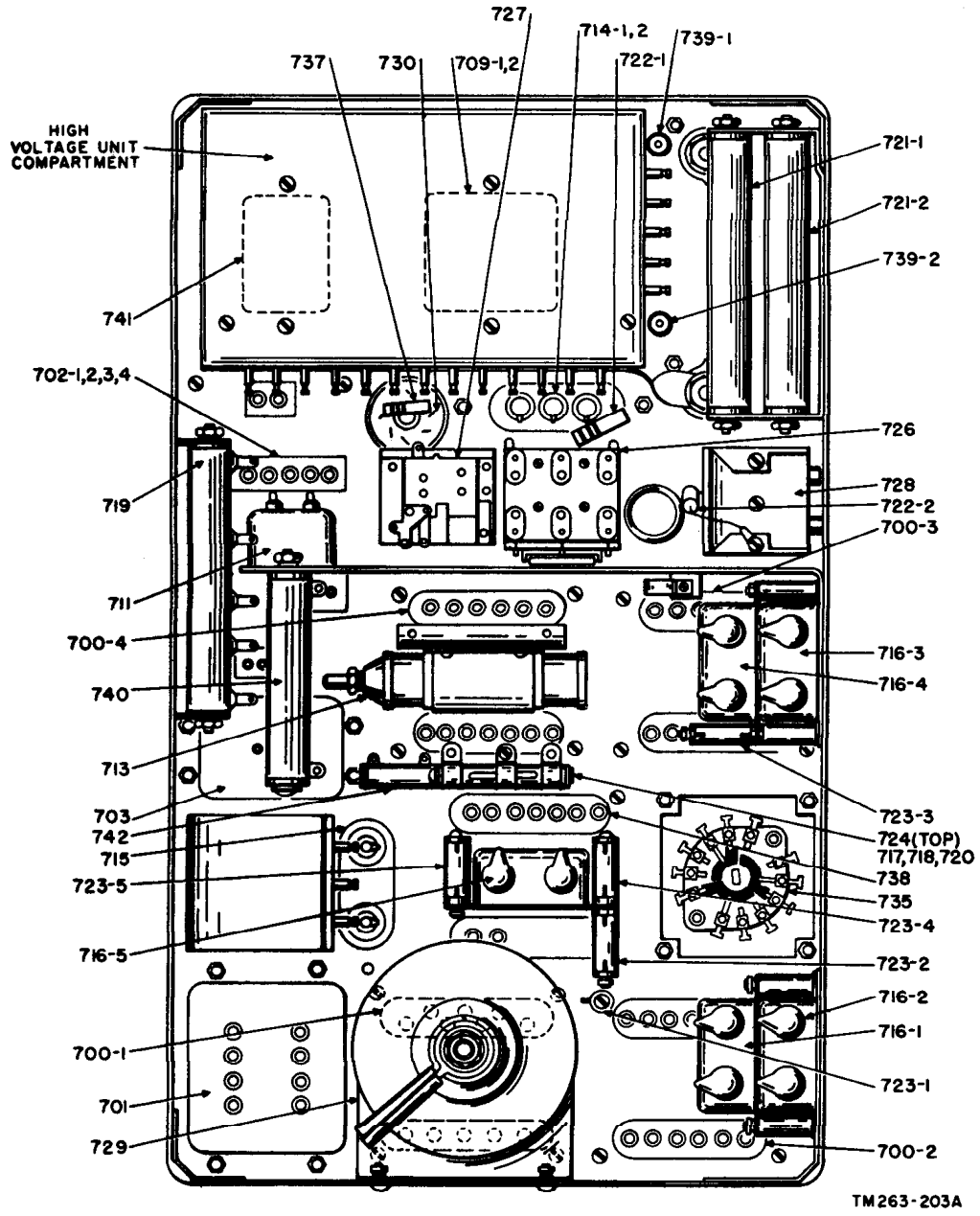


Figure 136. Vibrator Power Supply PE–237 (early models), bottom view for parts identification purposes.

190. Disassembly of Dynamotor-Power Supply DY–88/GRC–9

a. Loosen the eight clamps attached to the front panel, remove the cover, then pull the chassis out of the cover.

b. Remove the four screws holding each of the two front brush covers (fig. 141) to the dynamotor. The 12- and 24-volt brushes (fig. 144) are now accessible.

c. Remove the two screws holding the rear brush cover to the dynamotor. The 6- and 580-volt brushes are now available.

d. Capacitors C214, C215, and C229 (fig. 142) and relays K202, K203, and K204 (fig. 143) are located on the under side of the chassis, toward the rear of the unit. To reach the capacitors and relays, first remove the two screws holding bracket 0214 to the unit. Re-

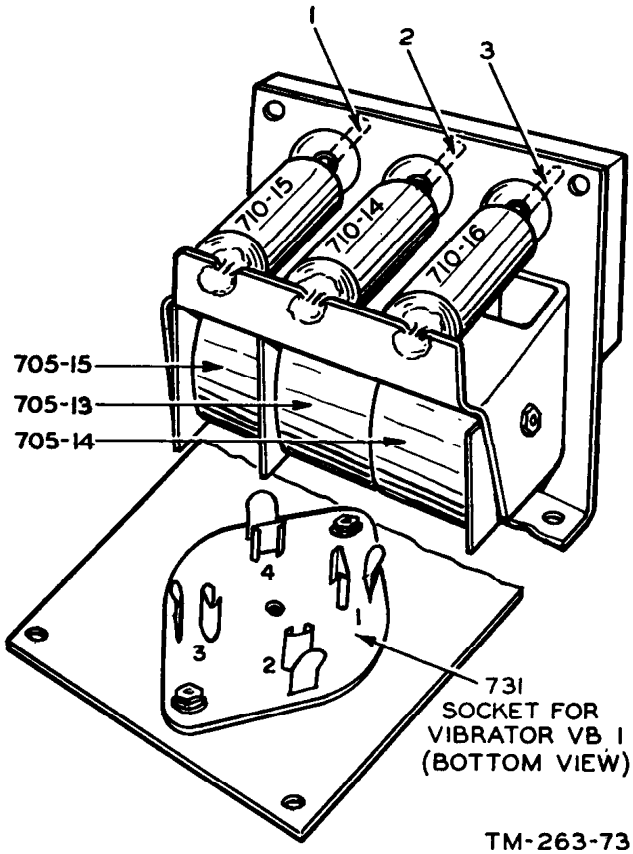


Figure 137. Shielded compartment for standby vibrator socket and filter unit, viewed from bottom of chassis.

move 0214. The capacitors and relays now can be removed.

Note. On some units, resistor R211 is mounted away from the chassis apron, and the location of capacitors C214 and C215 is reversed.

Caution: If the filter capacitors are to be removed, tag them with the serial number of the power supply. If capacitors from another supply are substituted, loss of frequency calibration of the receiver-transmitter is possible.

191. Troubleshooting Chart for Dynamotor-Power Supply DY–88/GRC–9

To troubleshoot the dynamotor power supply, remove the power supply from the case. Connect the power supply to a radio set known to be good. Set voltage selector switch control H206 (fig. 143) to the proper setting corresponding to the voltage of the battery to be used. Check the DYN. FUSE. Be sure it corresponds to the voltage of the battery to be used (par. 37*b*(6)). Note that the terminals on output receptacle J202 are numbered. Use these terminals to check the output voltage of the dynamotor power supply.

Symptom	Probable trouble	Correction
1. No voltage output from any terminal of J202. No vibrator hum is heard. Dynamotor D201 does not turn. Control Ⓔ in SEND or STANDBY.	Fuse F201 or F202 open.	Replace fuses if defective. If F202 continues to blow, check C218, C219, C222, and C223 for short.
2. No voltage output at terminal 22 and 23 of J202. Control Ⓔ in SEND or STANDBY.	Fuse F202 open.	Replace F202 if open.
	Resistor F210 open.	Replace R210 with spare.
	Relay K203 coil open.	Replace K203 if coil is open.
	Capacitor C215 or C216 shorted.	Replace C215 or C216 if shorted.
	Resistor R202 open (12-volt operation).	Replace R202 if open.
	Resistor R202 or R203 open (24-volt operation).	Replace R202 or R203 if open.
3. No voltage output from terminal 33 of J202. Vibrator does not hum. Control Ⓔ in STANDBY.	Fuse F202 open.	Replace fuse if open.
	Vibrator E201 defective.	Replace vibrator with spare.
	Contacts 3 and 7 of K203 not closing.	Check battery voltage at terminal 7 of K203. Replace relay if defective.
	For series-drive vibrator:	
	Coil 1202 open.	Replace L202 if open.
	Capacitor C217 or C220 shorted.	Replace C217 or C220 if shorted.
	Resistor R204 open (12-volt operation).	Replace R204 if open.
	Resistor R204 or R205 open (24-volt operation.)	Replace R204 or R205 if open.

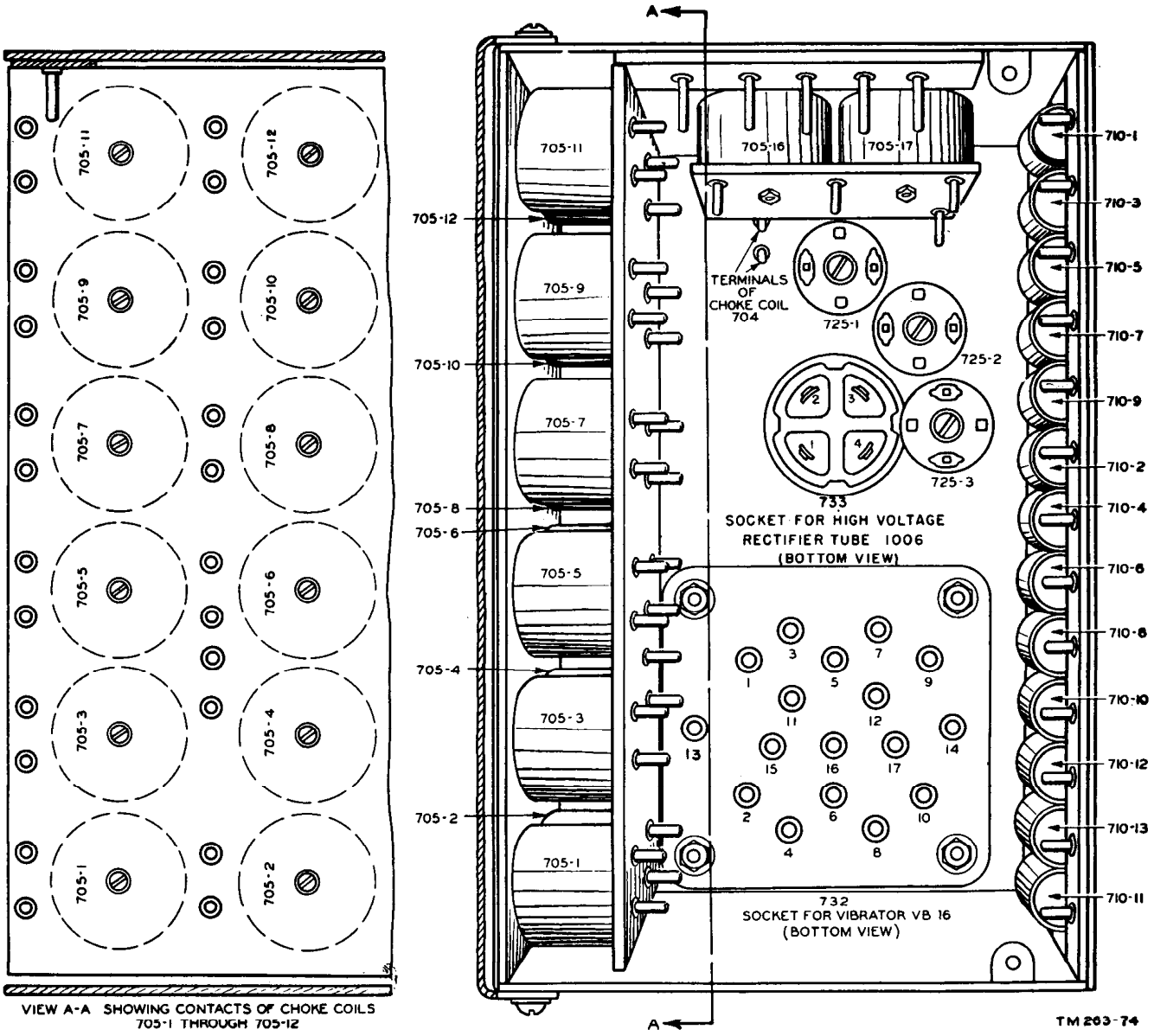


Figure 138. Shielded compartment for hv vibrator socket and filter unit, viewed from bottom of chassis.

Symptom	Probable trouble	Correction
	For shunt-drive vibrator:	
	Capacitor C225 shorted.	Replace C224 if shorted.
	Resistor R206 open (12-volt operation).	Replace R206 if open.
	Resistor R206 or R207 open (24-volt operation).	Replace R206 or R207 if open.
4. No voltage output from terminal 33 of J202. Vibrator hums. Control Ⓔ in STANDBY.	Resistor R212 or R213 open.	Replace R212 or R213 if open.
	Capacitor C226, C229A, C229B, or C230 shorted.	Replace C226, C229, C229B, or C230 if shorted.
	Open center tap to primary or secondary of T201.	Replace T201 if defective.
	S202E or S202F defective.	Repair or replace defective switch.
	Contacts 2 and 3 of K203 not closing.	Check for voltage at terminal 2 of K203. Replace K203 if defective.

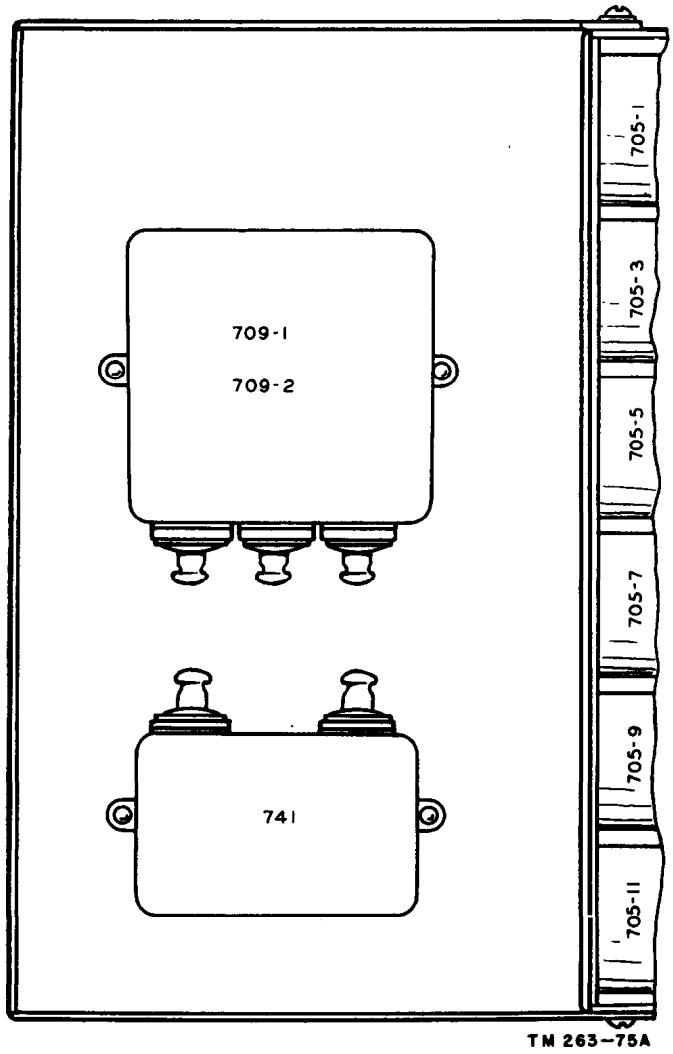


Figure 139. Inside view of door cover for hv filter compartment.

Symptom	Probable trouble	Correction
5. Low output voltage at terminal 33 of J202. Vibrator hums. Control Ⓔ in SEND.	Capacitor C227 or C228 shorted.	Replace C227 or C228 if shorted.
	Vibrator E201 defective.	Replace vibrator with spare.
	Transformer T201 partially shorted.	Replace T201 if defective.
	Resistor R212 or R113 changed value.	Check R212 and R113. Replace if defective.
	Capacitor C229A or C229B leaking.	Replace C229A and C229B if either is leaking.
6. Low voltage at terminal 33. Control Ⓔ in STAND-BY or SEND position.	Secondary of transformer T201 open between terminals 1 and 2 or between terminals 2 and 3.	Check continuity between terminals 1 and 2 and 2 and 3 of transformer T201.
	Choke L203 open.	Check continuity between terminals with vibrator removed from socket.
	Choke L206 open.	Check continuity of choke L206 with vibrator removed from socket.
	Resistor R212 increased in value.	Check R212. Replace if defective.

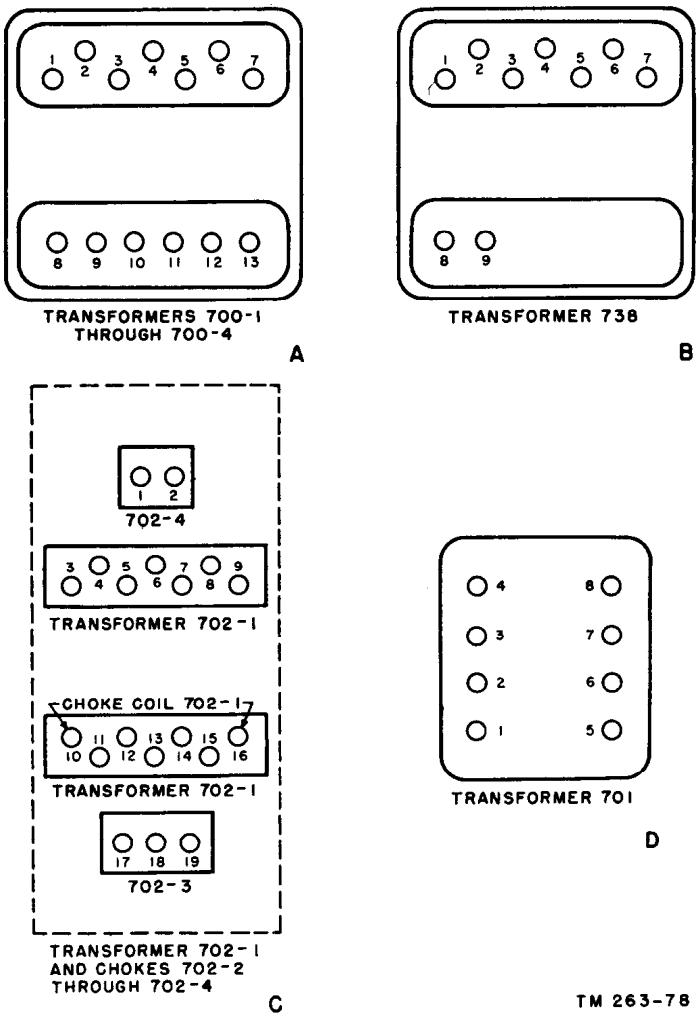


Figure 140. Vibrator Power Supply PE-237, transformer and choke coil terminal designations.

Symptom	Probable trouble	Correction
7. No voltage at terminal 21 with control Ⓔ in SEND position. No voltage at terminal 33 with control Ⓔ in STANDBY position.	Vibrator E201 defective.	Replace vibrator E201.
8. No voltage output from terminal 21 of J202. Vibrator hums. Dynamotor D201 runs. Control Ⓔ in SEND.	Capacitor C231 shorted.	Replace capacitor C231.
	Contacts 3 and 4 of relay K202 open.	Check for voltage at terminals 3 and 4 of relay K202.
	Resistor R212 open.	Check for voltage at each end of resistor R212.
	Capacitor C229A or C229B shorted.	Replace capacitor C229A and C229B.
9. No voltage output from terminal 20, 32, or 34. Dynamotor D201 does not run. Control Ⓔ in SEND.	Fuse F201 of F202 open.	Replace fuse F201 or F202 if open. If F201 continues to blow, check C201, C202, C203, C204, C205, C206, C210, C211, and C212 for short.
	Coil of K201 or K202 open, or contacts 11 and 12 of K702 not closing.	Replace K201 or K202 if defective.
	Switch S201 or S202 defective.	Repair or replace S201 or S202 if defective.

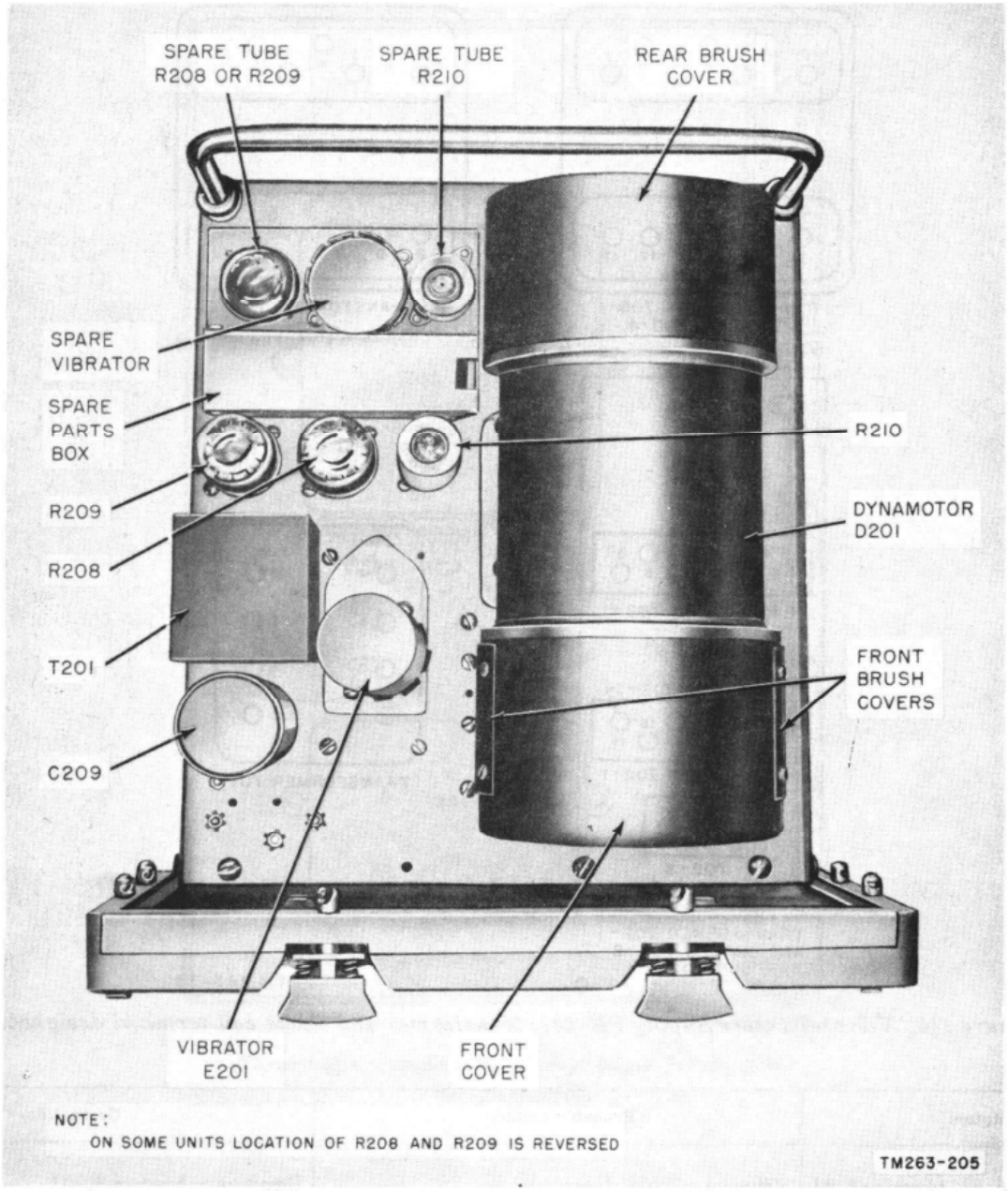


Figure 141. Dynamotor-Power Supply DY–88/GRC–9, top view of chassis.

Symptom	Probable trouble	Correction
10. High voltage at terminal 20. Receiver-transmitter in PHONE-SEND position. Microphone button released.	Resistor R211 open. Contacts 3 and 5 of relay K204 open.	**Replace resistor R211. Check for voltage at terminals 3 and 5 of K204.**
11. Lv output from terminal 20. Control Ⓔ in SEND.	Contacts 3 and 7 of K204 open.	**Replace K204.**
12. No voltage output from terminal 20 of J202. Output from terminals 32 and 34 normal. Control Ⓔ in SEND.	Capacitor C214 shorted. Ballast resistor R208 or R209 open.	**Replace C214 if shorted.** **Replace R208 or R209 if defective.**

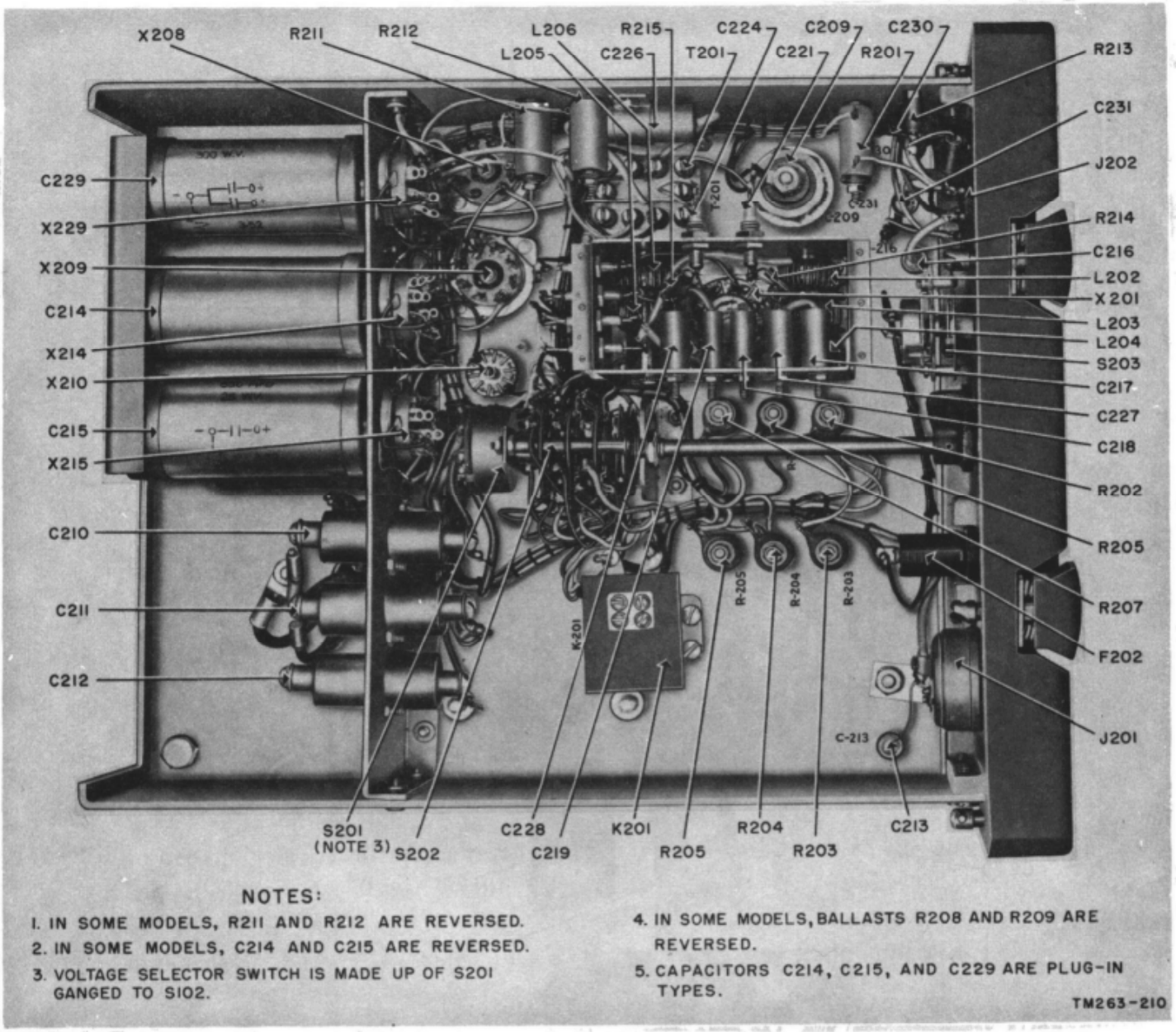


Figure 142. Dynamotor-Power Supply DY–88/GRC–9, bottom view of chassis with filter box cover removed.

Symptom	Probable trouble	Correction
13. No voltage output from terminal 34 of J202. Output from terminals 20 and 32 normal. Control Ⓔ in SEND.	Resistor R201 open.	Replace R201 if open.
14. No voltage at terminals 22 and 23. Control Ⓔ in STANDBY position.	Ballast resistor R210 open.	Check ballast resistor R210 for continuity.
	Capacitor C216 shorted.	Replace capacitor C216.
	Capacitor C215 shorted.	Replace capacitor C215.
	Relay K203 open.	Replace relay K203 if open.
15. No hv output from terminal 32 of J202. Dynamotor E201 runs.	Coil L201 open.	Replace L201 if open.
	Capacitor C201, C208, or C209.	Replace C207, C208, or C209 if shorted.
	Hv brushes defective.	Replace brushes.

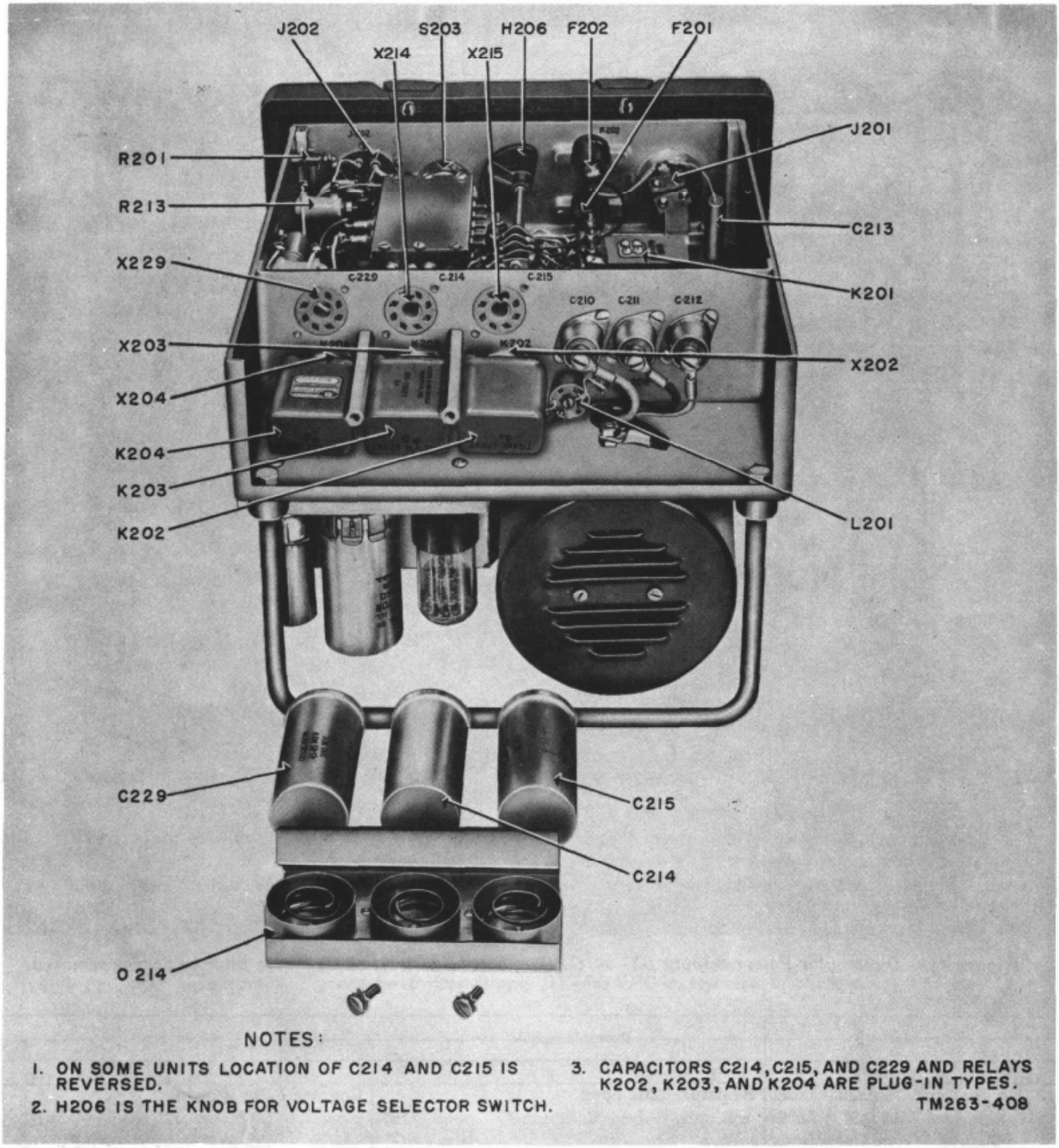


Figure 143. Dynamotor-Power Supply DY–88/GRC–9, rear view of chassis showing location of relays.

Symptom	Probable trouble	Correction
16. Excessive hash in receiver output. Control Ⓔ in SEND.	Relay K204 chatters.	Replace relay K204.

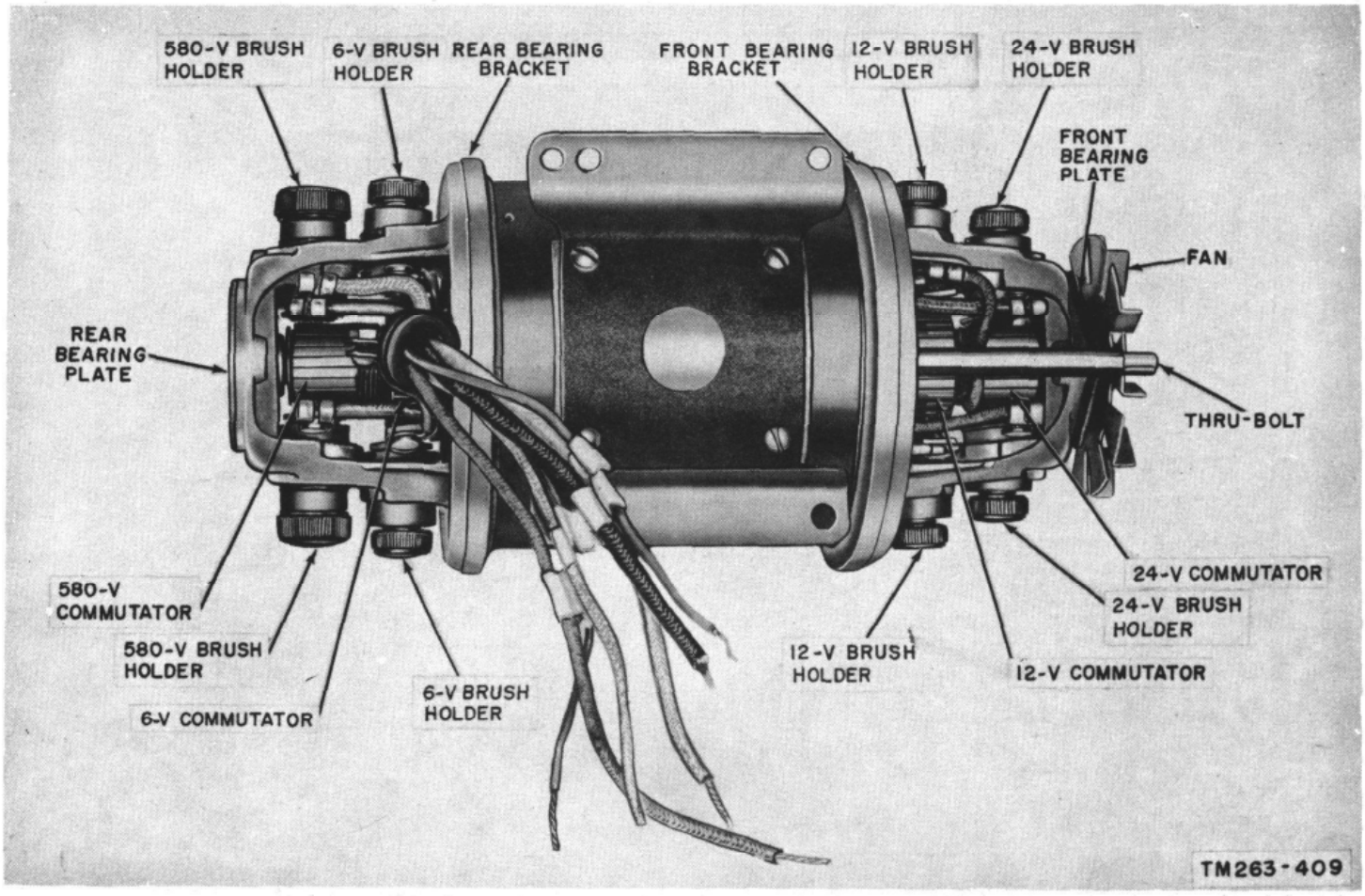


Figure 144. Dynamotor D201, covers removed, bottom view.

192. Resistance of Power Transformer and Relay Coils of Dynamotor-Power Supply DY–88/GRC–9

The resistances of the transformer windings and the relay coils in the dynamotor power supply are listed below.

Transformer or coil	Terminals	Ohms
T201	1 to 3	393
	4 to 5	11.6
	6 to 7	2.8
	8 to 10	.53
K201	COM. to 6	20.5
	COM. to 12	72.5
	COM. to 24	235
K202	1 to 9	407
	1 to 8	10.1
	1 to 7	2.0
K203	1 to 9	3.6
K204	1 to 9	118

Note. The resistances listed above (except the resistance for the coil of K203) are approximate and may vary slightly, depending on the individual supplier. The resistance for the coil of K203 must be exact because the current through this coil also flows through the filaments in the receiver.

193. Disassembly of Dynamotor-Power Supply DY–105/GRC–9X

a. Loosen the eight Dzus fasteners located on the front panel, and remove the chassis from the case.

b. Remove the screw that fastens each end cover (fig. 145) of the dynamotor D1.

c. Rotate the right end cover toward the chassis front panel and pull it off the dynamotor frame. The 580-volt brushes can now be reached (fig. 147).

d. Rotate the left end cover away from the chassis front panel and pull it off the dynamotor frame. The 24-volt brushes can now be reached (fig. 147).

Note. See that caution notice given in paragraph 190.

194. Troubleshooting Chart for Dynamotor-Power Supply DY–105/GRC–9X

To troubleshoot the dynamotor power supply, first remove the chassis from its case. Connect the power supply to a radio set known to be

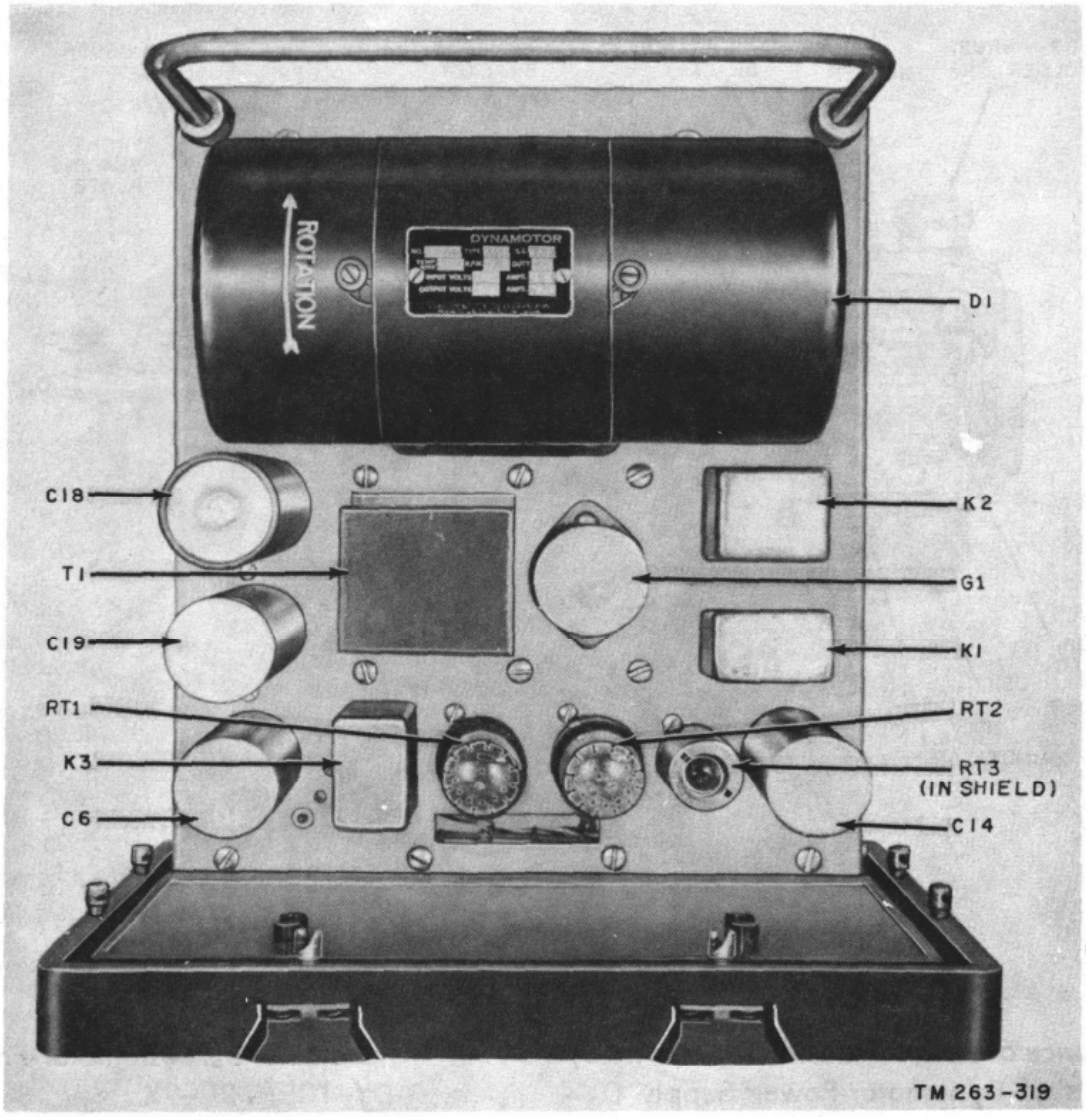


Figure 145. Dynamotor-Power Supply DY–105/GRC–9X, top view of chassis.

good. Note that the terminals on POWER OUT receptacle J2 are numbered. These terminals are to be used to check the output of the dynamotor power supply. Refer to figures 145 through 147 for component locations and to figure 174 for the schematic diagram.

Symptom	Probable trouble	Correction
1. No voltage output from any terminal of J2.	Fuse F1 or F2 open.	Replace fuses. If F2 continues to blow, check C1, C7, C9, and C10 for short.
No vibrator hum is heard. Dynamotor ⓓ1 does not turn. Control Ⓔ in SEND or STANDBY.	Switch S1 defective.	Replace S1.
2. No voltage output at terminals 22 and 23 of J2. Control Ⓔ in SEND or STANDBY.	Fuse F2 open.	Replace F2.
	RT3 open.	Replace RT3 with spare.
	Relay K1 coil open.	Replace K1.
	Capacitor C14 or C17 shorted.	Replace C14 or C17.
	Resistor R1 or R2 open.	Replace R1 or R2.
3. No voltage output from terminal 33 of J2. Vibrator does not hum. Control Ⓔ in STANDBY.	Fuse F2 open.	Replace F2.
	Vibrator defective.	Replace vibrator with spare.
	Contacts 2 and 3 of K1 not closing.	Check for battery voltage at terminal 2 of K1. Replace relay.

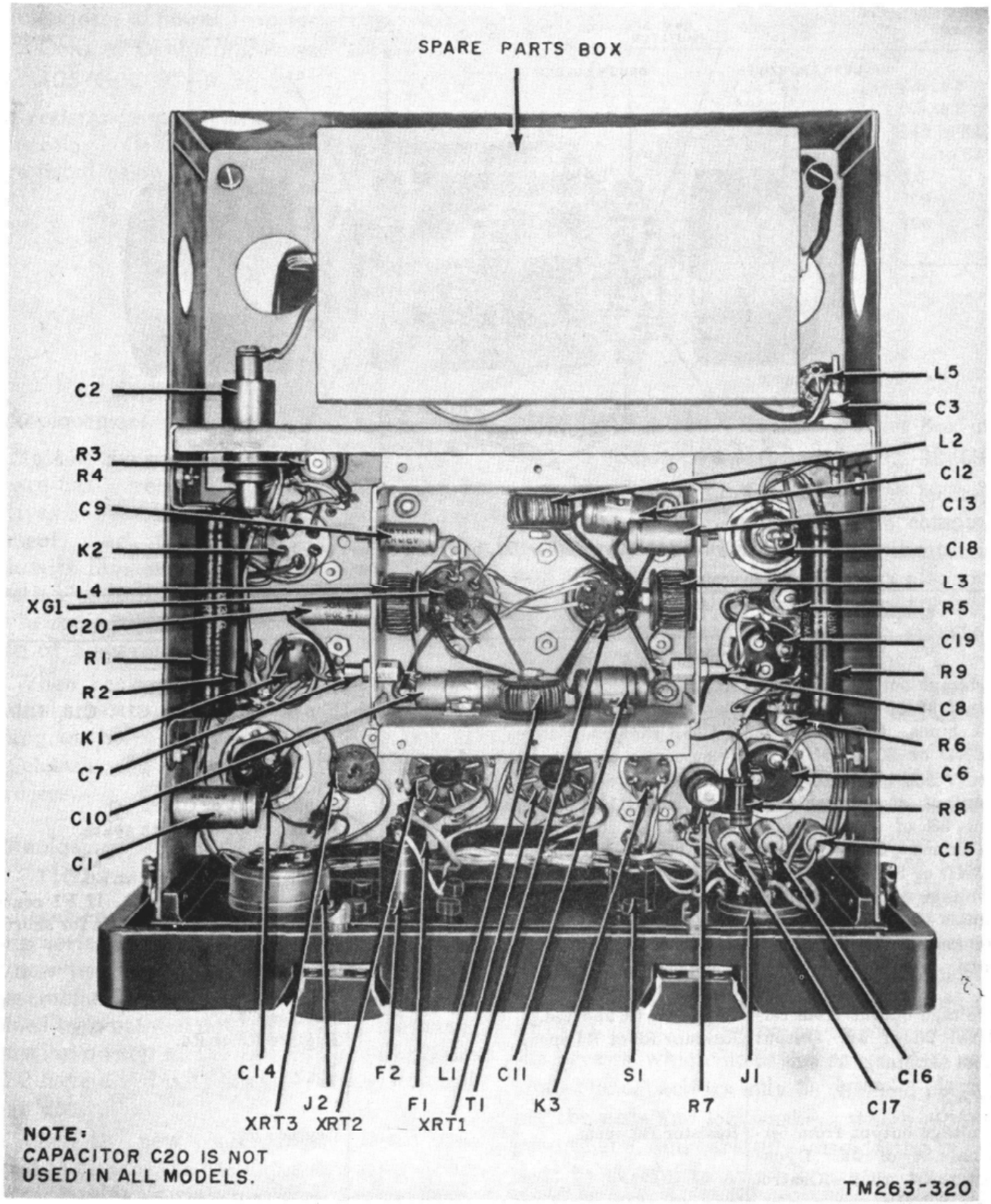


Figure 146. Dynamotor-Power Supply DY–105/GRC–9X, bottom view of chassis with filter box cover removed.

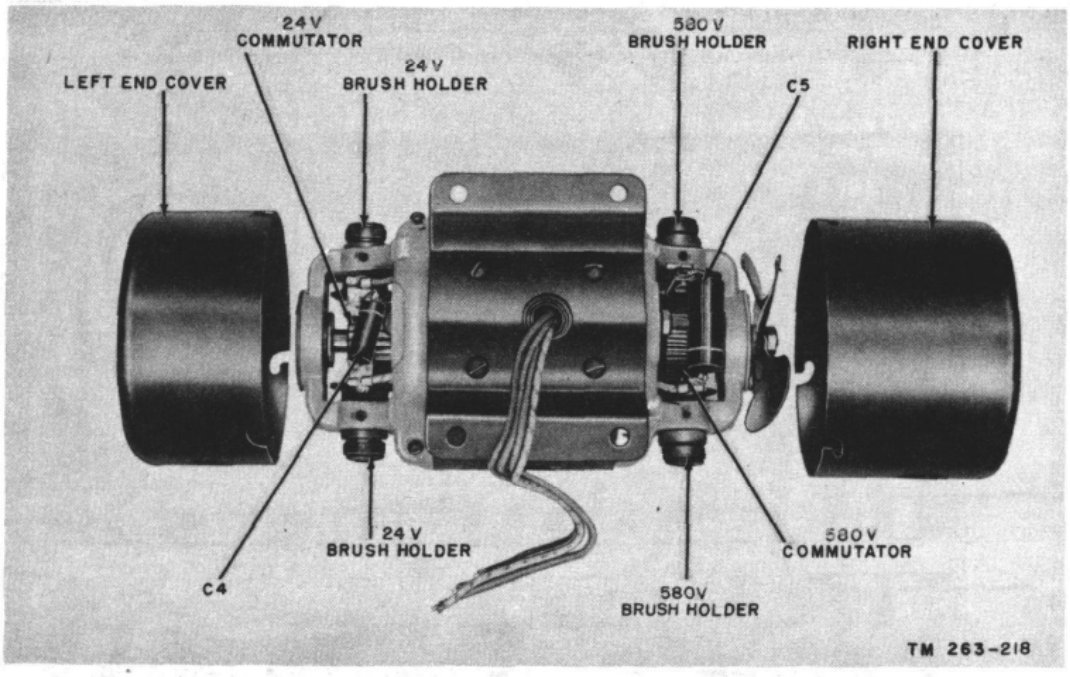


Figure 147. Dynamotor D1, with end covers removed.

Symptom	Probable trouble	Correction
	Coil L4 open.	Replace L4.
4. No voltage output from terminal 33 of J2. Vibrator ⓖ1 hums. Control Ⓔ in SEND or STANDBY.	Resistor R5, R6, or R8 open.	Replace R5, R6, or R8.
	Capacitor C10, C13, C15, C16, C19A, or C19B shorted.	Replace C10, C13, C15, C16, C19A, or C19B.
	Open center top to primary or secondary of T1.	Replace T1.
5. Lv output at terminals 21 and 33 of J2. Vibrator G1 hums. Control Ⓔ in SEND or STANDBY.	Capacitor C11 or C12 shorted.	Replace C11 or C12.
	Vibrator G1 defective.	Replace vibrator with spare.
	T1 partially shorted.	Replace T1.
	Resistor R5 or R6 changed value.	Check and replace R5 or R6.
6. No voltage output from terminals 20, 32, and 34. Dynamotor D1 does not turn.	Fuse F1 or F2 open.	Replace fuse F1 or F2. If F1 continues to blow, check C2 and C4 for short.
	Coil of K2 open or its contacts not closing.	Replace K2.
	Switch S1 defective.	Repair or replace S1.
7. No voltage output from terminal 20 of J2. Output from terminals 32 and 34 normal. Control Ⓔ in SEND.	Capacitor C6 shorted.	Replace C6.
	Resistor R3 or R4 open.	Replace R3 or R4.
8. No voltage output from terminal 34 of J2. Dynamotor D1 runs. Control Ⓔ in SEND.	Resistor R9 open.	Replace R9.
9. No hv voltage output from terminal 32 of J2. Dynamotor D1 runs. Control Ⓔ in SEND.	Coil L5 open.	Replace L5.
	Capacitor C18, C3, or C5 shorted.	Replace C18, C3, or C5.
	Brushes defective.	Replace brushes.
10. Lv output from terminal 20. Control Ⓔ in SEND.	Contacts 2 and 3 of K3 open.	Replace K3.
11. Excessive hash in receiver output. Control Ⓔ in SEND.	Relay K3 chatters.	Replace K3.

195. Resistances of Power Transformer and Relay Coils of Dynamotor-Power Supply DY–105/GRC–9X

The resistances of the transformer windings and the relay coils in the dynamotor power supply are listed below.

Transformer or coil	Terminals	Ohms
T1	1 to 2	2.5 to 3
	2 to 3	2.5 to 3
	4 to 5	145 to 325
	5 to 6	145 to 325
K1	1 to 4	3.6
K2	1 to 6	209
K3	1 to 5	120

* Resistance depends on manufacturer of transformer.

Section II. REPAIRS

196. Replacement of Parts

a. Most of the parts in Radio Set AN/GRC–9(*) are easily reached and replaced if found defective. If the band change switches need replacement, mark the wires connected to the switch with tags or other devices to avoid misconnection when the new switch is installed. Do this whenever replacement requires the disconnection of numerous wires.

b. When removing screws from the units, keep the screws in individual groups corresponding to the components which they fasten to the chassis. This will speed up the reassembly process.

197. Replacing Oscillator-Coil Assemblies T101, T102, and T103

a. Receiver-Transmitter RT–77(*)/GRC–9, bearing serial number 12100 and higher, contains new temperature-compensated oscillator-coil assemblies T101, T102, and T103 which are identified by a painted dot that follows the band designation on top of the can. Coils for bands 1 and 2 have a red dot; the coil for band 3 has a green dot.

b. When the new oscillator-coil assemblies are used to replace the oscillator-coil assemblies in units having serial numbers lower than 12100, temperature-compensating capacitors C149, C150, and C151 must be clipped off. If all three oscillator-coil assemblies are to be replaced simultaneously, the temperature-compensating characteristics can be improved by leaving capacitors C149, C150, and C151 in the assembly and clipping the leads to capacitor C146.

198. Removing and Replacing Filter Box in Dynamotor-Power Supply DY–88/GRC–9

a. General. The filter (fig. 142) located beneath the chassis, houses all the components necessary for rf filtering of the vibrator input and output voltages. The filter box also mounts the vibrator socket which protrudes through the power supply chassis to make the vibrator accessible from above. The filter box is a very compact unit, and it will frequently be more advantageous to replace the filter box in its entirety than to attempt repairs.

b. Removal Procedure. Remove the vibrator six leads, and four screws and their associated lockwashers. In removing the six leads, be sure that only sufficient heat to melt the solder is applied to the leads of capacitors C220, C221, C222, C223, C224, and C225, and that no pressure is applied to the leads which might break the ceramic bodies. Capacitors C227 and C228, resistors R214 and R215, and capacitors C217, C218, and C219 may be replaced by removing the screws which hold the cover plate on the box. The capacitors may be changed by removing the nuts and lockwashers which mount the ground end, and carefully unsoldering the other end; be careful to avoid damaging other parts. It is possible to replace any component in the filter box, but it must be done carefully and only by experienced repairmen.

c. Replacement Procedure. Installing a new filter box should be done in the reverse sequence of that given for removing the old box. The same caution should be applied to soldering leads to capacitors C220 through C225.

199. Replacing Voltage Regulator Unit in Generator GN–58(*)

a. The only pluck-out part in the hand generator is the voltage regulator unit. The top half of the generator housing is fastened to the bottom by clamps. On some models, the clamps are fastened to the bottom half of the housing by screws. These screws must be completely removed before the clamps can be released. Once the top half is lifted off the bottom half of the housing, the voltage regulator unit is clearly seen. Figure 148 shows an old model of Generator GN–58–A. This type of regulator has an octal socket and has been superseded with a new type of regulator. The new regulator is used on the latest models of Generator GN–58–A and, by means of an adapter plug, may be inserted into the old models. Within the adapter are resistance units to accommodate the new regulator to the old model generator. The bottom of the adapter has an octal base; the top has 14 holes into which the prongs of the new type regulator are inserted. If the old regulator is known to be defective, remove it and plug the adapter into the octal socket in the generator chassis. Place the new type voltage regulator in the adapter. Readjustment of resistor 245 (*b* below) may then be necessary.

b. If the regulator itself becomes defective, do not attempt to adjust it. Remove it and plug in a new regulator unit. Some slight voltage adjustment can be made by varying the slider position on resistor 245. If the tap is moved to increase the resistance of resistor 245, there will be less current in the regulator coil and it will not have a strong enough field to keep as many contacts open, as were open before resistor 245 was manipulated. Some of the contacts will then close to allow more current to flow in the generator field circuit. This action causes a higher output voltage from the generator.

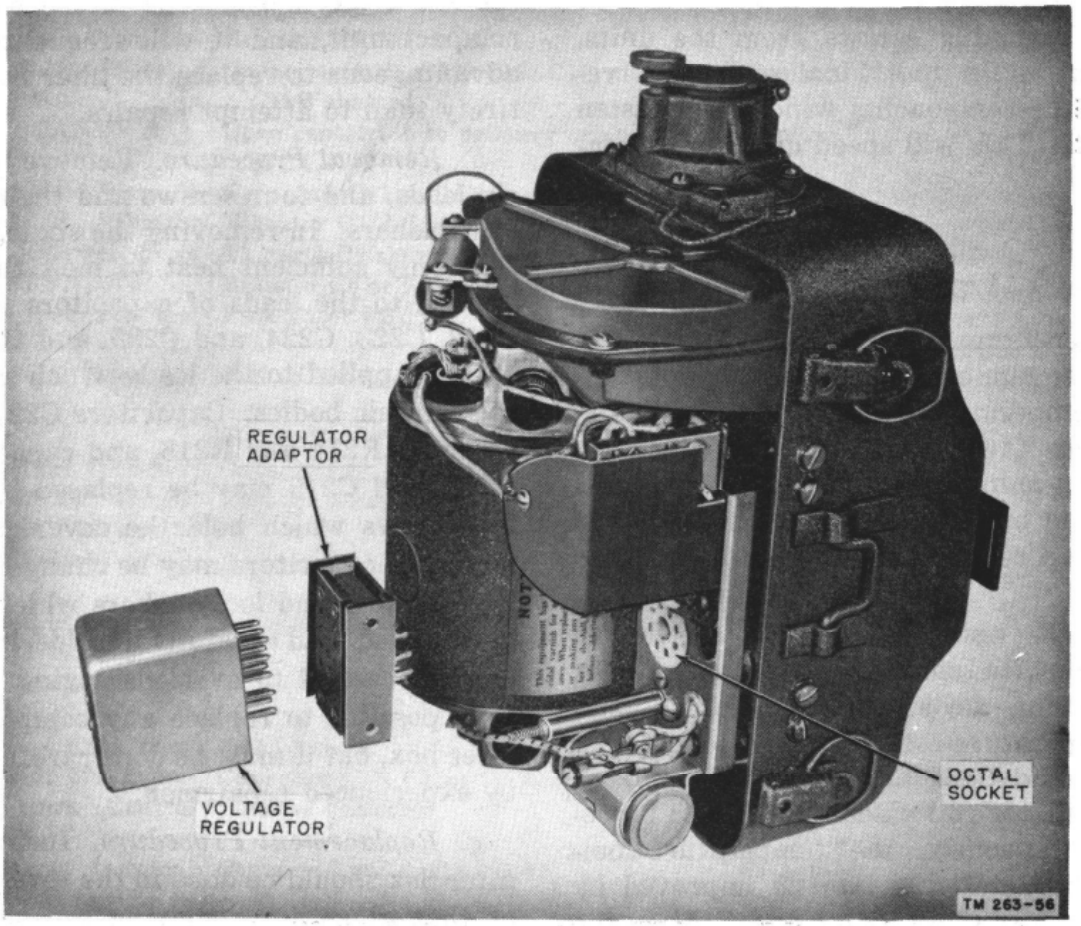


Figure 148. Replacement of early model voltage regulator with later model, in Generator GN–58–A (early models), by means of adapter.

200. Replacing Brushes in Generator GN–58–(*)

a. The standard replacement brushes for Generator GN–58–(*), shaped to fit the contour of the armature and have polarity markings on them. Replace the brushes so that the polarity markings face upward, in the normal operating position of the generator. If this is not observed, damage to the commutator may result.

b. Some brush replacements will need a *sand-in* operation to allow the brush to make full contact with the armature. If the operation is not performed, excessive heating of the brush and commutator will occur and ruin the commutator.

c. Use two strips of No. 00 sandpaper about 5 inches long and almost as wide as the hv and lv armatures. Wrap the strip of sandpaper around the commutator *with the sand surface out.* Insert the brushes in the brush holders, and replace the brush caps over the brush spring so that the brushes are pressed tightly against the sandpaper. Hold the ends of the sandpaper so as to stretch it tightly against the commutator (fig. 149). Rotate the armature back and forth until the full width of the brush face is making contact against the sandpaper, as indicated by the sanding marks or scratches on the contact surface of the brush when the brush is removed for inspection.

d. If no voltages or intermittant voltages appear in the output, then the brushes have been turned down too far.

e. When checking the old brushes, compare them with the new ones. If the old brushes compare in length and contour with the new ones, and if the output voltages are normal, replacement of new brushes is not necessary.

f. Never apply oil, grease, or any other lubricant to the brush, commutator, or brush holder.

201. Replacing Brushes in Dynamotor-Power Supply DY–88/GRC–9

The brushes used in dynamotor D201 are shaped to fit the contour of the armature and are generally replaced after 1,000 hours of operation. To replace the brushes, proceed as follows:

a. Refer to the disassembly instructions in paragraph 190*a* through *d.*

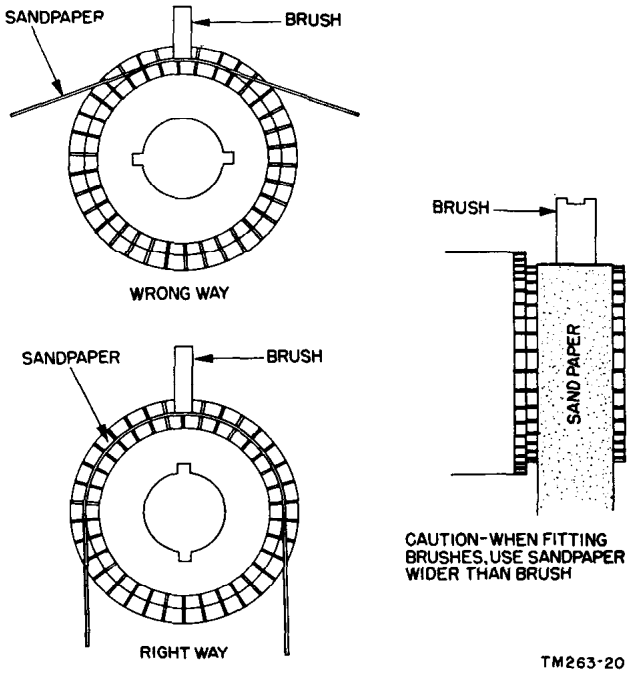


Figure 149. Correct and incorrect methods of fitting brush to commutator.

b. Unscrew the brush caps (fig. 156) and remove the brushes.

Note. The commutator arrangement will vary according to the type of dynamotor used (figs. 150 and 151).

c. When replacing the brushes, be sure that the polarity markings on the brushes face upward, in the normal operating position of the dynamotor. If this is not observed, the commutator may be damaged.

d. If the brushes have to be shaped to fit the contour of the commutator, follow the procedure given in paragraph 200*b* through *e.*

e. Replace the brush caps and end covers and tighten the end cover fastening screws.

202. Replacing Brushes in Dynamotor-Power Supply DY–105/GRC–9X

To replace the brushes, proceed as follows:

a. Refer to the disassembly instructions in paragraph 193*a* through *d.*

b. Unscrew the brush caps (fig. 147) and remove the brushes.

c. For brush polarity markings and shaping see paragraphs 201*c, d,* and *e.*

203. Removal of Armature of Generator GN–58–(*)

The armature is not to be repaired, except in a depot maintenance unit. The information be-

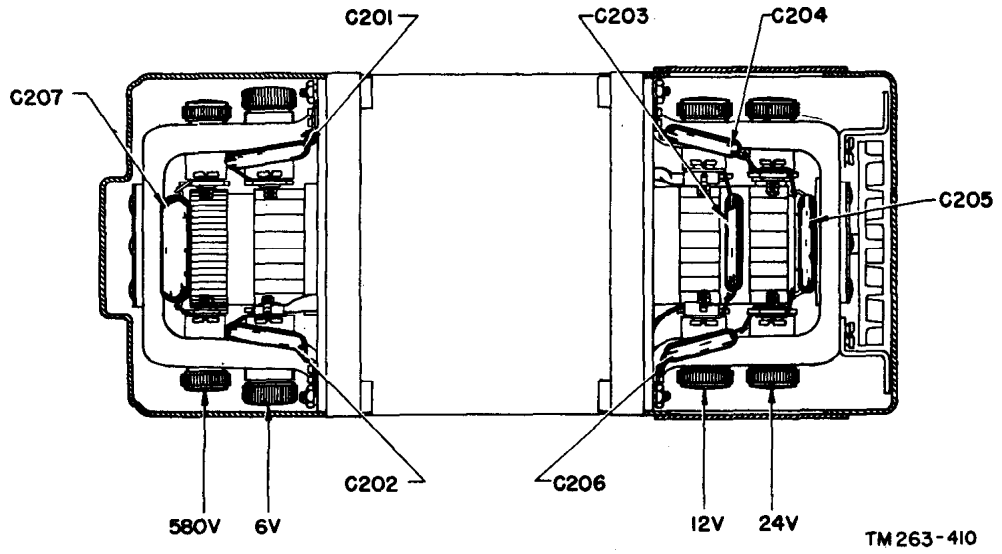


Figure 150. Dynamotor D201, parts location in some models.

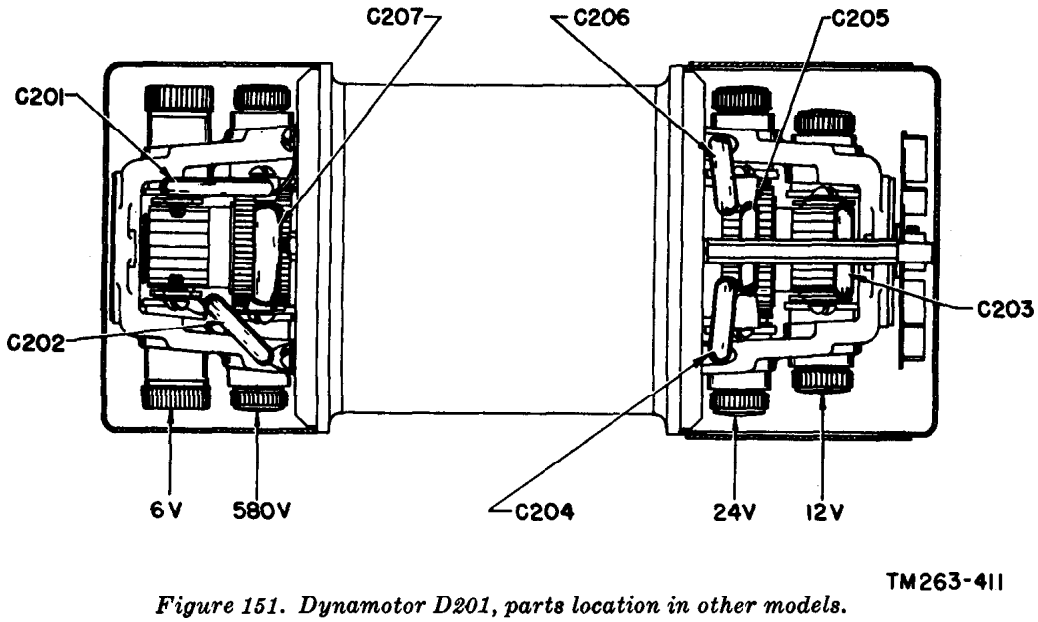


Figure 151. Dynamotor D201, parts location in other models.

low is for those units where the armature is to be replaced. Proceed as follows:

a. Remove all brushes.

b. Take off the speed change housing cover by removing the six screws around the edge of the cover (figs. 127 and 152).

Caution: Do not damage the gasket.

c. Remove the screw that secures the sprocket gear to the armature shaft (fig. 127).

d. The sprocket gear is press-fitted to the shaft. Pry it off gently (fig. 153).

e. Remove the two through-bolts from the left generating unit endpiece (fig. 154).

f. Pry the left *generating unit endpiece* away from the generating unit, and slip it off the armature shaft bearing. Be careful not to damage any of the wiring. If necessary, remove the left bearing plate so that the endpiece can be forced off and away from the bearing which is pressed-fitted to the armature shaft.

g. Now pull the armature gently through the generating unit (fig. 155).

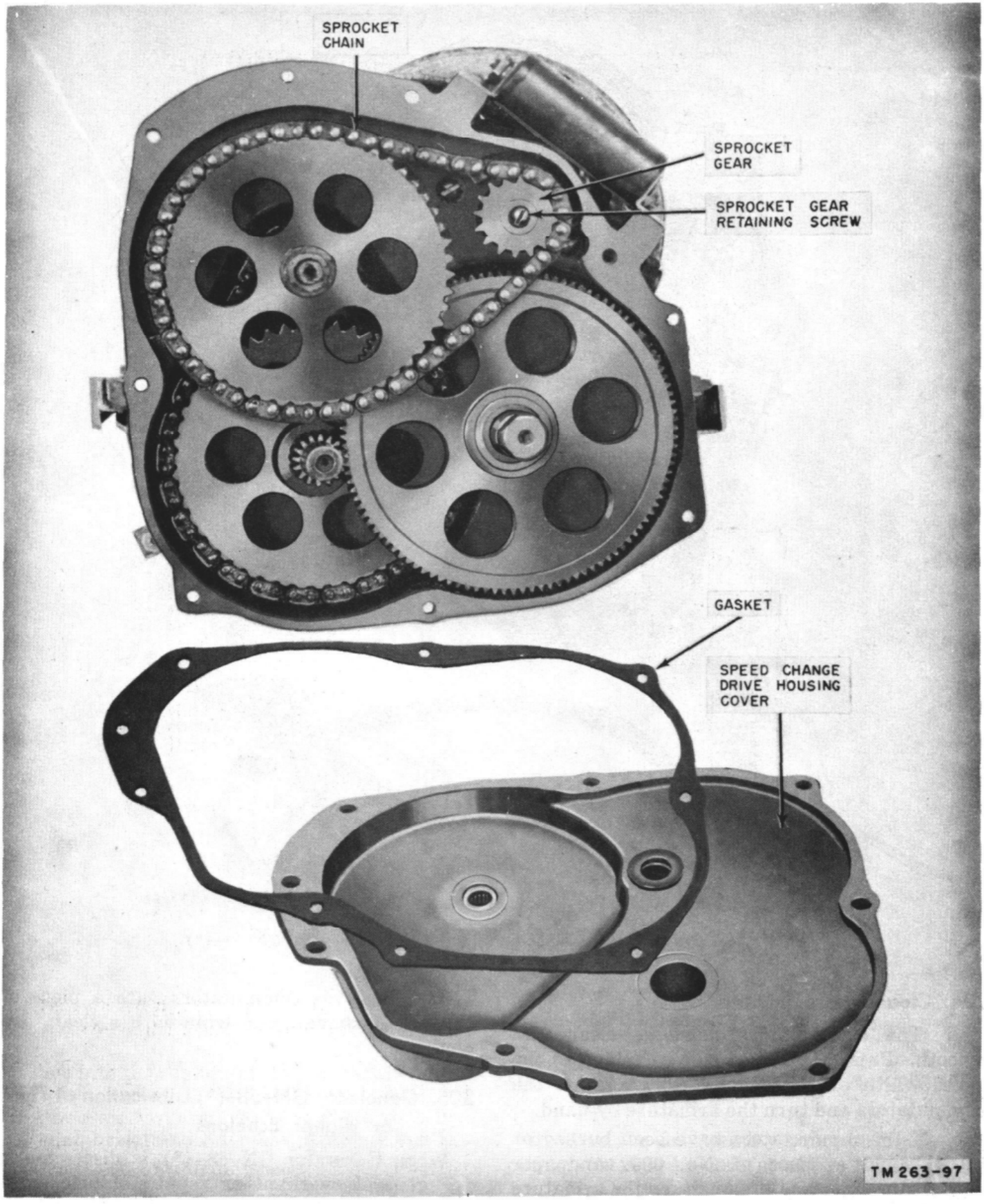


Figure 152. Speed change drive housing, gasket, and cover removed from Generator GN–58–(*).

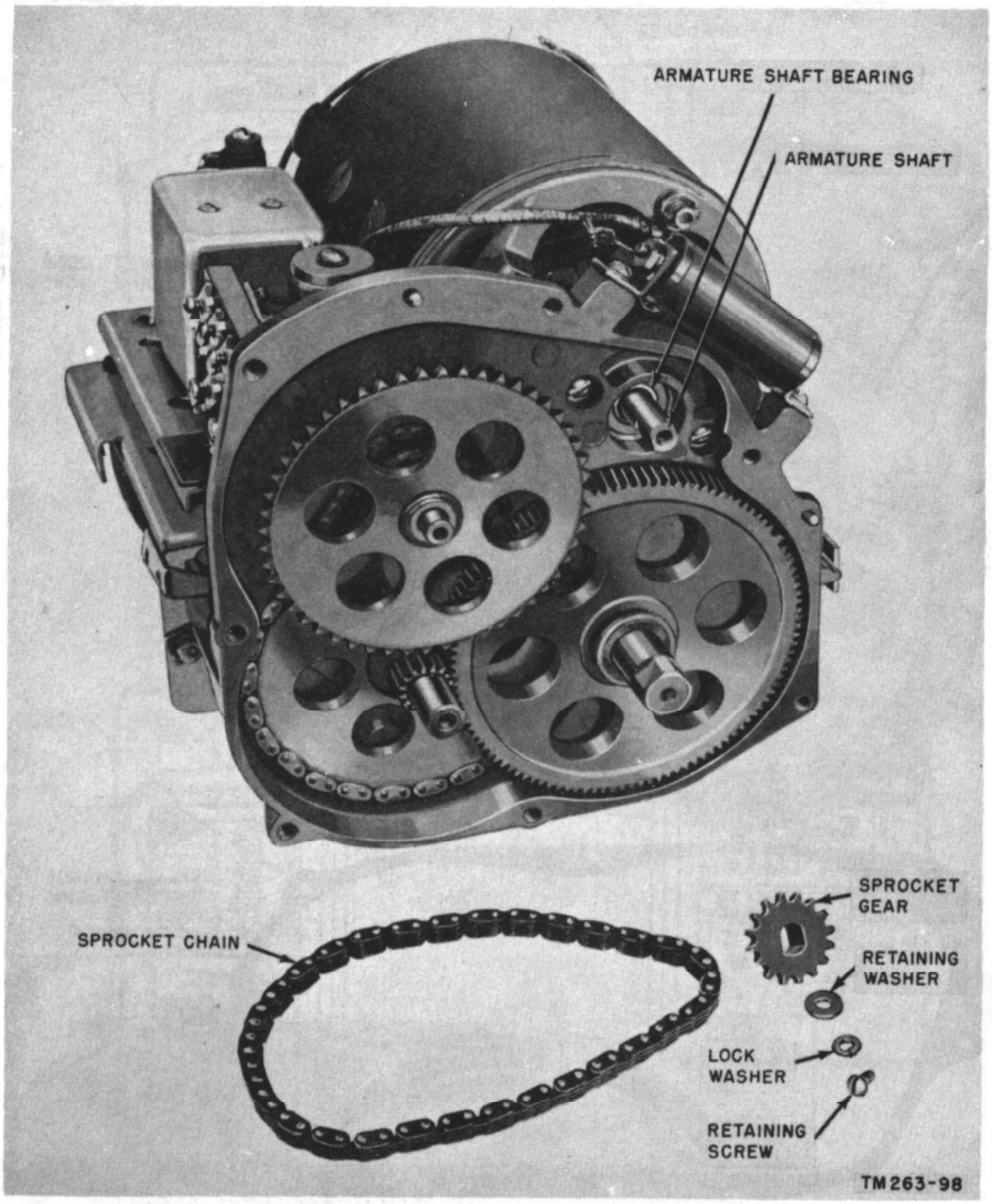


Figure 153. Sprocket gear and chain removed from Generator GN–58–(*).

204. Cleaning Commutator

a. The commutators must be clean and smooth. Press a piece of canvas folded to the exact width of the commutators against the commutators and turn the armature by hand.

b. If the commutators have been burned or pitted, hold a piece of No. 000 sandpaper against the commutators and turn the armature by hand.

c. If necessary, a cloth moistened in Cleaning Compound may be used to remove the dirt and grease.

d. Polish the commutators with a piece of canvas (*a* above), and wipe with a clean, dry cloth.

205. Generator GN–58–(*) Lubrication at Third or Higher Echelons

When Generator GN–58–(*) is disassembled for general overhaul or repairs, lubricate as follows:

a. Clean old grease from the bearings with Cleaning Compound. Invert the generator when cleaning, so that the Cleaning Compound does

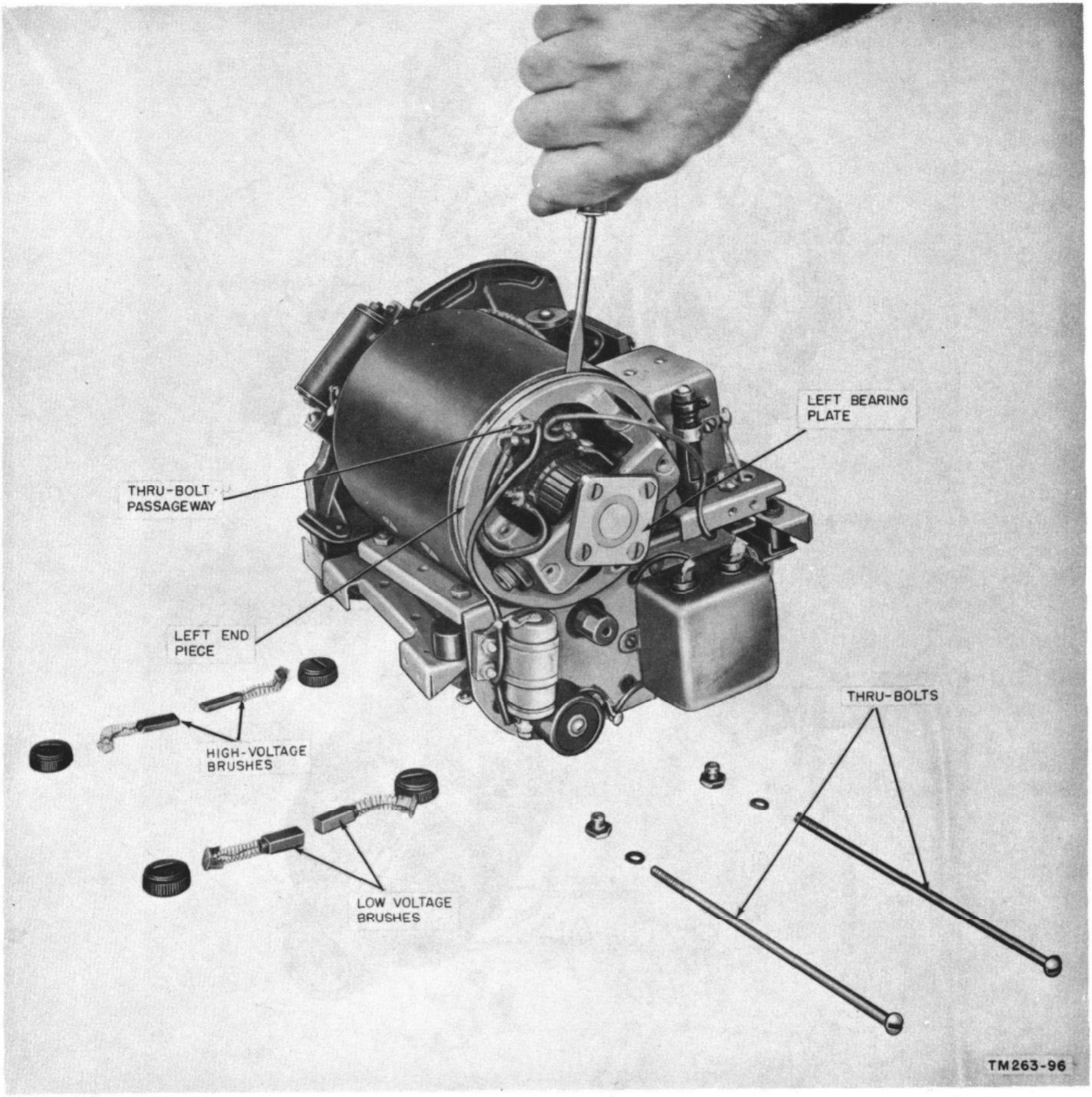


Figure 154. Prying off generating unit left endpice of Generator GN–58–(*).

not flow into the commutator or armature windings.

b. Relubricate with Grease, Aircraft and Instruments (GL) during reassembly, or after the unit is assembled. Spread the grease evenly and avoid an excess of grease.

Caution: Never apply grease (GL) to the brush, commutator, or brush holder.

206. Replacement of Armature of Generator GN–58–(*)

Reverse the disassembly procedure given in paragraph 203; be careful of the following:

a. The bottom through-bolt passes through a connecting lug before it emerges from the generating unit. Before screwing the nut on to the bolt, be sure that the lug is around the bolt inside the generating unit.

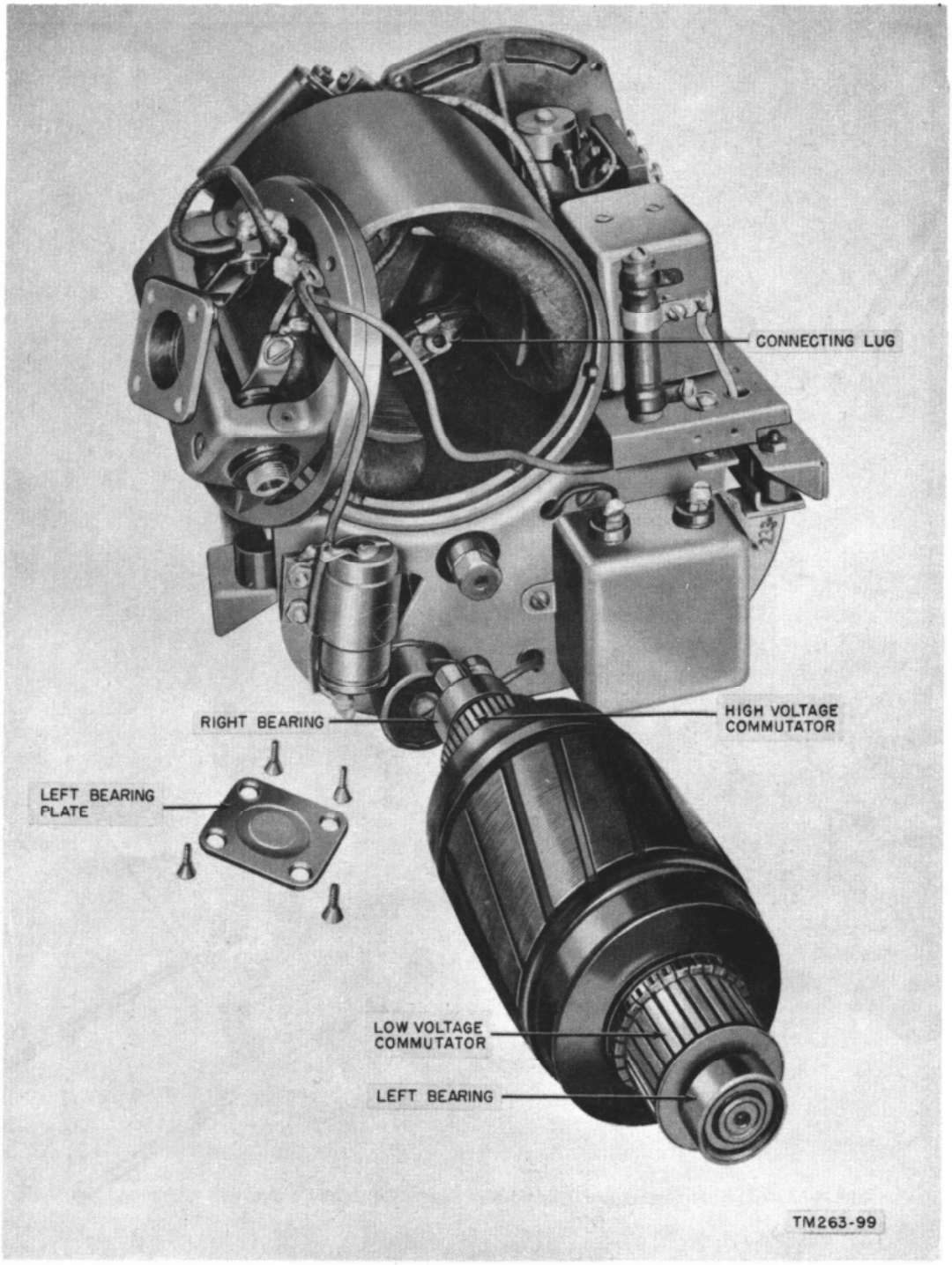


Figure 155. Armature removed from generating unit of Generator GN–58–(*).

b. Be sure that the sprocket chain is fitted completely about the sprocket gear and is sufficiently lubricated.

c. Do not forget to replace the gasket before screwing on the speed change housing cover.

207. Removal of Armature of Dynamotor-Power Supply DY–88/GRC–9

In general, repair of replacement of the armature is not recommended. If possible, replace the entire dynamotor. The armature is not to be repaired, except in a depot maintenance unit. The following information is given for those units where the armature is to be replaced. Proceed as follows:

a. Remove the power supply from its case.

b. Disconnect the dynamotor wires under the chassis by loosening the screws that hold the dynamotor wire spade lugs. *Tag all wires before removal.*

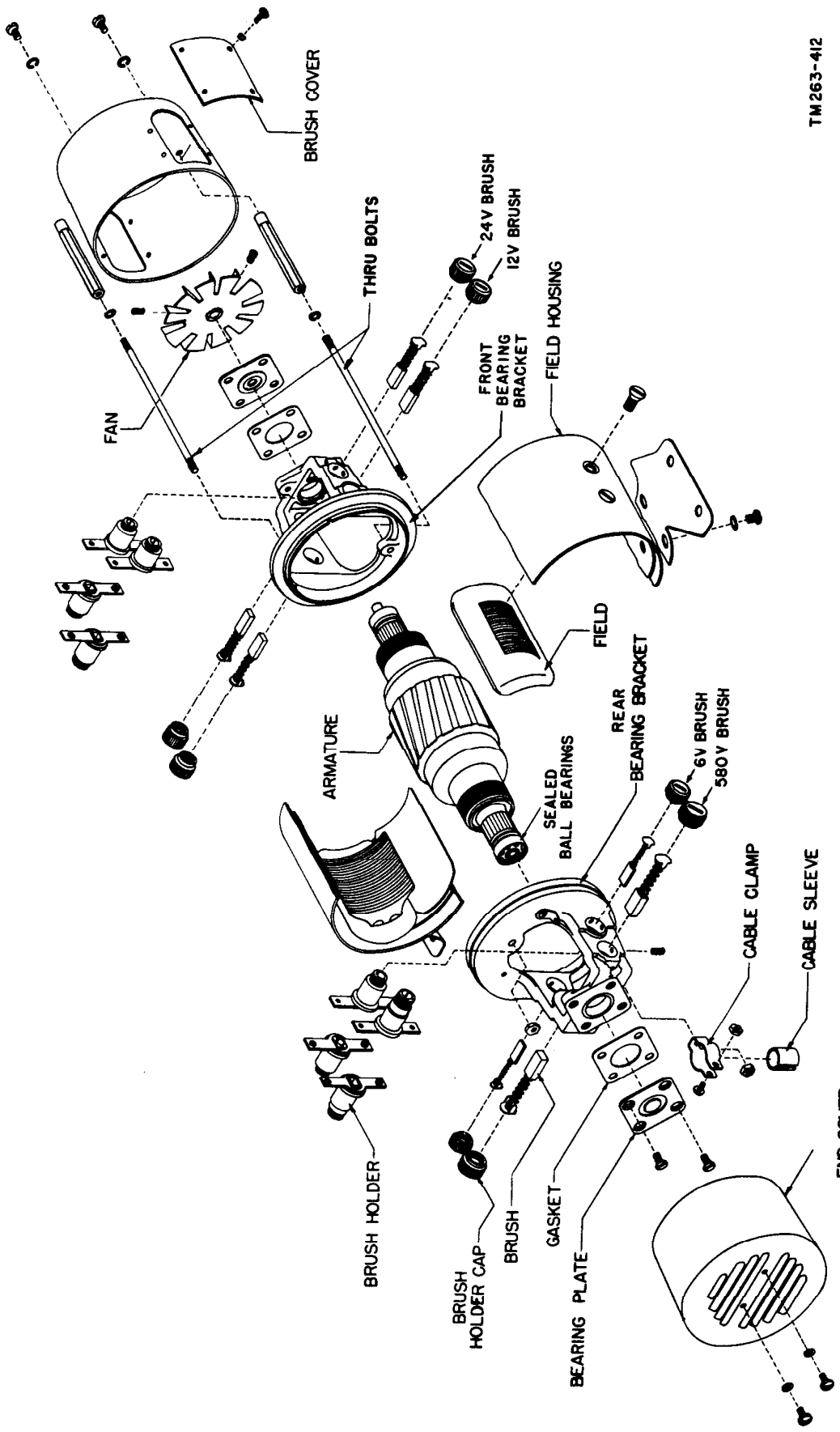


Figure 156. Dynamotor D201, exploded view.

c. Remove the four bolts that hold the dynamotor to the chassis.

d. Gently pull the dynamotor up off the chassis.

e. Refer to figure 156 for the remainder of the dynamotor disassembly procedure.

(1) Loosen the four screws and remove the dynamotor front and rear end covers.

(2) Remove all brushes.

(3) Remove the top through-bolt.

(4) Before removing the bottom through-bolt, loosen the cable clamp. Then remove the bottom through-bolt.

(5) Loosen and remove all field wires from the terminals at the front (fan) end of the dynamotor. *Be sure to tag all wires.*

(6) Use an Allen wrench to remove the two screws that hold the fan to the dynamotor. Remove the fan.

(7) Pry the front bearing bracket away from the dynamotor unit. Remove the front bearing bracket by pulling it off the dynamotor unit. Be careful not to damage any of the wiring.

(8) Now pull the armature out gently through the dynamotor unit.

208. Cleaning Commutator of Dynamotor-Power Supply DY–88/GRC–9

Refer to paragraph 204 for the cleaning procedure.

209. Lubricating Instructions for Dynamotor-Power Supply DY–88/GRC–9

When the dynamotor is disassembled for general overhaul or repairs, lubricate as follows:

a. Clean old grease from the bearings with Cleaning Compound. Do not let the Cleaning Compound flow into the commutator or armature windings.

b. Relubricate with grease (GL) during reassembly. Spread the grease evenly and avoid an excess of grease.

Caution: Never apply grease to the brushes, commutator, or brush holders.

210. Replacement of Armature of Dynamotor-Power Supply DY–88/GRC–9

To replace the dynamotor armature, reverse the disassembly procedure given in paragraph 207. Be sure to connect all wires properly.

211. Removal of Dynamotor-Power Supply DY–105/GRC–9X Dynamotor Armature

In general, repair or replacement of the armature is not recommended. If possible, replace the entire dynamotor. The armature is not to be repaired, except in a depot maintenance unit. The following information is given for those units where the armature is to be replaced. Proceed as follows:

a. Remove the chassis from its case.

b. Disconnect the dynamotor wires under the chassis and tag them.

c. Remove the four bolts that hold the dynamotor to the chassis and remove the dynamotor.

d. Refer to figure 157 for the remainder of the dynamotor disassembly procedure.

(1) Remove the dynamotor and covers by loosening the screw at the top of each cover and rotating and pulling the cover off.

(2) Unscrew the brush caps and remove the brushes.

(3) Disconnect the two field terminals connected to the 580-volt brush holders.

(4) Remove the nut and lock washer that holds the fan to the shaft and remove the fan.

(5) Remove the top and bottom through-bolts.

(6) Remove the right endpiece.

(7) The armature may now be pulled out gently through the dynamotor unit.

212. Cleaning Commutator of Dynamotor-Power Supply DY–105/GRC–9X

Refer to paragraph 204 for the cleaning procedure.

213. Lubrication Instruction for Dynamotor-Power Supply DY–105/GRC–9X

Refer to paragraph 209 for the lubrication instructions.

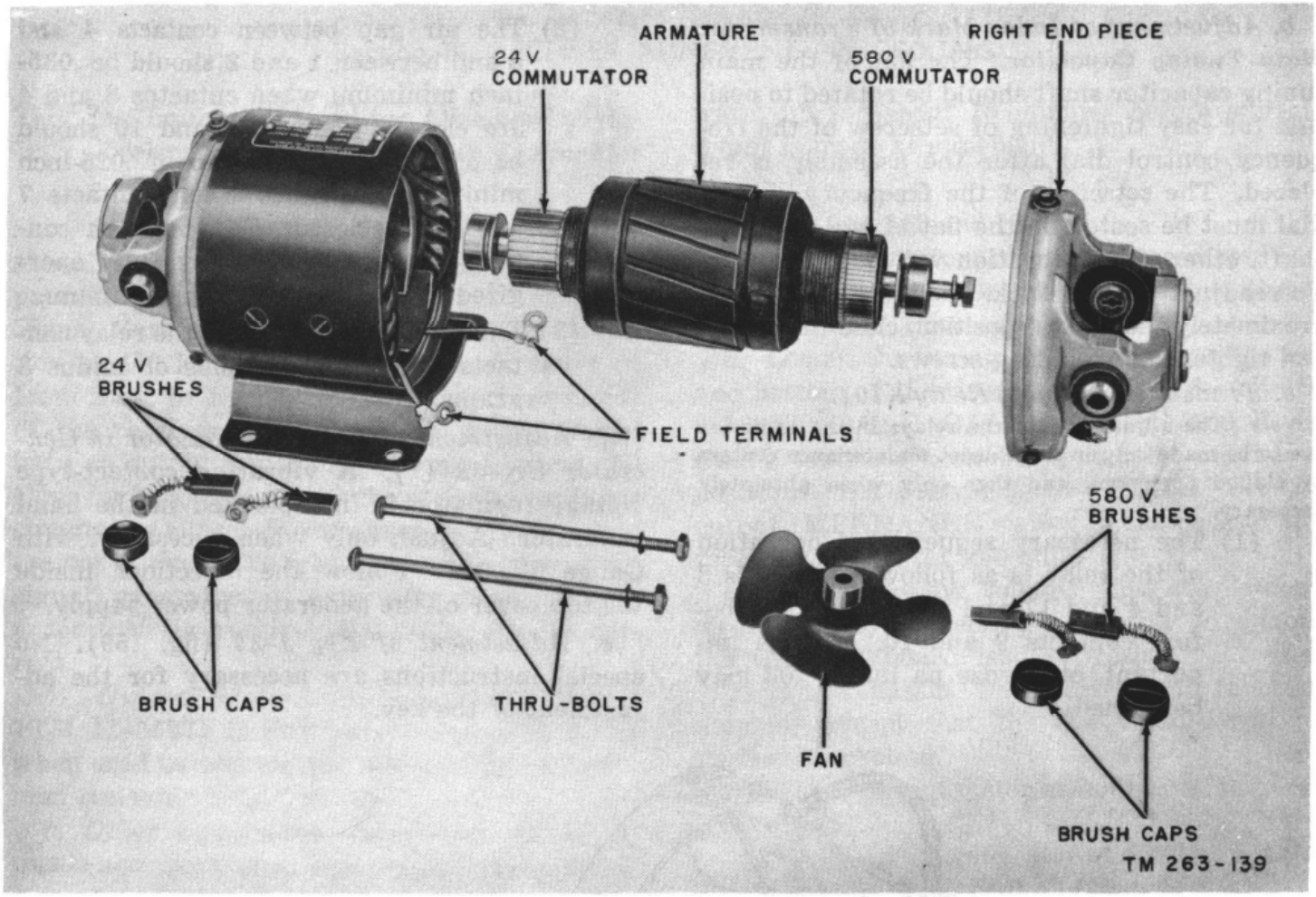


Figure 157. Armature removed from Dynamotor-Power Supply DY–105/GRC–9X.

214. Replacement of Armature of Dynamotor-Power Supply DY–105/GRC–9X

To replace the dynamotor armature, reverse the disassembly procedure given in paragraph 211.

215. Disassembly of Loudspeaker (fig. 158)

No special instructions are necessary to disassemble the loudspeaker.

216. Adjustment of Radio Set

a. Transmitter Tuning Control Ⓘ *Knob.* When replacing the tuning knob, be sure the setscrew in the knob is tightened against the flat side of the tuning control shaft. If the setscrew should be tightened incorrectly on the round part of the shaft, the dial readings on the knob will not correspond to the frequency to which the tuning capacitor will actually be tuned.

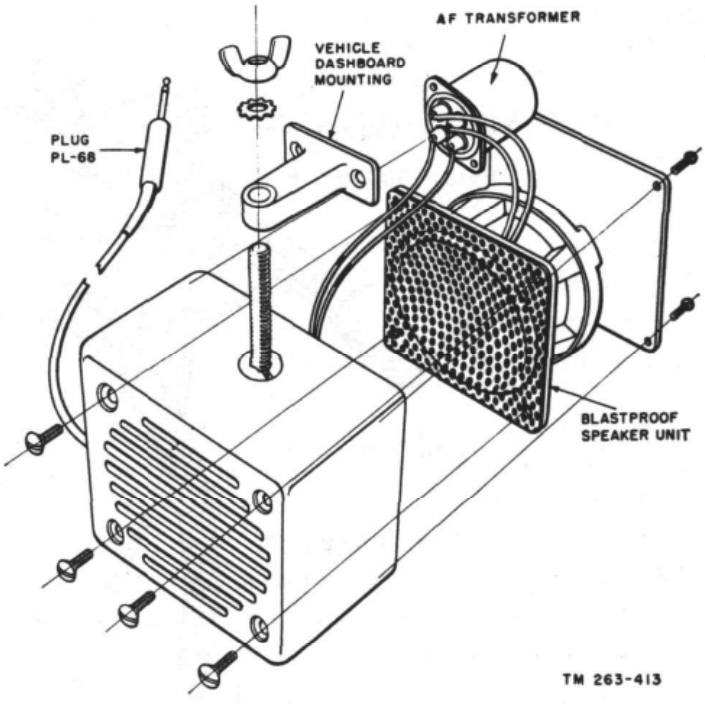


Figure 158. Disassembly of loudspeaker.

b. Adjustment of Index Mark of Transmitter Main Tuning Capacitor. The flat of the main tuning capacitor shaft should be rotated to position for easy tightening of setscrew of the frequency control dial after the assembly is replaced. The setscrew of the frequency control dial must be seated on the flat of the capacitor shaft, otherwise calibration will be inaccurate. To readjust the dial lock, place the lock in approximately the normal position, close the clamp, and tighten the mounting screws.

c. Transmitter Keying Relay K101.

Note. The adjustment of the relays in the radio set are to be made only in fixed depot maintenance centers by skilled personnel, and then only when absolutely necessary.

(1) The necessary sequence of operation of the relay is as follows: Contacts 3 and 4 and 17 and 18 should close before contacts 9 and 10. This is important, otherwise pa tube V103 may be ruined.

(2) The air gap between contacts 4 and 5 and between 1 and 2 should be .035-inch minimum when cntactos 3 and 4 are closed. Contacts 9 and 10 should be open with an air gap of .025-inch minimum clearance when contacts 7 and 8 are closed. Gap between contacts 8 and 9 with relay fully energized should be .018-inch minimum.

(3) The contact pressures of the relay contacts are 29 grams, plus or minus 3 grams.

d. Adjustment of Voltage Regulator in Generator GN–58–(*). A vibrating contact-type voltage regulator is incorporated in the hand generator. Adjust, only when necessary, with Gauge TL–127. Follow the directions inside the top cover of the generator power supply.

e. Adjustment of Key J–45 (fig. 159). No special instructions are necessary for the adjustment of the key.

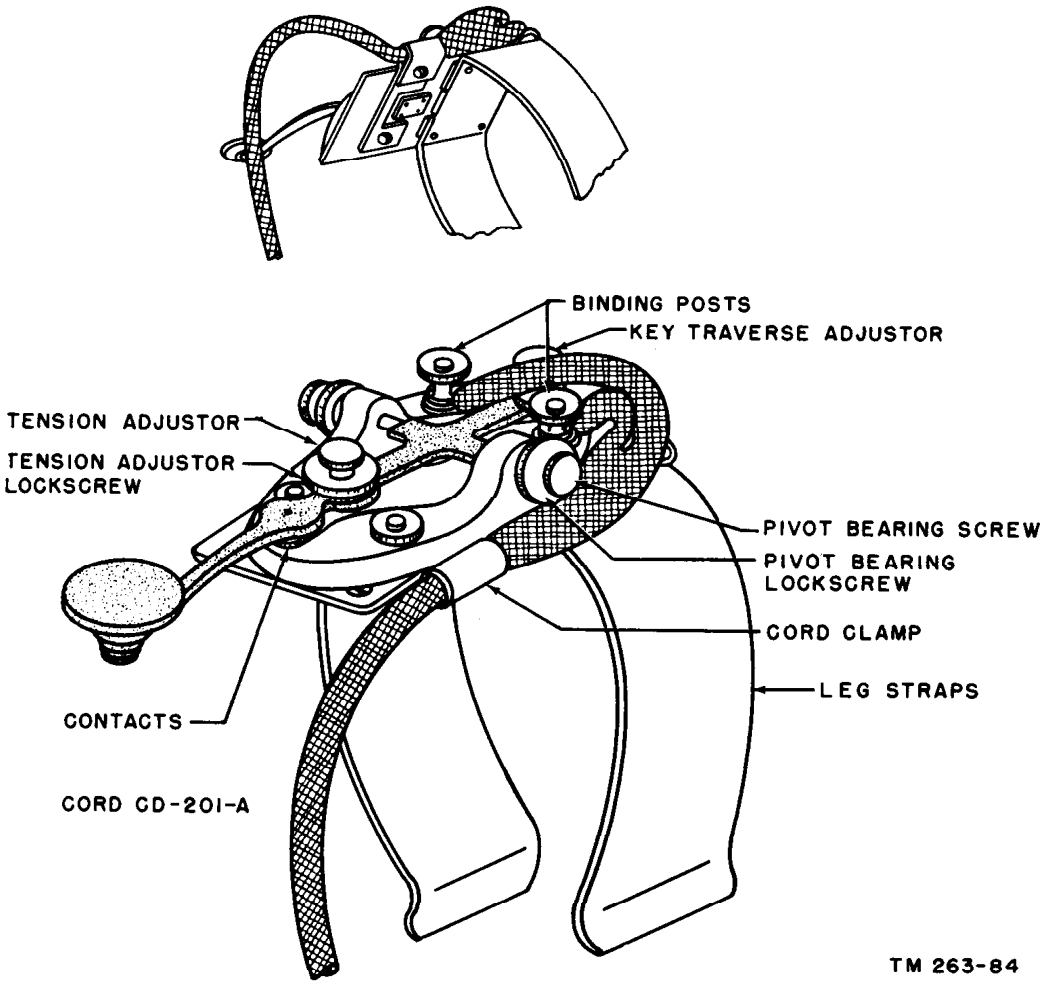


Figure 159. Adjustment of Key J–45.

Section III. RECEIVER ALINEMENT PROCEDURES

217. Test Equipment Used for Alinement of Receiver Section of Receiver Transmitter RT–77(*)/GRC–9

a. Signal Generator. The signal generator should be an accurately calibrated instrument producing modulated rf signals, such as R. F. Signal Generator Set AN/URM–25. In addition to 456 kc, the unit must have a range of from 2 mc to 12 mc, covering the three bands of the receiver. The signal generator should have an output impedance of approximately 50 ohms for best results when the rf and hf oscillator circuits are alined. For if alinement, these values are not critical. The frequency calibration of the signal generator is extremely important in order that the receiver dial calibration be correct.

b. Output Meter. Multimeter TS–352/U (TM 11–5527) is suitable as an output meter when used in conjunction with a 250-or a 4,000-ohm resistor.

c. Other Equipment. Additional test equipment necessary are Headset HS–30–(*), an 120-$\mu\mu$f and an .05-μf capacitor, and an alinement tool. Alinement Tool TL–597/U is recommended.

218. Preliminary Alinement Procedures

a. Turn on the signal generator and allow it to reach a stable operating temperature (approx. 15 min.). Refer to TM 11–5551 R.F. Signal Generator Set AN/URM–25, for the proper calibration of the signal generator.

b. Place the receiver on its right side; connect the output meter by attaching the two wires from it to Plug PL–55, and insert the plug in one of the PHONES jacks. Plug the headset into the other jack. Connect the 250-ohm resistor across the output meter leads.

c. Any of the power supplies issued may be used, but the battery power is recommended, because it is a more constant power source. If battery power is available, attach Cord CD–1119 between BATTERY receptacle J103 on the transmitter and the receptacle on Battery BA–48.

d. Turn control Ⓔ to STANDBY if the battery, or dynamotor supply is used. If Generator GN–58–(*) is used, turn control Ⓔ to SEND.

e. Allow the receiver and signal generator to warm up for about 15 minutes before any attempt is made at alinement.

219. If Alinement

(figs. 160 and 161)

Remove the bottom cover of the receiver and refer to figure 111 for the placement of the if transformers. Proceed as follows:

a. Loosen the tuning slug locknuts on the top and bottom of if transformers T4, T5, and T6.

b. Turn A. F. GAIN control Ⓞ and R. F. GAIN control Ⓟ clockwise to the maximum positions. Set control Ⓛ to PHONE. Set the output IMPEDANCE switch in the back of the receiver chassis for 250 ohms.

c. Cut out the avc voltage. This can be done most easily by connecting a shorting wire from the terminal board lead of resistor R1 (fig. 114) to the chassis. The receiver will function normally except that the avc voltage will be shorted to ground.

d. Set the output meter as instructed in paragraph 218*b*.

e. Set the signal generator at 456 kc. Set the modulation at 30 percent at 400 cycles.

f. Connect the ground side of the signal generator to the receiver chassis.

g. Connect the hot lead of the signal generator output to the signal grid, pin 6 of second if. amplifier tube V4, through the .05-μf capacitor.

h. Adjust the signal generator attenuator (rf) to produce an approximate midscale reading on the visual indicating output meter.

Note. As alinement progresses, it may be necessary to reduce the signal generator output to keep the output meter on scale.

i. Adjust the top and bottom screws on if transformer T6 until a maximum reading is obtained on the visual indicating output meter.

j. Tighten the locknuts slightly, maintain the peak output.

k. Repeat *g*, *h*, *i*, and *j* above for each of the other two if. transformers. For transformer T5, connect the hot lead of the signal generator to pin 6 of tube V3. For transformer T4, connect the hot lead to pin 6 of converter tube V2.

l. When the hot lead is on pin 6 of the converter tube, recheck the settings on all the if transformers. Tighten the locknuts snugly; be careful to maintain maximum reading on the output meter.

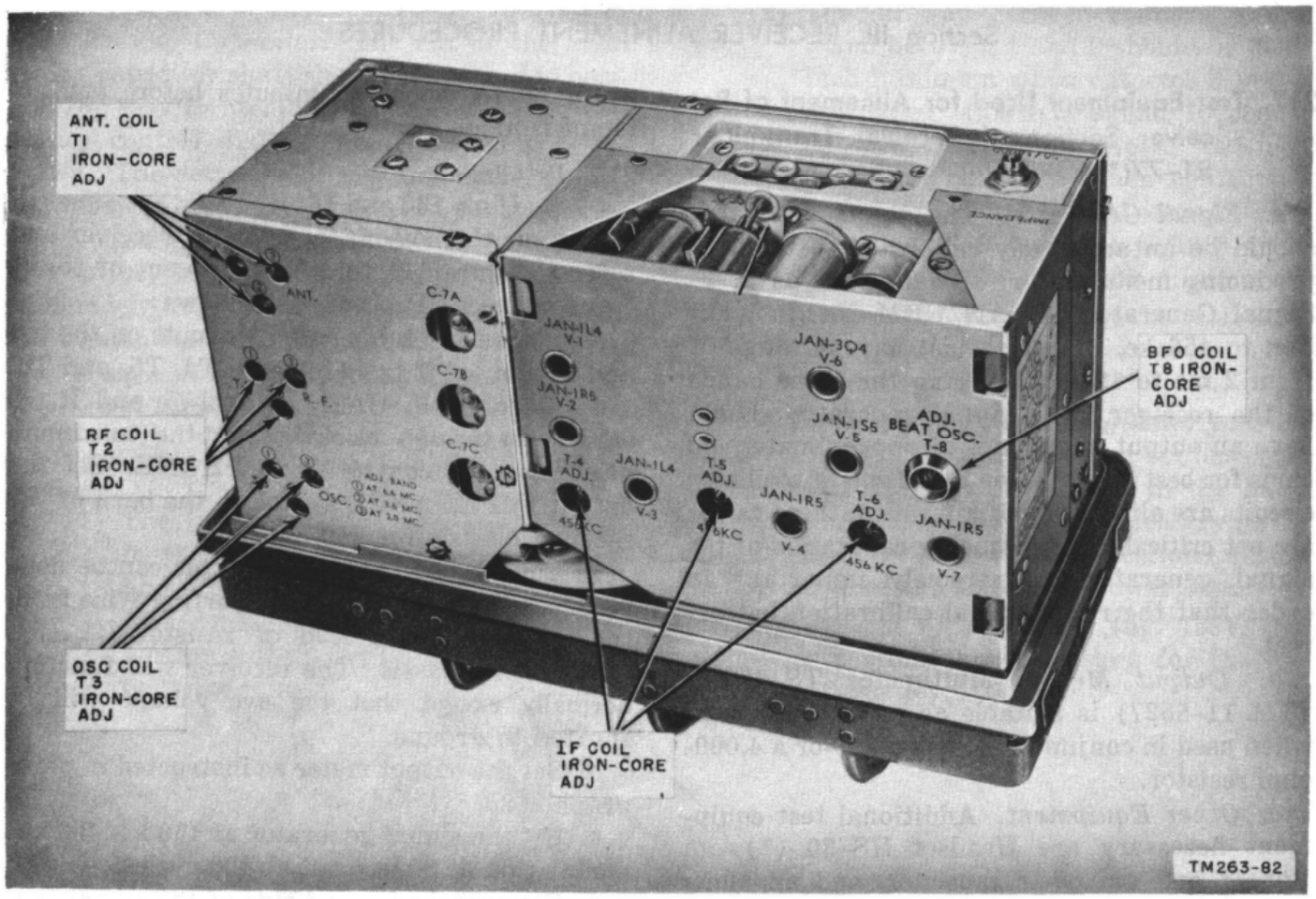


Figure 160. Receiver top, alinement points.

220. Bfo Alinement

To aline the bfo, proceed as follows:

a. Set TUNING dial control Ⓝ at 2 mc.

b. Set control Ⓛ at C.W.

c. Turn A.F. GAIN control Ⓞ clockwise to its maximum position.

d. Set the signal generator at 456 kc *with no modulation.*

e. Clip the hot side of the signal generator output to pin 6 of tube V2.

f. Loosen the locknut on the top of bfo coil T8 and adjust the tuning slug screw for a zero beat.

g. Tighten the locknut, be careful to maintain zero beat after the nut is tightened.

221. Rf Alinement

a. Preliminary Adjustments. For the rf alinement on each of the three bands, proceed as follows:

(1) Set the visual indicating output meter as instructed in paragraph 218*b*.

(2) Set the IMPEDANCE switch on the receiver chassis at 250 ohms.

(3) Set control Ⓛ to PHONE.

(4) Modulate the signal generator output 30 percent at 400 cycles.

(5) Connect the hot lead of the signal generator output to the ANT. binding post through the 120-$\mu\mu$f capacitor. Connect the ground lead to the receiver chassis.

(6) Control Ⓐ in the transmitter must *not* be set at position 9, 10, or 11.

(7) Disable the avc voltage supply as described in paragraph 219*c*.

b. BAND 1 Alinement.

(1) To aline the receiver at the lf end of BAND 1, proceed as follows:

(*a*) Set the signal generator at 6.6 mc.

(*b*) Turn control Ⓜ to BAND 1.

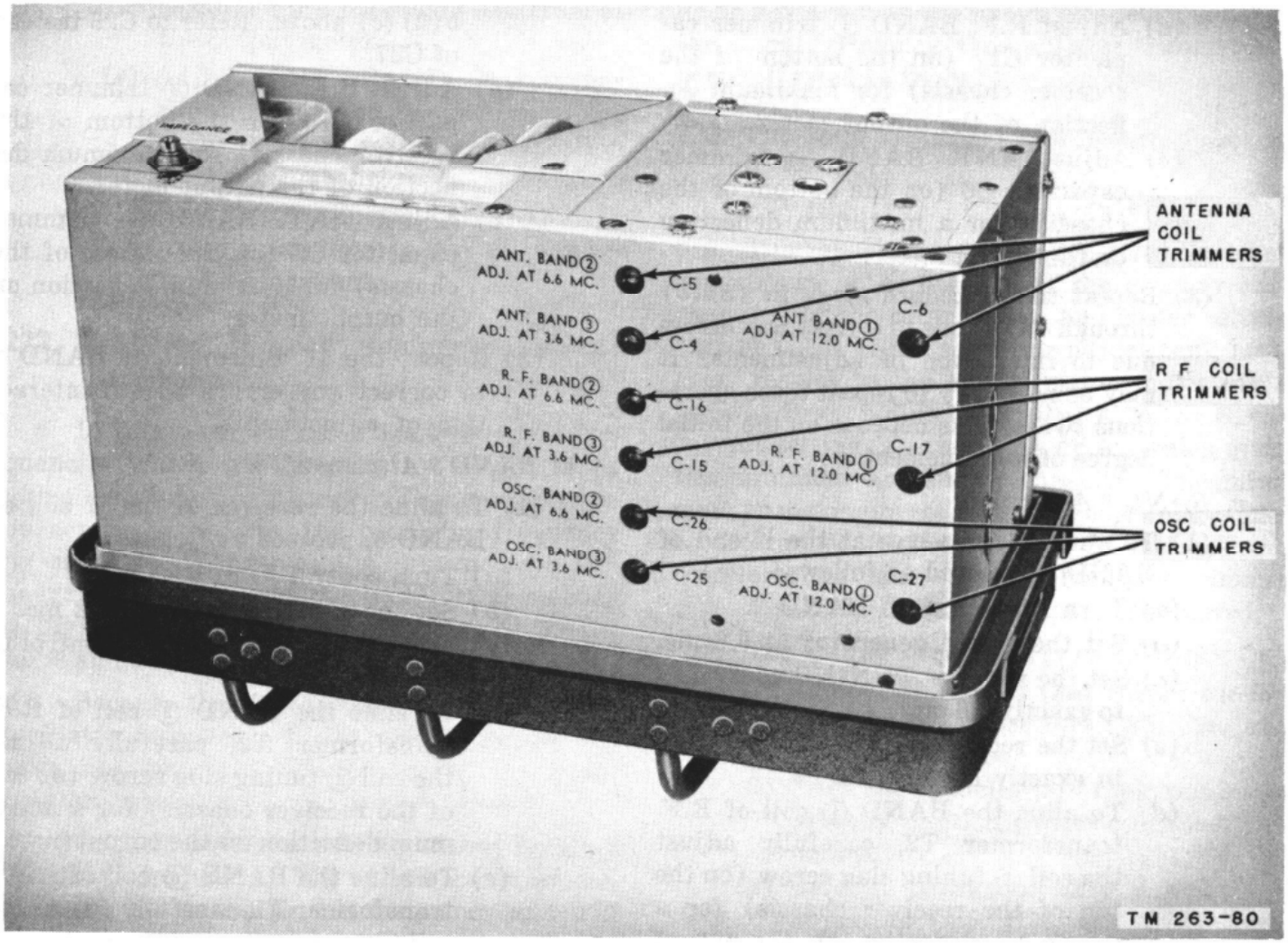


Figure 161. Receiver bottom, alinement points.

(*c*) Set the receiver TUNING dial to exactly 6.6 mc.

(*d*) To aline the BAND ① coil of rf transformer T2, carefully adjust the coil ① tuning slug screw (on the top of the receiver chassis) for a maximum deflection on the output meter.

(*e*) To aline the BAND ① coil of ANT. transformer T1, carefully adjust the coil ① tuning slug screw (on the top of the receiver chassis) for a maximum deflection on the output meter.

(*f*) To aline the BAND ① coil of OSC. transformer T3, carefully adjust the coil ① tuning slug screw (on the top of the receiver chassis) for a maximum deflection on the output meter.

(2) To aline the receiver at the hf end of band 1, proceed as follows:

(*a*) Set the signal generator at 12 mc.

(*b*) Set the receiver TUNING dial at exactly 12 mc.

(*c*) Carefully adjust OSC. BAND ① trimmer capacitor C27 (on the bottom of the chassis) for a maximum deflection of the output meter.

Note. It may be found that there are three positions of C27 (when rotated 360°) which will give a maximum reading on the output meter. Follow the procedure given in either paragraph 222 or 223 before following step (*d*) below. If there are only two positions found for a maximum output reading when rotating C27 for 360°, then proceed directly to step (*d*) below. Figure 162 shows the three settings of the oscillator trimmer capacitor that give three maximum output readings.

(*d*) Adjust R.F. BAND ① trimmer capacitor C17 (on the bottom of the receiver chassis) for maximum deflection of the output meter.

(*e*) Adjust ANT. BAND ① trimmer capacitor C6 (on the bottom of the chassis) for a maximum deflection on the output meter.

(3) Repeat the procedure given in (2) (*b*) through (*d*) above to correct any errors due to interaction of adjustments. It may be necessary to repeat these operations twice. This depends on the initial degree of misalinement.

c. BAND 2 Alinement.

(1) To aline the receiver at the lf end of BAND 2, proceed as follows:

(*a*) Turn control Ⓜ to BAND 2.

(*b*) Set the signal generator at 3.6 mc.

(*c*) Set the receiver TUNING control Ⓝ to exactly 3.6 mc.

(*c*) Set the receiver TUNING control Ⓝ to exactly 3.6 mc.

(*d*) To aline the BAND ② coil of R.F. transformer T2, carefully adjust the coil ② tuning slug screw (on the top of the receiver chassis) for a maximum deflection on the output meter.

(*e*) To aline the BAND ② coil of ANT. transformer T1, carefully adjust the coil ② tuning slug screw (on the top of the chassis) for a maximum deflection on the output meter.

(*f*) To aline the BAND ② coil of OSC. transformer T3, carefully adjust the coil ② tuning slug screw (on the top of the chassis) for a maximum deflection on the output meter.

(2) To aline the receiver at the hf end of BAND 2, proceed as follows:

(*a*) Set the signal generator at 6.6 mc.

(*b*) Set the receiver TUNING dial to exactly 6.6 mc.

(*c*) Carefully adjust OSC. BAND ② trimmer capacitor C26 (on the bottom of the chassis) for a maximum deflection on the output meter. If three maximum output readings are found, refer to the note given in *b* (2) (*c*) above. Refer to C26 instead of C27.

(*d*) Adjust R.F. BAND ② trimmer capacitor C16 (on the bottom of the receiver chassis) for maximum deflection of the output meter.

(*e*) Adjust ANT. BAND ② trimmer capacitor C5 (on the bottom of the chassis) for maximum deflection on the output meter.

(3) Repeat the lf alinement of BAND 2 to correct any errors due to interaction of adjustments.

d. BAND 3 Alinement.

(1) To aline the receiver at the lf end of BAND 3, proceed as follows:

(*a*) Turn control Ⓜ to BAND 3.

(*b*) Set the signal generator at 2 mc.

(*c*) Set the receiver TUNING control to exactly 2 mc.

(*d*) To aline the BAND ③ coil of R.F. transformer T2, carefully adjust the coil ③ tuning slug screw (on top of the receiver chassis) for a maximum deflection on the output meter.

(*e*) To aline the BAND ③ coil of ANT. transformer T1, carefully adjust the coil ③ tuning slug screw (on the top of the chassis) for a maximum deflection on the output meter.

(*f*) To aline the BAND ③ coil of OSC. transformer T3, carefully adjust the coil ③ tuning slug screw (on the top of the chassis) for a maximum deflection on the output meter.

(2) To aline the receiver at the hf end of BAND 3, proceed as follows:

(*a*) Set the signal generator at 3.6 mc.

(*b*) Set the receiver TUNING dial to exactly 3.6 mc.

(*c*) Carefully adjust OSC. BAND ③ trimmer capacitor C25 (on the bottom of the receiver chassis) for a maximum deflection on the output meter. If three maximum output readings are found, refer to the note given in *b* (2) (*c*) above. Refer to C25 instead of C27.

(*d*) Adjust R.F. BAND ③ trimmer capacitor C15 (on the bottom of the

chassis) for a maximum deflection of the output meter.

(*e*) Adjust ANT. BAND ③ trimmer capacitor C4 (on the bottom of the chassis) for a maximum deflection on the output meter.

(3) Repeat the lf alinement of BAND ③ to correct any errors due to interaction of adjustments.

222. Oscillator Trimmer Adjustment, Meter Method

a. In this receiver, there are two signal frequencies which will produce an output for a given oscillator frequency. The correct frequency is lower than the oscillator frequency by an amount equal to the intermediate frequency (456 kc), and the incorrect frequency is higher than the oscillator frequency by the same amount.

b. Because the signal frequency is below the oscillator frequency, the rf and converter circuits are tuned to this frequency to obtain greatest sensitivity in the overall receiver.

c. The incorrect frequency (*a* above) is called the image frequency. The rf and converter circuits are not tuned to this frequency and will almost keep this frequency signal out of the receiver. The sensitivity to the image frequency is consequently very much lower than the sensitivity to the signal frequency.

d. When adjusting an oscillator trimmer that gives two responses (A and B settings or A' and B settings on fig. 162), it is better to shift the signal-generator frequency to the image frequency to assure that the image frequency is above the signal frequency. If the signal frequency is 6.2 mc, the image frequency should be heard when the generator is tuned to 6.2 mc plus twice the intermediate frequency (6,200 kc + 912 kc = 7,112 kc or 7.112 mc). The output of the signal generator must be increased considerably to hear the response at the image frequency. If no signal is heard where the image signal is supposed to be received, tune the generator to the low side of the signal frequency and search for a response at a frequency lower than the signal frequency by an amount equal to twice the intermediate frequency. In this case, 6,200 kc (6.2 mc) —912 kc = 5,288 kc or 5.288 mc. If the image frequency is below the signal frequency, the oscillator trimmer has been adjusted to the wrong response.

223. Oscillator Trimmer Adjustment, Practical Method

(fig. 162)

a. The capacitor setting at A gives the same capacity as at A' because of the circular construction of the rotor plates, and either setting may be used. If the capacitor adjustment, however, results in the output meter indicating a peak at three points such as at A, A' or B, the correct setting is either at A or A', which gives the minimum amount of capacity. The minimum or maximum setting of the capacitor cannot be determined from the outside of the receiver; therefore, the panel cover of oscillator trimmer capacitors C25, C26, and C27 must be removed.

b. The tuning procedure is as follows:

(1) Remove the panel that covers oscillator trimmer capacitors C25, C26, and C27 (fig. 161).

(2) Turn the capacitors to their minimum capacity position (plates completely unmeshed).

(3) Refer to paragraph 221*b*, *c*, and *d* for adjusting C25, C26, and C27. Turn the capacitors until a first maximum is reached. This puts the oscillator

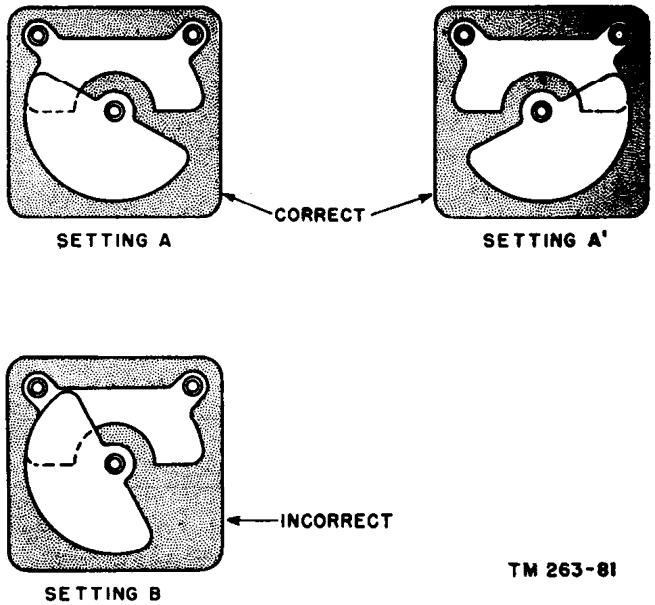


Figure 162. Determination of correct settings of oscillator trimmer capacitor C25, C26, and C27.

above the signal frequency for the correct setting.

(4) Replace the panel cover. This adds capacity to the circuit, and a fine adjustment of the capacitors is needed.

(5) *Slightly rock* the oscillator trimmers for a peak output reading on the output meter.

224. Crystal Calibrator Oscillator Alinement

The adjustment of the iron core slug in transformer T7 is made by the manufacturer and further adjustment may be unnecessary. The position of the slug will not change the frequency output of the crystal oscillator to any extent; therefore, do not attempt to adjust the crystal oscillator output.

Section IV. TRANSMITTER ALINEMENT PROCEDURES

225. Test Equipment Used for Alinement of Transmitter Section

Note. Transmitter alinement without test equipment is impossible. Never attempt to aline the transmitter without a multimeter.

a. To aline the transmitter, use the following equipment:

Item	Common name	Technical manual
Frequency Meter AN/URM-79 or equivalent.	Frequency meter.	TM 11-5094
Multimeter TS-352/U or equivalent that has a 1,000-ohm-per-volt section.	Multimeter	TM 11-5527
Ammeter IS-76	Rf meter	

Note. The receiver may be used as a frequency meter when placed in the CAL. position of control Ⓛ.

b. It may be desirable to use a dummy antenna instead of an actual radiator. The dummy antenna for transmitter tests is a 20-ohm, 20-watt noninductive resistor in series with a 70-$\mu\mu$f capacitor and an 0- to 5-ampere rf meter. This is equivalent to a 15-foot whip antenna. The components for the whip-type dummy antenna are listed below:

(1) 5 each resistors, 100 ohms, 5 watts ± 10 percent (connected in parallel to present 20 ohms at 20 watts).

(2) 1 each capacitor, 70 $\mu\mu$f ±20 percent, 500 vdcw.

Note. A 5,400-ohm noninductive resistor is equivalent to a half-wave antenna (control Ⓐ in REEL position).

226. Transmitter Alinement Procedure (figs. 163 and 164)

Warning: Be careful, because the cap of the output tube and many other points carry approximately 500-volts dc when the power is turned on.

a. Remove the power supply cable from the transmitter.

b. Unfasten the catches and remove the transmitter from its case. Be careful not to damage the pa tube.

c. Attach the power cable to the power receptacle on the front of the panel.

d. Set switch Ⓓ to PHONE–HI.

e. Set switch Ⓕ to BAND 1–MO.

f. Turn the ANT. SELECTOR switch Ⓐ to WHIP position 4, and adjust the ANTENNA TUNING control Ⓒ to 10. Do not use any position lower than 10, because misalinement will result.

g. Set the frequency meter to 11,200 kc.

h. Set control Ⓗ (OSC. CAL. control) to mid-position.

Note. If the dummy antenna is to be used (par. 225*b*), connect the meter end to the chassis or GND. post on the receiver. Connect the resistor end to the ANT. post on the transmitter.

i. Set the FREQ. CONTROL Ⓘ knob on the transmitter to the setting indicated on the calibration chart for 11,200 kc.

j. Press the microphone button and listen in the phones for the signal from the transmitter. Adjust the mo BAND 1 (MO) trimmer (C-106B) to exactly zero beat. If the CAL. position of control Ⓛ in the receiver is used instead of the frequency meter, proceed as instructed in paragraph 58.

Note. Because the frequency meter can give beat notes between harmonics of the transmitter and frequency meter, measurements of the transmitter frequency should be taken at several points on the dial to be sure that the transmitter has been alined to the cor-

rect frequency, and that it has calibrated closely over its entire range. If a check is made at several points and it is found that only the one at which the adjustment has been made is closely on frequency and that the other points checked are considerably in error, it is probable that the wrong beat note was used in the frequency meter and that none of the frequencies is correct.

k. Connect the negative lead of the 1,000-ohm-per-volt rang of the multimeter to point No. 5 on the metering socket and connect the positive lead to the chassis or pin 7; use the 250-volt scale on the multimeter.

l. Adjust the doubler trimmer (C111) BAND 1 for *maximum* output indication on the meter.

m. Use approximately a 3-volt scale of the multimeter and connect the positive lead of the meter to point No. 2 and the negative lead to point No. 8 of the metering socket.

Warning: Be careful, because both ends of the meter connected in this manner are approximately 500 volts above chassis ground.

n. Adjust the power amplifier trimmer (C-118) BAND 1 for *minimum* indication on the meter.

o. Set the FREQ. CONTROL ① knob on the transmitter to the setting indicated on the calibration chart for 6.6 mc. Use the 250-volt scale and connect the negative meter lead to pin 5 and the positive lead to pin 7 of the metering socket. Loosen the locknut and adjust the BAND 1 DOUBLER screw on coil T104 (core) for maximum voltage and then tighten the locknut.

p. Using the 2.5-volt scale, connect the negative meter lead to pin 8 and the positive meter lead to pin 2 at the metering socket. Loosen the locknut and adjust BAND 1 (PA) iron core for minimum voltage on the meter and then tighten the locknut.

q. Repeat the procedures in *i* through *n* (omitting *j*) above in their proper sequence

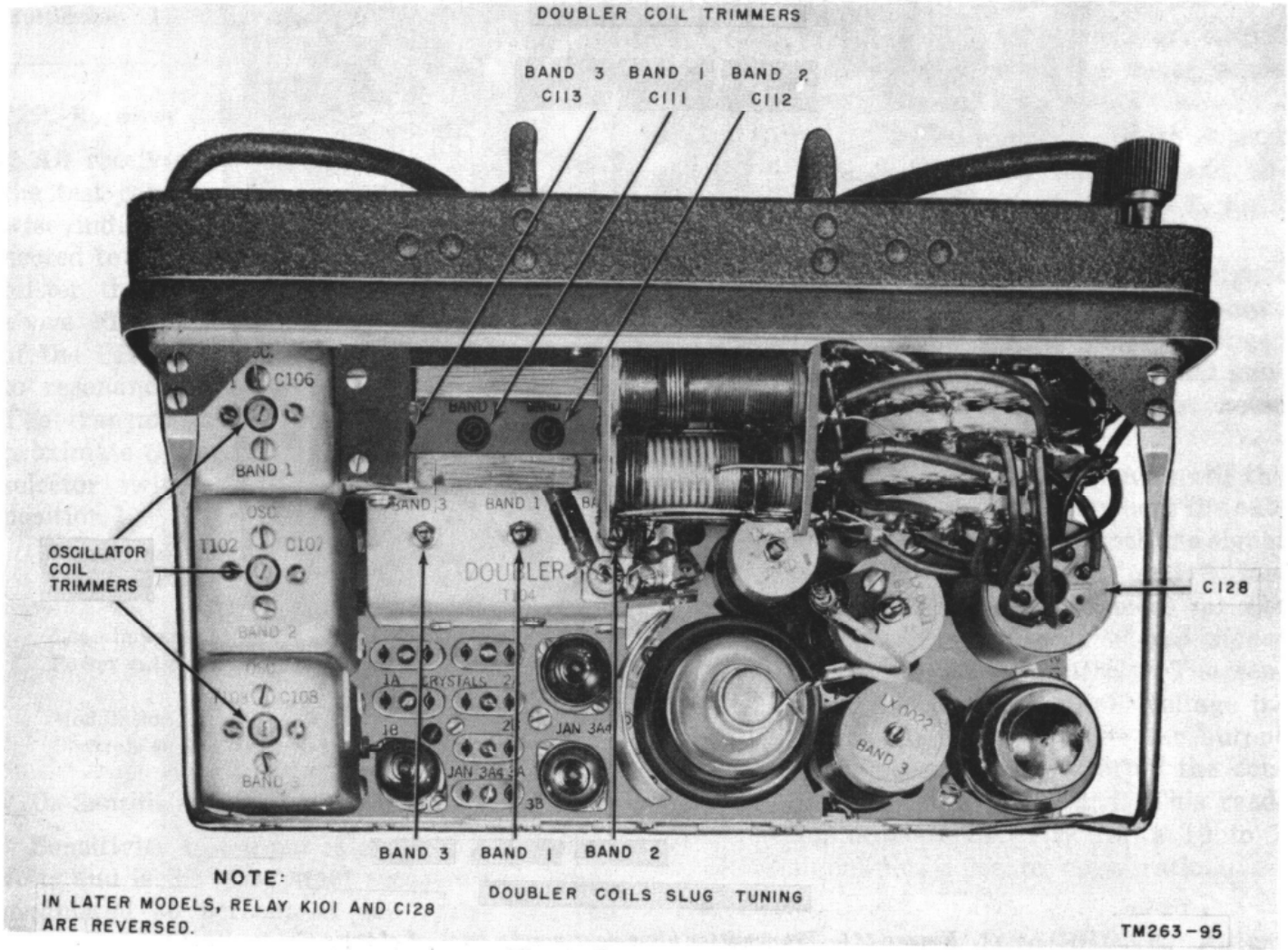


Figure 163. Transmitter alinement points, top of chassis.

until further adjustment will give no improvement.

r. Connect a 5,000-ohm carbon resistor from the ANT. post on the transmitter to a bare metal part of the chassis of the transmitter. Turn the ANT. SELECTOR switch Ⓐ to REEL 5, 6, 7, or 8, whichever will resonate. Rotate the ANTENNA TUNING knob (control Ⓒ) until the INDICATOR Ⓑ glows brightest.

s. As a final check to insure proper alinement, tune the transmitter at one end of the frequency band and then at the other end. At the same time, adjust knobs Ⓐ and Ⓒ at each end of the band. This will make the indicator glow with normal brilliance and will assure that the antenna coupling circuits can be tuned to resonance at each end of the band.

t. Follow the same procedure for BANDS 2 and 3; use alinement frequencies of 6,100 kc and 3,600 kc for BAND 2 and 3,300 kc and 2,000 kc for BAND 3.

u. Remove the power cable as a safety measure.

v. Replace and fasten the transmitter in its case.

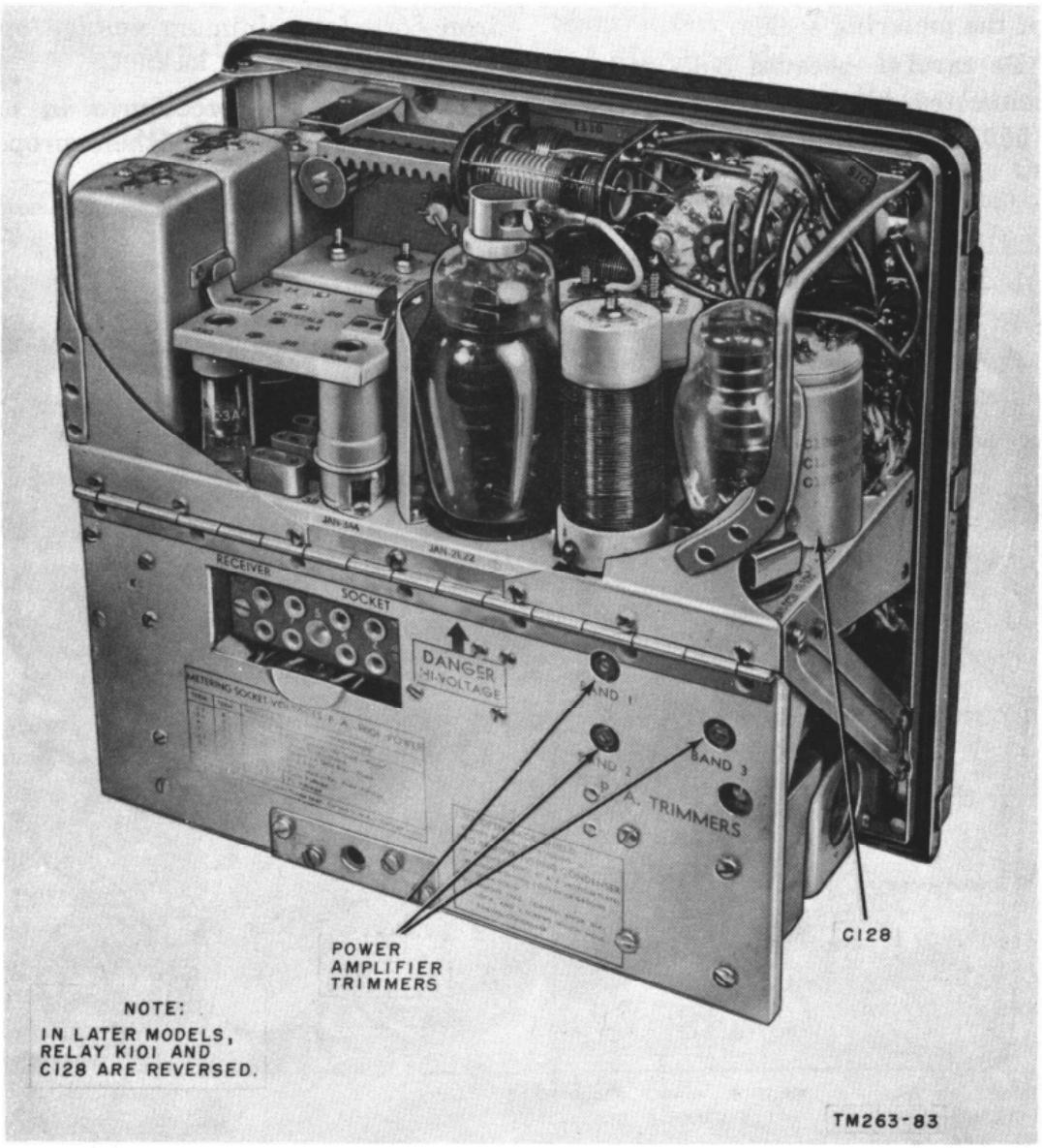


Figure 164. Transmitter alinement points, back of chassis.

Section V. FINAL TESTING OF RECEIVER SECTION

227. General

Paragraphs 244 through 264 are intended as a guide to be used in determining the quality of a repaired Radio Set AN/GRC–9(*). The minimum test requirements outlined in paragraphs 230 through 264 may be performed by maintenance personnel with adequate test equipment and the necessary skills. Repaired equipment meeting these requirements will furnish uniformly satisfactory operation.

228. Test Equipment Required

The instruments needed for testing the required equipment are listed below.

Item	Common name	Technical manual
R. F. Signal Generator Set AN/URM–25.	Signal generator.	TM 11–5551
Multimeter TS–352/U	Output meter	TM 11–5527

229. Receiver Section, Preliminary Adjustments

All receiver measurements are made under the test conditions listed below, unless otherwise indicated. The signal generator is connected to the ANT. binding post on the transmitter through the dummy antenna specified above. The output meter is connected to one of the PHONES jacks. The receiver is tuned to resonance at each of the test frequencies. The transmitter control © is set at the approximate center of its range, and the antenna selector switch (control Ⓐ) is set to WHIP position 1.

Dummy antenna ..... 120 $\mu\mu$f.
Standard output ..... 10 mw or 6.3 volts in a 4,000-ohm noninductive load.
Load impedance ..... 4,000 ohms noninductive.
Power ratio ..... Signal-plus-noise to noise ratio (10:1).
Modulation ..... 30 percent at 400 cycles.
Controls Ⓞ and Ⓟ ..... Set at maximum.

230. Sensitivity Test

Sensitivity test input is expressed in microvolts and is the least input signal which, when modulated 30 percent at 400 cycles and fed into receiver, will produce the standard output of 10 mw with controls Ⓞ and Ⓟ at maximum settings. The test is conducted to give a signal-plus-noise ration of 10 to 1. The sensitivity is measured at the following test frequencies.

Band	High	Medium	Low
1	12.0 mc	9.3 mc	6.6 mc
2	6.6 mc	5.1 mc	3.6 mc
3	3.6 mc	2.8 mc	2.0 mc

a. CW. The procedure is as follows:

(1) Turn control Ⓛ to C.W.

(2) Adjust TUNING control Ⓝ to the test frequency.

(3) Set the signal generator to approximately the same test frequency, using no modulation, to provide a 1,000-cycle beat note. Set the output meter as instructed in paragraph 218*b*.

(4) Adjust the signal generator output control until the output meter reads 10 mw.

(5) Detune the signal generator to at least 20 kc away from resonance and adjust the A. F. GAIN control Ⓞ until the output meter reads 1 mw.

(6) It is probable that when the signal generator is set again at the resonant frequency, the output meter no longer reads 10 mw. Adjust the signal generator output until the output meter reads 10 mw.

(7) Repeat steps 5 and 6 above until the condition is maintained where the output meter reads 10 mw with the signal generator on resonance and 1 mw with the generator detuned, *for the same setting of receiver and signal generator volume controls.* The sensitivity is then the signal voltage input to the receiver when the output meter records 10 mw after the condition in step 7 is found. This reading is the sensitivity for a 10 to 1 signal-plus-noise to noise ratio.

b. Phone.

(1) Turn control Ⓛ to PHONE. Adjust R. F. GAIN control Ⓟ to maximum.

(2) Adjust TUNING control Ⓝ to the test frequency.

(3) Set the signal generator to the same test frequency, modulated 30 percent at 400 cycles.

(4) Adjust the signal generator output control until the output meter reads 10 mw.

(5) Remove the modulation from the signal input and adjust the A. F. GAIN control Ⓞ until the output meter reads 1 mw.

(6) When the signal is modulated again, the output may no longer be 10 mw. Readjust the signal generator output until it is 10 mw.

(7) Repeat (5) and (6) above until the condition is maintained where the output meter reads 10 mw with the signal generator modulated and 1 mw with the generator unmodulated, *for the same setting of receiver and generator volume controls.*

(8) The sensitivity is then the signal voltage input to the receiver when the output meter records 10 mw and when the condition in step 7 is found. This reading is the sensitivity for a 10 to 1 signal-plus-noise to noise ratio.

c. Sensitivity Values. For a receiver output of 10 mw at a signal-plus-noise to noise ratio of 10, the sensitivity figure of the receiver should be not more than 3 microvolts for cw reception, and not more than 10 microvolts for am reception.

231. Selectivity Test

The selectivity test gives an indication of the shape of the bandwidth or band-pass characteristics of the tuned circuits in the receiver. The selectivity is measured at 6,600 kc (BAND 2).

a. The signal generator is set at 6,600 kc, with a 400-cycle signal modulated at 30 percent, and it has an initial output of 10 microvolts. The output meter is set as described in paragraph 218*b*.

b. With control Ⓟ set at maximum, receiver volume control Ⓞ is adjusted so that a 10-mw output is indicated on the output meter. These controls are not changed for the remainder of the test.

c. The input voltage from the signal generator is successively increased to 2, 10, 100, and 1,000 times its initial value and, at each value of signal strength, the signal generator is detuned *on each side* of 6,600 kc so that the receiver will produce exactly a 10-mw output.

d. The selectivity of the receiver is within the following limits, using the procedures in *a* through *c* above.

Signal generator input	Total bandwidth (kc)	
	Maximum*	Maximum
2 x initial setting	3.5	
10 x initial setting		12
100 x initial setting		20
1000 x initial setting		30

* Indicates that for a signal-generator input of 2 x initial setting, there should not be less than 3.5 kc between the two points (on either side of 6,600 kc) at which the power output will be equal to the 10-mw prevailing at the initial input of 10 microvolts.

232. Image Frequency Rejection Ratio

a. This is defined as the ratio of signal input voltage at the image frequency to the signal input voltage required at the desired frequency, with the receiver power output being the same for both frequencies. The image frequency rejection ratios for the receiver should be as follows:

Band	*Ratio*
1	Greater than 50 to 1
2	Greater than 250 to 1
3	Greater than 1000 to 1

b. The image frequency rejection ratio is determined at the high, middle, and low end of each band. Proceed as follows:

(1) Set the output meter as instructed in paragraph 218*b* and set the output voltage of the signal generator at 10 microvolts with a 400-cycle signal modulated at 30 percent.

(2) Controls Ⓞ and Ⓟ are adjusted to produce a 10-mw output indication on the output meter.

(3) Tune the signal generator to the image frequency of the resonant frequency to which the receiver TUNING control Ⓝ is set. The image fre-

quency is 912 kc plus the resonant frequency. Image ratio is obtained by dividing the microvolts necessary to produce a 10-mw output at image frequency (912 kc plus resonant frequency) by the microvolts required for the same 10-mw output at the resonant frequency, with the gain controls (Ⓞ and Ⓟ) in the same position for the two measurements.

233. If. Rejection Ratio

The if. rejection ratio should be greater than 100 db at all frequencies within the 2-mc to 12-mc bandwidth of the receiver. It is measured at the low end of each band, 2 mc, 3.6 mc, and 6.6 mc. The output meter is set as instructed in paragraph 218*b*. The input voltage of the signal generator is 10 microvolts at resonance. Controls (Ⓞ and Ⓟ) are adjusted to produce 10-mw output. The ratio is obtained by dividing the microvolts, necessary to produce 10-mw output at the if. (456 kc), by the microvolts required for the same output at the resonant frequency, with controls Ⓞ and Ⓟ in the same position for the two measurements.

234. Af Output

a. The maximum power output of the receiver should not be less than 90 mw at all frequencies from 250 to 2,500 cps (cycles per second) for both the 250- and 4,000-ohm output impedances. For these impedances, the maximum undistorted output (less than 10 percent distortion) should be not less than 75 mw at all frequencies from 250 to 2,500 cps.

b. The input level of the test signal is set to 500 microvolts at 5,100-kc modulated at 30 percent, and the receiver is tuned to resonance. The af is varied, and receiver volume control Ⓞ is adjusted to maximum undistorted output at each af. Maximum undistorted power output is defined as the maximum power output which contains less than 10 percent total harmonic distortion (root-mean-square voltage). For the 4,000-ohm impedance test, substitute the 4,000-ohm resistor for the 250-ohm resistor (par. 218*b*).

235. Audio Fidelity

a. With both 250- and 4,000-ohm output impedances, the maximum undistorted output at all frequencies from 250 to 2,500 cps should be within +2 db or —5 (decibel) of the output at 400 cps.

b. The input level of the test signal is set to 500 microvolts at 6,600 kc (BAND 2) and modulated at 30 percent at 400 cps. The receiver is tuned to 6,600 kc and controls (Ⓞ and Ⓟ) are set to produce an output meter reading of 10 mw. The volume controls should not be touched for the remainder of the test. The am frequency is varied, while the modulation remains at 30 percent for all modulation frequencies.

236. Calibration Accuracy

a. The dial calibration should be accurate to within 30 kc on BANDS 2 and 3 and 50 kc on BAND 1.

b. The calibration accuracy of the receiver is checked at 200-kc intervals over the entire frequency range of each band, starting at 2,000 kc. The dial is turned in the direction of the increasing frequency for each check point. Refer to paragraph 52 for calibration operation.

237. Crystal Calibrator Circuit

a. With the receiver set to CAL. and controls (Ⓞ and Ⓟ) set at maximum, the power output of the receiver is measured at each crystal check point as the receiver is tuned through the entire frequency range. The power output indicated by the output meter should be a minimum of 10 mw.

b. The crystal calibrator oscillator circuit should have an accuracy of plus or minus 20 cps at 200 kc when using standard Crystal Unit CR–2/U which is calibrated to ±18 cps.

c. The spurious response should have a rejection ratio of more than 27 db compared to the crystal check points on either side of the particular spurious response. With the receiver set to CAL. and controls Ⓞ and Ⓟ set to maximum, the receiver is tuned over the entire range and spurious responses are noted. The receiver is tuned to the weaker of the crystal check points on either side of each spurious response, and the R. F. GAIN control Ⓟ is reduced so that the receiver output is 50 mw. The receiver then is tuned to the spurious re-

sponse without disturbance of the gain control. The spurious response power output reading should be less than .1 mw.

238. Beat Frequency Oscillator

The bfo is checked at 6,600 kc (BAND 2). When left in this position, controls ⓞ and Ⓟ are adjusted to produce an output of 50 mw at a signal input of 500 microvolts. When Headset HS–30–(*) is used, the audible beat note is distinct, (without distortion), as the signal input voltage is increased to 500 millivolts.

239. Resettability

a. The resettability is a measure of the backlash in the tuning gears, and it is checked at the hf end of each band. Each test frequency is approached from the clockwise and counterclockwise directions, and the difference in readings is recorded. There should not be more than a 5-kc difference in the dial reading when the test frequency is approached from the clockwise and counterclockwise directions.

b. To check the resettability of the tuning gears, set the receiver controls as indicated.

(1) Set controls ⓞ and Ⓟ to their mid-settings.
(2) Set control Ⓛ to CAL.
(3) Set control Ⓜ to BAND 1.
(4) Turn control Ⓝ to 12.0 mc.

c. Tune control Ⓝ for a zero beat by approaching the signal frequency from a clockwise direction. Measure this frequency with the frequency meter.

d. Tune control Ⓝ for a zero beat by approaching the signal frequency found in *c* above but from a counterclockwise direction. Measure the frequency as in *c* above.

240. Spurious Responses

Spurious responses caused by harmonics of the hf oscillator and bfo should have a rejection ratio of more than 50 db over the entire tuning range. Spurious responses are measured at the hf end of each band. With 10 microvolts input at the receiver signal frequency, control ⓞ and Ⓟ are adjusted to give a 10-mw output. The input is then adjusted to 10,000 microvolts, and the signal generator frequency is adjusted over the frequency range of ±2 mc of the test frequencies. If spurious responses occur, the input should be reduced to give an output of 10-mw. The voltage ratio of this input to the resonant frequency input is recorded as the spurious response ratio.

241. Current Drain

The receiver current drain is measured with the receiver set for cw operation, using a 0- to 50-ma meter in series with the B supply and a 0- to 1-ampere meter in series with the A supply. At 105- and 1.4-volt input, the B drain should be less than 20 ma and the A drain should be less than 500 ma, respectively, under conditions of maximum current consumption. Multimeter TS–352/U may be used for these measurements.

242. Sidetone

The receiver should provide clear monitoring when the transmitter is set for cw, mcw, or voice operation. With the SIDE TONE VOL. control Ⓖ set at maximum, the sidetone output at the receiver jack should be a minimum of 10 mw.

243. Receiver Section Tests at Reduced Dc Supply Voltage Input

a. Sensitivity. With a 1.2-volt filament voltage, a plate voltage of 75 volts and an output of 10 mw, the sensitivity should be not less than 50 microvolts for voice reception and not less than 25 microvolts for cw reception.

b. Calibrator Output. The crystal calibrator output under lv conditions is measured by the use of headphones at the receiver output jacks. With 1.2-volts filament voltage and a plate voltage of 75 volts, the calibrator output should be audible over the frequency range within two consecutive crystal check points.

c. Filament Voltage Regulation. The filament voltage is measured at a tube socket when operating the filaments through a 10.6-ohm dropping resistor in series with a 6-volt source and then with an 8-volt source. The filament voltage should be greater than 1.2 volts for a 6-volt source and less than 1.7 volts for an 8-volt source.

Section VI. FINAL TESTING OF TRANSMITTER

244. Test Equipment Required

a. The instruments needed for final testing of the transmitter are listed below:

Item	Technical manual	Common name
Ammeter IS–76		Rf meter
Multimeter TS–352/U	TM 11–5527	Multimeter
Oscilloscope OS–8A/U	TM 11–1214	Oscilloscope
Audio Oscillator TS–382A/U.	TM 11–2684A	Af oscillator
Frequency Meter FR–67/U.	TM 11–2698	Frequency counter.
Electronic Multimeter TS–505/U.	TM 11–5511	Vtvm
Frequency Meter AN/URM–9.	TM 11–5094	Frequency meter.
Electronic Multimeter ME–6A/U.	TM 11–5549	Ac vtvm

b. In addition to the instruments listed above, the following items are required for final testing of the transmitter:

1 each capacitor, 1 $\mu\mu$f $\pm$20 percent.
5 each resistors, 100 ohms, 5 w $\pm$10 percent (connected in parallel to present 20 ohms at 20 watts).
1 each capacitor, 70 $\mu\mu$f $\pm$20 percent, 500 vdcw.

245. Transmitter Section, Preliminary Adjustments

Unless otherwise specified, all transmitter measurements are made under the following test conditions:

a. For the dummy antenna, use a 20-ohm, 20-watt noninductive resistor in series with a 70-$\mu\mu$f capacitor and 0- to 5-ampere rf meter. This is equivalent to a 15-foot whip antenna. Connect the meter end to the chassis or ground side.

Note. A 5,400-ohm noninductive resistor is equivalent to half-wave antenna (control Ⓐ in REEL position).

b. Control Ⓓ is set to PHONE–HI position unless otherwise stated.

246. Power Output

With input voltages of 6.3 volts filament and 500 and 425 plate voltages at the POWER receptacle, the power outputs should not be less than those listed in the table below. The ANTENNA TUNING control Ⓒ is adjusted to maximum meter deflection for each frequency. The power output is: (ANTENNA CURRENT)^2 (20 ohms). The input power to the transmitter is obtained by measuring the total dc plate and screen currents of the pa tube. The input power to the transmitter should be less than the input powers listed in the table below.

Note. Screen current cannot be measured directly but may be computed from the following procedure: Measure the voltage between pins 3+ and 7— at the metering socket. Divide this voltage by 30,000 ohms. Denote this current as I 1. Measure the voltage between pins 2+ and 3— at the metering socket. Divide this voltage by 10,000 ohms if switch S105 is set for high power; divide by 40,000 ohms if switch S105 is set for lower power. Denote this current as I 2. The value of screen current is I 2–I 1.

Operating voltages	Plate and screen input power (watts)	Position of control D	Power output (watts)	Frequency (kc)	Frequency band
500	75 to 100	CW HI	7 to 8	2,000	3
500	60 to 80	PHONE HI	2 to 3.5	2,000	3
500	60 to 70	CW LI	3 to 3.5	2,000	3
500	40 to 50	PHONE LO	.3 to .5	2,000	3
500	80 to 100	CW HI	12	3,600	3
500	60 to 80	PHONE HI	3 to 4	3,600	3
500	75 to 100	CW HI	10 to 12	3,600	2
500	60 to 80	PHONE HI	3.5 to 5	3,600	2
500	75 to 100	CW HI	12	6,600	2
500	60 to 80	PHONE HI	3 to 5	6,600	2
500	75 to 100	CW HI	7.5 to 12	6,600	1
500	60 to 80	PHONE HI	3 to 5	6,600	1
500	75 to 100	CW HI	12	12,000	1
500	60 to 80	PHONE HI	5	12,000	1
425	30 to 60	CW LO	2 to 3	2,000	3
425	20 to 40	PHONE LO	.2 to .3	2,000	3

247. Microphone Input Voltage

a. In phone operation for audio-modulation frequencies between 250 and 3,000 cps, 100 percent modulation should be obtained for an input of less than .5 volt to the primary of microphone transformer T112.

b. To check the microphone input voltage required for 100 percent modulation, proceed as follows:

(1) Turn the transmitter on.
  (*a*) Set control Ⓓ to HI–PHONE.
  (*b*) Set control Ⓔ to SEND.
  (*c*) Set control Ⓕ to MO–BAND 1.

c. Tune for maximum output as shown in INDICATOR Ⓑ.

d. Connect the oscilloscope between the antenna terminal post and the receiver GND. post and place the graph in front of the oscilloscope tube.

e. Connect the af oscillator to the MIKE jack using a 250 cps signal.

f. Tune the transmitter to the middle of BAND 1.

g. Increase the output of the af oscillator until 100 percent modulation is indicated on the oscilloscope.

h. Read value on the ac voltmeter connected across the af oscillator output. The reading should be .5 volts or less.

i. Repeat the above procedure (*b* through *h* above) except to turn control Ⓓ to the LO position.

j. Repeat above procedure (*b* through *i* above) with the af oscillator set for 400, 1,000, and 3,000 cps.

k. Repeat entire procedure with control Ⓕ at MO–BAND 2 and then to MO–BAND 3.

l. Reduce the modulation to 50 percent as seen on the oscilloscope. Check the wave form for distortion with the aid of the graph. The distortion should be less than 10 percent on all three bands with all audio frequencies used.

248. Mcw and Cw Operation

a. The frequency of the modulating tone in mcw operation should be between 700 and 1,100 cps. The transmitter should be modulated from 70 to 100 percent on mcw and no modulation should occur on cw.

b. The transmitter is set up for normal operation and the sidetone control is adjusted for maximum output. The percentage of modulation, as viewed on an oscilloscope (par. 247*d*), is checked for both high and low power mcw operation at 8 mc.

c. On cw operation, no trace of the sidetone signal should be on the rf carrier.

d. To check the modulation tone, use either the frequency counter or the combination of the oscilloscope and af oscillator.

249. Netting Operation

a. At all frequencies in the range of the radio set, the transmitter should be capable of netting with another radio transmitter within ±1,000 cps.

b. The transmitter is set up for high-power, mo, and cw operation (HI–MO–CW). The receiver of the radio set is zero-beat to the frequency meter adjusted to 12 mc. The transmitter is adjusted to zero-beat with the receiver in the NET position, then the transmitter is set to normal cw operation and the frequency of the beat note in the frequency meter should be checked.

250. Overload Relay K102

a. The overload relay in the pa circuit should open during crystal operation when mistuning of FREQ. CONTROL Ⓘ exceeds 7 percent of the operating frequency. Also the overload relay should de-energize before the pa grid voltage drops below 10 volts.

b. The transmitter is set up for CW–HI–XTAL operation for frequencies in the middle of each band. The transmitter tuning dial is set to the crystal frequency, and is tuned above and below until the overload relay opens. The dial readings and the pa grid voltage should be recorded and compared to *a* above.

251. Metering Socket Readings

a. The transmitter is set for high-power, mo, and cw operation with the 20-ohm, —20 watt, 70-$\mu\mu$f dummy antenna load on the antenna circuit. The plate supply should be adjusted to 500 volts and the filament supply to 6.3 volts. The antenna circuit should be resonated, and the voltages at the metering socket should be recorded for cw operation. The meas-

urements are made by using the 20,000-ohm-per-volt range of the multimeter. Plate current (with no load) measurements are made with the dummy antenna removed.

b. The following readings should be obtained:

Metering socket pins		Circuit	Value
1+	7—	Pa filament voltage	+6.3
2+	7—	Pa plate voltage	+500 volts
2+	8—	Pa plate current (loaded).	BANDS 1, 2, and 3, 110 ma; maximum.
		Pa plate current (unloaded).	Less than 30 ma on all bands.
3+	7—	Pa screen grid voltage.	275 volts maximum on all bands.
4+	7—	Pa suppressor grid bias (CW).	+6.3 volts
4—	7+	Pa suppressor grid bias (PHONE).	—40 volts
5—	7+	Pa signal grid bias	—46 to —70 volts
6+	7—	Master oscillator plate voltage.	+105 volts
		Modulator plate voltage.	
7+	7+	Terminal 7 is grounded to the transmitter chassis.	0 volt

252. Keying Relay and Keying

a. It should be possible to key the transmitter at speeds up to 25 words per minute either in the MO or XTAL position of control Ⓕ. The keying relay should meet the requirements given in paragraph 216*c*.

b. To check the keying, proceed as follows:

(1) Turn the transmitter on.

(*a*) Set control Ⓓ to CW–HI.

(*b*) Set control Ⓕ to MO–BAND 1.

(*c*) Turn control Ⓘ to any frequency.

(2) Plug the keying to the KEY jack and key at 25 words per minute.

(3) INDICATOR bulb Ⓑ should flash at the same rate as (2) above.

(4) Turn control Ⓕ to XTAL–BAND 1 and turn control Ⓘ to the crystal frequency.

(5) Repeat (2) above and look for the same indication as in (3) above.

253. Frequency Stability Versus Input Voltage

a. The transmitter is connected to the dummy antenna and is fully loaded for high-power cw operation.

b. The transmitter is tuned to 12,000 kc and is allowed to warm up for 5 minutes at input voltages of 5.4 and 400 volts. The frequency is checked by a frequency meter and the transmitter is set to zero beat with the frequency meter. The supply voltages are increased to 7.5 and 700 volts. The frequency meter is then zero-beat to the transmitter. The difference in readings is considered the drift.

c. The frequency drift of the mo should not exceed .02 percent for a variation from 5.4 volts filament and 400 volts plate to 7.5 volts filament and 700 volts plate.

Section VII. FINAL TESTING OF POWER SUPPLIES

254. Vibrator Power Supply PE–237, Voltage Output and Time Delay Relay Test

a. With a 6-, 12-, or 24-volt vehicular battery connected to the input of the power supply, the voltage outputs are as indicated below. These measurements are made with the power supply loaded. Refer to paragraph 187 for measurement disassembly.

Terminals	Circuit	Value in volts (dc)
20 to 24 (ground).	Transmitter filaments	6.3
21 to 24	Receiver plates (SEND)	105
22 to 24	Receiver filaments (STANDBY).	1.4
23 to 24	Receiver filaments (SEND)	1.4
32 to 24	Transmitter plates (V102 and V103).	500
33 to 24	Receiver plates (STANDBY).	100
34 to 24	Keying relay K101	6.0

b. The voltages in the table above should be obtained approximately 100 milliseconds after time delay relay 743 is energized.

255. Vibrator Power Supply PE–237, Ripple Voltage Test

The maximum ripple voltages for the vibrator power supply as measured with Electronic Multimeter ME–6A/U in series with a 1-$\mu\mu$f capacitor are as follows:

Terminals	Circuit	Value in volts (ac)
20 to 24 (ground).	Transmitter filaments	.025
21 to 24	Receiver plates (SEND)	3.5
22 to 24	Receiver filaments (STANDBY).	.005
23 to 24	Receiver filaments (SEND)	.005
32 to 24	Transmitter plates	4.0
33 to 24	Receiver plates (STANDBY).	.1

256. Dynamotor-Power Supply DY–88/GRC–9, Voltage Output Test

a. The voltage output measurements are made at POWER OUT receptacle J202. To measure the output voltages, proceed as follows:

(1) Connect the receiver-transmitter to the dynamotor power supply.
(2) Check the setting of the voltage selector switch control H206 (fig. 142) and DYN. FUSE F201 to see that they correspond with the voltage source available.
(3) Connect a 6-, 12-, or 24-volt battery to the input of the dynamotor power supply.
(4) With the transmitter tuned and loaded for CW–SEND operation, the voltage outputs as measured with Electronic Multimeter TS–505/U should be within the maximum and minimum values in the following chart.

Terminals on J202	Circuit	Rated output (volts dc)	Maximum output (volts dc)	Minimum output (volts dc)
20 to 24 (ground).	Transmitter filaments	6.5	6.8	6.2
21 to 24	Receiver plates (SEND)	120	140	105
22 to 24	Receiver filaments (STANDBY)	1.5	1.6	1.4
23 to 24	Receiver filaments (SEND)	1.5	1.6	1.4
32 to 24	Transmitter doubler and pa plates (key down).	580	630	530
33 to 24	Receiver plates (STANDBY)	120	140	105
34 to 24	Keying relay K101 (key down)	6.9	7.4	6.4

b. The maximum output voltage from the keying relay circuit (pins 34 to 24 on J202), with the receiver-transmitter in PHONE–SEND operation and with the microphone switch released, should not exceed 8 volts dc.

257. Dynamotor-Power Supply DY–88/GRC–9, Voltage Regulation Test

The voltage regulation of the transmitter plate supply circuit between no-load and normal-load conditions must not exceed 15 percent. To measure the percent regulation, proceed as follows:

a. Connect the receiver-transmitter to the dynamotor power supply.

b. Check the setting of the voltage selector switch control H206 (fig. 142) and DYN. FUSE F201 to see that they correspond with the voltage source available.

c. Connect a 6-, 12-, or 24-volt battery to the input of the dynamotor power supply.

d. With the transmitter tuned and loaded for CW–SEND operation, and the key closed, measure the transmitter plate supply voltage from pin 32 of POWER OUT receptacle J202 to ground; use Electronic Multimeter TS–505/U. This is the normal-load voltage which is designated E_2.

e. Repeat the procedure in *d* above with the key up. The voltage measured is the no-load voltage which is designated E_1.

f. Compute the percent regulation from the following formula:

$$\text{Percent regulation} = \frac{E_1 - E_2}{E_2} \ (100)$$

For example, if the normal-load voltage E_2 is 580 volts, and the no-load voltage E_1 is 630 volts, the percent regulation is:

$$\frac{630-580}{580} \ (100) = 8.6\%$$

g. If the percent regulation exceeds 15 percent, Dynamotor D201 is probably defective. Check for poor brush contact, worn brushes, or commutator segments that are heavily coated with oxide.

258. Dynamotor Power Supply DY–88/GRC–9, Ripple Voltage Test

With a 6-, 12-, or 24-volt battery connected to the input of the dynamotor power supply and a receiver-transmitter connected as a load, the maximum permissible ripple voltages as measured with Electronic Multimeter ME–6A/U in series with a 1-$\mu\mu$f capacitor are as follows:

Terminals on J202	Circuit	Ac ripple (volts)
20 to 24 (ground).	Transmitter filaments	.05
21 to 24	Receiver plates (SEND)	.1
22 to 24	Receiver filaments (STANDBY).	.005
23 to 24	Receiver filaments (SEND)	.005
32 to 24	Transmitter plates (V102 and V103).	4.0
33 to 24	Receiver plates (STANDBY).	.1
34 to 24	Keying relay K101	.3

259. Dynamotor-Power Supply DY–105/GRC–9X, Voltage Output Test

a. The voltage output measurements are made at POWER OUT receptacle J2. To measure the output voltages, proceed as follows:

(1) Connect the receiver-transmitter known to be good to the dynamotor power supply or load resistors as listed in the chart below.

(2) Connect a 24-volt battery to the input of the dynamotor power supply.

(3) With the transmitter tuned and loaded for CW–SEND operation, the voltage outputs as measured with Electronic Multimeter TS–505/U should be within the maximum and minimum values in the following chart:

FOR FULL-LOAD OPERATION

Terminals	Circuit	Rated output (volts dc)	Maximum output (volts dc)	Minimum output (volts dc)	Dummy load resistor if used (ohms)	Dummy load wattage rating	Current drain at full load (ma)
20 to 24 (ground).	Transmitter filaments	6.5	6.8	6.2	3¼	25	2,000
21 to 24	Receiver plates (SEND)	120	140	105	2,625	10	45
22 to 24	Receiver filaments (STANDBY).	1.5	1.6	1.4	3	2	500
23 to 24	Receiver filaments (SEND)	1.5	1.6	1.4	3	2	500
32 to 24	Transmitter plate (key down).	580	610	550	5,800	100	100
33 to 24	Receiver plates (STANDBY).	150	170	130			
34 to 24	Keying relay K101 (key down).	6.9	7.4	6.4	12	8	575

FOR STANDBY OPERATION

21 to 24	Receiver plates	120	140	105	5,900	8	25
22 to 24	Receiver filaments	1.5	1.6	1.4	3	2	500
23 to 24	Receiver filaments	1.5	1.6	1.4	3	2	500

b. The maximum output voltage from the keying relay circuit (terminals 34 to 24 on J2), with the receiver-transmitter in PHONE–SEND operation and with the microphone switch released, should not exceed 8 volts dc.

260. Dynamotor-Power Supply DY–105/GRC–9X, Voltage Regulation Test

The voltage regulation test for Dynamotor-Power Supply DY–105/GRC–9X is the same as the test for Dynamotor-Power Supply DY–88/GRC–9 (par. 257).

261. Dynamotor-Power Supply DY–105/GRC–9X, Ripple Voltage Test

With a 24-volt battery connected to the input of the dynamotor-power supply and a receiver-transmitter connected as a load or load resistors as listed in chart below, the maximum permissible ripple voltages as measured with Electronic Multimeter ME–6A/U in series with a 1-$\mu\mu$f capacitor are as follows:

Terminals on J2	Circuit	Ac ripple (volts)	Dummy load resistor, if used (ohms)	Dummy load wattage rating
20 to 24 (ground).	Transmitter filaments	.05	3¼	25
21 to 24	Receiver plates (SEND)	.1	2,625	10
22 to 24	Receiver filaments (STANDBY)	.005	3	2
23 to 24	Receiver filaments (SEND)	.005	3	2
32 to 24	Transmitter doubler and pa plates	4.0	5,800	100
33 to 24	Receiver plates (STANDBY)	.1		
34 to 24	Keying relay K101	.3	12	8

262. Generator GN–58–(*), Voltage Output Test

When the generator power supply is driven at approximately 60 rpm, the voltage outputs should be the same as those given in the VOLTAGE CHART on the main schematic diagram (fig. 170). Refer to paragraph 184 for disassembly of the generator power supply so that it may be checked under load.

263. Generator GN–58–(*), Voltage Regulation Tests

a. High-Voltage Regulation Test. The voltage regulation of the generator high-voltage winding between no-load and normal-load condition must not exceed 8 percent. To measure the percent regulation, proceed as follows:

(1) Connect the receiver-transmitter to the generator.

(2) Crank the generator at approximately 60 rpm.

(3) With the transmitter tuned and loaded for CW–SEND operation, and the key closed, measure the voltage from pin 32 of the generator output voltage receptacle to ground; use Electronic Multimeter TS–505/U. This is the normal-load voltage which is designated E2.

(4) Repeat the procedure in (3) above with the key up. The voltage measured is the no-load voltage which is designated E1. Compute the percent regulation from the formula in paragraph 257*f*.

b. Low-Voltage Regulation Test. The voltage regulation of the generator 6.3-volt winding between no-load and normal-load conditions must not exceed 12 percent. To measure the percent regulation, proceed as follows:

(1) Connect the receiver-transmitter to the generator.

(2) Set the transmitter for CW–SEND operation.

(3) Leave the headset disconnected from the PHONES jacks so that the receiver filament circuit is open.

(4) Crank the generator at approximately 60 rpm.

(5) With the key up, measure the voltage from pin 20 of the generator output receptacle to ground; use Electronic Multimeter TS–505/U. This is the

normal-load voltage and is designated E2.

(6) Repeat the procedure in (5) above with the OFF–SEND–STANDBY switch in the OFF position. The voltage measured is the no-load which is designated E1. Compute the percent regulation from the formula in paragraph 257*f*.

c. Corrective Measures. If the percent regulation is greater than the values specified in *a* through *b* above, check for poor brush contact, worn brushes, or commutator segments that are heavily coated with oxide.

264. Generator GN–58–(*), Ripple Voltage Test

With a receiver-transmitter connected to the generator as a load, and the generator cranked at approximately 60 rpm, the maximum permissible ripple voltages as measured with Electronic Multimeter ME–6A/U in series with a 1-$\mu\mu$f capacitor are as follows:

Terminals on generator output voltage receptacle	Circuit	Ac ripple voltage (volts)
20 to 24 (ground).	Transmitter filaments	.063
21 to 24	Receiver plates (SEND)	1.05
23 to 24	Receiver filaments (SEND)	.014
32 to 24	Transmitter doubler and pa plates.	4.25
34 to 24	Keying relay K101	.063

CHAPTER 7
SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

265. Disassembly

The following instructions are a general guide for preparing the radio set for transportation and storage.

Warning: Disconnect all power sources before disassembly.

a. Disconnect the cord from the power supply used and from the radio set.

b. Disconnect the cord from the battery power supply used and from the radio set.

c. Disconnect the microphone, key, and headset.

d. Disconnect the antenna lead from the binding posts on the transmitter panel.

e. Disassemble the antenna assembly.

f. Check the equipment against the table of components (par. 7).

266. Field Repackaging Data

a. Materials Required. The following chart lists the estimated amount of materials required to prepare the radio set for shipment:

Materials	Amount
Waterproof barrier	81 sq ft
Pressure-sensitive tape	22 ft
Single-faced, flexible, corrugated paper	100 sq ft
Double-faced, corrugated paper	45 sq ft
Gummed paper tape	30 ft
Flat steel strapping	38 ft
Wooden shipping boxes	3 ea

b. Box Size. The dimensions of the shipping boxes required for the radio set are given in the chart below.

Box No.	Inner dimensions			Board ft	Volume (cu ft)	Packed weight (lb)
	Height (in.)	Width (in.)	Depth (in.)			
1 of 3	16⅝	25	15½	19	3.7	79
2 of 3	12⅝	47¾	21	38	7.6	142
3 of 3	12	15½	15½	10	1.6	72
or						
3 of 3	14⅞	26⅝	19½	20	4.6	138

267. Repackaging Radio Set

a. Technical Manuals. Wrap the manuals in waterproof-barrier material. Seal all the seams and folds with pressure-sensitive tape.

b. Receiver Transmitter, Panel Cover, Cord, and Bag CW–140/GRC–9. Place the panel cover on the receiver-transmitter and secure all fastenings. Wind the cords into a coil proportionate dimensions and secure them to the receiver-transmitter with suitable ties. Place and secure the receiver-transmitter within the bag. Close and secure all fastenings. Cushion the receiver-transmitter in the bag with pads fabricated of double-faced, corrugated paper. Secure the cushioning with gummed paper tape. Inclose the cushioned receiver transmitter within a wrap of single-faced, flexible, corrugated paper and seal with gummed paper tape.

c. Generator GN–58–(*) and Spare Brushes in Bag BG–175. Place the spare brushes in a

cloth drawstring bag and secure the closed bag inside the cover of the generator case. Close the generator case and secure the fastenings. Place the smooth side of the generator against the bottom of Bag BG–175 and secure the fastenings. Cushion each bag on all surfaces with pads, fabricated of double-faced corrugated paper used to absorb the shock of impact normally encountered in handling and transit. Secure the cushioning with gummed tape. Inclose each cushioned bag with contents within a wrap of single-faced flexible corrugated paper and secure with gummed paper tape.

d. Dynamotor Power Supply and Bag of Hardware or Vibrator Power Supply and Bag of Hardware. For dynamotor power supply only, place spare fuses within the designated compartments of the dynamotor power supply. Inclose spare brushes within a close fitting bag fabricated of waterproof barrier material. Seal all seams with pressure-sensitive tape. Place the packaged spare brushes within the designated compartment of the dynamotor power supply. Install spare tubes in the sockets provided. Secure the bag of hardware to the dynamotor power supply. For vibrator power supply only, install spare vibrator and tubes in sockets provided. Secure the bag of hardware to the vibrator power supply. For either power supply, wind cables into coils of proportionate dimensions and tie each coil in three places with pressure-sensitive tape, securing the connectors to the coils with the ties. Cushion the dynamotor power supply or the vibrator power supply on all surfaces with pads fabricated of double-faced corrugated paper. Secure the cushioning with gummed paper tape. Inclose the dynamotor power supply or the vibrator power supply within a wrap of single-faced flexible, corrugated paper. Secure with gummed paper tape.

e. Mast Base MP–65–B. Cushion both ends of the mast base with pads fabricated of double-faced corrugated paper in such a manner as to assure at least ½-inch clearance on all sides of the ceramic insulator and further cushion by wrapping in single-faced flexible, corrugated paper to prevent damage in transit. Secure the cushioning with gummed paper tape.

f. Mounting MT–350/GRC–9 and Bag of Hardware. Secure the bag of hardware to the mounting. Cushion the mounting by wrapping with single-faced flexible, corrugated paper. Secure the cushioning with gummed paper tape.

g. Roll BG–174 and Contents (fig. 6). Wind Cord CD–1086 into a coil of proportionate dimensions and tie in three places with pressure-sensitive tape; secure the connectors to the coil with the ties. Place each item within the designated compartments of the roll. Close the roll and secure all fastenings. Inclose the roll within a wrap of single-faced corrugated paper and secure with gummed paper tape.

h. Key J–45. Cushion the key by wrapping it in single-faced flexible, corrugated paper. Secure the cushioning with gummed paper tape.

i. Antenna AT–101/GRC–9 and Antenna AT–102/GRC–9. Wind each antenna on reels provided. Cushion each insulator by wrapping it in single-faced flexible, corrugated paper. Secure the cushioning and the ends to the reels with suitable ties.

j. Wire W–128, Guy–12, Guy GY–42, Halyard M–378, Halyard M–379, Counterpoise CP–13. Wind each item into a coil of proportionate dimensions and tie at three places with pressure-sensitive tape; secure the ends with the ties.

k. Bracket FT–515. No packaging required.

l. Box BX–53 and Contents (fig. 7). Place items within the box; close the box cover and secure the fastenings.

m. Loudspeaker. Wind the cord attached to the loudspeaker into a coil of proportionate dimensions and secure it to the loudspeaker with pressure-sensitive tape.

n. Stowage Within Bag BG–172. Stow the items packaged as specified in *h* through *m* above within the designated compartments of the bag. Fill all remaining voids with single-faced flexible, corrugated paper to prevent movement. Close the bag and secure the fastenings. Cushion the bag on all surfaces with pads fabricated of double-faced corrugated paper. Secure the cushioning with gummed paper tape. Inclose the cushioned bag within a wrap of single-faced flexible, corrugated paper and secure the wrap with gummed paper tape.

268. Field Repacking, Strapping, and Marking

a. Repacking.

(1) Place one each packaged Bag CW–

140/GRC–9 with contents within a nailed wooden box lined with a sealed waterproof case liner and proceed as follows:

(*a*) Secure the technical literature between the contents and lid of the box.

(*b*) Fill all voids with pads fabricated of single-faced flexible, corrugated paper to prevent movement.

(*c*) Seal the waterproof liner with pressure-sensitive tape.

(*d*) Nail the lid to the wooden box.

(2) Place one each packaged Bag–172 with contents, one each packaged Bag BG–175 with contents, one each packaged Roll BG–174 with contents, one each packaged Mast Base MP–65–B, and one each packaged Mounting MT–350/GRC–9 within a nailed wooden box lined with a sealed waterproof case liner and proceed as follows:

(*a*) Fill all voids with pads fabricated of single-faced flexible, corrugated paper to prevent movement.

(*b*) Seal the waterproof liner with pressure-sensitive tape.

(*c*) Nail the lid to the wooden box.

(3) Place one each packaged dynamotor power supply or one each packaged vibrator power supply with contents within a nailed wooden box lined with a sealed waterproof case liner and proceed as follows:

(*a*) Fill all voids with pads fabricated of single-faced, flexible, corrugated paper to prevent movement.

(*b*) Seal the waterproof liner with pressure-sensitive tape.

(*c*) Nail the lid to the wooden box.

b. Strapping. Strap the three shipping boxes.

c. Marking. Mark the three shipping containers in accordance with the requirements of SR 55–720–1.

Section II. DEMOLITION OF MATERIAL TO PREVENT ENEMY USE

269. General

The demolition procedures outlined in paragraph 270 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accompanied only upon order of the commander.

270. Methods of Destruction

Use any or all of the following methods to destroy the equipment.

a. Smash. Smash the crystals, controls, tubes, coils, switches, transformer, and headsets; use sledges, handaxes, pickaxes, hammers, crowbars, or heavy tools.

b. Cut. Cut cords, headsets, and wiring; use axes, handaxes, or machetes.

c. Burn. Burn cords, resistors, capacitors, coils, wiring, technical manuals; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

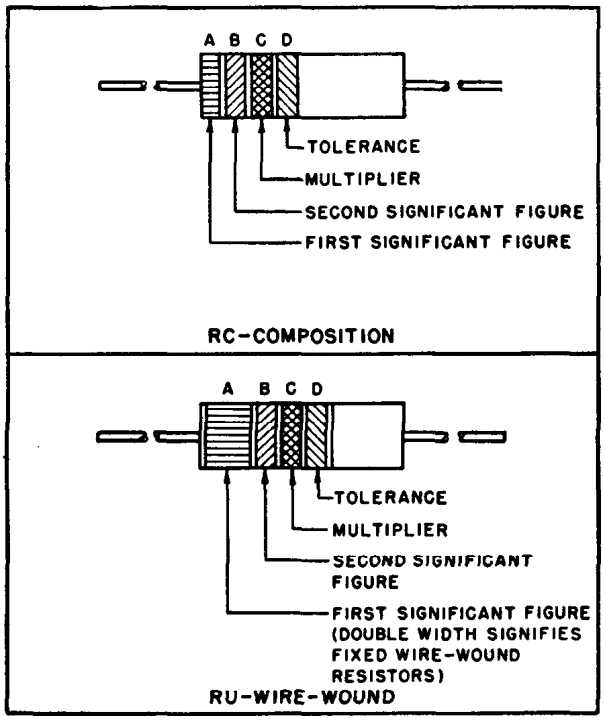
d. Bend. Bend panels, cabinet, and chassis.

e. Explosives. If explosives are necessary, use firearms, grenades, or TNT.

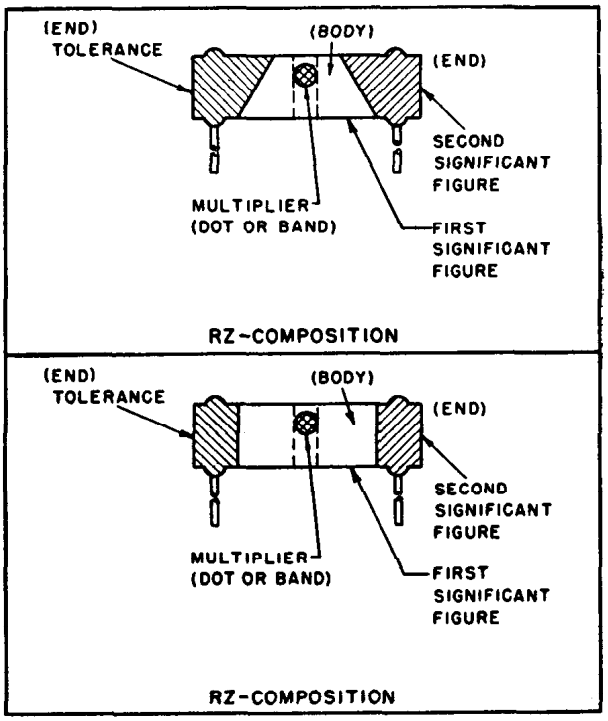
f. Disposal. Bury or scatter the destroyed parts in slit trenches, fox holes, or other holes, or throw them into streams.

RESISTOR COLOR CODE MARKING
(MIL-STD RESISTORS)

AXIAL-LEAD RESISTORS (INSULATED)



RADIAL-LEAD RESISTORS (UNINSULATED)



RESISTOR COLOR CODE

BAND A OR BODY*		BAND B OR END*		BAND C OR DOT OR BAND*		BAND D OR END*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1	BODY	± 20
BROWN	1	BROWN	1	BROWN	10	SILVER	± 10
RED	2	RED	2	RED	100	GOLD	± 5
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000		
GREEN	5	GREEN	5	GREEN	100,000		
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	GOLD	0.1		
WHITE	9	WHITE	9	SILVER	0.01		

*FOR WIRE-WOUND-TYPE RESISTORS, BAND A SHALL BE DOUBLE-WIDTH. WHEN BODY COLOR IS THE SAME AS THE DOT (OR BAND) OR END COLOR, THE COLORS ARE DIFFERENTIATED BY SHADE, GLOSS, OR OTHER MEANS.

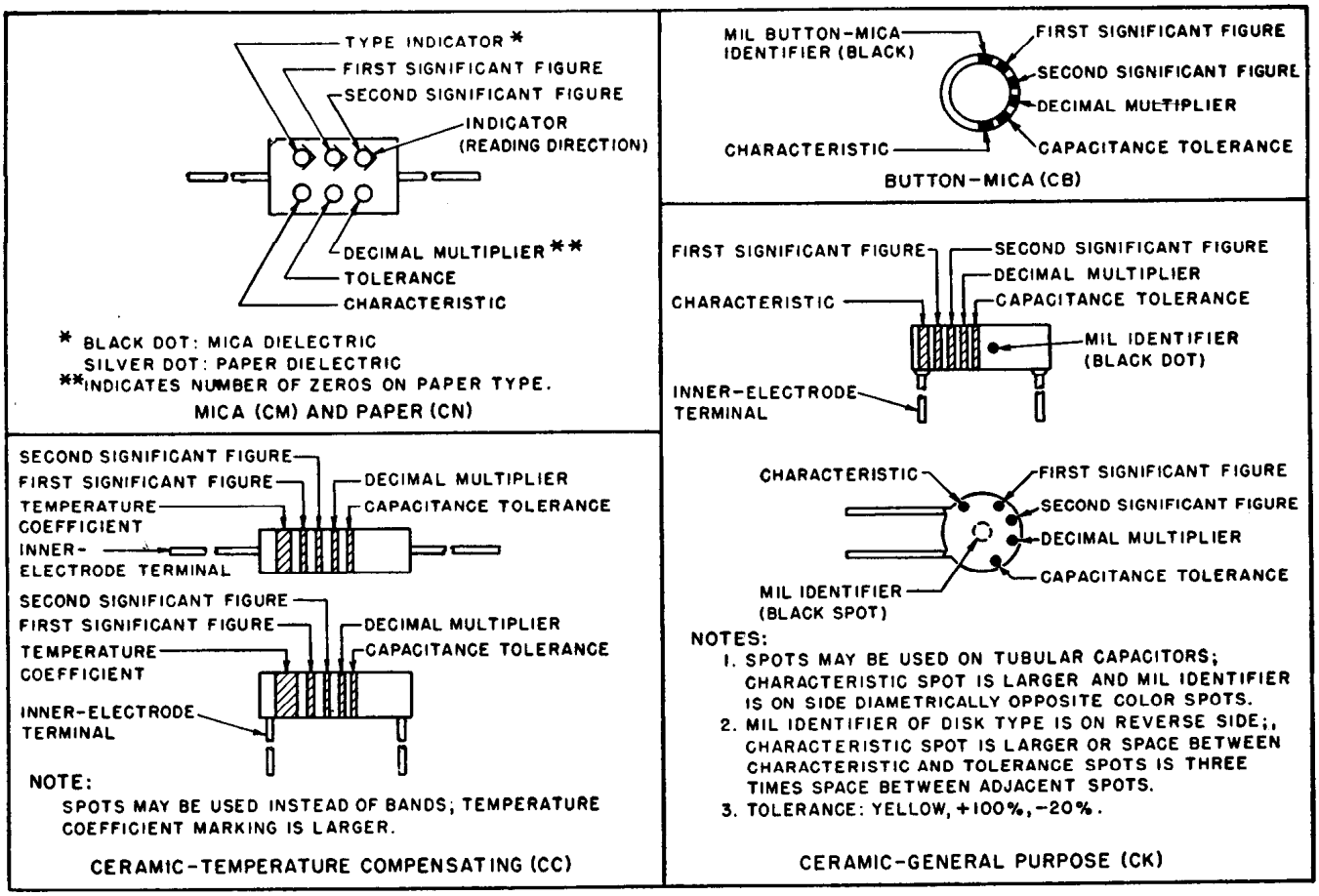
EXAMPLES (BAND MARKING):
10 OHMS ±20 PERCENT: BROWN BAND A; BLACK BAND B; BLACK BAND C; NO BAND D.
4.7 OHMS ±5 PERCENT: YELLOW BAND A; PURPLE BAND B; GOLD BAND C; GOLD BAND D.

EXAMPLES (BODY MARKING):
10 OHMS ±20 PERCENT: BROWN BODY; BLACK END; BLACK DOT OR BAND; BODY COLOR ON TOLERANCE END.
3,000 OHMS ±10 PERCENT: ORANGE BODY; BLACK END; RED DOT OR BAND; SILVER END.

STD-RI

Figure 165. Resistor color codes.

CAPACITOR COLOR CODE MARKING
(MIL-STD CAPACITORS)



CAPACITOR COLOR CODE

COLOR	SIG FIG.	MULTIPLIER		CHARACTERISTIC[1]				TOLERANCE [2]					TEMPERATURE COEFFICIENT (UUF/UF/°C)
		DECIMAL	NUMBER OF ZEROS	CM	CN	CB	CK	CM	CN	CB	CC		
											OVER 10UUF	10UUF OR LESS	CC
BLACK	0	1	NONE		A			20	20	20	20	2	ZERO
BROWN	1	10	1	B	E	B	W				1		-30
RED	2	100	2	C	H		X	2		2	2		-80
ORANGE	3	1,000	3	D	J	D			30				-150
YELLOW	4	10,000	4	E	P								-220
GREEN	5		5	F	R						5	0.5	-330
BLUE	6		6		S								-470
PURPLE (VIOLET)	7		7		T	W							-750
GRAY	8		8			X						0.25	+30
WHITE	9		9								10	1	-330(±500) [3]
GOLD		0.1						5		5			+100
SILVER		0.01						10	10	10			

1. LETTERS ARE IN TYPE DESIGNATIONS GIVEN IN MIL-C SPECIFICATIONS.
2. IN PERCENT, EXCEPT IN UUF FOR CC-TYPE CAPACITORS OF 10 UUF OR LESS.
3. INTENDED FOR USE IN CIRCUITS NOT REQUIRING COMPENSATION.

STD-CI

Figure 166. Capacitor color codes.

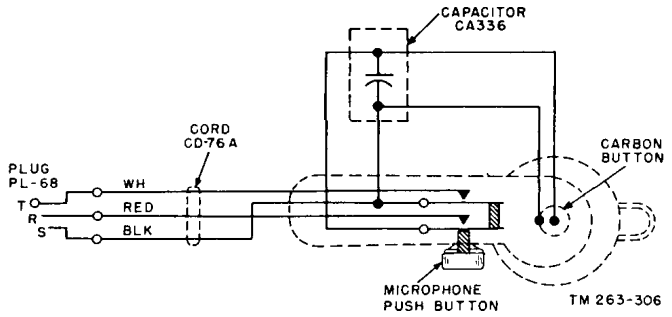
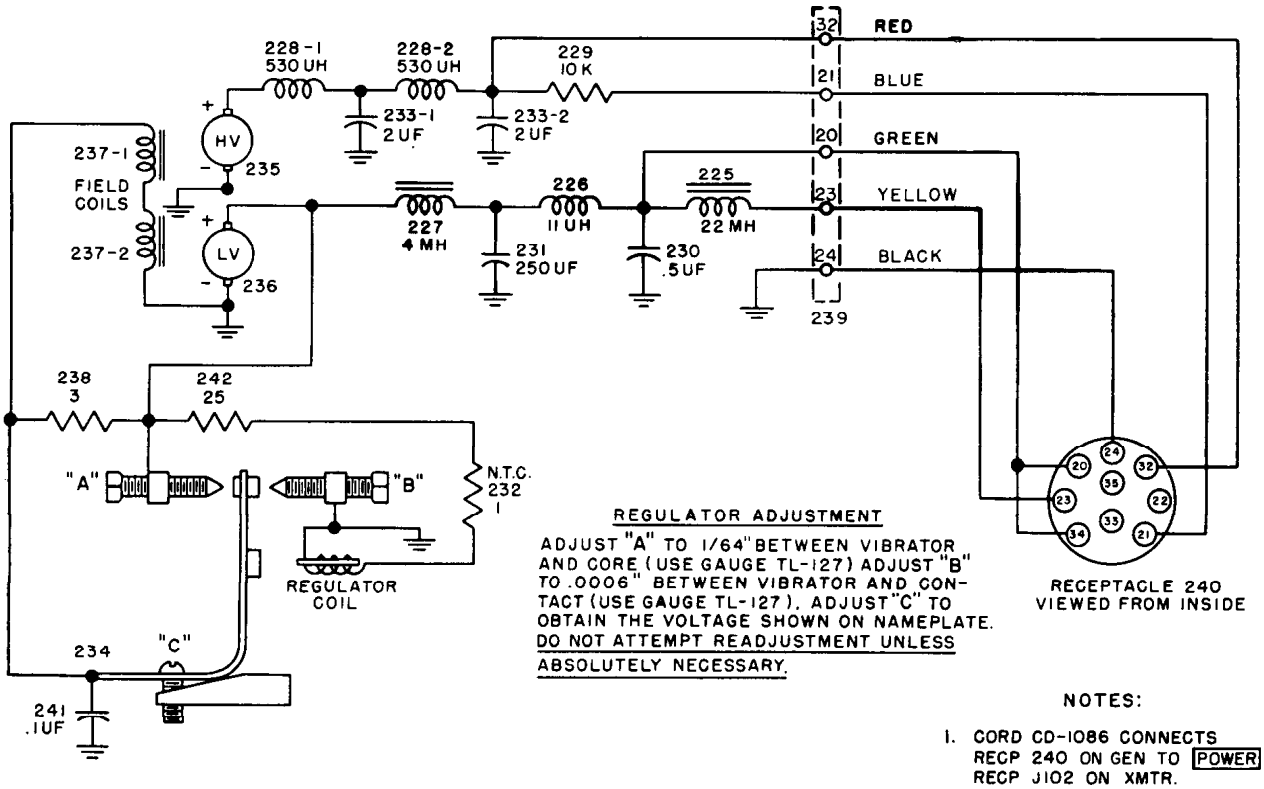


Figure 167. Internal wiring diagram of Microphone T–17.



VOLTAGE CHART		
TERMINAL	VOLTAGE	CIRCUIT
20	+6.3	XMTR FILS AND REL K1028
21	+105	RCVR AND XMTR
22	—	———
23	+1.4	RCVR FIL
24	0	GRD (A- AND B-)
32	+425	XMTR
33	—	———
34	+6.3	KEYING REL K101
35	—	———

VOLTAGE CHART MEASUREMENTS MADE WITH NO LOAD.

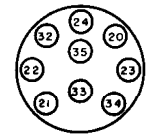


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Figure 168. Generator GN–58, schematic diagram.

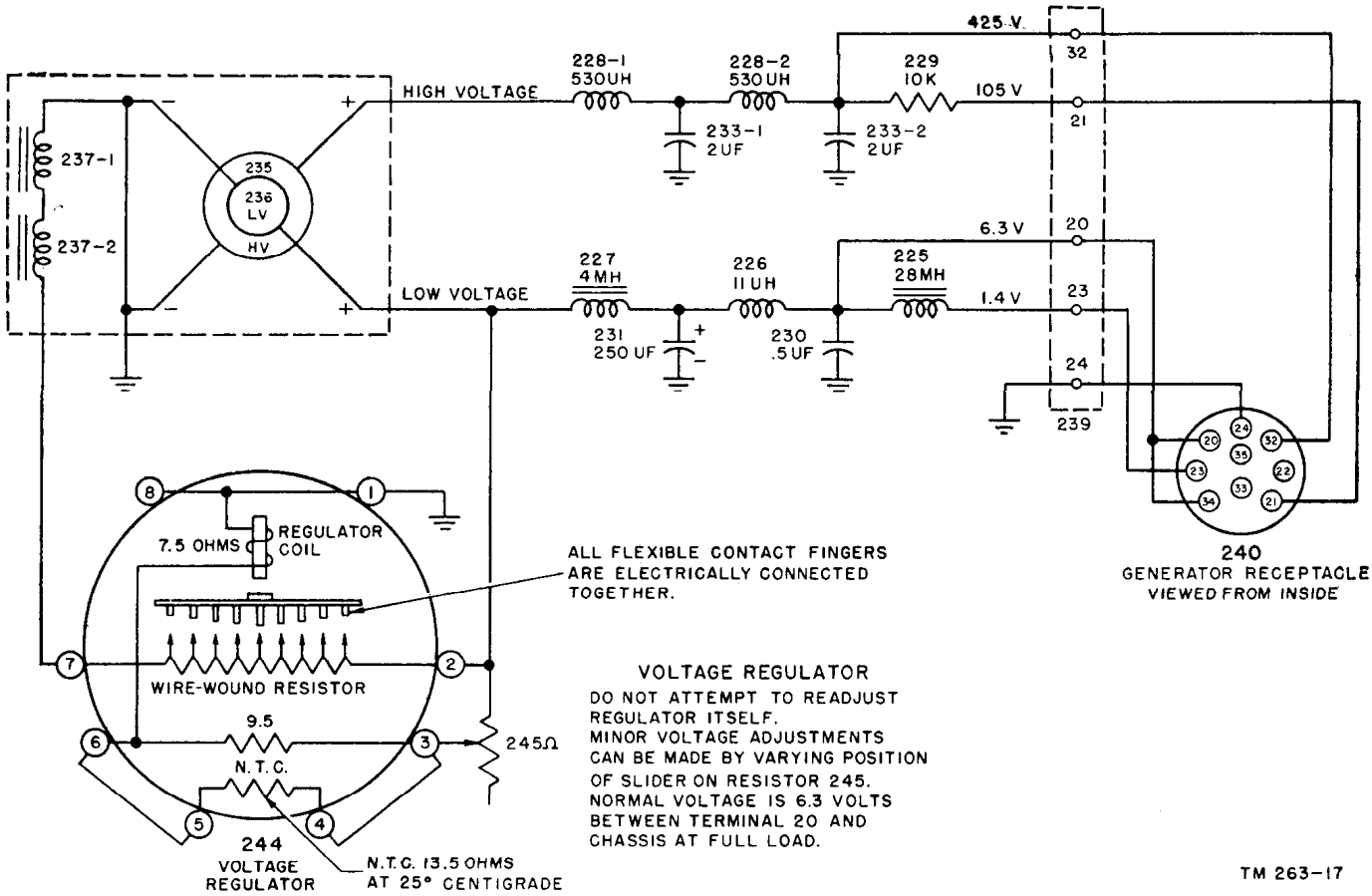
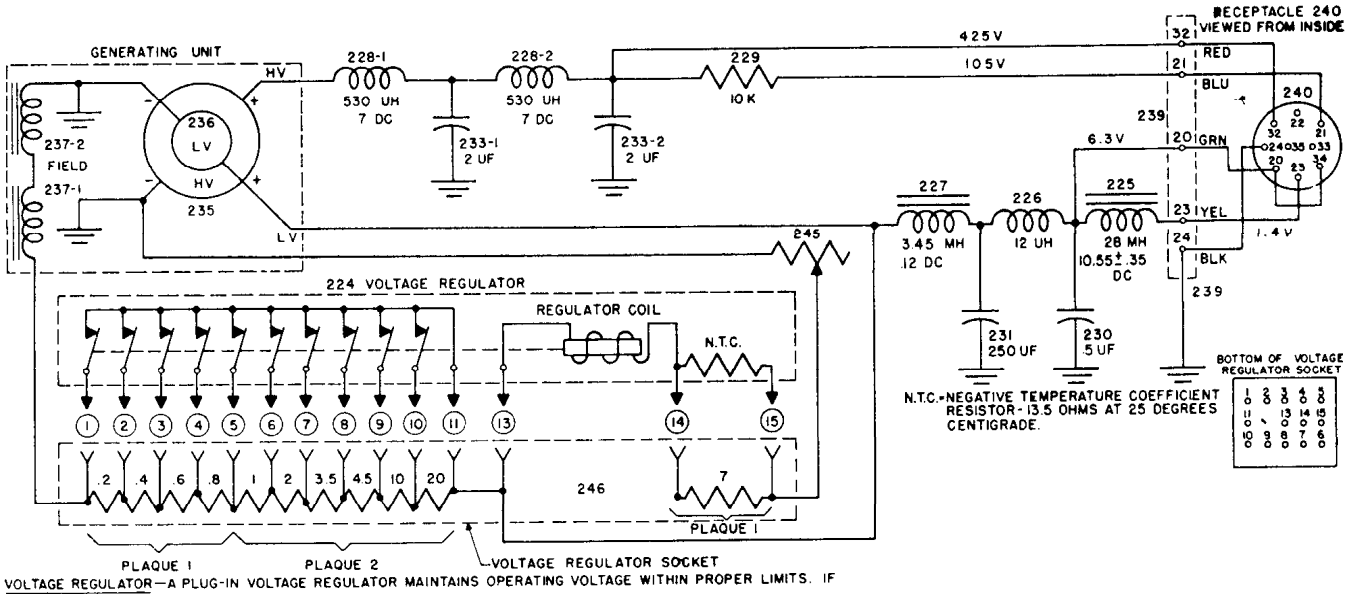


Figure 169. Generator GN-58-A (early models), schematic diagram.



VOLTAGE REGULATOR—A PLUG-IN VOLTAGE REGULATOR MAINTAINS OPERATING VOLTAGE WITHIN PROPER LIMITS. IF REGULATOR IS DEFECTIVE REPLACE WITH NEW PLUG-IN UNIT.
DO NOT ATTEMPT TO READJUST REGULATOR ITSELF—MINOR VOLTAGE ADJUSTMENTS CAN BE MADE BY VARYING POSITION OF SLIDER ON RESISTOR 245. NORMAL VOLTAGE IS 6.3 VOLTS BETWEEN CHASSIS AND TERMINAL 20 ON TERMINAL BOARD AT FULL LOAD.

NOTES:

1. ALL CONTACTS OF REGULATOR ARE NORMALLY CLOSED.
2. ON LATER MODELS, THE MULTI-TAPPED RESISTOR IS CONTAINED IN THE VOLTAGE REGULATOR SOCKET.
3. ON SOME MODELS, CHOKE COIL 227 MAY BE 3.11 MH.
4. THE NUMBERS BETWEEN TAPS OF 246 ARE THE RESISTANCES OF THE PORTIONS BETWEEN THE TAPS.
5. RESISTOR 245 IS 15 OHMS IN SOME MODELS.

TM 263-24

Figure 170. Generator GN-58-A (late models), schematic diagram

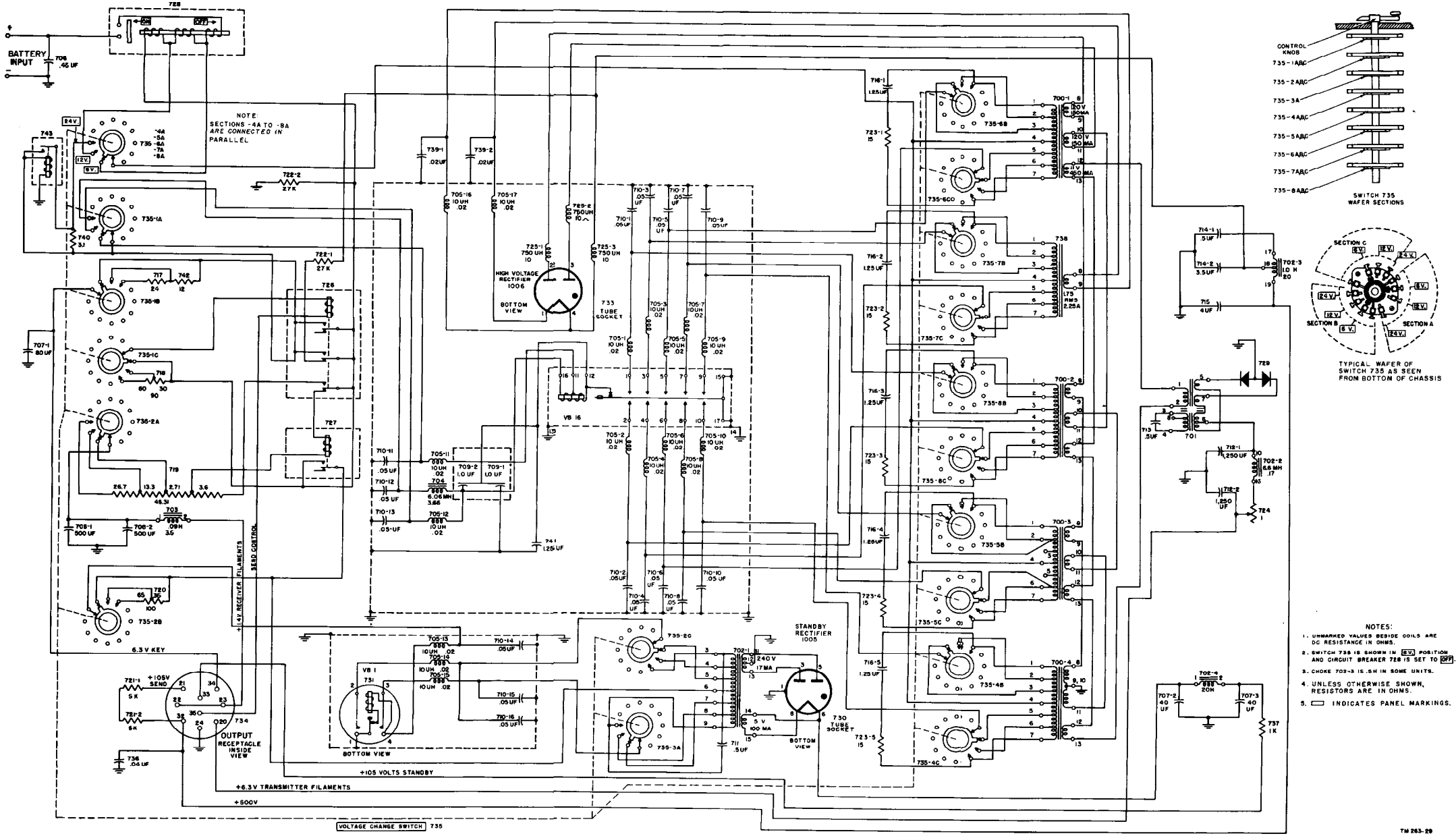


Figure 171. Vibrator Power Supply PE–237 (early model), schematic diagram.

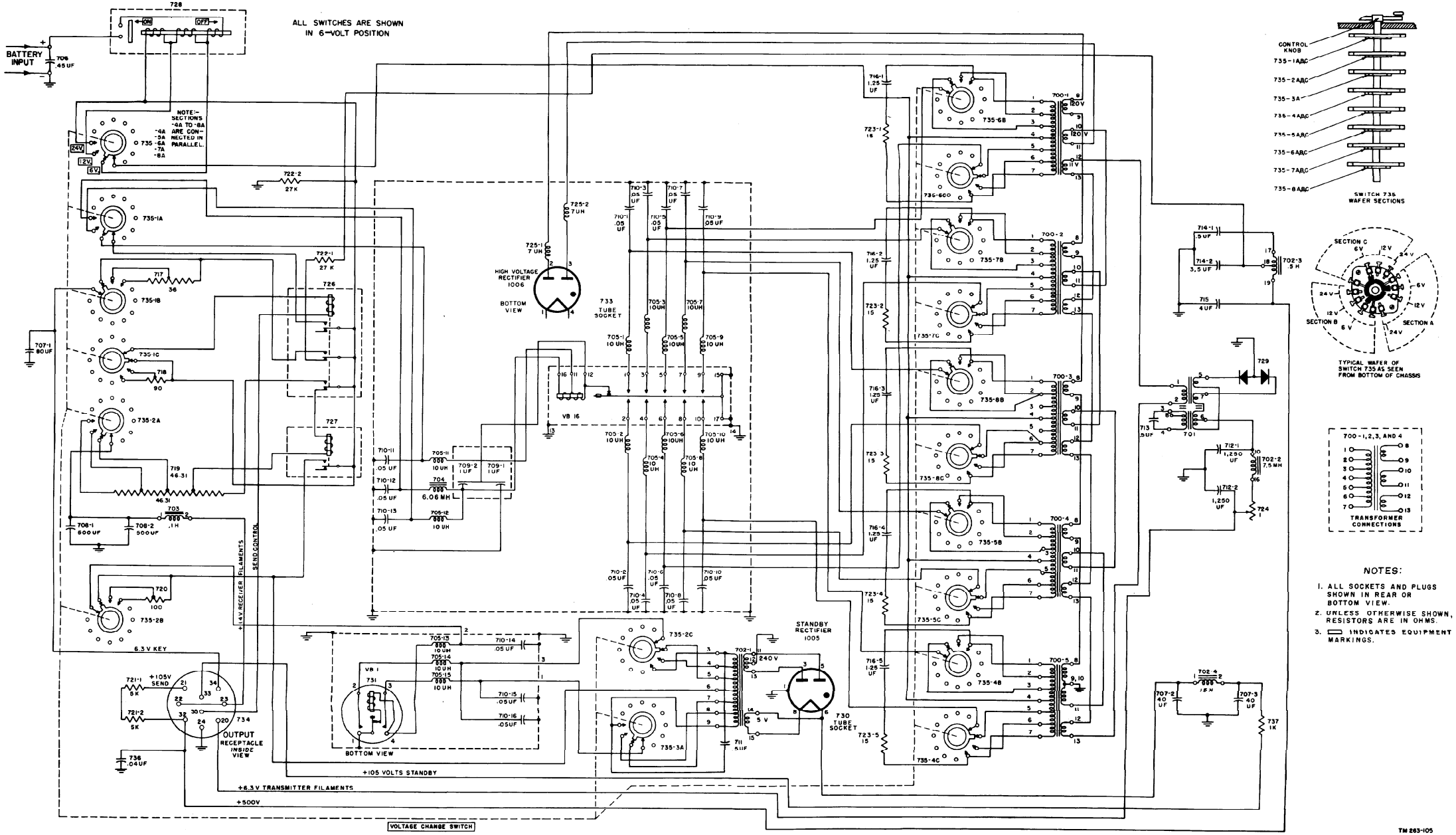
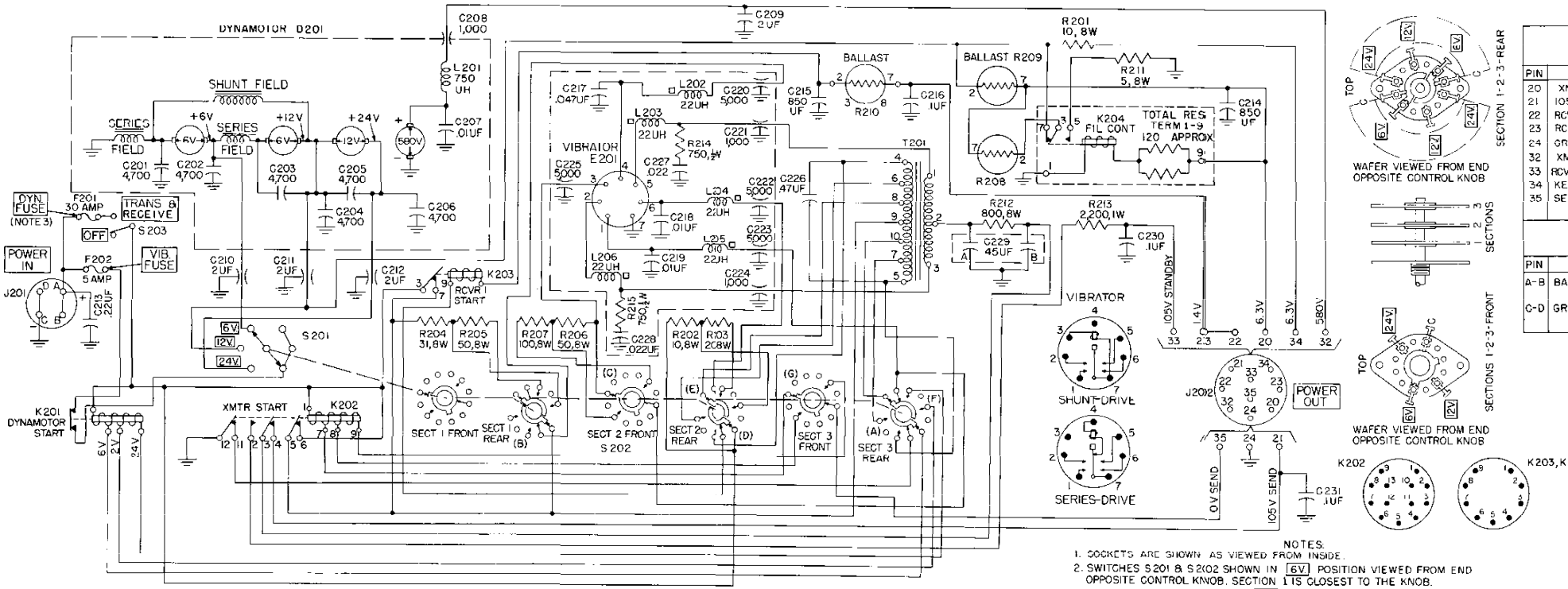


Figure 172. Vibrator Power Supply PE-237 (late models), schematic diagram



POWER OUTPUT RECEPTACLE J202			
PIN	CONNECTS TO	PIN	VOLTS
20	XMTR FIL SUPPLY	54	+6.3
21	105 V SEND	57	+105
22	RCVR FIL	56	+1.4
23	RCVR FIL	46	+1.4
24	GROUND	53	0
32	XMTR PLATE SUPPLY	47	+580
33	RCVR PLATE SUPPLY	58	+105
34	KEYING RELAY SUPPLY	45	+6.3
35	SEND CONTROL	55	0

POWER INPUT RECEPTACLE J201		
PIN	CONNECTS TO	VOLTS
A-B	BATTERY CABLE	6, 12, OR 24 V
C-D	GROUND	0

FUSES		
	AMP	
VOLTS	DYN. F201	VIB. F202
6	30	5
12	20	5
24	10	5

NOTES:
1. SOCKETS ARE SHOWN AS VIEWED FROM INSIDE.
2. SWITCHES S201 & S202 SHOWN IN [6V] POSITION VIEWED FROM END OPPOSITE CONTROL KNOB. SECTION 1 IS CLOSEST TO THE KNOB.
3. A 20-AMP FUSE IS USED FOR [12V] OPERATION AND A 10-AMP FUSE IS USED FOR [24V] OPERATION.
4. POWER SUPPLY IS SHOWN FOR [SEND] POSITION OF XMTR CONTROL (E).
5. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF
6. ▭ INDICATES EQUIPMENT MARKINGS.

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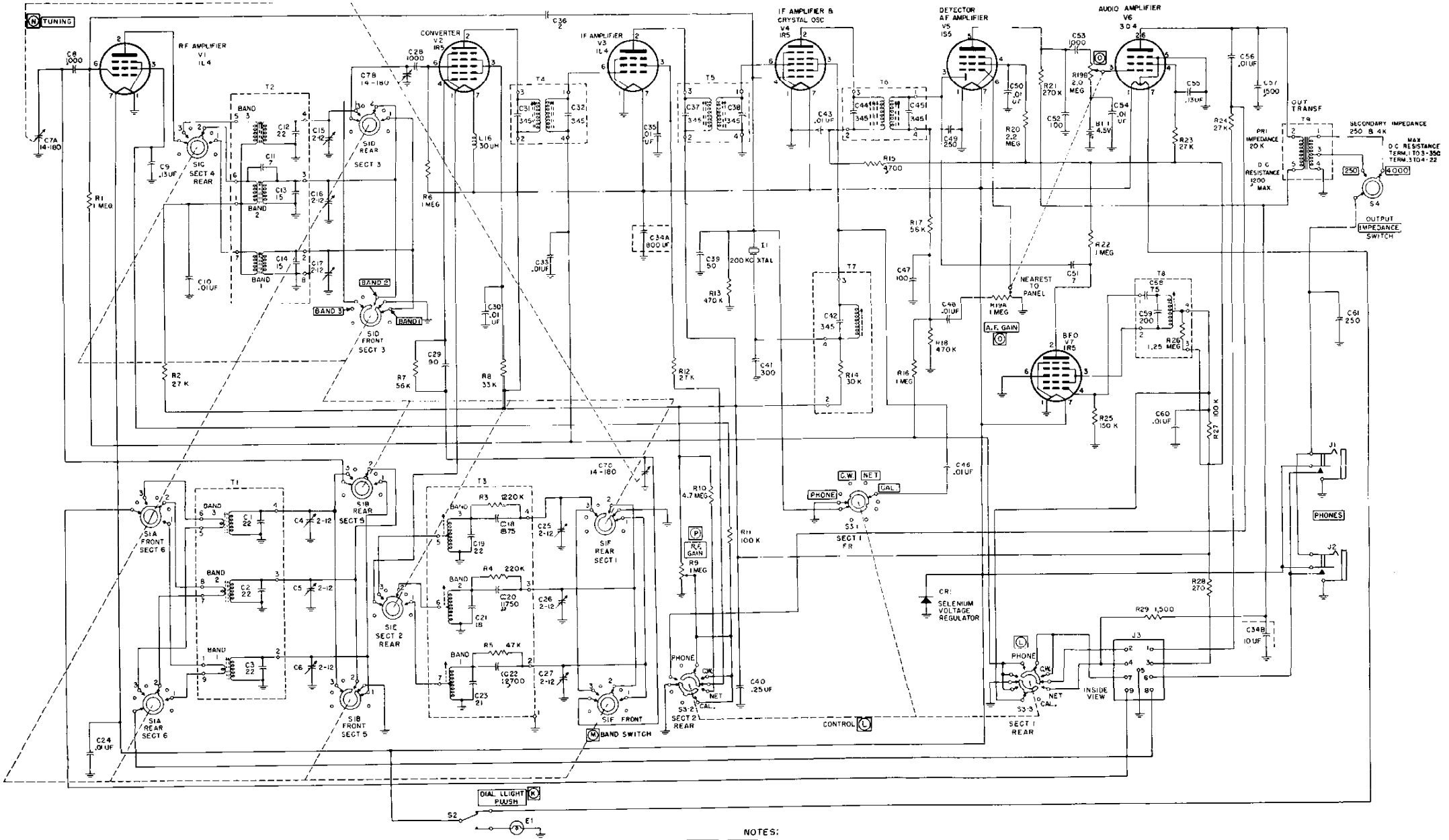
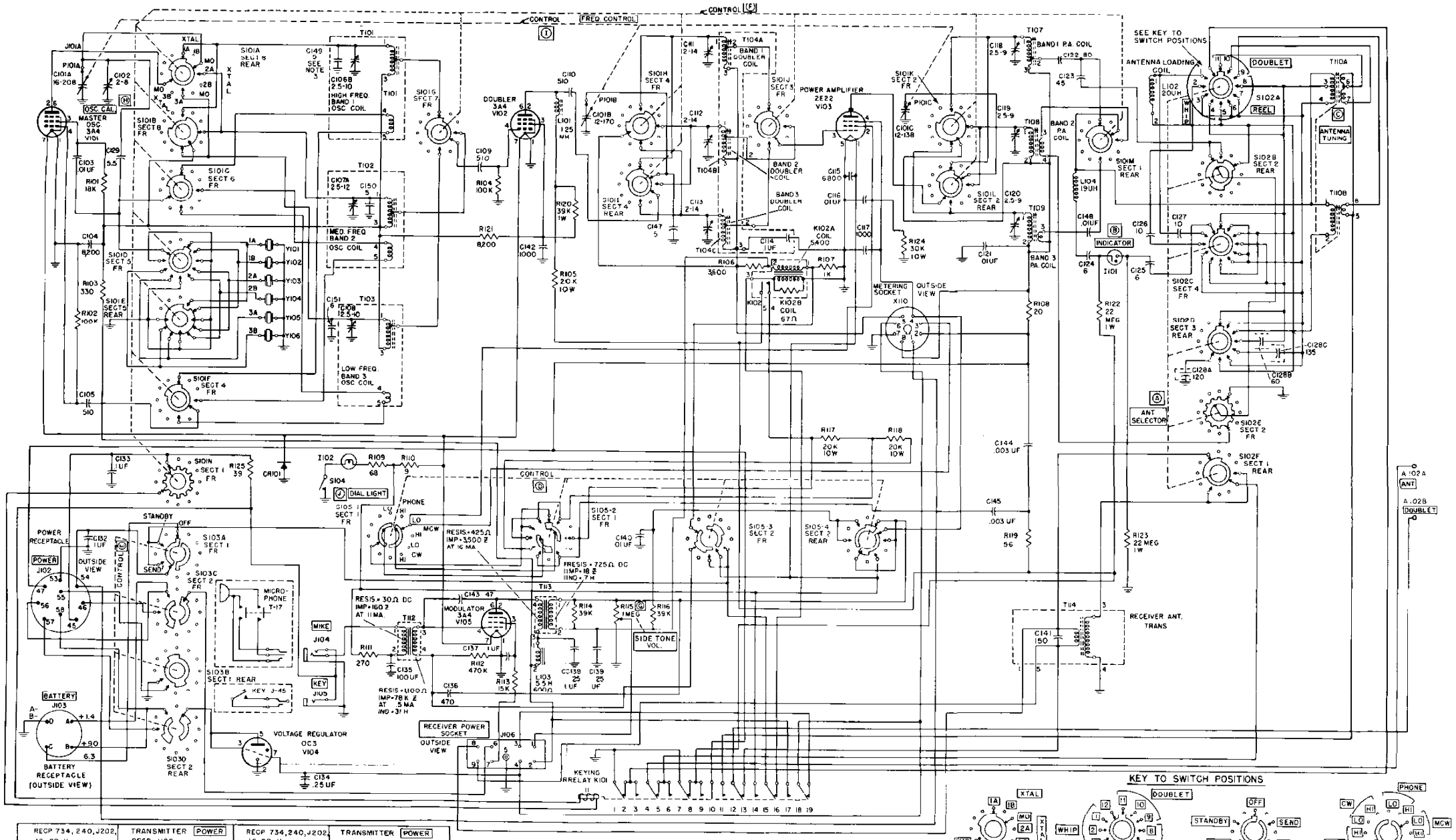
Figure 173. Dynamotor-Power Supply DY-88/GRC-9X, schematic diagram



NOTES:

1. RECEIVER SHOWN IN BAND 2, PHONE POSITION.
2. ALL SWITCH SECTIONS ARE SHOWN AS VIEWED FROM FRONT PANEL.
3. FRONT SECTION OF EACH WAFER SECTION IS THE ONE NEAREST CONTROL KNOB.
4. J3 TERMINALS:
   1. SIDETONE
   2. NET +105V
   3. RECEIVER +105V
   4. +105V
   5. GROUND
   6. RECEIVER 1.4V
   7. MOD TUBE CONTROL
   8. RECEIVER ANTENNA
   9. RECEIVER ANTENNA
5. CAPACITORS C13, C19, C29, C39, AND C49 ARE 17, 18, 91, 51, AND 240 UUF RESPECTIVELY IN LATER MODELS.
6. RESISTORS R7, R14, R21, AND R26 ARE 57K, 27K, 470K, AND 1 MEG (OR 1.2 MEG) RESPECTIVELY IN LATER MODELS.
7. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS AND CAPACITORS ARE IN UUF.
8. ▭ INDICATES EQUIPMENT MARKINGS.

Figure 175. Receiver section, schematic diagram.

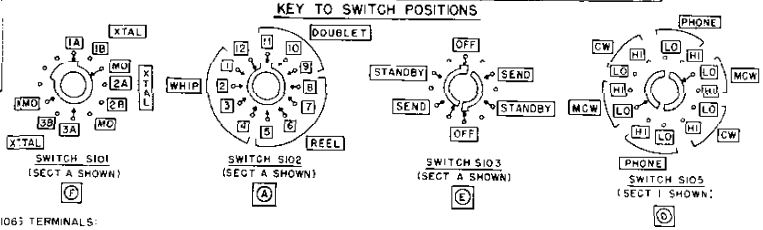


RECP J34, 240, J202, J2, OR J1	TRANSMITTER POWER RECP J102		RECP J34, 240, J202, J2, OR J1	TRANSMITTER POWER RECP J102	
PIN	CONNECTS TO	PIN	VOLTS	PIN	CONNECTS TO	PIN	VOLTS
20	" "	54	+6.3 REG	32	" "	47	+500
21	" "	57	105 SEND	33	" "	58	105 STANDBY
22	" "	56	1.4 STANDBY	34	" "	45	+6.3 KEY
23	" "	46	1.4 SEND	35	" "	55	SEND CONTROL
24	" "	53	A− B−				

NOTES:

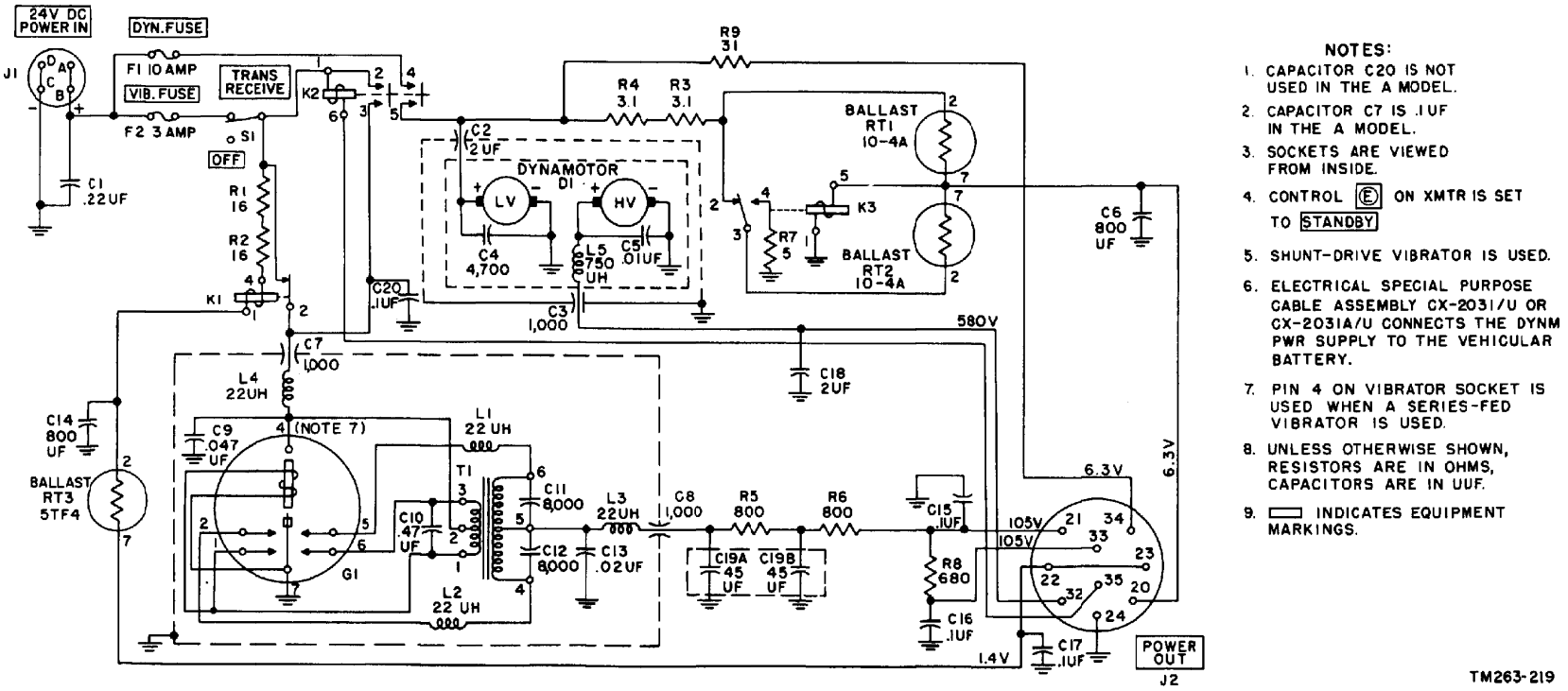
1. TRANSMITTER IS SHOWN IN OFF, PHONE-LO, BAND 1-XTAL 1A, KEY UP, DOUBLET 11 POSITION
2. A. ROTARY SWITCHES S103 AND S105 ARE SHOWN AS VIEWED FROM THE KNOB END.
   B. ROTARY SWITCH S102 IS SHOWN AS VIEWED FROM OPPOSITE THE KNOB END.
   C. SECTIONS OF SWITCHES S102, S103, AND S105 ARE DESIGNATED IN NUMERICAL ORDER WITH SECTION 1 NEAREST THE KNOB END.
   D. ROTARY SWITCH S101 IS SHOWN AS VIEWED FROM THE LEFT SIDE OF THE FRONT OF THE TRANSMITTER, WITH THE TRANSMITTER IN UPRIGHT POSITION
   E. SECTIONS OF SWITCH S101 ARE DESIGNATED IN NUMERICAL ORDER READING LEFT TO RIGHT WITH SECT 1 ON THE LEFT OF THE TRANSMITTER, WITH THE TRANSMITTER IN UPRIGHT POSITION
3. CAPACITOR C149 REPLACES C146 (6.5UUF) IN EARLIER MODELS. ALSO, C146 WAS LOCATED OUTSIDE OF T101.
4. CAPACITORS C150 AND C151 WERE NOT USED IN EARLIER MODELS.
5. CAPACITORS C149, C150, AND C151 ARE OF THE TEMPERATURE-COMPENSATING TYPE.
6. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
7. ▭ INDICATES EQUIPMENT MARKINGS.

KEY TO SWITCH POSITIONS



J103 TERMINALS:
1. SIDETONE SIGNAL
2. NOT 105V
3. RECEIVER 105V
4. 105V
5. GROUND
6. RECEIVER 1.4V
7. MOD TUBE CONTROL
8. RECEIVER ANTENNA
9. RECEIVER ANTENNA

Figure 176. Transmitter section, schematic diagram.



NOTES:

1. CAPACITOR C20 IS NOT USED IN THE A MODEL.
2. CAPACITOR C7 IS .1 UF IN THE A MODEL.
3. SOCKETS ARE VIEWED FROM INSIDE.
4. CONTROL (E) ON XMTR IS SET TO STANDBY
5. SHUNT-DRIVE VIBRATOR IS USED.
6. ELECTRICAL SPECIAL PURPOSE CABLE ASSEMBLY CX-2031/U OR CX-2031A/U CONNECTS THE DYNM PWR SUPPLY TO THE VEHICULAR BATTERY.
7. PIN 4 ON VIBRATOR SOCKET IS USED WHEN A SERIES-FED VIBRATOR IS USED.
8. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
9. ▭ INDICATES EQUIPMENT MARKINGS.

TM263-219

Figure 174. Dynamotor-Power Supply DY-105/GRC-9X, schematic diagram.

INDEX

[AG 413.44 (6 Jun 56)]

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

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    3-267R (2)
    5-15C (2)
    5-16C (2)
    5-17C (2)
    5-35R (2)
    5-36R (2)
    5-37R (2)
    5-55R (2)
    5-138C (2)
    5-192C (2)
    5-225C (2)
    5-226C (2)
    5-227C (2)
    5-315R (2)
    5-316R (2)
    5-317R (2)
    5-348R (2)
    5-367C (2)
    5-412R (2)
    5-415R (2)
    5-416R (2)
    5-417R (2)
    6-100C (2)
    6-101C (2)
    6-115R (2)
    6-116R (2)
    6-125C (2)
    6-126C (2)
    6-135C (2)
    6-136C (2)
    6-200C (2)
    6-201C (2)
    6-225C (2)
    6-226C (2)
    6-235C (2)
    6-236C (2)
    6-300C (2)
    6-401C (2)
    6-415R (2)
    6-416R (2)
    6-435R (2)
    6-501C (2)
    6-515R (2)
    6-525R (2)
    6-535R (2)
    6-536R (2)
    6-537R (2)
    6-575C (2)
    6-576C (2)
    6-577C (2)
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    6-616R (2)
    6-626R (2)
    7-2R (2)
    7-11R (2)
    7-12R (2)
    7-13R (2)
    7-14R (2)
    7-15R (2)
    7-16R (2)
    7-31C (2)
    7-32C (2)
    7-33C (2)
    7-34C (2)
    7-35C (2)
    7-36C (2)
    7-95R (2)
    7-96R (2)
    8-15C (2)
    8-16C (2)
    8-18C (2)
    9-25C (2)
    9-26C (2)
    9-35C (2)
    9-36C (2)
    9-167R (2)
    10-17C (2)
    11-7C (2)
    11-16C (2)
    11-18C (2)
    11-57C (2)
    11-117R (2)
    11-127R (2)
    11-128R (2)
    11-500R(AA-AE) (2)
    11-537R (2)
    11-557C (2)
    11-587R (2)
    11-592R (2)
    11-597R (2)
    17-2R (2)
    17-35C (2)
    17-57C (2)
    17-115R (2)
    17-116R (2)
    17-125R (2)
    17-126R (2)
    19-35R (2)
    19-36R (2)
    19-37R (2)
    19-55R (2)
    19-56R (2)
    19-57R (2)
    19-500R(AA-AE) (2)
    20-45R (2)
    20-47R (2)
    20-300R (2)
    20-511R (2)
    20-512R (2)
    30-600C(AA-AE) (2)
    32-500R (2)
    33-2C (2)
    33-510R (2)
    52-2C (2)
    55-68R (2)
    55-116R (2)
    55-117R (2)
    57-2C (2)
    57-57C (2)

NG: State AG (6); units—same as Active Army except allowance is one copy to each unit.

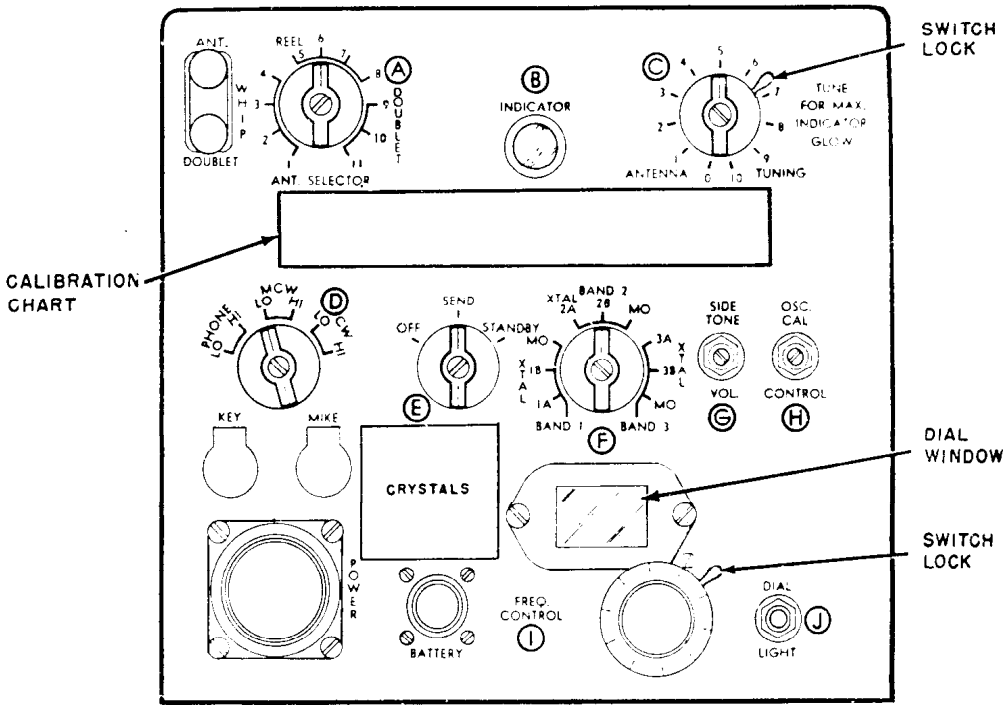
USAR: None.

For explanation of abbreviations used, see SR 320-50-1.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1960 O - 577221

CONTINUED FROM FRONT COVER.

CONDENSED OPERATING INSTRUCTIONS FOR RADIO SET AN/GRC-9 (*)



TO TRANSMIT

8. Turn switch (D) to the type of transmission desired.
9. Turn switch (A) to the highest numbered position of the antenna used.
10. Turn switch (F) to the band position desired.
11. Turn control (I) to the dial setting corresponding to the frequency of transmission as given on the calibration chart. Lock the tuning dial in place.
12. See that the red dots on INDICATOR (B) lenses are adjacent to each other.
13. Turn switch (E) to SEND.
14. Turn control (C) while pressing the key down or closing the mike switch and TUNE FOR MAX. INDICATOR GLOW on INDICATOR lamp (B). Lock the switch knob in place.
15. For PHONE operation (switch (D)), wait 2 seconds after closing the mike switch before speaking. When operating the mike, speak in a loud and clear voice.

TO TURN OFF RADIO SET

16. Turn switch (E) to OFF.
17. Turn the power switches OFF.

AGO 10018A