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INSTRUCTION MANUAL AND PARTS CATALOG

FOR
UF
SERIES

Page 4

DIRECT CURRENT GENERATORS

(NON BATT CHG)

125 VOLT D.C. SHUNT WOUND VARIABLE SPEED

MODEL 2.OUF-125S

MODEL 5.OUF-210S

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SPECIFICATIONS

	2.0UF-125S	5.0UF-210S
Rating (watts)	2000	5000
Volts (DC)	125	125
Current (Amperes)	16	40
Variable Speed Range (RPM)	1200 to 2500	1750 to 3000
Voltage Regulation, Automatic ($\pm\%$) (No Load to Full Load)	1/2	1/2
Minimum H.P. Recommended (Driving Source)	4	10
Weight	149	203

NOTE: Model designation 2UF-125N and 5UF-210N changed beginning with Spec S to 2.0UF-125S and 5.0UF-210S.

GENERAL INFORMATION

INTRODUCTION

This instruction book contains information for the proper installation, operation, and maintenance of your generator. We suggest that this book be kept handy so that it can be referred to when necessary.

If you wish to contact your dealer or the factory regarding this equipment, be sure to supply the complete MODEL and SPEC.NO., and the full serial number of the equipment as shown on the nameplate. This information is necessary to identify your equipment among the many basic and special optional units manufactured.

GENERATOR DESCRIPTION

These generators are designed for 125-volt DC direct lighting purposes. They can be used for other DC applications, but not for battery charging. Both generators use the same type voltage regulator to automatically maintain the output voltage of the generators at a constant value when driven within its correct speed range (rpm).

Rotation of the generator shaft can be either clockwise or counterclockwise. The wiring diagram shows proper connections for rotation in either direction.



MANUFACTURER'S WARRANTY

Onan warrants, to the original user, that each product of its manufacture is free from defects in material and factory workmanship if properly installed, serviced and operated under normal conditions according to Onan's instructions.

Onan will, under this warranty, repair or replace, as Onan may elect, any part which on examination shall disclose to Onan's satisfaction to have been defective in material and workmanship; provided that such part shall be returned to Onan's factory or one of its Authorized Service Stations, transportation charges prepaid, not later than one (1) year after the product is first placed in service. Such defective part will be repaired or replaced free of charge, including labor (in accordance with rates approved by Onan) during the stated one (1) year coverage under this warranty.

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No person is authorized to give any other warranty or to assume any other liability on Onan's behalf unless made or assumed in writing by an Officer of Onan, and no person is authorized to give any warranty or to assume any liabilities on the Seller's behalf unless made or assumed in writing by such Seller.

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A DIVISION OF ONAN CORPORATION

IMPORTANT...RETURN WARRANTY CARD ATTACHED TO UNIT

CAUTION

Onan uses this symbol throughout the text to warn of possible equipment damage.

WARNING

This symbol is used to warn of any possible personal injury.

INSTALLATION

LOCATION

Select a site for the generator with the following in mind. Figure 1 shows dimensions of the generator and bolthole centers for installation.

1. **Ventilation** - The generator creates a considerable amount of heat when operating under load conditions. It is of vital importance that this heat be dissipated by proper ventilation. If the generator is installed inside a small room or compartment, provide a vent for exhausting the air heated by the generator. Locate the heated air exhaust vent above the inlet vent. Heated air is discharged from the drive-shaft end of the generator.
2. **Convenience to Drive Power** - (Driving power is described as an engine or prime mover of the generator). Both driving source (engine) and driven counterpart (generator) must be bolted securely to a heavy mounting base to maintain pulley and shaft alignment. The direction of rotation of the generator will be determined by the direction of rotation of the driving unit. Generator rotation is determined by looking at end opposite shaft. Refer to wiring diagram for proper connection.

The shaft of the generator and driving unit must be parallel and the pulleys must be lined up. Correct belt tension must be maintained. After the pulleys are in proper alignment both generator and driving unit must be bolted down to a heavy rigid mounting base.

NOTE: If a flexible coupling is used, shaft alignment of the generator and driving unit must be accurately made and permanently maintained. Incorrect shaft alignment will cause excessive wear on both units and unnecessary loss of power from the driving unit.

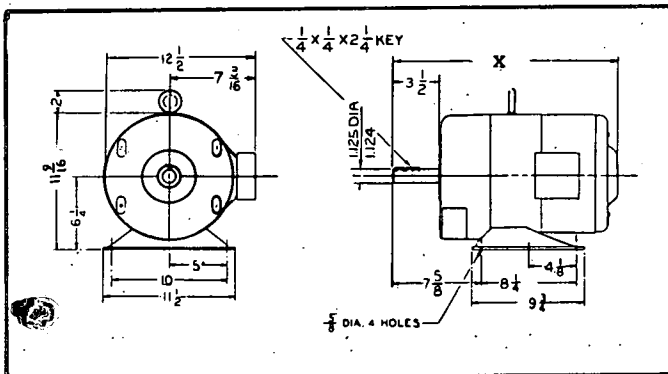


FIGURE 1. GENERATOR DIMENSIONS

NOTE: Dimension x (Figure 1) = 19-1/4 in. (2.0UF-125S) and 20-7/8 in. (5.0UF-210S).

3. **Dusty or Damp Conditions** - Avoid dusty or damp conditions as much as possible. Generator should be mounted under cover or inside a building to protect it against the weather.
4. **Servicing Convenience** - Allow at least 24 inches of space on all sides of the generator so that it can be serviced conveniently.

GENERATOR COOLING

The generator blower scroll is mounted at the factory for a counterclockwise rotation. If clockwise rotation is desired, scroll position must be reversed. The arrow printed on the scroll must be pointing in the direction of rotation of the shaft, Figure 2.

To reverse scroll, remove only the scroll with screen attached. Turn it end for end and reinstall so scroll will be at opposite end of air outlet hole.

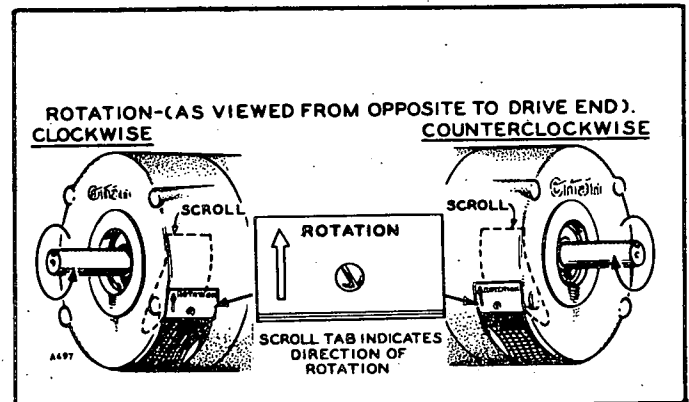


FIGURE 2. GENERATOR ROTATION

MOUNTING THE GENERATOR

Provide a substantial mounting base of concrete, wood or steel and use large bolts. The surface of the mounting base should be flat so that the generator mounting brackets will not be sprung when tightening into place. It should be possible to turn the generator shaft by hand after the generator is bolted down.

MOUNTING THE REGULATOR

The voltage regulator is cooled by a natural air flow and should not be mounted near heat generating equipment or inside totally enclosed switchboards. Regulator can be mounted in any position without affecting its regulating characteristics, however vertical mounting is recommended to obtain maximum cooling.

WIRING CONNECTION

Follow specifications of local and national electrical codes for installing load connection wiring and grounding the generator. Be sure to use wire large enough to avoid excessive drop in voltage between the generator and the load, depending upon the distance and the amount of the load.

Figures 3 and 4 show correct connections for either clockwise or counterclockwise rotation. Always remember that direction of rotation is taken from end opposite shaft. Be sure blower scroll is installed correctly according to shaft rotation.

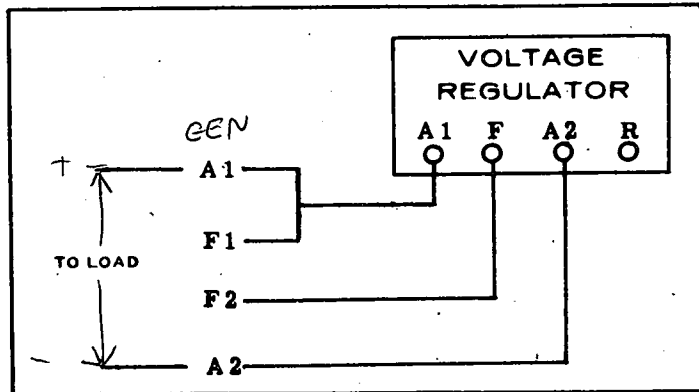


FIGURE 3. COUNTERCLOCKWISE ROTATION

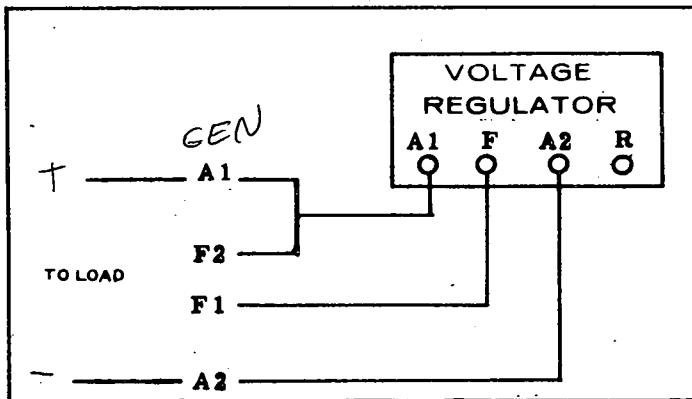


FIGURE 4. CLOCKWISE ROTATION

FLASHING THE FIELD

Before running the generator, the field must be flashed (Figure 4) with A1 positive or regulator will be seriously damaged. Proceed as follows:

1. Connect generator to regulator for rotation desired.
2. Remove lead from "F" terminal of regulator.
3. Apply a 12-volt DC positive lead to A1 terminal of regulator and touch negative lead momentarily to field lead removed from "F" terminal of regulator.

CAUTION

Do not flash field with lead connected to "F" terminal of regulator.

DRIVING POWER

When a gasoline or diesel engine is used as the driving source the following factors should be considered:

1. Engine Power - The engine must have a minimum of 2 H.P. for each 1000 watts of generator output.

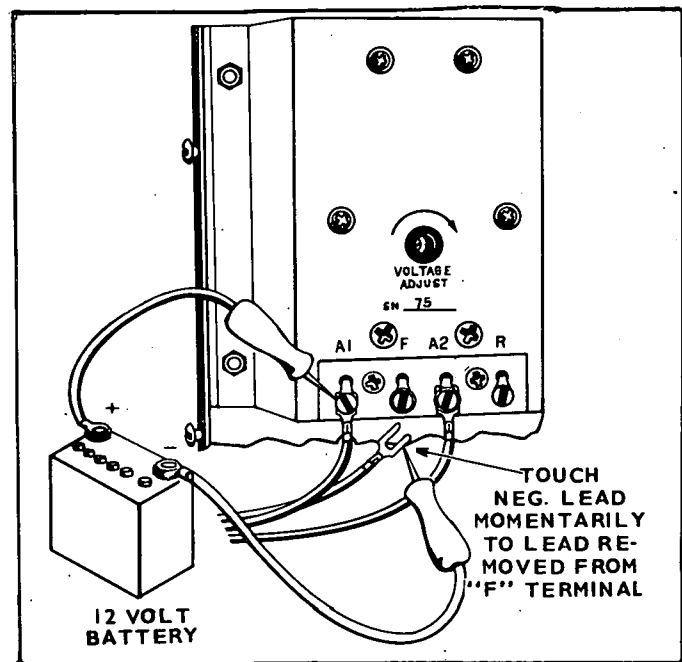


FIGURE 5. FLASHING THE FIELD

For example, if a 2000 watt generator is to be operated, the engine must deliver at least 4-horsepower at the drive shaft. If the engine has a considerable reserve of power the speed regulation and voltage regulation will be much better.

2. Engine Pulley Speed - The engine may have a variable speed governor which regulates engine speed at about 8-1/2 to 12%. If so, governor operation is best at the maximum rated speed of the engine. When the generator is operating at or near its capacity, the tendency of the engine is to increase speed when the load is suddenly removed. The engine governor does not react fast enough at low speed to prevent momentary acceleration and high voltage. This may cause serious damage to any electrical equipment left connected. The engine cannot increase its speed too much when the load is removed. If the engine has a constant speed governor, the speed regulation is 5% or less and the above effects are not present.
3. Pulley Selection - The rated speed of the engine will determine the size of pulley to use on the generator. To determine the correct generator pulley size to use, proceed as follows:
 - A. Multiply the DIAMETER of the driving unit pulley by its SPEED in rpm (revolutions per minute).
 - B. Divide the above result by the nameplate speed of the generator.

Example: A pulley 15 inches in diameter is used on a driving engine operating at 1200-rpm. Multiply 15 x 1200 getting a result of 18,000. Divide the 18,000 by 1750-rpm (generator pulley speed desired) and the final result is 10 which expresses the size of the pulley (in inches) required.

OPERATION

GENERAL

See that the generator is aligned properly with the driving source. If a belt drive is used, see that the tension is correct. A tight belt will wear rapidly and cause wear to the generator bearings. A loose belt will slip, wear rapidly, and cause low generator output.

STARTING

Start the generator, and while running at no load, check the voltage. Be sure the generator is being driven at

its nameplate rpm (rated speed). The generator voltage should be approximately 125 volts with no load connected. This results in a desirable voltage under full load operation.

OPERATION

The automatic voltage regulator keeps the output voltage within 1/2% from no load to full load. The regulator was preset at the factory and no additional adjustment should be necessary.

SERVICE!

REMEMBER TOO, THAT ONAN AUTHORIZED SERVICE STATIONS, WITH THEIR FACTORY TRAINED PERSONNEL, HAVE THE BEST OF FACILITIES FOR COMPLETE OVERHAULING AND REBUILDING YOUR ONAN ELECTRIC PLANT OR ENGINE. SEE YOUR PARTS AND SERVICE CENTER FOLDER FORM F-115.

SERVICE AND MAINTENANCE

PERIODIC SERVICE AND INSPECTION

Follow a definite schedule of inspection and servicing. Make a good visual check before, while, and after generator is operated; look for loose or broken leads and bad connections.

Internal generator parts should be examined periodically. Remove end bell cover and inspect brushes, springs, bearings, etc.

BRUSH REPLACEMENT

Replace the brushes when they wear to about 5/8 inch in length, Figure 6. Order replacement brushes by part number, never by description: similar brushes may have different electrical characteristics.

CAUTION If brushes are not replaced when they wear to the stamped Onan name, severe damage to the commutator will take place. See Figures 7 and 8.

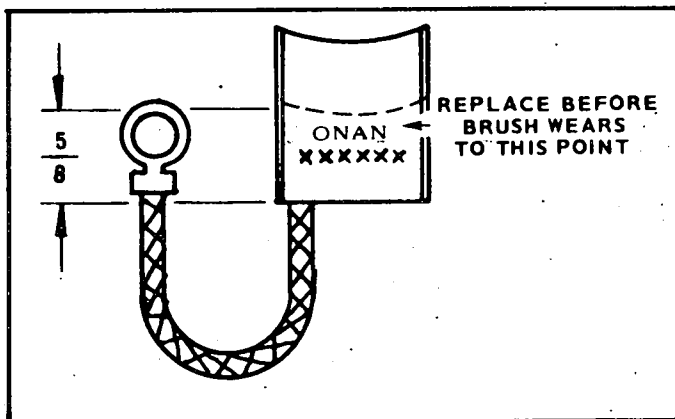


FIGURE 6. BRUSH REPLACEMENT

INSTALL BRUSHES WITH BEVELLED TOP SLANTING DOWN TOWARD SPRING HOLDER

TO REMOVE BRUSH SPRING, PRESS SPRING HOLDER DOWN AND OUT AS SHOWN IN BROKEN LINES.

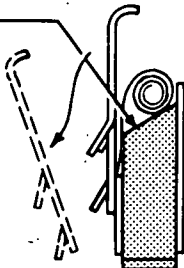


FIGURE 7. BRUSH HOLDER (5.0UF-2105)

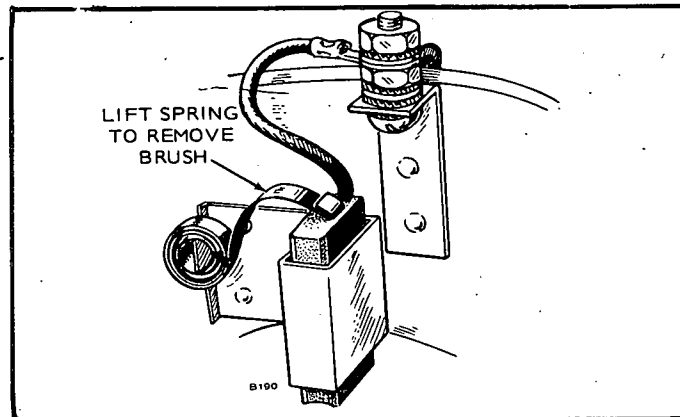


FIGURE 8. BRUSH HOLDER (2.0UF-125S)

BRUSH RIG POSITION

The position of the brush rig assembly in the generator end bell is very important. The correct setting of the brush rig was determined at the factory and is identified by a mark on the outer edge of the brush rig, Figure 9. It must align with the edge of the end bell where the brush rig is mounted.

As long as the original brush rig and armature are continued in service, the alignment reference mark must be observed.

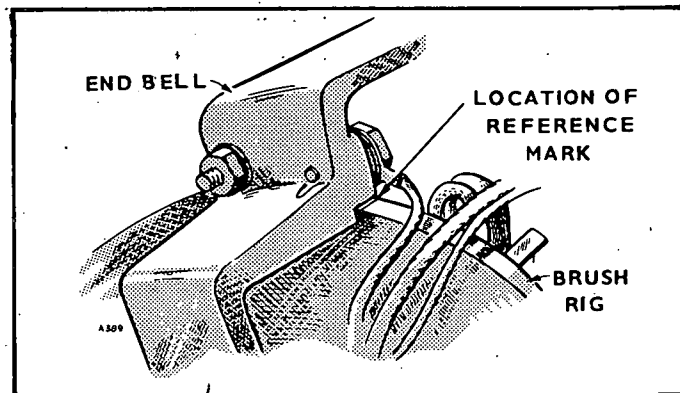


FIGURE 9. BRUSH RIG ALIGNMENT

BRUSH RIG REPLACEMENT

If you replace the brush rig follow these instructions:

1. Remove end cover and band to allow access to brush rig.
2. Loosen four cap screws holding brush rig to end bell. Remove old brush rig.
3. Mark new brush rig in same location as reference mark on old rig.
4. Make sure brush rig is free to rotate, then rotate rig back to reference mark.
5. Start unit and run at rated rpm.
6. Stop unit and inspect brush faces. They must be seated across thickness of brush for an accurate brush rig setting.

7. With a DC voltmeter (0-30 range) attached across positive (+) and negative (-) brushes, start unit and run at rated rpm with no load.
8. Rotate brush rig in one direction until voltage starts to drop (or sparking occurs). Mark this point. Rotate in opposite direction until voltage starts to stop (sparking occurs). Mark this point also.

NOTE: Peak voltage should be reached about halfway between these two marks.

9. Stop unit and tighten all four brush rig cap screws. Start unit again to make sure DC voltage remains the same as Step 7 and that no sparking (arcing) of the brushes occurs.
10. Mark ring of brush rig and end bell with a notch or paint for future reference.

BEARINGS

The ball bearings are double-sealed and lubricated for life.

MAJOR GENERATOR REPAIR

Several tests for open or grounded circuits can be made without disassembling the generator. However, if it becomes necessary to disassemble, proceed as follows:

- a. Remove the sheet metal end cover. Tag or otherwise mark each lead as it is disconnected, to assure correct reconnection.
- b. Remove all brushes and springs.
- c. Remove the blower wheel from the armature shaft.
- d. Remove the hex screws holding the end plate at the drive end of the frame. With a soft faced mallet, tap the armature shaft at the brush rig end until the ball bearing is free of the end support. On reassembly, align the bearing notch with its support notch.
- e. Carefully withdraw the armature from the frame to prevent damage to the windings.

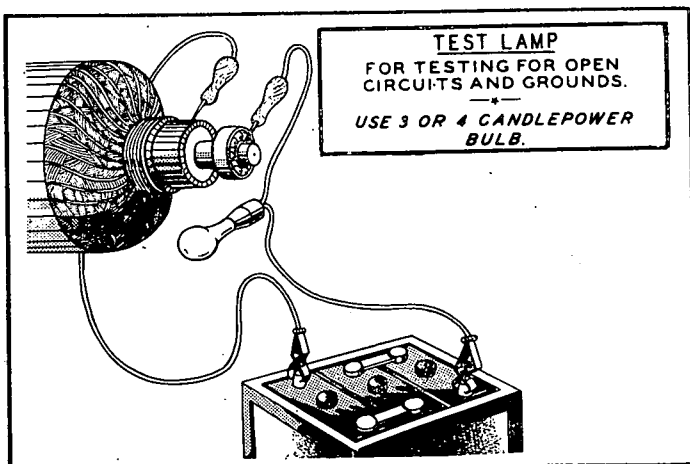


FIGURE 10. TESTING ARMATURE

ARMATURE GROUNDED

See that all brushes are lifted high in their holders. Use a continuity type test lamp set. Place one test prod on the commutator, and the other prod on a bare clean part of the generator frame or armature shaft. The prods must make good electrical contact. The test set lamp should not light. If it does light up, the armature is grounded. If the armature tests grounded, replace with a new one.

TESTING THE ARMATURE FOR AN OPEN CIRCUIT

To test the DC winding of an armature for an open circuit, use an armature growler. Most electrical repair shops have such equipment. Remove the armature for testing. Proceed as follows:

1. Place the armature in the growler which is connected to alternating current. Rub a smooth steel blade (back edge of a hacksaw blade) across the segments of the commutator, Figure 11.
2. At some point around the commutator a spark should occur as the blade contacts the two adjacent segments. If a spark occurs, the circuit is complete (not open) between those two segments. Then rotate the armature just enough to test the next two segments.

Continue the rotating and testing until the commutator segments have been tested completely around. A good spark should occur between all adjacent segments when those segments and windings attached to them are in the correct position in the growler magnetic field. If no spark occurs, the winding between those two segments is open circuited. (There is a possibility that a short circuit of a winding might prevent the sparking, but then the armature would also be magnetized as described in the following paragraph).

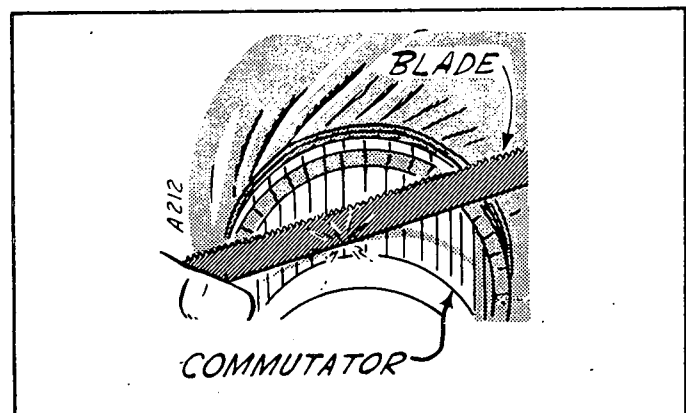


FIGURE 11. TESTING ARMATURE FOR OPENS.

TESTING THE ARMATURE FOR SHORT CIRCUITS

Place the armature in the growler which is connected to alternating current. Hold a steel knife blade (or hacksaw blade) 1/4 inch from the armature laminations,

Figure 12. If the steel blade is attracted to any magnetized armature laminations, either the armature windings or commutator is short-circuited. Do not test for magnetism at just one point of the armature laminations, but test all of the armature laminations, from one side over to the other side (along the dotted line of Figure 10). After testing the armature in one position, revolve the armature about 1/8 revolution and test for magnetism again. Continue the revolving and testing until the armature has been tested completely around.

FIELD WINDINGS, OPEN CIRCUIT

A test lamp set can be used to test field windings for an open circuit. Place one test prod on one of the terminal ends of the field windings, and the other test prod on the other terminal end of the winding. The test lamp should light. If it does not, an open circuit is indicated. Check carefully to see that the open circuit is not at the terminal leads or a loose terminal. An open circuit due to a broken lead or loose terminal is easily repaired. An open circuit within a coil requires replacement of the set of coils.

BELT ADJUSTMENT, BELT DRIVE UNITS.

Proper belt tension must be maintained at all times. Too much belt tension will cause an extra load on the driving unit and rapid wear of the belts and generator bearings. Bolts which are too loose will slip, wear out rapidly, and cause the generator to run at a lower speed. Reduced generator speed causes lower output voltage.

To test the V belt tension, press down on the belt at a point midway between the driving unit and generator pulleys, with the unit not in operation. It should be possible to press the belt down a certain amount depending upon the distance between the belts. When more than one belt is used, each belt should show the same tension. When necessary to replace a worn belt, all belts should be replaced at the same time. A new belt will stretch slightly when first put into operation. Tension should be frequently checked during the first week or

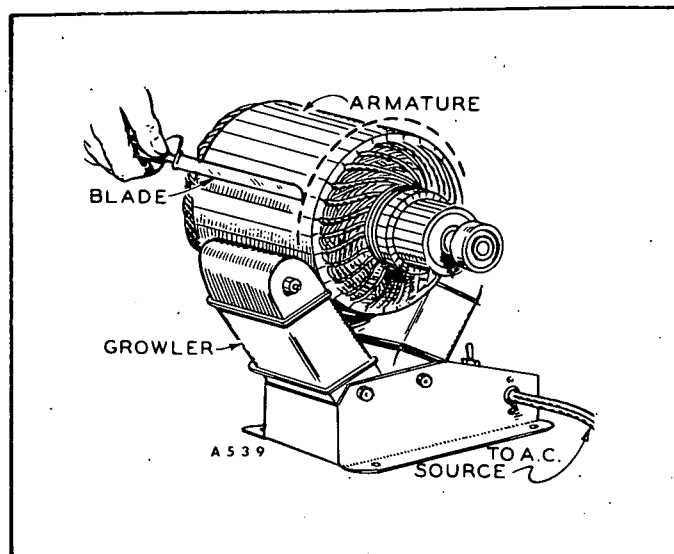


FIGURE 12. TESTING ARMATURE FOR SHORTS

two of operation. After this period, little adjustment should be required.

Driving unit and generator pulleys must be in alignment. To test alignment, place a straight edge against the side of the outer driving unit pulley. As the straight edge contacts both sides of the driving unit pulley, it should also contact both sides of the generator pulley. It may be necessary to loosen the mounting bolts of either the driving unit or generator and slightly turn the loosened unit for proper alignment. Be sure to retighten the mounting bolts.

ALIGNMENT, COUPLING DRIVE UNITS

Coupling (direct) drive units have the driving unit and generator shafts in line with each other. If either the driving unit or generator is loosened from the base, the loosened unit must be properly aligned when reinstalled. Misalignment causes vibration and excessive strain on the coupling and bearings. Generator shaft maximum run-out is .002 inch.

GENERATOR TROUBLE SHOOTING CHART

We suggest that only a qualified Electrician or Mechanic perform these tests.

NATURE OF TROUBLE	POSSIBLE CAUSE	REMEDY
<p>Poor Commutation or Arcing at the Generator Brushes</p>	<p>Brushes out of neutral position.</p> <p>Brushes not seating properly.</p> <p>Generator heavily overloaded.</p> <p>Brushes binding in holder.</p> <p>Brush tension insufficient.</p> <p>Brushes worn too short.</p> <p>Brush tension unequal.</p> <p>Wrong type brush</p> <p>Loose commutator bars.</p> <p>High mica.</p> <p>Commutator out of round.</p> <p>Commutator surface dirty or oily.</p>	<p>Turn brush ring until the reference marks are aligned correctly.</p> <p>Sand the brush to the proper contour.</p> <p>If the DC amperage is more than stated on the generator nameplate, remove part of the load.</p> <p>Clean each brush and holder.</p> <p>Replace brush springs.</p> <p>Replace brushes.</p> <p>Replace weak brush springs.</p> <p>Replace with correct type and make of brush and spring.</p> <p>Replace with new armature.</p> <p>Undercut the mica.</p> <p>True the commutator in a lathe.</p> <p>Clean the commutator.</p>
<p>Generator Overheats.</p>	<p>Windings and parts covered with dirt and oil.</p> <p>Overloaded.</p> <p>Short circuit or grounded circuit in the field winding or armature winding.</p> <p>Excessive arcing at the brushes.</p> <p>Unequal air gap between pole shoe and armature.</p> <p>Generator blower scroll installed in wrong position.</p>	<p>Clean generator.</p> <p>Check load or output of generator.</p> <p>Replace defective parts.</p> <p>See "Poor Commutation" above.</p> <p>Shim up pole shoe until air gaps are equal.</p> <p>Reverse blower scroll position.</p>
<p>Noisy Generator</p>	<p>Generator loose on base.</p> <p>Worn or defective bearing.</p> <p>Field pole rubbing armature.</p>	<p>Tighten mounting bolts.</p> <p>Replace worn parts. Check alignment.</p> <p>Tighten field poles to frame.</p>

NATURE OF TROUBLE	POSSIBLE CAUSE	REMEDY
<p>Generator Runs but does not Produce Current.</p>	<p>Brushes not contacting commutator.</p> <p>Open, short or grounded circuit in generator.</p> <p>Generator line leads broken or loose.</p> <p>Generator armature rotating in the wrong direction.</p>	<p>Free brushes in holders. Assemble brushes and springs correctly.</p> <p>Test windings and repair or replace defective parts.</p> <p>Tighten connections and replace broken leads.</p> <p>Correct direction of rotation. Or, connect wires, polarize field and re-install scroll to agree with direction of rotation.</p>
<p>Generator Produces Low Voltage</p>	<p>Speed low because of loose, slipping belts.</p> <p>Generator brushes not in neutral position.</p> <p>External short circuit on line.</p> <p>Open circuit of shunt field winding.</p> <p>Short circuit of windings in the field or armature.</p>	<p>Adjust belt tension.</p> <p>Turn brush ring until the identifying marks are aligned correctly.</p> <p>Test generator with line wires disconnected.</p> <p>Make proper connections according to wiring diagram.</p> <p>Replace defective part.</p>

PARTS!

**LOOK FOR THEM ASK FOR THEM BE SURE
YOU GET GENUINE ONAN REPLACEMENT PARTS. NEVER
ACCEPT SUBSTITUTES! IF YOU WANT TO MAKE YOUR
ONAN ELECTRIC PLANT OR ENGINE AS GOOD AS NEW,
WATCH FOR THE GREEN AND WHITE LABEL WITH THE
IDENTIFYING WORDS: GENUINE ONAN PARTS.**

PARTS CATALOG

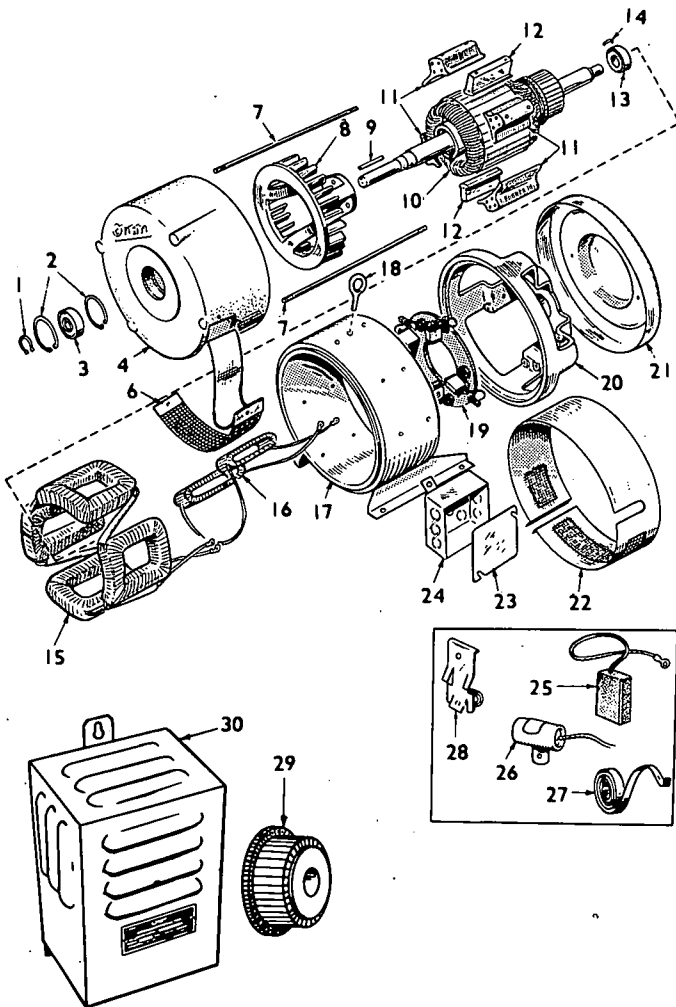
For parts or service, contact the dealer from whom you purchased this equipment or refer to your Nearest Authorized Parts & Service Center.

To avoid errors or delay in filing your parts order, please furnish all information requested.

Always give the MODEL & SPEC. NO. and SERIAL NO.

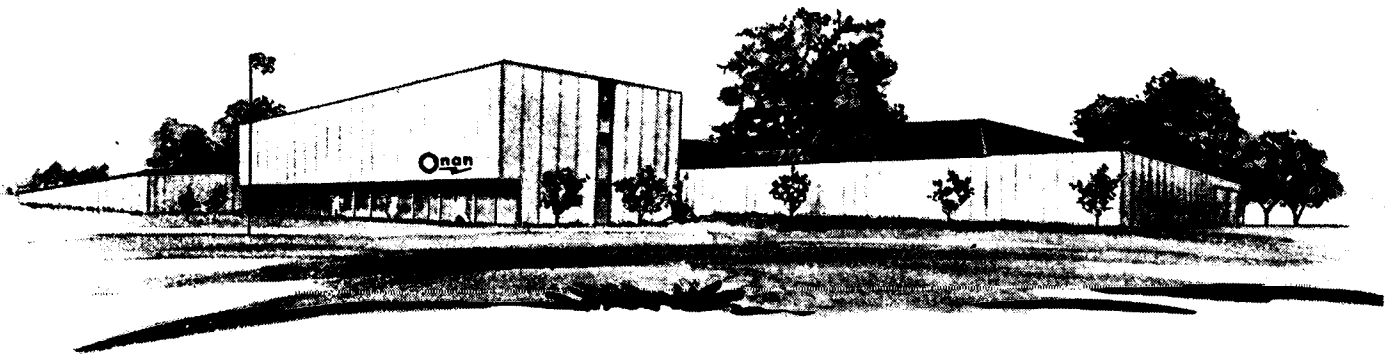
MODEL	_____
SERIAL	_____
FRAME	_____
ALWAYS MENTION MODEL & SERIAL NO.	
DC VOLTS	_____
WATTS	_____
AMPS	_____
RPM	_____
GENERATOR ONLY OF THIS GENERATING PLANT MANUFACTURED BY ONAN	
DIVISION OF ONAN CORPORATION MINNEAPOLIS, MINNESOTA, U.S.A.	
99A1278 FOR ELECTRICAL EQUIPMENT ONLY	

GENERATOR PARTS



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	518-0012	1	Ring, Retainer - External - Drive End Bearing to Shaft
2	518-0166	2	Ring, Retainer - Internal - Drive End Bearing to End Bell
3	510-0052	1	Bearing, Armature - Drive End Bell, End - Drive End
4	211-0127	1	

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
6	234-0077	1	Scroll & Screen, Blower
7	STUD, GENERATOR THROUGH		
	520-0337	2	For 2000 Watt Generator
	520-0486	2	For 5000 Watt Generator
8	205-0060	1	Blower, Air
9	515-0045	1	Key, Armature Shaft Drive
10	ARMATURE WOUND, ASSEMBLY		
	201-0957	1	For 2000 Watt Generator
	201-0984	1	For 5000 Watt Generator
11	SHOE, POLE - FIELD		
	221-0056	4	For 2000 Watt Generator
	221-0131	4	For 5000 Watt Generator
12	INTERPOLE, COMMUTATING		
	221-0047	2	For 2000 Watt Generator
	221-0133	2	For 5000 Watt Generator
13	510-0047	1	Bearing, Armature - Brush Rig End
14	232-0596	1	Clip, Bearing
	222-1447	1	For 2000 Watt Generator
	222-1547	1	For 5000 Watt Generator
16	COIL, SET, COMMUTATING		
	222-1448	1	For 2000 Watt Generator
	222-1548	1	For 5000 Watt Generator
17	FRAME, GENERATOR		
	210-1665	1	For 2000 Watt Generator
	210-1682	1	For 5000 Watt Generator
18	403-0095	1	Bolt, Eye - Lifting
19	RIG ASSEMBLY, BRUSH - INCLUDES BRUSHES & SPRINGS		
	212-0250	1	For 2000 Watt Generator
	212-0237	1	For 5000 Watt Generator
20	211-0097	1	Bell, End - Brush Rig End
21	234-0047	1	Cover, End Bell
22	234-0065	1	Band, End Bell
23	330-0006	1	Cover, Junction Box
24	330-0047	1	Box, Junction
25	BRUSH, COMMUTATOR		
	214-0055	4	For 2000 Watt Generator
	214-0065	4	For 5000 Watt Generator
26	312-0038	2	Condenser, .5 Mfd. - For 5,000 Watt Generator
27	212-1003	4	Spring, Brush - For 2000 Watt Generator
28	212-1105	4	Spring, Brush - For 5000 Watt Generator
29	COMMUTATOR (DC)		
	203-0049	1	For 2000 Watt Generator
	203-0134	1	For 5000 Watt Generator
30	305-0451	1	Control, Automatic Voltage (Not part of Generator)



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