SUPPLEMENT

JUNE 1953

SUPPLEMENT TO HAND BOOK (US-TM 11-263)

for

RADIO SET AN/GRC-9

TÉLÉCOMMUNICATIONS RADIOÉLECTRIQUES ET TÉLÉPHONIQUES

PARIS-FRANCE

SUPPLEMENT

JUNE 1953

SUPPLEMENT TO
HAND BOOK (US-TM 11-263)
for
RADIO SET AN/GRC-9

The following information, published on order : DA-91-557-Euc 2, supplements the hand book for ANG/RC-9. The serial numbers of the equipment covered in this supplement are :

Name	*Serial numbers*
Radio set AN/GRC-9	Order n° DA-91-557-Euc-2 n° 0001 thru 3322

Personnel using this equipment and having custody of this hand book will enter suitable notations beside each affected paragraph and figure in the AN/GRC-9 hand book to indicate the presence of this supplementary information.

NOTE : Dynamotor-Power Supply DY-88/GRC-9 is issued and may be used in place of Vibrator Power Unit PE 237 covered in hand book for AN/GRC-9.

Add, " or Dynamotor-Power Supply DY-88/GRC-9 " after " Vibrator Power Unit PE-237 " in the following places in the manual :

Page 1. Par. 3*b*. Line 12.
Page 2. Par. 4*c*. Line 6.
Page 2. Par. 4*d*. Line 5.
Page 2. Par. 4*e*. Line 1.
Page 3. Par. 5*a*. Right-hand column. Line 6.
Page 4. Par. 5*a*. Left-hand column. Line 8.
Page 4. Par. 5*b*. Left-hand column. Lines 19 and 25.
Page 11. Par. 7. Component column. Lines 11 and 39.
Page 19. Par. 19*b*. Line 9.
Page 19. Par. 20. Lines 4 and 8.
Page 35. Par. 33*b* (1). Lines 5 and 8.
Page 35. Par. 33*b* (1). Note. Line 1.
Page 43. Par. 39. Function column. Line 40.
Page 44. Par. 39. Function column. Line 12.
Page 47. Par. 50*a* (2). Line 2.
Page 51. Par. 53*b* (7) (a). Line 1.
Page 52. Par. 54*c* (7). Line 5.
Page 52. Par. 55*f*. Line 3.
Page 61. Par. 77*e*. Action or condition column. Item 3. Line 6.
Page 66. Par. 78*c*. Line 10.
Page 77. Par. 89*b*. Line 2.
Page 117. Par. 138. Correction column. Item 1*b*. Line 2.
Page 165. Par. 165*d*. Line 2.
Page 168. Par. 170*c*. Line 3.

Add, " or dynamotor power supply " after " vibrator power unit ", " vibrator power supply ", " vibrator unit ", or " vibrator " in the following places in the manual :

Page 14. Par. 10*a*. Line 13.
Page 57. Par. 66. Monthly column. Item 1 (*d*). Line 3.
Page 77. Par. 89*a*. Line 1.
Page 79. Par. 90*a*. Lines 2 and 4.
Page 93. Par. 101*a*. Lines 3 and 5.
Page 96. Par. 101*b*. Line 4.

Page 3. Fig. 3. Add the following to the caption : (Dynamotor-Power Supply DY-88/GRC-9 may be substituted for Vibrator Power Supply PE-237.)

Page 3. Par. 5*a*. Add the following after line 13 in the right-hand column :

Dynamotor-Power Supply DY-88/GRC-9 may be substituted for Vibrator Power Unit PE-237. The power input to the dynamotor-power supply with the transmitter operating is the same as for the vibrator power unit.

Page 3. Par. 5*d*. Add the following column to the " Power output " table :

Dynamotor—Power Supply DY—88/GRC—9	
Phone	CW
7 watts	15 watts
1 watt	5 watts

Page 5. Par. 5. Add the following after subparagraph *d* :

e. DYNAMOTOR-POWER SUPPLY DY-88/GRC-9.

Supply requierements : 6-, 12-, 24-volt vehicular battery.

Basic circuit : H-v dynamotor and an 1-v vibrator supply.

Full-load output : Transmitter plate, 580 volts, at 100 ma. Receiver plate, 105 volts at 45 ma. Transmitter filament 6.3 volts at 2 amperes. Receiver filament, 1.4 volts at 500 ma. Keying relay, 6.3 volts at 575 ma.

Full-load input (with transmitter operating) :

6 volts, high-power position—27 amperes.
6 volts, low-power position—24 amperes.
12 volts, high-power position—13.2 amperes.
12 volts, low-power position—11 amperes.
24 volts, high-power position—7 amperes.
24 volts, low-power position—6.2 amperes.

Tube complement :

Two ballast tubes 10-4A. One ballast tube 5TF4.

Weight :

35 lbs.

Page 5. Par. 6*a*. Add the following after the last item in the table :

Box No.	Contents	Dimensions (in.)			Weight (lb)	Volume (cu ft)
		Length	Width	Depth		
	or Dynamotor-Power Supply DY-88/GRC-9 Cable Assembly CX-2031/U Cord CD-1086	15-1/2	15-1/2	12	35	1.6

Page 11. Par. 7. Add the following after the last item in the table :

Component	Required No.	Length (in.)	Width (in.)	Depth (in.)	Weight (lb)
Dynamotor-Power Supply DY-88/GRC-9	1	12-7/8	11-1/4	12	35

Page 16. Par. 11. Add the following after subparagraph *c* :

Par. 11.1. Dynamotor-Power Supply DY-88/GRC-9 (fig. 15.1).

a. Dynamotor-Power Supply DY-88/GRC-9 is a vehicular operational component capable of supplying all voltages required for Receiver-Transmitter RT-77/GRC-9. It consists of two sections, a dynamotor section to supply power to the transmitter and a vibrator section to supply power to the receiver and portions of the transmitter. Input voltage to the power supply may be 6, 12, or 24 volts, with the negative (—) grounded. A switch control (H206) provided behind the front panel allows the operator to change all internal connections simultaneously to correspond with the voltage of the vehicular battery (fig. 122.2).

b. A window on the front panel permits observation of a drum which indicates the voltage for which the switch control is set. The case of the unit is immersionproof. It is corrugated for greater strength, for cooling, and for protection from warping or damage caused by vibration and shock. The entire unit is supported on four shock mounts through which bolts can be passed to secure it to the vehicle.

c. The power supply output receptacle is located on the lower left corner of the front panel. The contacts of the receptacle are arranged in a definite pattern so that the cable plug which fits into it will be in the correct position. A heavy rubber cable is used to connect the vehicular battery to the power supply.

Page 15. Fig. 15. Insert figure 15.1 after figure 15.

Page 36. Fig. 42. Add the following to the caption :

(Dynamotor-Power Supply DY-88/GRC-9 may be substituted for Power Supply PE-237.)

Page 41. Par. 37. Add the following after paragraph 37 :

37.1. Vehicular Installation of Dynamotor-Power Supply DY-88/GRC-9.

a. Select a horizontal mounting surface which permits Cable Assembly CX-2031/U to reach the vehicular power terminal box or battery, and which permits Cord CD-1086 (44" or 7' 0") to reach the receiver-transmitter. Allow clearance to permit free movement of the power supply on its shock mounts. Larger size terminal lugs are provided in the hardware bag for connection to the vehicle battery terminals.

b. When the power supply front panel does not overhang the edge of the mounting surface, be sure to use the 5/16-inch thick washers (provided in the hardware bag) between the shock mounts and the mounting surface. This is necessary to provide clearance for operating the thumbscrew fasteners at the bottom of the front panel. When bolting the power supply

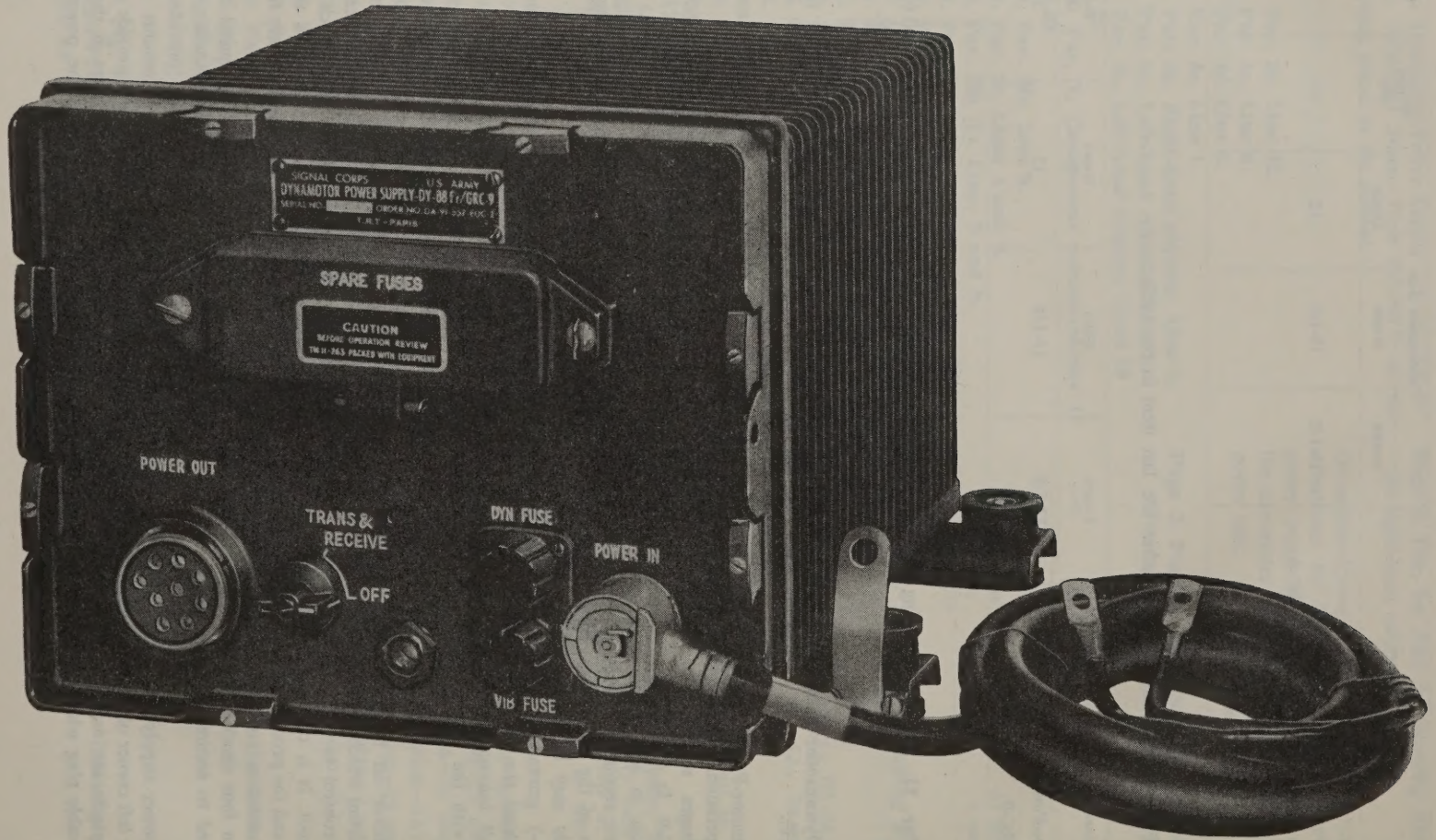


Figure 15.1. *Dynamotor-Power Supply DY-88/GRC-9.*

to a grounded metal mounting surface, be sure that one of the mounting bolts passes through the free end of the ground strap. Use one of the internal-external toothed lockwashers (provided in the hardware bag) between the ground strap lug and the head of the mounting bolt, and another similar type lockwasher between the nut and the mounting surface. When the power supply is mounted on an ungrounded surface, connect the free end of the ground strap to a nearby grounded metal portion of the vehicle.

c. Connect the power cable to the vehicle terminal box; be sure of the following :

(1) The negative (—) terminal of the vehicle storage battery is grounded to the vehicle frame. (The set will not operate properly in vehicles with the positive battery terminal grounded.)

(2) The negative lead of the power cable is connected to the ground terminal in the vehicle terminal box.

(3) The input voltage setting of the power supply (par. 11.1) corresponds to the vehicular battery voltage.

d. Push the TRANS & RECEIVE-OFF switch on the front panel of the dynamotor power supply to the OFF position. Connect Cord CD-1086 (44" or 7' 0") between the dynamotor power supply and the receiver-transmitter and secure it in a manner which permits ready removal for field use.

Page 44. Fig. 51. Insert figure 51.1 after figure 51.

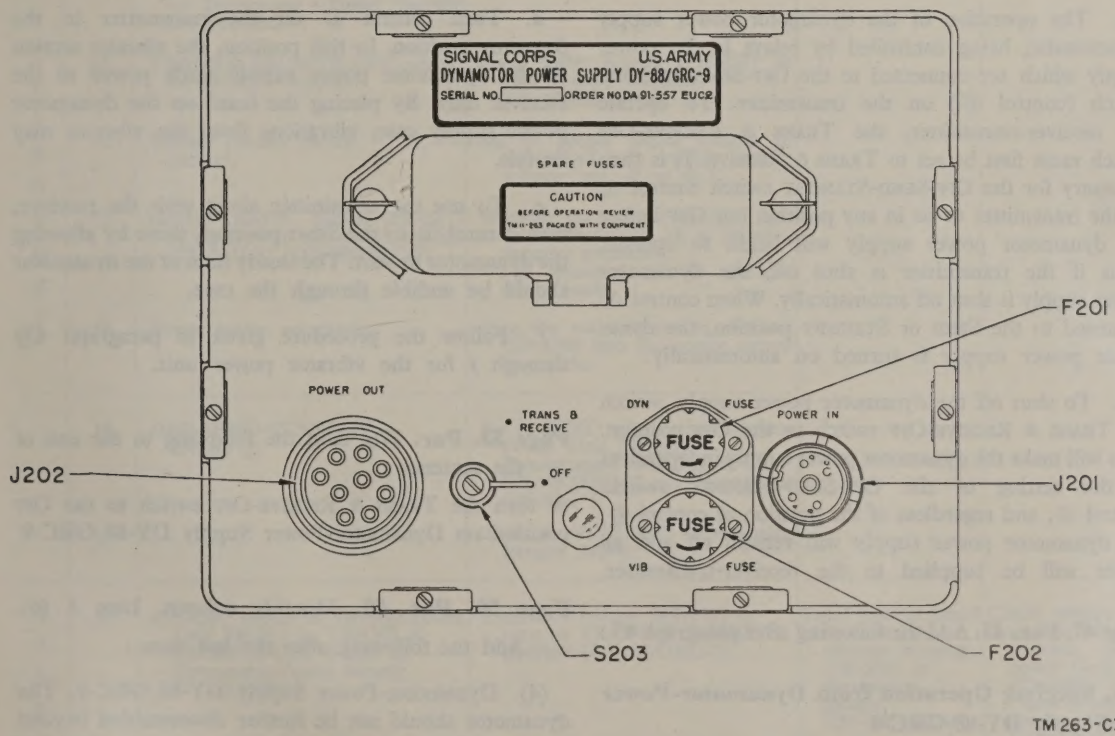


Figure 51.1. *Dynamotor-Power Supply DY-88/GRC-9, front view of panel.*

Page 45. Par. 41. Add the following after paragraph 41 :

41.1. Dynamotor-Power Supply DY-88/GRC-9 (fig. 51.1).

a. TRANS & RECEIVE-OFF SWITCH. The unit can be controlled from the receiver-transmitter when this switch is turned to the TRANS & RECEIVE position. When the switch is in the OFF position, no power is supplied to the receiver-transmitter.

b. VOLTAGE SELECTOR SWITCH. When the unit is removed from the case, ganged switches S201 and S202 can be adjusted to 6, 12, or 24 volts by means of switch control H206 to correspond with that of the vehicular battery used (fig. 122.2). When the unit is encased, the switch setting can be checked visually by looking through the transparent window on the front panel.

Page 46. Par. 43. Add the following after paragraph 43 :

43.1. Dynamotor-Power Supply DY-88/GRC-9

a. Vehicular installation instructions are given in paragraph 37.1.

b. The operation of the dynamotor power supply is automatic, being controlled by relays in the power supply which are connected to the OFF-SEND-STANDBY switch (control Ⓔ) on the transmitter. To operate the receiver-transmitter, the TRANS & RECEIVE-OFF switch must first be set to TRANS & RECEIVE. It is then necessary for the OFF-SEND-STANDBY switch control Ⓔ on the transmitter to be in any position but OFF before the dynamotor power supply will begin to operate. Thus if the transmitter is shut off, the dynamotor power supply is shut off automatically. When control Ⓔ is turned to the SEND or STANDBY position, the dynamotor power supply is turned on automatically.

c. To shut off the dynamotor power supply, switch the TRANS & RECEIVE-OFF switch to the OFF position. This will make the dynamotor power supply independent of the setting of the OFF-SEND-STANDBY switch, control Ⓔ, and regardless of the position of control Ⓔ, the dynamotor power supply will remain off and no power will be supplied to the receiver-transmitter.

Page 47. Par. 45. Add the following after paragraph 45 :

45.1. Receiver Operation from Dynamotor-Power Supply DY-88/GRC-9

Check the voltage of the storage battery to be used. If the voltage does not agree with that shown on the indicator drum as viewed through the window in the front panel, remove the unit from its case and set the voltage selector switch control H206 to the proper position (fig. 122.2). Reinstall the unit in its case.

a. Remove the DYN FUSE (F201). Check it against the voltage of the storage battery to be used. The rating of the dynamotor fuse must be as shown in the table below.

Battery voltage (volts)	DYN FUSE rating (amperes)
6	30
12	20
24	10

b. Follow the procedure given in paragraph 45*a* through *d* for the vibrator power unit.

c. Turn the TRANS & RECEIVE-OFF switch on the dynamotor power supply to the TRANS & RECEIVE position.

d. Turn control Ⓔ on the transmitter to the STANDBY position. In this position, the vibrator section of the dynamotor power supply feeds power to the receiver only. By placing the hand on the dynamotor power supply case, vibrations from the vibrator may be felt.

e. To use the transmitter along with the receiver, turn control Ⓔ to the SEND position, there by allowing the dynamotor to start. The steady hum of the dynamotor should be audible through the case.

f. Follow the procedure given in paragraph 45*g* through *j* for the vibrator power unit.

Page 53. Par. 57*b*. Add the following to the end of the sentence :

or turn the TRANS & RECEIVE-OFF switch to the OFF position on Dynamotor-Power Supply DY-88/GRC-9.

Page 58. Par. 66. Monthly column. Item *b* (6). Add the following after the last item :

(4) Dynamotor-Power Supply DY-88/GRC-9. The dynamotor should not be further disassembled beyond removal of the case and the brush cover plates. If definite repairs are necessary, refer to chapter 6.

a. Check all the plug-in capacitors, vibrators, relays, and the transformer. Feel and inspect all the capacitors and resistors that are accessible. There should be no excessive heating, discoloration, or bulging.

b. Inspect the brushes and the commutators at regular intervals. The brushes should be long enough to make firm contact with the commutator. The brush springs must have adequate tension and be in firm contact with the brushes. If the brushes are in good condition, be sure they are re-inserted with polarity markings facing upward. Do not invert the brushes, as they will not seat properly.

c. 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.

d. If the commutators have been burned or pitted, hold a piece of #0000 sandpaper against the commutators and turn the armature by hand.

e. If necessary, a cloth moistened in carbon tetrachloride may be used to remove the dirt and grease.

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

Page 62. Par. 77. In subparagraph *e*, delete all information given for items No. 15 through 20 and substitute the following :

e. Equipment Performance Checklist

	Item No.	Item	Action or conditions	Normal indications	Corrective measures
PREPARATORY		Vibrator Power Unit PE-237 or Dynamotor - Power Supply DY-88/GRC-9.			
	15	TRANS & RECEIVE-OFF switch, or ON-OFF button.	Press OFF button (PE-237) or turn to OFF position (DY-88/GRC-9).		
	16	Voltage selector switch control.	Set to proper input voltage to correspond with vehicle battery voltage (par. 41 or 41.1).		
	17	Battery lead-in cables (PE-237) or battery lead-in Cable Assembly CX-2031/U (DY-88/GRC-9).	Connect the battery cable to the vehicle battery ;6, 12, or 24 volts, negative grounded. Pay attention to the polarity of the leads.		
	18	Power output receptacle.	Plug the male connector of Cord CD-1086 into the power output receptacle.		
	19	OFF-SEND-STANDBY control Ⓔ	Set to SEND when using Vibrator Power Unit PE-237, Dynamotor-Power Supply DY-88/GRC-9, or Generator GN-58-(*). Turn to STANDBY when using Battery BA-48.		
START	20	ON-OFF switch on Vibrator Power Unit PE-237 or TRANS & RECEIVE-OFF switch on Dynamotor-Power Supply DY-88/GRC-9.	Press ON button (PE-237) or turn to TRANS & RECEIVE position (DY-88/GRC-9).	Loud hum is heard from inside vibrator housing (PE-237) or dynamotor rotates (DY-88/GRC-9). Panel lights illuminated when DIAL LIGHT push buttons are pressed.	Check voltage selector switch position. Check power Cord CD-1086. Check to see that correct fuse is being used (DY-88/GRC-9). See that the headset plug is inserted fully in the PHONES jack. Trouble shooting may be necessary (ch. 6).

Page 65. Par. 77. In subparagraph *e*, delete all information given for items No. 32 and 33 and substitute the following :

e. Equipment Performance Checklist

	Item No.	Item	Action or conditions	Normal indications	Corrective measures
S T O P	32	OFF-SEND-STANDBY control Ⓔ	Turn to OFF.	Vibrator stops (PE-237). Vibrator and dynamotor stop (DY-88/GRC-9).	Press OFF button (PE-237) or turn TRANS & RECEIVE-OFF switch to OFF. (DY-88/GRC-9). If trouble shooting is necessary see chapter 6.
	33	TRANS & RECEIVE-OFF switch	Press OFF button (PE-237) or turn to OFF (DY-88/GRC-9).	Receiver or transmitter will not operate regardless of position of any of the receiver-transmitter controls. This is normal when Vibrator Power Unit PE-237 or Dynamotor-Power Supply DY-88/GRC-9. is set to OFF.	See chapter 6.

Page 96. Par. 101. Add the following after subparagraph *g* :

h. Dynamotor-Power Supply DY-88/GRC-9. Dynamotor Power Supply DY-88/GRC-9 may be bustituted for Vibrator Power Unit PE-237. In order for the transmitter to receive power from the dynamotor power supply, Cord CD-1086 is plugged from J106 on the transmitter to plug J202 on the dynamotor power supply. When the set is used for long periods of listening only, the 1-v vibrator portion of the dynamotor power supply is in operation. The 1-v power supply requires much less vehicular battery current than does the h-v supply. This portion operates when switch S103 D, control Ⓔ is at Standby (fig. 81). When control Ⓔ is at the Send position, both the dynamotor and vibrator portions of the power supply operate to supply power to the receiver and transmitter.

Page 110. Par. 125. Add the following section after paragraph 125 :

Page 110. Sect. IV. Add the following after section IV ·

Section V. THEORY OF DYNAMOTOR-POWER SUPPLY DY-88/GRC-9

125.1 General (fig. 90.1)

This unit is designed to convert a 6-, 12-, or 24-volt d-c input from a vehicular storage battery into the necessary operating voltages for the receiver and transmitter. It consists of two major circuits : the dynamotor section and the vibrator section. The vibrator section operates when the Off-Send-Standby switch (control Ⓔ) is turned to Send or Standby. Both the dynamotor and vibrator sections operate when control Ⓔ is turned to the Send position. In stand-by operation, only the receiver is supplied with power and this presents less of a drain on the battery than when the dynamotor section also is used. This is advantageous for prolonged periods of listening. In the Send position, power is supplied to both the receiver and the transmitter for normal two-way communications.

a. Standby Operation. With Trans & Receive-Off switch S203 on the dynamotor power supply in the Trans & Receive position, and control Ⓔ on the transmitter in the Standby position, the following operations take place :

(1) The receiver filament path is completed through switch S210B, receiver start relay K203, ballast tube R210 and the receiver tube filaments to ground.

(2) Contacts 3 and 7 of K203 close, to complete the path for stand-by operation through switches S211—S1 and S2, vibrator E201, transformer T201, the normally closed contacts 2 and 3 of transmitter start relay K202 and dropping resistor R213.

b. SEND OPERATION. With S203 on the dynamotor power supply in the TRANS & RECEIVE position, and control Ⓔ on the transmitter in the SEND position, the following operations take place :

(1) The receiver filament path is completed through the same circuit shown in subparagraph *a* (1) above.

(2) Transmitter start relay K202 is energized through switch S210A, terminal 35, through the transmitter to ground.

(3) When K202 is energized, contacts 5 and 6, and contacts 3 and 4 will close, completing the path through S211—S1 and S2, vibrator E201, switch S211—S3 and S4, and transformer T201. This circuit supplies 105 volts to the transmitter and to the audio section of the receiver (par. 90).

(4) Contacts 11 and 12 of K202 also close to complete the circuit which energizes the dynamotor start relay K201. When the contacts of K201 close, voltage will be supplied to the dynamotor through S201. The dynamotor supplies 580 volts for the transmitter at terminal 32 of J202. A 12 volts output from the dynamotor is reduced to 6.3 volts for the keying voltage at terminal 34, and 6.3 volts for the transmitter filaments at terminal 20. R201 is a voltage dropping resistor. Ballast tubes R208 and R209 maintain the current to the transmitter filament at a constant value.

c. OPERATION OF THE FILAMENT CONTROL RELAY. When the receiver-transmitter is in PHONE-SEND operation and the key is up, the voltage at terminal 20 could rise as high as 16 volts. This voltage, without overload protection, would be applied instantaneously to relay K102 and the transmitter filaments when the transmitter is keyed. This condition is eliminated through the use of K204 and resistor R211 which act to reduce the voltage to a safe value (par. 125.7).

125.2. Fuses and Switches

a. FUSES. The vehicular battery is connected to the + and — terminals of the dynamotor power supply across capacitor C213, (fig. 90.2). C213 is an r-f bypass capacitor which prevents the input cables from radiating r-f noise that would interfere with radio reception. DYN FUSE F201 protects the dynamotor circuits. *This fuse must be changed each time the battery voltage is changed* (par. 45.1). VIB FUSE F202 protects the vibrator circuits.

b. SWITCHES. The voltage selector switches, S201, S210 and S211 in the dynamotor power supply are ganged to one common shaft and perform the function of connecting the correct circuit components when a 6, 12, or 24 volts vehicular battery is used. There are several wafer sections of S210B, C and S211—S1, S2, S3, S4, (figs. 90.2 and 90.3). TRANS & RECEIVE-OFF switch S203 is a single-section rotary switch.

125.3. Receiver Filament Supply (fig. 90.2)

a. When control Ⓔ on the transmitter is in the SEND or STANDBY position, 1.4 volts dc is supplied to the filaments of the receiver tubes. The battery voltage is fed through VIB FUSE F202 and switch S203 in the TRANS & RECEIVE position to switch S210B. S210B introduces the proper resistance to permit the circuit to operate from each of the three different battery voltages used. In the 6 volts position, no resistance is introduced ; in the 12 volts position, R202 is switched into the circuit ; in the 24 volts position, R202 and R203 in series are switched into the circuit.

b. The circuit then is completed through the coil of receiver start relay K203, ballast R210, and the receiver filaments to ground. The current that flows in this circuit energizes K203. C215 acts to eliminate ripple.

c. Ballast tube R210 is a thermal resistor in series with the receiver filament supply. It acts as a voltage regulator, maintaining a constant voltage output for the receiver filaments under conditions of varying input voltage. Capacitor C216 provides additional filtering.

d. When control Ⓔ is in the STANDBY position, the receiver filaments receive their power through terminal 22 of J202. When control Ⓔ is in the SEND position, the receiver filaments receive their power through terminal 23 of J202.

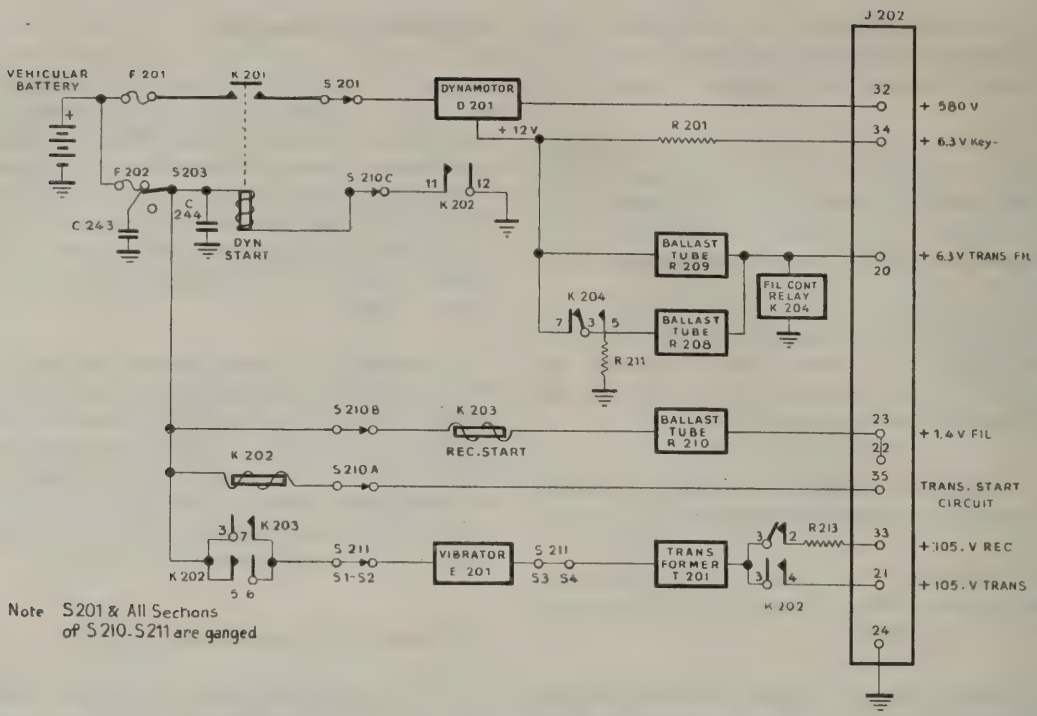


Figure 90.1. *Dynamotor-Power Supply DY-88/GRC-9, block diagram.*

125.4. Receiver Plate and Screen Supply

a. Synchronous vibrator E201 and transformer T201 (fig. 90.2) are used to supply 105 volts dc at 17 ma to the receiver plate and screen circuits during stand-by periods, and 105 volts dc at 45 ma to the plate and screen circuits of V5 and V6 in the receiver (fig. 65) and to the oscillator, doubler, and modulator plates and screens of the transmitter, during send periods (figs. 81 and 82).

b. Receiver start relay K203 is energized when control Ⓔ is at the SEND or STANDBY position (par. 125.3). Battery current passes through closed contacts 3 and 7 of K203, or 5 and 6 of K202, or both (fig. 90.2), to voltage selector switch S211—S2 and to the center tap (terminal 9) of transformer T201 (fig. 90.3). S211—S2 introduces the proper resistance into the circuit to permit the circuit to operate from each of the three different battery voltages used.

c. Either a series-drive or a shunt-drive vibrator may be used in the vibrator section of the power supply. The principles of operation are basically the same. For purposes of discussion, the series-drive vibrator will be considered.

(1) The series-driven vibrator coil, connected from pin 4 to the stationary contact, and the movable arm, connected to pin 7, constitute an ordinary buzzer similar to the doorbell type (fig. 90.3). However, the vibrating arm or reed moves back and forth many times more rapidly than in the familiar doorbell buzzer. The current through the vibrator coil attracts the reed, breaking the circuit to ground. This de-energizes the coil and the reed swings back in the opposite direction, completing the circuit to ground again. This action continues, causing the reed to swing back and forth rapidly. The movable arm connects to ground through pin 7, and also makes contact with poins 1 and 6 in the two opposite directions of its vibration, thus connecting each pin alternately to ground. (Pins 2 and 5 are considered in subparagraph (2) below.) Pins 1 and 6 are connected to voltage selector switches S211—S3 and S211—S4, which select the proper voltage for operation of transformer T201. Therefore, as the movable arm vibrates alternately to connect the top and the bottom of the primary of T201 to ground, the center tap (terminal 9) of the transformer connects to the positive terminal of the battery. Because of this center tap, the current in the primary flows from the center to either the top or the bottom half of the primary, depending on whether pin 1 or pin 6 of the vibrator is connected by the vibrating arm to ground. Therefore, the function of the portion of the vibrator considered so far is to cause an alternating

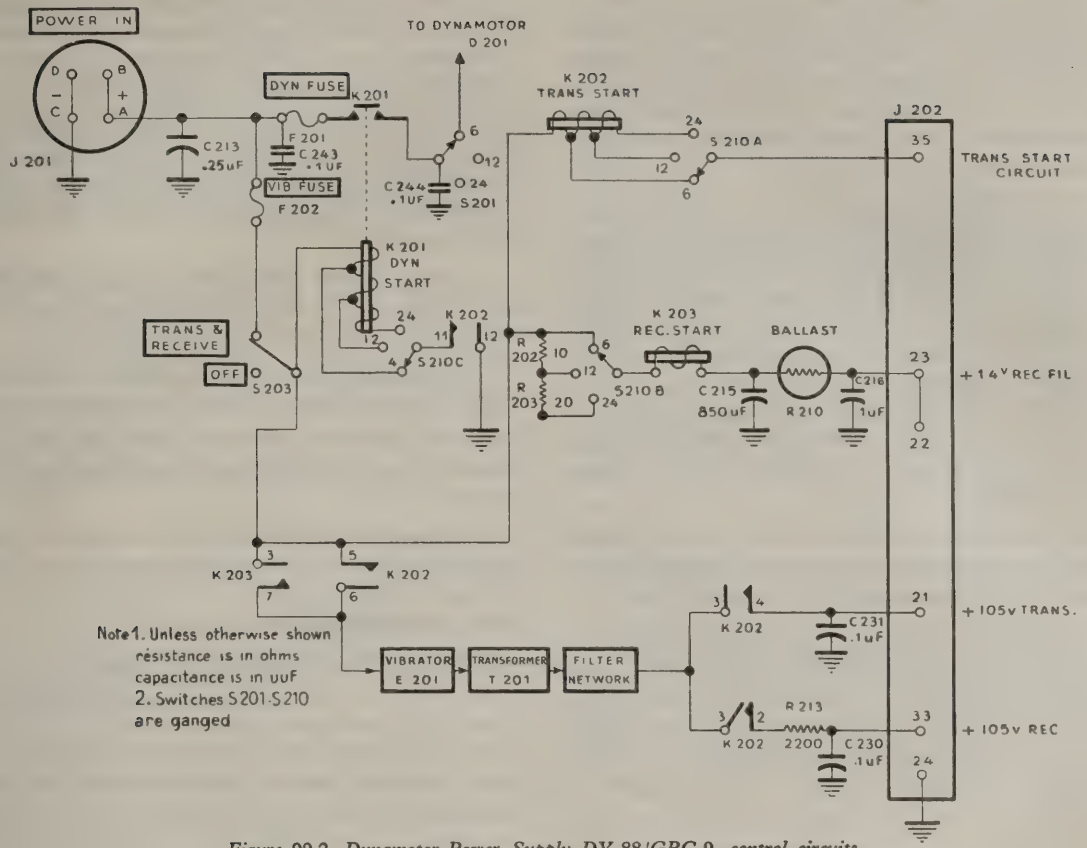


Figure 90.2. Dynamotor-Power Supply DY-88/GRC-9, control circuits

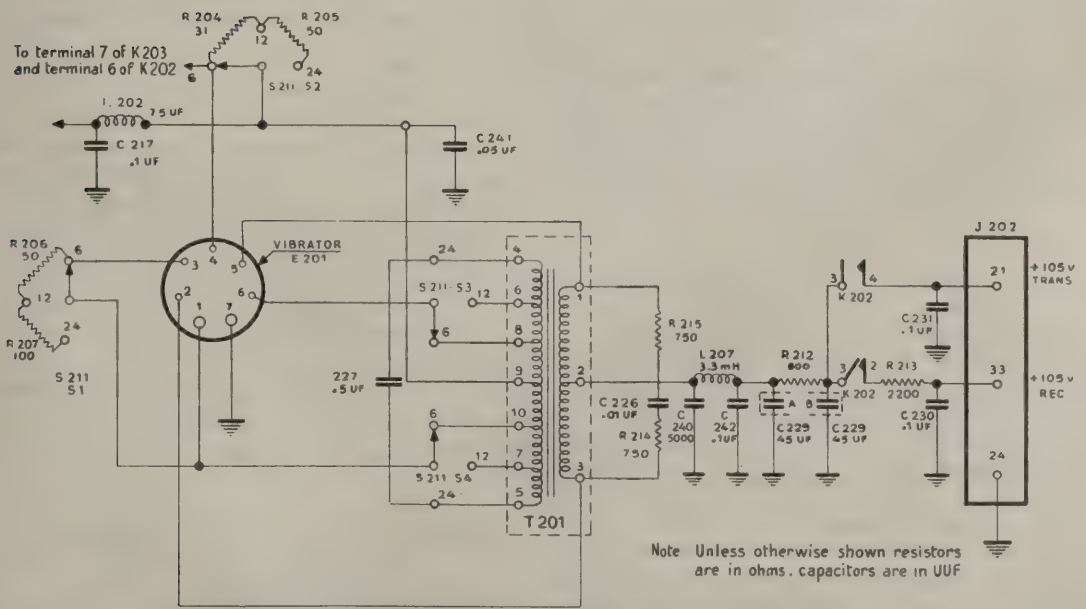


Figure 90.3. Dynamotor-Power Supply DY-88/GRC-9, vibrator circuits.

current to flow through the transformer primary by making the battery current flow first in one direction and then in the opposite direction through the primary, simulating an alternating current. It is actually the pulses of d-c current sent through alternate halves of the primary which cause a voltage to be induced in the secondary.

(2) The vibrator contains an extra pair of contacts (pins 2 and 5) which is used to rectify the output voltage of T201, thereby dispensing with the need for a rectifier tube. Pins 2 and 5 are grounded alternately as explained in subparagraph (1) above. The secondary output from T201 is across transformer terminals 2 and 1 or 2 and 3 depending on whether vibrator pin 5 or 2 is grounded. The transformer windings are phased so that the voltage from terminal 2 to ground is always positive. Thus, terminal 2 on transformer T201 becomes a d-c source.

(3) When a shunt drive vibrator is used, switch S211—S1 and resistors R206 and R207 provide the correct operating voltage for the vibrator coil.

d. The rectified output from T201 is filtered by resistor R212 and capacitors C229A and C229B. During stand-by operation, the output is fed through contacts 3 and 2 of K202 to voltage-dropping resistor R213. The 105-volts dc at 17 ma then is fed through terminal 33 of output receptacle J202 to the receiver plates and screens.

e. With control Ⓔ in SEND, K202 is energized and contacts 3 and 2 open while contacts 3 and 4 close. The filtered output then is fed through contacts 3 and 4 to terminal 21 on output receptacle J202.

f. In the explanation of the receiver plate and screen supply circuits several circuit elements were omitted. This was done to clarify the essential points of operation. The functions of these elements are explained below.

(1) Filter chokes L202 and L307 and capacitors C217—C240—C241 and C242 are incorporated for elimation of hash caused by the vibrator.

(2) Capacitor C227 is the primary buffer. Its fonction is to minimize arcing of the vibrator contacts.

(3) Resistors R214 and R215, and capacitor C226 fonction as arc suppressors and also as the secondary buffers.

(4) Capacitors C230 and C231 are used to filter out R-f hash in the 105 volts dc output.

125.5. Transmitter Start Circuit

a. TRANSMITTER START RELAY. When control Ⓔ is turned to the SEND position, transmitter start relay K202 is energized and contacts 11 and 12 close to apply power to dynamotor start relay K201 (fig. 90.2). At the same time, contacts 5 and 6 and 3 and 4 of K202 close, while contacts 2 and 3 open (par. 125.6). Voltage

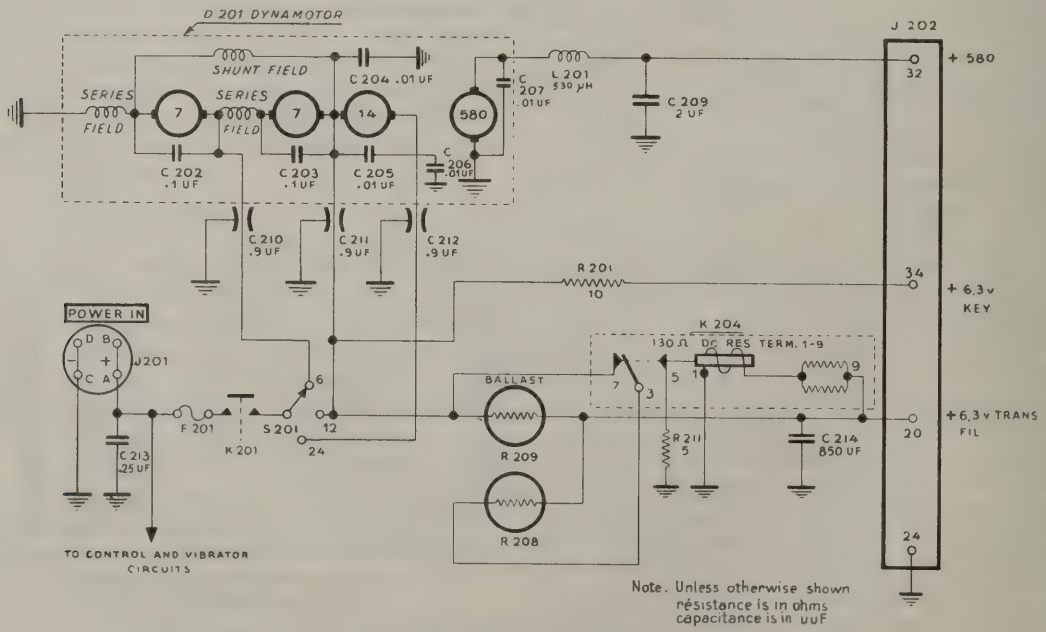


Figure 90.4. Dynamotor-Power Supply DY-88/GRC-9, dynamotor circuits.

selector switch S210A permits the relay to operate from a 6-, 12-, or 24-volt battery.

b. DYNAMOTOR START CIRCUIT. Battery power is applied to the dynamotor through DYN FUSE F201, the closed contacts of dynamotor start relay K201, and voltage selector switch S201 (fig. 90.4). Voltage selector switches S201 and S210C permit operation from a 6-, 12-, or 24-volt battery.

125.6. Transmitter Plate and Screen Supply

a. Closed contacts 5 and 6 of K202 apply battery power to the vibrator portion of the dynamotor power supply (fig. 90.2). The 105-volt output is applied through closed contacts 3 and 4 of K202 (contacts 2 and 3 now are open), terminal 21 of J202, and closed contacts 18 and 19 of keying relay K101 to the receiver (fig. 65).

b. During send periods, keying relay K101 is energized, which causes contacts 18 and 19 to open and contacts 17 and 18 to close. This action transfers the 105 volts at 45 ma from all the receiver plate and screen circuits (except the last two audio stages) to the oscillator, doubler, and modulator stages in the transmitter (figs. 80 and 81).

c. Ordinarily contacts 5 and 6 of K202 are shorted by closed contacts 3 and 7 of receiver start relay K203 so that the 105-volt supply is operating continuously. Contacts 5 and 6 of K202 insure that 105 volts are available for the transmitter even through K203 is not energized, as would be the case if the receiver were inoperative.

d. The h-v output from the dynamotor is fed through terminal 32 of J202 and is applied to the p-a plate when control Ⓔ is turned to the SEND position (fig. 90.4). No p-a plate current flows until keying relay K101 is energized and contacts 9 and 10 close to apply high voltage to the p-a screen (figs. 80 and 81).

e. Capacitors C202, C203, C204, C205, and C206 are used to eliminate r-f noise. Capacitors C210, C211, and C212 reduce r-f hash from the dynamotor, which might enter the battery cable and cause interference with other radio equipment. Capacitors C207 and C209 and r-f choke coil L201 serve to prevent radiation of r-f energy and to reduce commutator ripple in the output voltage.

125.7. Transmitter Filament and Keying Relay Supply (fig. 90.4)

Depending on the voltage of the vehicle battery, 12 volts are made available for the transmitter filament and keying relay circuits either directly from the battery or from the 12-volt output of the dynamotor (par. 125.8). Voltage selector switches S201 and S210C permit operation from a 6-, 12-, or 24-volt battery.

a. TRANSMITTER FILAMENTS SUPPLY. A regulated 6.3-volt dc output is fed to the transmitter filaments through terminal 20 of output receptacle J202. Twelve volts are fed to the ballast tubes from the dynamotor on the vehicle battery (par. 125.8). Ballasts R208 and R209 are thermal resistors used to regulate the filament voltage at 6.3 volts. R208 and R209 are normally connected in parallel through normally closed contacts 3 and 7 of relay K204. Transmitter filament control relay K204 is used as an additional precaution to prevent the application of excessive voltage to relay K102B. When the radio set is in PHONE-SEND operation, no transmitter filament current is drawn until the push-to-talk button on the microphone is pressed (figs. 79 and 80). Under these conditions, insufficient current is drawn through R208 and R209 to drop the voltage down to 6.3 volts as required by relay K102B. If the voltage becomes excessive, K204 is energized and contacts 3 and 7 open. At the same time, contacts 3 and 5 close to connect R209, R208, and surge limiting resistor R211 in series to form a voltage divider. Reduced voltage for relay K102B then is taken from the junction of R208 and R209. When the push-to-talk button is pressed and the transmitter filaments are energized, the voltage across the coil of relay K204 drops so that K204 is de-energized. Contacts 3 and 5 open and contacts 3 and 7 close again to connect the two ballasts in parallel.

b. KEYING RELAY SUPPLY. The keying relay is supplied through terminal 34 of J202. Twelve volts are fed to voltage-dropping resistor R201 from the dynamotor or the vehicle battery. Resistor R201 provides the necessary voltage drop so that 6.3 volts are supplied to keying relay K101 when it is energized.

125.8. Dynamotor D201

a. Dynamotor D201 furnishes h-v d-c power to the plate and screen circuits of the transmitter and l-v d-c power to the transmitter filaments and keying relay. A switching arrangement in the power supply permits operation from a 6-, 12-, or 24-volt storage battery while still maintaining the same output voltages.

b. The dynamotor is essentially a motor and a generator that operates from a common magnetic field. It has one armature which incorporates four windings and four commutators. Three l-v windings are connected in series to form the motor section of

the dynamotor armature. Two of the windings are 6-volt windings; the third is a 12-volt winding. For 6-volt operation, one 6-volt winding is used as the motor portion of the dynamotor; for 12-volt operation, the two 6-volt windings are connected in series; for 24-volt operation, all three windings are connected in series. The fourth winding is the h-v section of the armature and furnishes 580 volts for the transmitter plate and screen circuits. The armature and its four windings revolve on a common shaft in a common magnetic field. The shaft is mounted on ball bearings to provide free rotation. The voltage across each of the armatures is proportional to the voltage for which each armature is designed to operate. This is true because a motor, when driven by another motor, will act as a generator, when its field is excited.

c. All armatures have a common field, so that any non-driving armature acts as a generator. Thus when S201 (fig. 90.4) is in the 6-volt position, the first 6 volt armature acts as a motor and the second 6 volt armature acts as a generator and will produce approximately 6 volts that will add to the battery voltage to make approximately 12 volts dc. Likewise, when switch S201 is in the 24-volt position, the voltage across the two 6 volt armatures in series will be approximately 12 volts because of the voltage dividing action of motors connected in series. Therefore, with S201 in any position (6, 12, or 24 volts), the voltage across the two 6-volt windings of the dynamotor always will be approximately 12 volts. This characteristic provides a convenient source of voltage which can be reduced by means of ballast tubes R208 and R209 in parallel to 6.3 volts for the transmitter filament (par. 125.7) even though the battery of the vehicle may be above or below this voltage. Therefore, because of the regulating action of the dynamotor on 6 volts and on 24 volts and because of the regulating action of the ballast tubes, the transmitter filaments are assured of the well-regulated voltage that their filaments require. On 12-volt operation, the filament circuit is connected directly to the battery through ballasts R208 and R209.

d. When d-c voltage is applied to the dynamotor, current flows through the field coils and the l-v armature windings. This current sets up magnetic fields in both the field and armature windings that are opposite in polarity, causing the armature to rotate. Since the h-v winding is wound on the same armature, it cuts the lines of the common magnetic field, generating an alternating voltage which is converted to the 580-volt d-c voltage by the commutators. This voltage then is picked up from the commutators by a set of brushes. From the brushes, the high voltage passes through a filter circuit composed of capacitors C207, C209, and choke L201. The brushes and commutators on the l-v windings are used to transfer the d-c voltages from the battery to the windings. The field is compound wound; that is, part of the field winding is in series and part in shunt with the armature windings. This type of winding provides high starting torque and quick acceleration besides giving fairly constant output and speed for various loads.

Page 112. Par. 127. Add the following after subparagraph *b* :

b.1. DYNAMOTOR - POWER SUPPLY DY-88/GRC-9. To remove pluck-out parts on the dynamotor power supply, remove the cover and proceed as follows :

(1) Vibrator E201 and ballast tubes R208, R209, and R210 are located on the upper side of the chassis (fig. 122.1). E201, R208, and R209 can be removed without further disassembly. R210 is shielded by E207. The shield is removed by twisting it in a counterclockwise direction and then pulling it straight up off the tube. R210 then can be removed without difficulty.

(2) Capacitors C214, C215, and C229 (fig. 122.2) and relays K202, K203, and K204 are located on the under side of the chassis, toward the rear of the unit. To gain access to the capacitors and relays, first remove the two screws holding bracket to the unit. The capacitors and relays now can be removed.

(3) Do not attempt to repair the hermetically sealed relays. If they are defective, they must be replaced.

Page 115. Par. 132. Add the following after subparagraph *d* :

e. DYNAMOTOR-POWER SUPPLY DY-88/GRC-9.

Fig. No.	Description
122.1	Dynamotor-Power Supply DY-88/GRC-9, cover removed, top view.
122.2	Dynamotor-Power Supply DY-88/GRC-9, cover removed, bottom view.
123.1	Dynamotor D201 manufactured by Radio-Energie.
123.2	Dynamotor D201 manufactured by Electro Engineering Products Company.
141.1	Dynamotor-Power Supply DY-88/GRC-9. schematic diagram.

Page 116. Par. 137. Make the following changes in paragraph 137 :

Line 1. Change " nine " to read : ten.

Add the following after subparagraph *i* :

i. The chart in paragraph 157.1 is to be used to trouble shoot the dynamotor power supply.

Page 117. Par. 138. In the " Correction " column, change item 1*b* to read :

See charts for Vibrator Power Unit PE-237, Dynamotor-Power Supply DY-88/GRC-9, or Generator GN-58-(*).

Page 118. Par. 139. In the " Probable trouble " column, add the following after the last sentence in item 4*e* :

Filters or vibrator E201 in Dynamotor-Power Supply DY-88/GRC-9 defective.

Page 153. Par. 157. Add the following after paragraph 157 :

157.1. Trouble-shooting Chart for Dynamotor-Power Supply DY-88/GRC-9

In order to trouble shoot the dynamotor power supply, it is necessary to 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. 122.2) 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 as shown in paragraph 45.1*b*. Note that the terminals on output receptacle J202 are numbered (fig. 122.2). These terminals are to be used to check the output voltage of the dynamotor power supply.

157.1. Trouble-shooting Chart for Dynamotor-Power Supply DY-88/GRC-9

Symptom	Probable trouble	Correction
1. No voltage from any terminal of power output receptacle J202.	1*a*. Fuse F202 open.	1*a*. Replace fuse.
	b. S203 open.	*b*. Check switch S203.
	c. Power input cable open.	*c*. Check input cable.
2. No voltage at terminal 20. Control Ⓔ in SEND position.	2*a*. C214 shorted.	2*a*. Replace C214.
	b. R208 and R209 open.	*b*. Replace R208 and R209.
3. No voltage at terminal 32. Dynamotor runs, Control Ⓔ in SEND position.	3*a*. Choke L201 open.	3*a*. Check for voltage at each end of L201. If open, replace L201.
	b. H-v brushes defective.	*b*. Check brushes. If worn, replace with new ones.
4. No voltage at terminal 33. Control Ⓔ in STANDBY position. Vibrator hums.	4*a*. Resistor R213 open.	4*a*. Check resistance of R213.
	b. Resistor R212 open.	*b*. Check resistance of R212.
	c. Capacitor C230 shorted.	*c*. Replace capacitor C230.
5. No voltage at terminal 33. Control Ⓔ in STANDBY position. Vibrator does not hum.	5*a*. Vibrator defective.	5*a*. Replace vibrator.
	b. Contacts 2 and 3 of relay K202 defective.	*b*. Check for voltage at contacts 2 and 3 of relay K202 for continuity.
	c. Contacts 3 and 7 of relay K203 open.	*c*. Check for voltage at contacts 3 and 7 of relay K203.
6. No voltage at terminal 34. Control Ⓔ in SEND position.	6*a*. Resistor R201 open.	6*a*. Check for voltage at each end of resistor R201.
7. No voltage at terminals 22 and 23. Control Ⓔ in STANDBY position.	7*a*. Ballast resistor R210 open.	7*a*. Check ballast resistor R210 for continuity.
	b. Capacitor C216 shorted.	*b*. Replace capacitor C216.
	c. Capacitor C215 shorted.	*c*. Replace capacitor C215.
8. No voltage at terminal 21. Control Ⓔ in SEND position.	8*a*. Capacitor C231 shorted.	8*a*. Replace capacitor C231.
	b. Contacts 3 and 4 of relay K202 open.	*b*. Check for voltage at terminals 3 and 4 of relay K202.
	c. Resistor R212 open.	*c*. Check for voltage at each end of resistor R212.
	d. Capacitor C229A or C229B shorted.	*d*. Replace capacitors C229A and C229B.
9. Low voltage at terminal 33. Control Ⓔ in STANDBY or SEND position.	9*a*. Secondary of transformer T201 open between terminals 1 and 2 or between terminals 2 and 3.	9*a*. Check continuity between terminals 1 and 2 and terminals 2 and 3 of transformer T201.
	b. R213 increased in value.	*b*. Check R213. Replace if defective.

157.1. Trouble-shooting Chart for Dynamotor-Power Supply DY-88/GRC 9 (contd)

Symptom	Probable trouble	Correction
10. High voltage at terminal 20. Receiver-transmitter in PHONE-SEND position. Microphone button released.	10*a*. Resistor R211 open. *b*. Contacts 3 and 5 of relay K204 open.	10*a*. Replace resistor R211. *b*. Check for voltage at terminals 3 and 5 of K204.
11. No voltage at terminals 22, 23, and 33. Control Ⓔ in STAND BY position.	11*a*. K203 relay coil open. *b*. Ballast resistor R210 is open.	11*a*. Check K203 coil for continuity. *b*. Replace ballast resistor R210.
12. No voltage at terminals 20, 32, and 34. Control Ⓔ in SEND position. Dynamotor does not run.	12*a*. Fuse F201 is open. *b*. K201 relay coil open. *c*. Contacts 11 and 12 of K202 are open. *d*. K202 relay coil is open.	12*a*. Replace fuse F201. *b*. Check K201 coil for continuity. *c*. Replace K202 if defective. *d*. Check continuity of K202 coil.
13. No voltage at terminal 21 with control Ⓔ in SEND position. No voltage at terminal 33 with control Ⓔ in STANDBY position.	13*a*. Vibrator E201 is defective.	13*a*. Replace vibrator E201.
14. Fuse F201 keeps blowing control Ⓔ in SEND position.	14*a*. Capacitor C202, C203, C204, C205, C207, C206, C209, C210, C211 shorted. *b*. Fuse F201 not the correct value for the voltage used.	14*a*. Check for shorted capacitor and replace. *b*. Replace fuse F201 as follows : 30 amp for 6-volt operation, 20 amp for 12-volt operation, and 10 amp for 24-volt operation.

Page 158. Fig. 122. Insert figures 122.1 and 122.2, after figure 122.

Page 159. Par. 160. Add the following after paragraph 160 :

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

There are standard replacement brushes furnished as spare parts with Dynamotor-Power Supply DY-88/GRC-9. These brushes are already shaped to fit the contour of the armature. To replace the brushes, proceed as follows :

a Remove the power supply from its case.

b. Remove the four screws holding each of the two access covers (fig. 122.1) to the dynamotor. The 12-and 24-volt brushes now are accessible.

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

d. Unscrew the brush caps and remove the brushes.

Note. The commutator arrangement will vary according to the type of dynamotor used (figs. 123.1 and 123.2.)

e. 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.

f. Replace the brush caps, access covers, and rear cover of the dynamotor.

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

Page 159. Fig. 123. Insert figures 123.1 and 123.2 after figure 123.

Page 162. Par. 162. Add the following after paragraph 162 :

162.1. Removal of Armature of Dynamotor D201

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. This information is given for those units where the armature is to be replaced. Proceed as follows :

a. Remove power supply from its case.

b. Remove the dynamotor from the chassis.

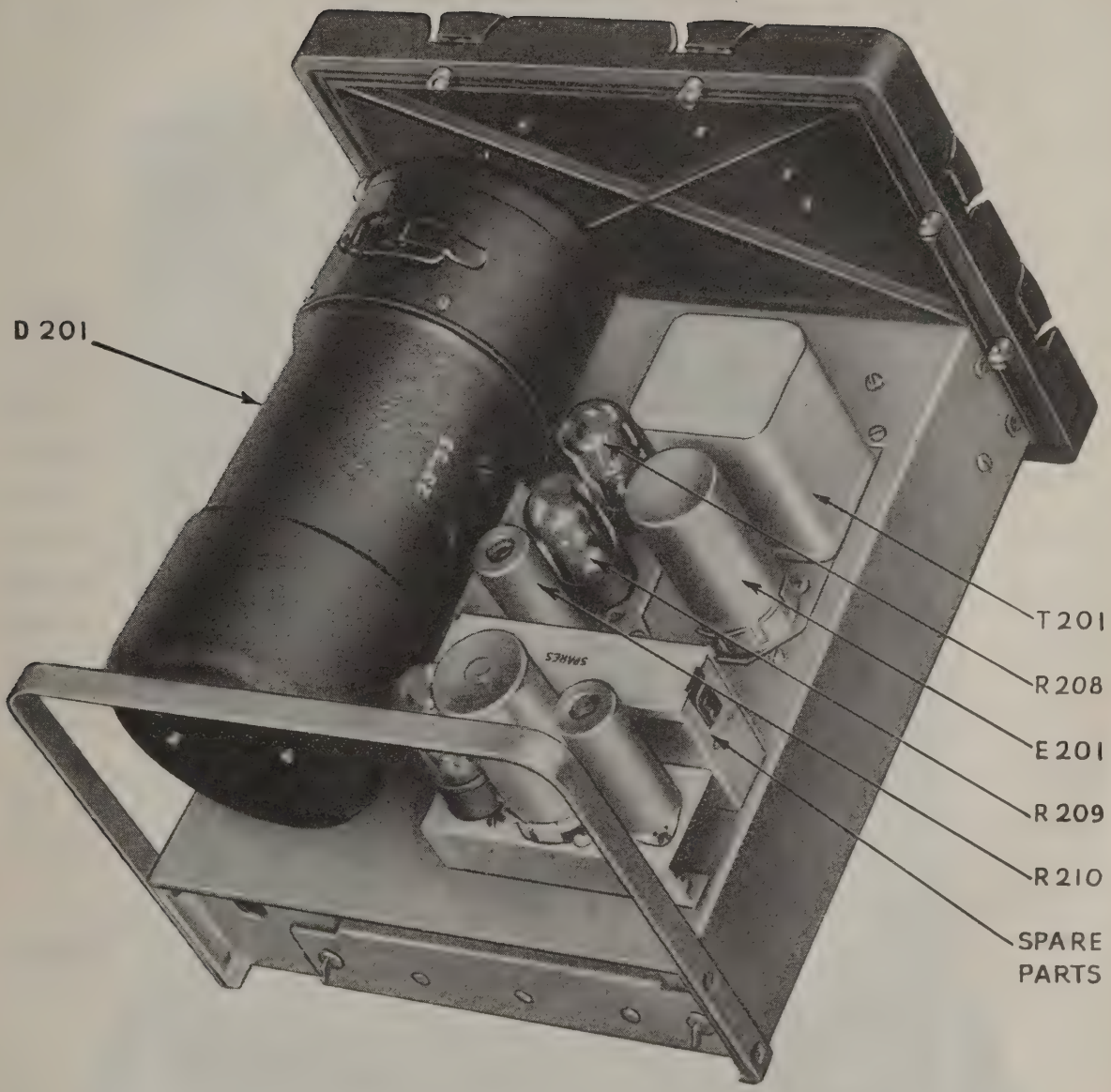


Figure 122.1. *Dynamotor-Power Supply DY-88/GRC-9, cover removed, top view.*

(1) Disconnect the dynamotor wires at the under side of the chassis (fig. 122.2) by loosening the screws which hold the dynamotor wire spade lugs. *Tag all wires before removal.*

(2) Remove the four screws and nuts which hold the dynamotor to the chassis.

(3) Gently pull the dynamotor up off the chassis.

c. Remove the screws which hold the front and rear covers to the dynamotor. Remove the covers (fig. 127.1).

d. Remove all brushes.

e. Remove the top through bolt.

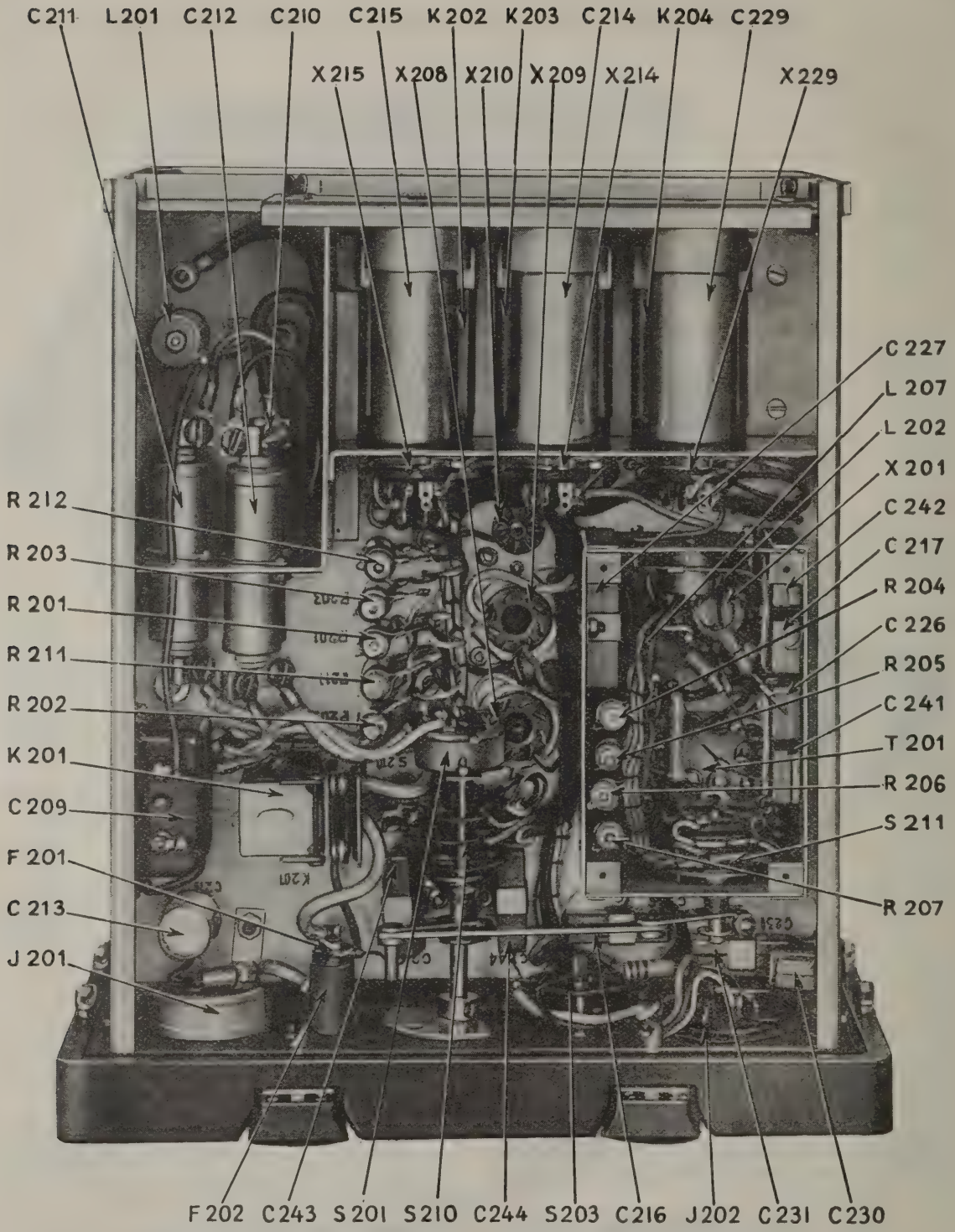


Figure 122.2. Dynamotor-Power Supply DY-88/GRC-9, cover removed, bottom view.

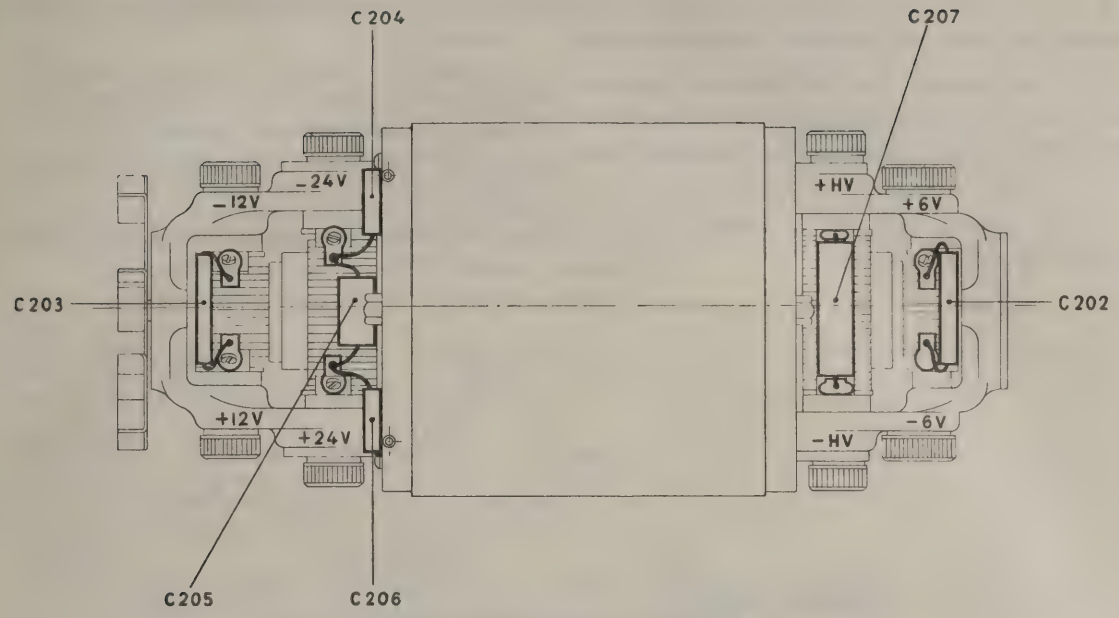
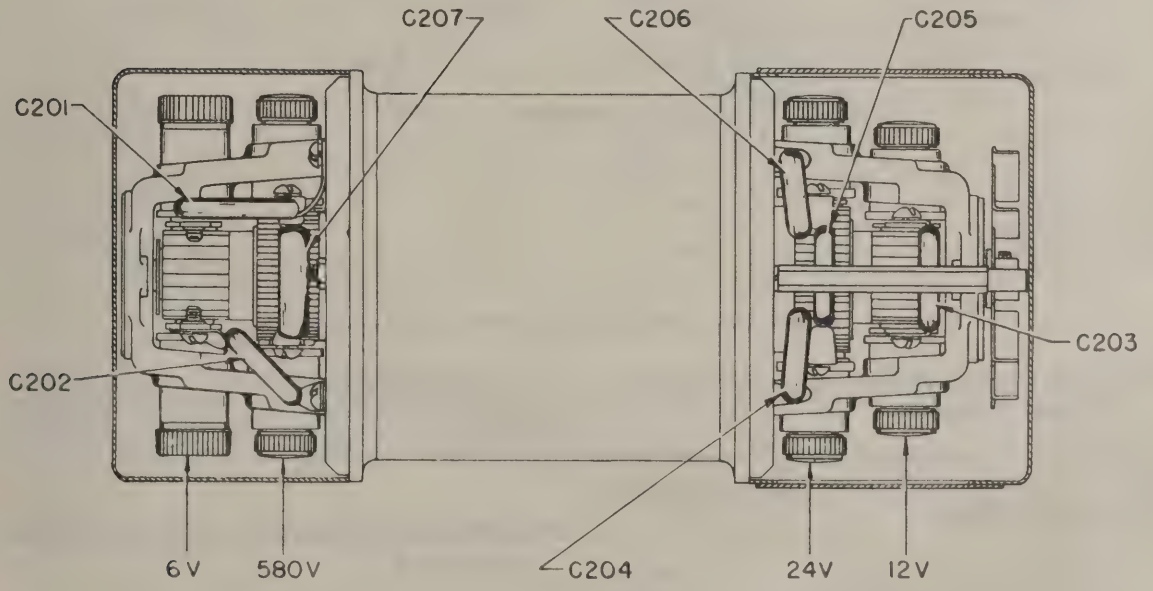


Figure 123.1. *Dynamotor D201 manufactured by Radio Energie.*



TM263-C3-46

Figure 123.2. *Dynamotor D201 manufactured by Electro Engineering Products Company.*

f. Before removing the bottom through bolt, loosen the cable clamp. Then, remove the bottom through bolt.

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

h. Use an Allen wrench to remove the two screws holding the fan to the dynamotor. Remove the fan.

i. Pry the front end piece away from the dynamotor unit. Remove the front end piece by pulling it off the dynamotor unit. Be careful not do damage any of the wiring.

j. The armature now can be pulled out gently through the dynamotor unit.

162.2. Replacement of the Armature of Dynamotor D201

To replace the dynamotor armature, reverse the disassembly procedure given in paragraph 162.1. Be sure to connect all wires properly.

Page 163. Fig. 127. Insert figure 127.1 after figure 127.

Page 176. Par. 199. Add the following after paragraph 199 :

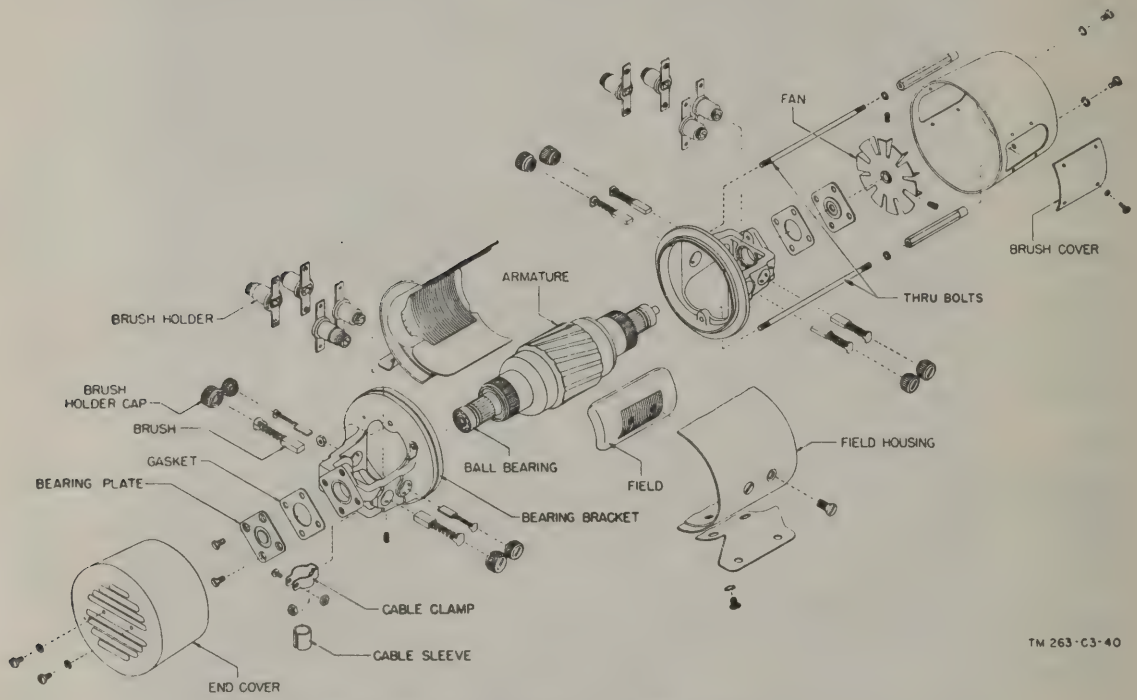


Figure 127.1. *Typical dynamotor D*201, *exploded view.*

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

With a 6-, 12-, or 24-volt battery connected to the input of the dynamotor power supply, the voltage outputs are as follows :

Terminals (ground)	Circuit	Value in volts
20 to 24	Transmitter filaments	6.5
21 to 24	Receiver plates (SEND)	105
22 to 24	Receiver filaments	1.5
23 to 24	Receiver filaments	1.5
32 to 24	Transmitter plates	580
33 to 24	Receiver plates (STANDBY)	105
34 to 24	Keying relay K101	6.9

Note. These measurements are made at output receptacle J202 (fig. 122.2) with the receiver-transmitter connected to the dynamotor power supply. The terminals on J202 are numbered (fig. 122.2). Figure 141. Insert figure 141.1 after figure 141.

Page 215. App. II. Par. 4. Add the following after paragraph 4.

4.1. Identification Table of Parts for Dynamotor-Power Supply DY-88/GRC-9 Fr

Ref symbol	Name of part and description	Function of part	T.R.T. drawings
	DYNAMOTOR-power supply : rated output data, 580 v at 100 ma ; 120 v at 45 ma ; 7 v at 575 ma ; 1.5 v at 500 ma ; rated input data, 6/12/24 v dc at approx 28/15/8 amps ; includes shock mounts ; water-tight housing ; contains an integral vibrator power supply w/associated components, 4 relays and a special purpose Cable Assembly CX-2031/U.	Supplies operating power required by transmitter and receiver of radio set.	
E 213 E 215	BRUSH SET, electrical contact, w/pressure spring.	12-, 24- volt positive commutator brush.	29.981
E 217	BRUSH SET, electrical contact, w/pressure spring.	580-volt positive commutator brush	28.585
E 219	BRUSH SET, electrical contact, w/pressure spring.	6 volt positive commutator brush.	29.980
W 202	CABLE ASSEMBLY, power, electrical ; Sig C Cable assembly Input CX-2031/U.	Input cable.	44.023
W 203	CABLE ASSEMBLY, power, electrical, Sig C CD 1086 ; 8 cond, rubber jacket ; 44″ lg ; term. fitting on first end : 1 Sig C Plug PL 279 ; term fitting on second end : 1 Sig C Plug PL 294.	Connects dynamotor power supply to receiver-transmitter.	42.405
O 205	CAP ELECTRICAL BRUSH HOLDER.	Cap for 12- 24 and h-v commutator brush holder.	29.978
O 206	CAP ELECTRICAL BRUSH HOLDER.	Cap for 6-v commutator brush holder.	29.979
C 210 C 211 C 212	CAPACITOR, fixed : 0.9 μF + 20 % — 10 % ; testing voltage 250 v ; type 2057 T.	Input power filters.	42.993
C 204 C 205 C 206	CAPACITOR, fixed, paper ; 0.01 μF ± 20 % testing voltage 200 v.	R-f noise suppression.	29.810
C 209	CAPACITOR, fixed, paper ; 2 μF + 20 % — 10 % testing voltage 600 v.	R-f noise suppression.	42.312
C 213	CAPACITOR, fixed : paper ; 0.25 μF ± 10 % testing voltage 250 v type 2514 E.	Input filter.	42.225
C 202 C 203	CAPACITOR, fixed : paper ; 0.1 μF ± 10 % 120 vdcw.	R-f noise suppression.	29.663
C 214 C 215	CAPACITOR, fixed : electrolytic ; 850 μF + 150 % — 10 % 32 vdcw.	C 214 : Transmitter filament by pass. C 215 : Receiver filament bypass.	44.003
C 241	CAPACITOR, fixed : paper ; 0.05 μF + 20 % — 10 %, 200 vdcw.	R.f noise suppression.	42.989
C 216 C 217 C 230 C 231 C 242 C 243 C 244	CAPACITOR, fixed : paper ; 0.1 μF + 20 % — 10 % testing voltage 200 v.	C 216 : Receiver filament bypass. C 217 : Vibrator r-f noise filter. C 230 : Receiver, l-v filter. C 231 : Transmitter, l-v filter. C 242 : Vibrator, l-v filter. C 243 : Noise suppression. C 244 : Noise suppression.	42.990
C 226	CAPACITOR, fixed : paper ; 0.01 μF ± 20 % testing voltage 1.000 v.	Arc suppression capacitor.	29.809

4.1. Identification Table of Parts for Dynamotor-Power Supply DY-88/GRC-9 Fr (contd)

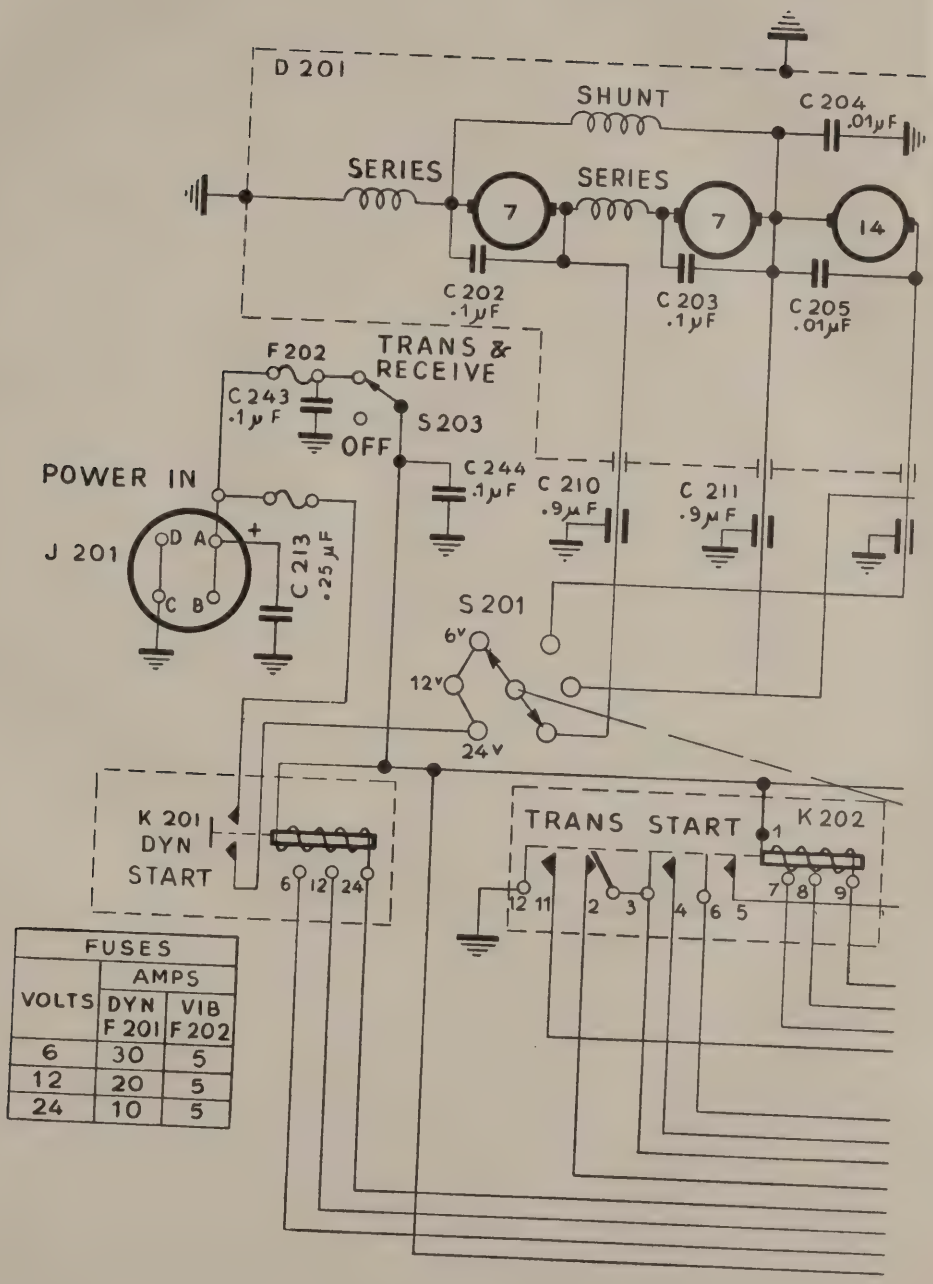
Ref symbol	Name of part and description	Function of part	T.R.T. drawings
C 227	CAPACITOR, fixed : paper ; 0.5 uF + 15 % — 10 % testing voltage 200 v.	Arc suppression capacitor.	42.992
C 229A C 229B	CAPACITOR fixed, two sect ; 45 uF + 150 % — 10 % 300 vdcw.	105 v Supply filter.	42.002
C 240	CAPACITOR, ceramic, 5.000 pF + 80 % — 15 % testing voltage 300 v.	105 v Supply noise filter.	
L 201	CHOKE, RF : 530 uH ± 5 %, 7. ohms dc resistance.	HV filter.	42.513
	CLIP, vibrator holding clip.	Vibrator holding clip.	42.984
L 202	COIL, 7.5 uH ± 10 %, 0,038 ohms dc resistance.	Noise suppression.	42.321
L 207	COIL, 3.3 mH ± 10 % 40 ohms dc resistance.	Noise suppression.	44.054
P 201	CONNECTOR plug : 4 male round pin cont. cont. electrical rating ; 20 amps, 800 v rms ; water-tight ; Amphenol type.	Input power plug.	42.431
J 201	CONNECTOR, receptacle : ppo CX 2031/U ; 4 female, round cont ; cont. electrical rating, 20 amps, 800 v rms ; Amphenol type.	Input connector.	42.432
J 202	CONNECTOR, receptacle, 9 female round cont.	Output receptacle.	42.354
	COVER, fuse, holder for spare fuses.	Cover for holder for spare fuses.	42.931
D 201	DYNAMOTOR, rated input data ; dc ; 7.2/14.5/29 volts approx 28/15/8 amps ; rated output data ; dc 600 v at 100 ma ; 13.2 volts, 2.5 A.	Provides high voltage dc for transmitter operation.	62.104
	FASTENER, Dzus : panel.	Panel fastener.	29.639
F 201	FUSE, cartridge : 10 amp, 32 v max ; time delay, 200 % Between 15 and 60 sec. and 500 % for 2.5 sec.	Overload protection for 24 v input.	44.006
F 201	FUSE, cartridge : 20 amp, 32 v max ; time delay, 200 % Between 15 and 60 sec. and 500 % for 2.5 sec.	Overload protection for 12 v input.	44.006
F 201	FUSE, cartridge : 30 amp, 32 v max ; time delay, 200 % between 15 and 60 sec. and 500 % for 2.5 sec.	Overload protection for 6 v input.	44.006
F 202	FUSE, cartridge : 5 amp, 32 v. dc, time delay, 135 % for 1 hr and 200 % for 25 sec.	Overload protection.	44.006
E 203	FUSEHOLDER ; max electrical rating for holder ; 30 amp 32 v dc, water-tight.	For mounting F 201 and F 202.	44.025
	DIAL CONTROL, voltage indicating knob.	Voltage indicating knob.	29.541
	MOUNT, vibration assembly, shock mount assembly for dynamotor.	Shock mount assembly.	29.753 to 29.756
	PIN, hinge : hinge pin for spare fuse cover.	Hinge pin for spare fuse cover.	29.982

4.1. Identification Table of Parts for Dynamotor-Power Supply DY-88/GRC-9 Fr (contd)

Ref symbol	Name of part and description	Function of part	T.R.T. drawings
K 201	RELAY, armature : cont. arrangement 1A, MBCA ref dwg. group 4 ; double break ; 7.2, 14.5, 29 volts operating voltages.	Dynamotor starting relay.	42.995
K 202	RELAY, armature : cont. arrangement 2A 1C, MBCA ref dwg, group 4 ; 7.2, 14.5, 29 volts operating voltages ; mts by 13 pins, noval type base, plug-in type.	Transmitter starting relay.	42.998
K 203	RELAY, armature : cont. arrangement 1A, MBCA ref dwg. group 4 ; mts by 9 pins, noval type base, plug-in type.	Receiver starting relay.	42.997
K 204	RELAY, armature : cont. arrangement 1C, MBCA ref. dwg. group 4 ; mts by 9 pins, noval type base, plug-in type.	Relay filament voltage control.	42.999
R 201 R 202	RESISTOR, fixed ; WW ; 10 ohms $\pm$ 5 % 10 W.	R 201 : Dynamotor input dropping resistor. R 202 : Receiver filament dropping resistor.	28.371
R 203	RESISTOR, fixed, WW ; 20 ohms $\pm$ 5 % 10 W.	Drops 24 volts input for receiver filaments.	28.371
R 204	RESISTOR, fixed, WW ; 31 ohms $\pm$ 5 % 10 W.	Dropping resistor for trans. input.	28.371
R 205 R 206	RESISTOR, fixed, WW ; 50 ohms $\pm$ 5 % 10 W.	Vibrator input dropping resistor.	28.371
R 207	RESISTOR, fixed, WW ; 100 ohms $\pm$ 5 % 10 W.	Vibrator input dropping resistor.	28.371
R 211	RESISTOR, fixed, WW ; 5 ohms $\pm$ 5 % 10 W.	Dropping Resistor for transmitter filaments.	28.371
R 212	RESISTOR, fixed, WW ; 800 ohms $\pm$ 5 % 10 W.	Filter resistor.	28.371
R 213	RESISTOR, fixed, WW ; 2.200 ohms $\pm$ 5 % 1 W.	Dropping resistor.	
R 214 R 215	RESISTOR, fixed, comp ; 750 ohms $\pm$ 5 % 1 W.	Arc suppression resistor.	
R 208 R 209	RESISTOR, thermal : ballast tube type, noval base for socket mtg ; nom operating cur. 0.910 amp. to 1.05 amp. from 3 to 10 vdc.	Transmitter filament voltage regulator.	44.021
R 210	RESISTOR, thermal : nom operating cur. 0.40 amp to 0.55 amp from 1.9 to 14 vdc ; ballast tube type, noval base for socket mtg.	Receiver filament voltage regulator.	44.022
	SHIELD, electron tube ; contains shaped spring at top for holding shield in locked position.	Shield for R 210.	29.697
X 210	SOCKET, electron tube : 9 cont., round w/oval mtg saddle.	For mouting R 210.	44.007
X 201	SOCKET, electron tube : 7 cont., round w/oval mtg plate.	For mounting vibrator E 201.	44.005

4.1. Identification Table of Parts for Dynamotor-Power Supply DY-88/GRC-9 Fr (contd)

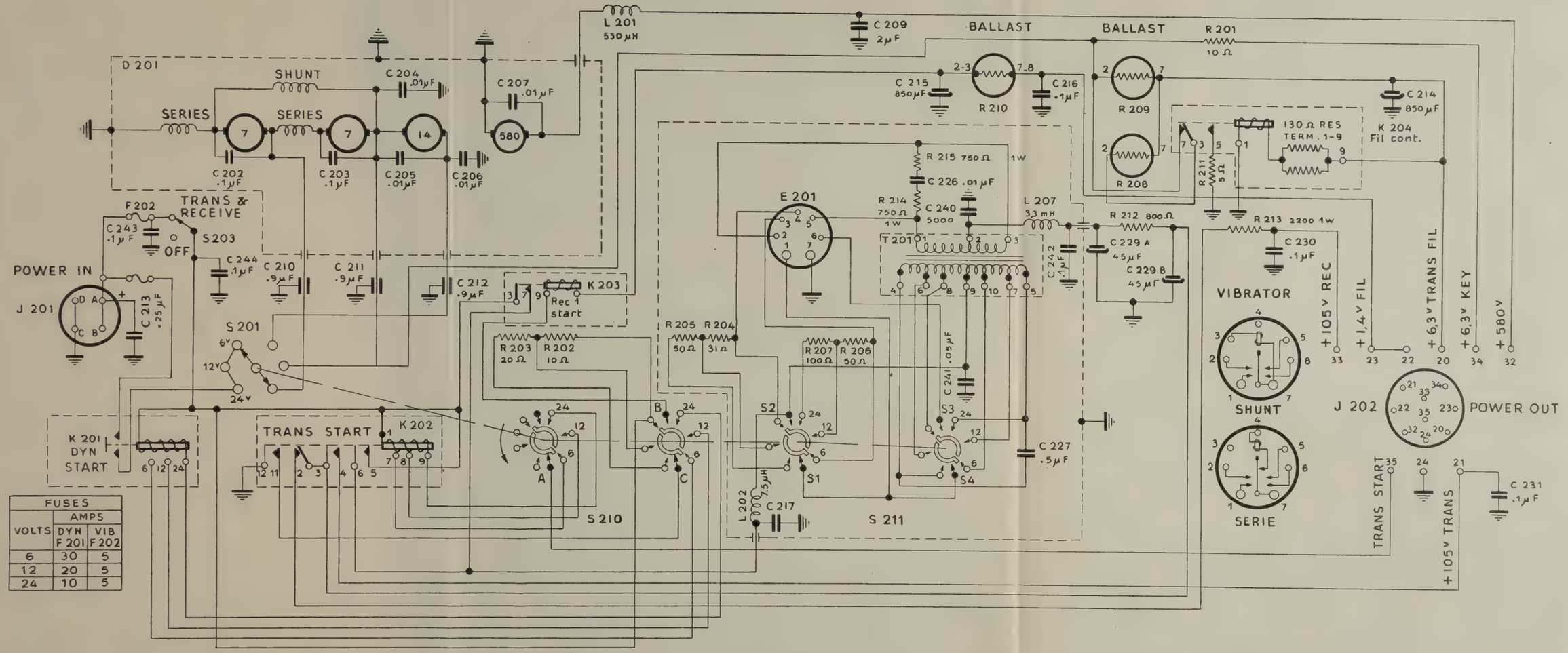
Ref symbol	Name of part and description	Function of part	T.R.T. drawings
X 202	SOCKET, electron tube : 13 cont., noval ; round w/oval mtg saddle.	Mounting for K 202.	44.009
X 203 X 204	SOCKET, electron tube : 9 cont. ; noval ; round w/oval mtg saddle.	X 203 : Mounting for K 203. X 204 : Mounting for K 204.	44.008
X 208 X 209 X 214 X 215 X 229	SOCKET, electron tube : 9 cont. ; standard octal ; round w/oval mtg saddle.	X 208 : for mounting R 208. X 209 : for mounting R 209. X 214 : for mounting R 214. X 215 : for mounting R 215. X 229 : for mounting R 229.	26.832
	SPRING : helical compression ; for panel fastener.	Spring for panel fastener assembly.	29.641
	STUFFING Tube ; feedthru type.	For passing cable through housing.	32.043
	SUPPRESSOR, electrical noise : contains capacitors, resistors and coils ; enclosed in rectangular aluminium alloy case — cabinet filter box w/transformer T201 and cover.	Hash filter and mounting for vibrator.	62.107
S 201	SWITCH, rotary : single sect. 3 positions ; 30 amps ; 32 volts.	Voltage selector switch.	44.026
S 203	SWITCH, rotary : single sect. ; 2 positions, 5 amps, 32 volts.	ON-OFF switch.	44.027
S 210	SWITCH, rotary : 3 circuits ; 2 positions, 2 sections.	Voltage selector switch.	44.028
S 211	SWITCH, rotary : 3 circuits, 2 positions, 2 sections.	Voltage selector switch.	44.029
	TENSION UNIT : for holding 3 relays and 3 capacitors in place.	For holding 3 relays and 3 capacitors in place.	44.107
	TOOL, retainer ring : for forcing dzus cap washer on to dzus fastener.	For forcing cap washer on to fastener.	32.313
T 201	TRANSFORMER ; power, vibrator ; input data 7.2 v dc/14.5 v dc/29 v dc ; output 160-0-160 v dc 45 ma.	Steps up pulsating 6 v for receiver.	44.001
E 201	VIBRATOR, synchronous : input data for max power output 6 v dc, 4.3 amp ; 115 cyc freq. $\pm$ 7 % tol ; D4 base.	Interrupter for 120 v supply.	44.020
	WASHER, cup. for spring fastener.	Spring fastener retainer.	29.971



FUSES		
VOLTS	AMPS	
	DYN F 201	VIB F 202
6	30	5
12	20	5
24	10	5

4.1. Identification Table of Parts for Dynamotor-Power Supply DY-88/GRC-9 Fr (contd)

Ref symbol	Name of part and description	Function of part	T.R.T. drawings
X 202	SOCKET, electron tube : 13 cont., noval ; round w/oval mtg saddle.	Mounting for K 202.	44.009
X 203 X 204	SOCKET, electron tube : 9 cont. ; noval ; round w/oval mtg saddle.	X 203 : Mounting for K 203. X 204 : Mounting for K 204.	44.008
X 208 X 209 X 214 X 215 X 229	SOCKET, electron tube : 9 cont. ; standard octal ; round w/oval mtg saddle.	X 208 : for mounting R 208. X 209 : for mounting R 209. X 214 : for mounting R 214. X 215 : for mounting R 215. X 229 : for mounting R 229.	26.832
	SPRING : helical compression ; for panel fastener.	Spring for panel fastener assembly.	29.641
	STUFFING Tube ; feedthru type.	For passing cable through housing.	32.043
	SUPPRESSOR, electrical noise : contains capacitors, resistors and coils ; enclosed in rectangular aluminium alloy case — cabinet filter box w/transformer T201 and cover.	Hash filter and mounting for vibrator.	62.107
S 201	SWITCH, rotary : single sect. 3 positions ; 30 amps ; 32 volts.	Voltage selector switch.	44.026
S 203	SWITCH, rotary : single sect. ; 2 positions, 5 amps, 32 volts.	ON-OFF switch.	44.027
S 210	SWITCH, rotary : 3 circuits ; 2 positions, 2 sections.	Voltage selector switch.	44.028
S 211	SWITCH, rotary : 3 circuits, 2 positions, 2 sections.	Voltage selector switch.	44.029
	TENSION UNIT : for holding 3 relays and 3 capacitors in place.	For holding 3 relays and 3 capacitors in place.	44.107
	TOOL, retainer ring : for forcing dzus cap washer on to dzus fastener.	For forcing cap washer on to fastener.	32.313
T 201	TRANSFORMER ; power, vibrator ; input data 7.2 v dc/14.5 v dc/29 v dc ; output 160-0-160 v dc 45 ma.	Steps up pulsating 6 v for receiver.	44.001
E 201	VIBRATOR, synchronous : input data for max power output 6 v dc, 4.3 amp ; 115 cyc freq. $\pm$ 7 % tol ; D4 base.	Interrupter for 120 v supply.	44.020
	WASHER, cup. for spring fastener.	Spring fastener retainer.	29.971



FUSES		
VOLTS	AMPS DYN F 201	AMPS VIB F 202
6	30	5
12	20	5
24	10	5

Figure 141.1. Dynomotor-Power Supply DY-88/GRC-9, schematic diagram.