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INSTRUCTION MANUAL
AND PARTS CATALOG

FOR



AC/DC TRUCK GENERATORS

*Page 2
5*

MODEL 2.0UG-1N/135

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ONAN

1400 73RD AVENUE N. E. • MINNEAPOLIS, MINNESOTA 55432

A DIVISION OF STUDEBAKER CORPORATION

N. Y. INTERNATIONAL OFFICE: Empire State Bldg.

900-153 (2-12-71)

SUPPLEMENTARY INSTRUCTIONS
FOR ONAN TWO-BEARING GENERATORS

Beginning with the Spec. letters shown below, two-bearing generator model designation will change. The reason for this change is to identify single-bearing generators from two-bearing generators.

The two-bearing generators will change to letter "S" after the voltage code. The single-bearing generators will have the letters "C" or "N" after the voltage code.

EXAMPLE

2.5UD-1S/1D WAS 2.5UD-1N/1C

<u>NEW GENERATOR MODEL</u>	<u>EFFECTIVE SPEC.</u>	<u>INSTRUCTION MANUAL</u>
1.5UF-232S	B	943-3
2.0UF-232S/32	B	943-4
2.0UF-125S	B	943-9
2.0UG-1S/135	B	943-10
2.5UD-1S	D	937-5
2.5UF-1S	E	943-1
3.0UF-232S	B	943-3
3.5UD-1S	D	937-5
4.0UF-1S	E	943-1
5.0UF-210S	B	943-3
5.0UF-210S	B	943-9
7.0UF-1S	E	943-1
10.0UF-150S	B	943-5
12.0UF-3S	E	943-8
12.0UF-4S	E	943-8
15.0UB-150S	B	914-33
15.0UF-3S/104	E	943-7
25.0UT-3S/106	B	971-1
25.0UT-5DS/106	B	971-1

TABLE OF CONTENTS

TITLE	PAGE
Specifications	1
General Information	2
Installation	3
Operation	5
Service and Maintenance	7
Parts Catalog	9

SPECIFICATIONS

2.0UG-1N/135

DIRECT CURRENT (DC)

Volts, Battery Charging	14.5
Amperes, Battery Charging	55.0
Voltage Regulation, 1200rpm - 10,000rpm	2%
Regulator, Solid State	Yes

ALTERNATING CURRENT (AC)

Volts	120
Amperes	16.7
Watts	2000
Phase	1
Voltage Regulation, No Load to Full Load	3%
Frequency, @ 3600rpm, Cycles	60
Maximum Generator Shaft Speed	12,000
Regulator, Solid State	Yes

GENERAL INFORMATION

**IMPORTANT!
RETURN WARRANTY CARD
ATTACHED TO UNIT.**

INTRODUCTION

This instruction book contains information for the proper installation, operation, and maintenance of your generator. Keep this book handy for reference.

This generator is the result of proven engineering design, highest quality materials, and expert workmanship. Thorough inspection and testing assures you that the generator will perform as expected.

If you wish to contact your dealer or the factory regarding this equipment, be sure to supply the complete MODEL and SPECIFICATION LETTER, and the full SERIAL NO. 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 AND REGULATOR DESCRIPTION

This complete generator replaces your truck's standard battery charging generator or alternator. Its two-in-one design provides 55 amps for battery charging, as well as 120 volts of AC for operating your electrical equipment up to 2000 watts.

Both AC and DC generators are mounted on the same shaft and in one housing. This eliminates coupling that can slip out of alignment.

There are two voltage regulators. One controls the AC and the other controls DC output voltage. Both are solid state design, and keep the AC voltage steady from no load to full load, within 3 percent of the set voltage.

AC INSTRUMENT PANEL

The AC instrument panel includes a voltmeter, an "ON-OFF" toggle switch, and two grounded AC outlets.

INSTALLATION

INSTALLING THE GENERATOR

The generator is equipped with adjustable mounting lugs. Figure 1 shows the best angle for mounting the generator. Besides giving ample belt tension adjustment, the load on the bracket is applied in compression. The closer the load line is to 30° , the more the bracket's strength will be utilized.

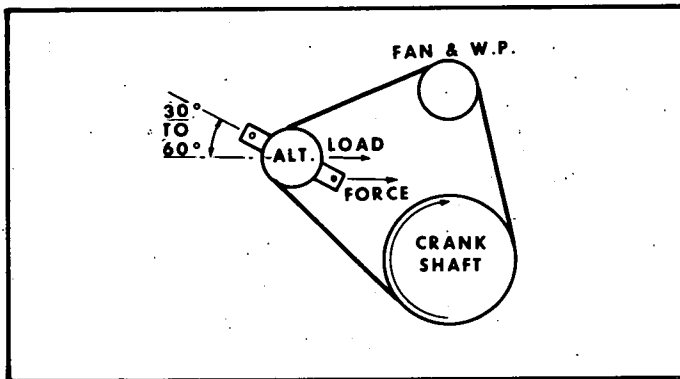


FIGURE 1. BEST METHOD

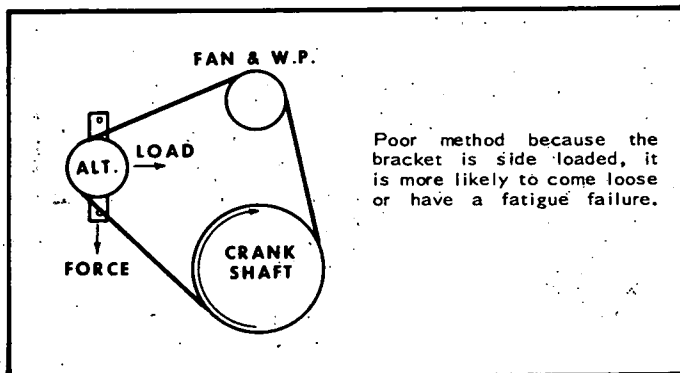


FIGURE 2. POOR METHOD

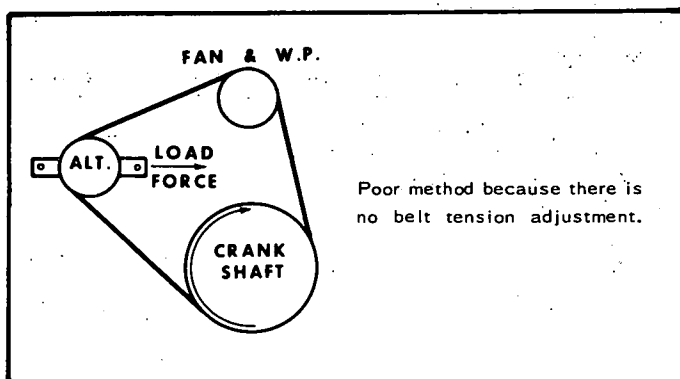


FIGURE 3. POOR METHOD

DIRECTION OF ROTATION

Generator can rotate in a clockwise direction only. There is no fan option for a counterclockwise rotation. Figure 1 shows the proper mounting side (left side) for the generator (looking from the front of truck).

The pulley supplied with the generator should give approximately a 1 to 3 ratio in most applications. With this ratio, an engine running at 1200rpm will drive the generator at 3600rpm. At maximum engine rpm, generator will not exceed 12,000rpm.

BELT ALIGNMENT

The pulleys must rotate in the same plane for longest belt life and lower bearing loads. See Figure 4.

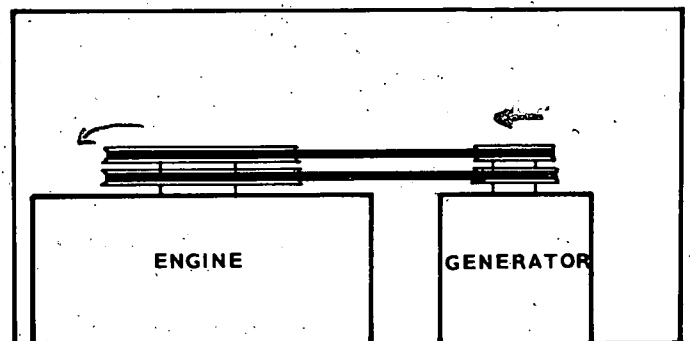


FIGURE 4. BELT ALIGNMENT

BELT WRAP

The greater the degree of belt wrap, the less slippage will occur. The amount of belt wrap should not be less than 120° for satisfactory operation. See Figure 5.

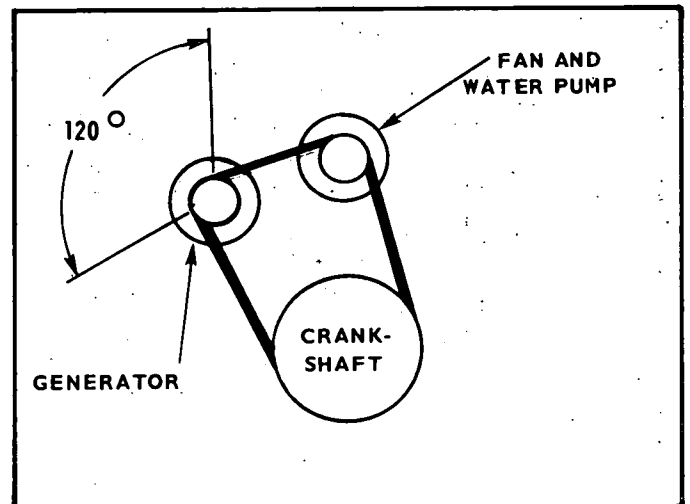


FIGURE 5. BELT WRAP

INSTALLING AC CONTROL BOX

This panel can be mounted under the dash, under the hood, or in any desirable and safe location on the truck.

NOTE: Before installing the panel, wires must be brought into it. (See Figure 6.) Proceed as follows:

1. Remove rear cover of panel.
2. Insert two lengths of #14 wire (minimum size) through rubber grommet on the rear cover and connect to T1 and T2 inside the panel.
3. Insert one length of #18 wire (minimum size) through grommet and connect to No. 1. (Wire lengths should be determined before connecting.)
4. Ground the case to the truck chassis or to the battery (-).
5. Tag all leads for identification.

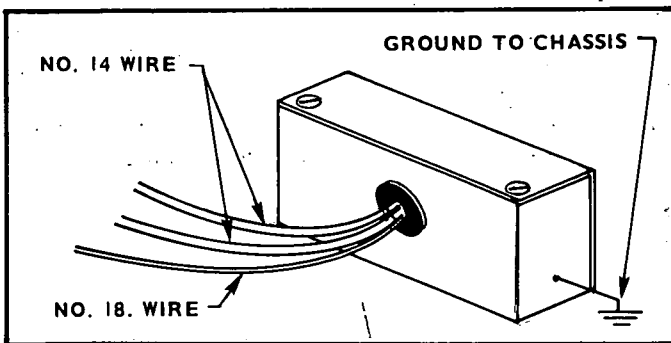


FIGURE 6. AC INSTRUMENT PANEL (REAR)

WIRING CONNECTIONS

Wiring is simplified because most of the DC connections to the old generator (or alternator) will connect directly to the Onan generator. (See Fig. 7.) Proceed as follows:

1. Disconnect all wires from, and remove old generator.
2. Install Onan generator and AC control panel.
3. Connect a #18 wire from IGNITION terminal on old regulator to terminal marked "2" on Onan generator.
4. Disconnect FIELD wire, which ran from old generator to regulator, and discard.
5. Connect armature output wire (#8) from old generator to "+" terminal on Onan generator.
6. Connect a #8 wire from "-" terminal of Onan generator to battery ground (-) if the present ground wire does not reach.
7. Connect the three wires from the AC panel to the Onan generator. These terminals are labeled T1, T2 and 1
8. If indicator lamp is used (to show low amperage), connect between terminals marked "2" and "3" on Onan generator. (If DC ammeter is used, old connection is okay.)

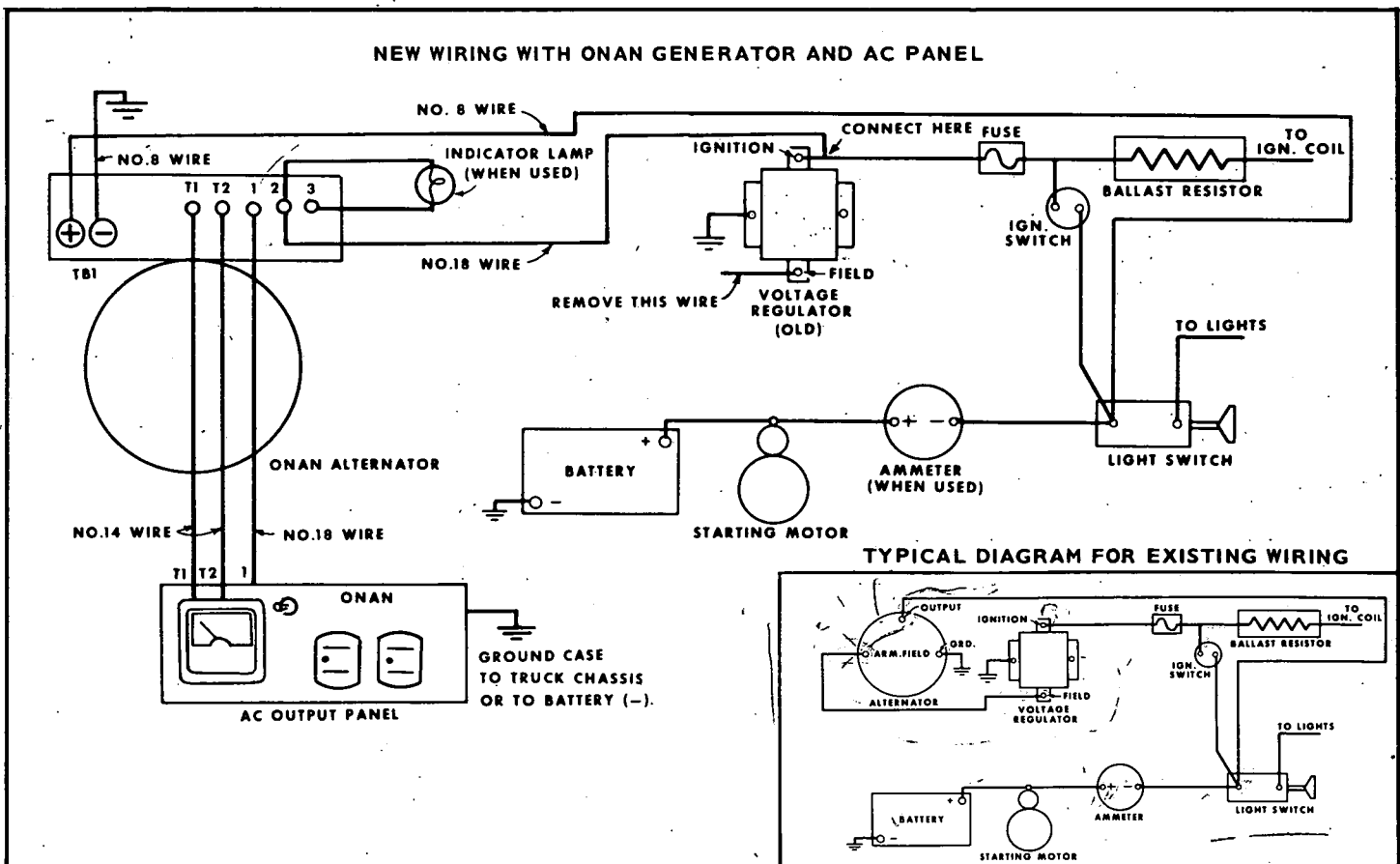


FIGURE 7. WIRING CONNECTIONS

OPERATION

BEFORE STARTING

See that generator pulley is aligned properly with the engine pulley and that belt tension is correct.

Toggle switch on AC panel should be in the "OFF" position. Disconnect all loads.

CAUTION Do not operate the generator without the battery in the circuit. The battery is the load for the DC generator; when there is no load on the DC generator, the voltage could rise dangerously high and burn out the DC regulator.

STARTING

Start truck engine and adjust manual throttle control within a speed range of 1000rpm to 1500rpm (preferably 1200rpm). (Check AC voltmeter to be sure generator output is 120 volts.)

Turn AC toggle switch to the "ON" position. Plug AC appliances into receptacles, being careful not to overload generator.

NOTE: Truck engines vary in speed from an idle of 600rpm to a top speed of 3600rpm. Using a 3 to 1 ratio generator pulley, the generator shaft speed will then vary from 1800rpm to 10,800rpm, or an AC frequency from 30 cycles to 180 cycles. At an engine speed of 4500rpm the generator shaft turns at 13,500rpm. The generator will not be damaged by any of these conditions. See Table 1. The generator will maintain 120 volts at full load when turning faster than 3600rpm.

CAUTION Recheck belt tension after one hour of operation, because the belts have a tendency to stretch. Air conditioning ~~retro~~ or glass reinforced belts will give longer belt life. *rated*

TABLE 1. SPEEDS USING A 3 TO 1 RATIO GENERATOR PULLEY

ENGINE RPM	GENERATOR RPM	FREQUENCY
1200*	3600*	60*
2400	7200	120
3600	10,800	180

* - Recommended

DETERMINING THE LOAD

Table 2 shows the average starting and running loads for motors up to 3/4 hp. Always start the largest motors first. Use care not to exceed the nameplate rating of the generator.

STOPPING

Disconnect all loads and turn ON-OFF switch to OFF position.

WHY FAST IDLE?

Most people object when they hear that Onan suggests an engine idle speed of 1000rpm to 1500rpm when taking power from the Onan AC alternator. They feel that the higher speed wears out their engine faster than an idle speed of 400rpm to 600rpm. Actually, the opposite is true. The following is a list of things that harm your engine if left idling at low speeds for long periods of time. These harmful items are reduced when the engine is fast idled at 1000rpm to 1500rpm.

1. There is an excessive build-up of carbon in the exhaust system because of lower exhaust temperatures.
2. Most gasoline engines eventually kill because of a gasoline build-up in the intake manifold.
3. The trend in modern engine design is to operate the engine at a higher temperature and with a smaller radiator. Therefore, with a slow fan speed, the

TABLE 2. MOTOR STARTING AND RUNNING LOADS

MOTOR SIZE	STARTING LOADS				RUNNING LOADS	
	REPULSION - INDUCTION		CAPACITOR - START			
	H.P.	WATTS	AMP.	WATTS	AMP.	WATTS
1/6	600	5.0	850	7.1	275	2.3
1/4	850	7.1	1050	8.8	400	3.3
1/3	975	8.1	1350	11.3	450	3.8
1/2	1300	10.8	1800	15.0	600	5.0
3/4	1900	16.0	-	-	850	7.1

* - Capacitor motors must run at 3600 RPM (60 cycle) or they will overheat and burn up.

engine overheats.

4. As the engine gets older and the bearings begin to wear, the low oil pressure at slow idle speeds will reduce the oil reaching the bearings therefore increasing the wear, and it is possible that some bearings will not get any oil when the oil pressure drops too low.
5. The oil becomes diluted because at low idle speeds the unburned raw gasoline washes past or blows by the piston and into the crankcase oil.
6. At slow idle speeds the engine oil does not come up to proper temperature. Therefore sludge builds up, because of condensation in the crankcase.
7. There is poor frequency regulation because of low horsepower and less flywheel inertia.

LOAD APPLICATIONS

There are two types of load applications:

1. Those that require a constant voltage, but at any

speed (frequency):

- a. Lighting
 - b. Heating
 - c. Fans (universal motors)
 - d. Power tools (universal motors)
 - e. Some appliances, and sound equipment labeled AC-DC.
2. Those that require a constant voltage and 60 cycles: *
 - a. Induction motors
 - b. Capacitor start motors
 - c. Inductive loads, (those with transformer inputs)
- * - When operating these types of loads extreme caution must be taken to maintain 3600rpm to prevent damage to the loads.

NOTE: See Table 1 for recommended speeds for various frequencies. Note that Onan recommends 3600rpm (60 cycle) generator speed.

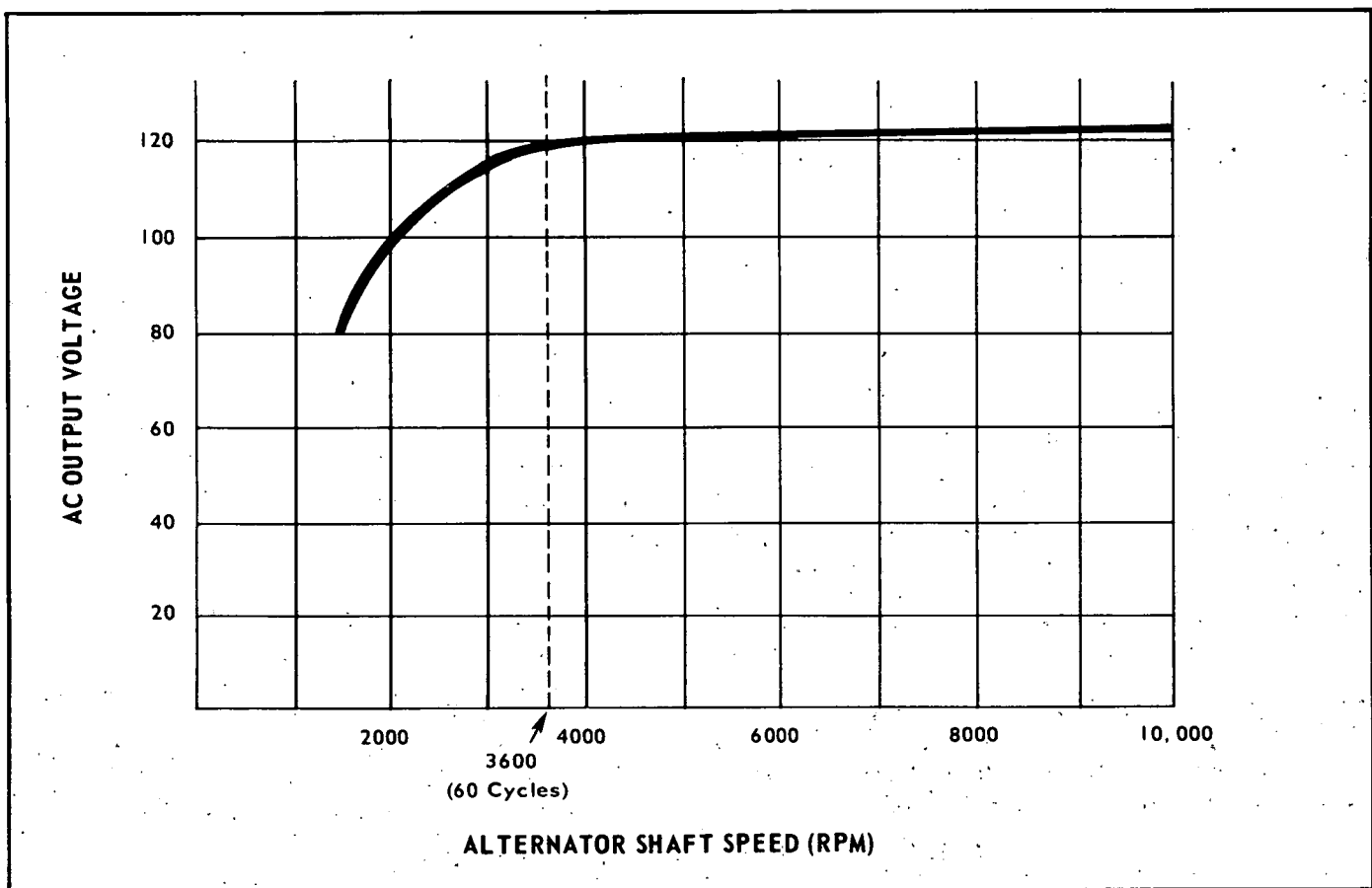


TABLE 3. AC OUTPUT VOLTAGE VS. ALTERNATOR SHAFT SPEED

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 operating; look for loose or broken leads and bad connections.

BRUSHES

The brushes are located under a conveniently located access hole in the top of the front bearing support. They can be inspected or replaced without removing the generator from its mounting.

Inspect the brushes every 200 hours of running time or every 6 months. Replace the brushes when they have worn to the size shown in Figure 8.

CAUTION Severe damage may occur to the generator if brushes wear into the solid area shown in Figure 8. Always replace brush inspection cover as it is part of the cooling system.

In extremely dry or dusty conditions, inspect the brushes more often. In humid or clean conditions the inspections may be less.

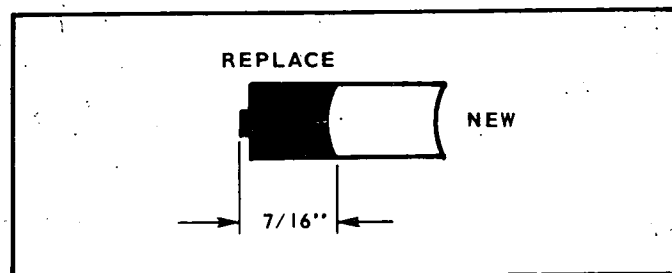


FIGURE 8. BRUSH REPLACEMENT

Order replacement brushes by part number, never by description. Similar brushes may have entirely different electrical characteristics.

GENERATOR TESTING

If generator does not function properly and the brushes, brush springs, and collector rings are in good condition, further tests on the generator are required.

NOTE: If generator requires disassembly or major repair contact an authorized Onan dealer or distributor.

ALTERNATOR TROUBLESHOOTING GUIDE

NATURE OF TROUBLE	POSSIBLE CAUSE	SUGGESTED REMEDY
DC output but no AC output (3600 RPM)	1. Blown fuse	1. Replace with Onan No. 321P166, Little Fuse No. 314020 (20 amp - 125 volts)
No AC or DC output (3600 RPM)	1. DC regulator 2. Brushes worn or not seating properly 3. Generator leads broken or loose 4. Open circuit, grounded circuit or short circuit 5. Broken drive belt 6. Defective diode/diodes	1. Replace DC regulator 2. Replace brushes when worn to 7/16" or reseal brushes 3. Replace broken leads or tighten connections 4. Test with series test lamp and repair or replace defective parts 5. Install new belt and adjust tension (readjust after one hour of operating) 6. Test and replace
Low AC output (3600 RPM)	1. Defective parts in AC regulator 2. Brushes not making good contact with slip rings 1 and 2 3. Drive belt slipping 4. Overloaded	1. Test and replace defective parts 2. Check brush tension and slip rings for out-of-round condition 3. Adjust tension and check for proper voltage 4. Remove part of load
Low DC output (3600 RPM)	1. DC voltage regulator 2. Defective diode/diodes 3. Brushes not making good contact with slip rings 3 and 4 4. Improper initial connection to DC circuit 5. Drive belt slipping	1. Replace 2. Test and replace 3. Check brushes, brush tension and check slip rings for an out-of-round condition 4. Trace circuit with wiring diagram 5. Adjust tension and recheck voltage
Alternator overheats	1. Windings and parts covered with dirt and oil 2. Drive belt slipping 3. Brush access cover removed	1. Disassemble alternator and clean 2. Adjust tension or replace 3. Replace cover

PARTS CATALOG

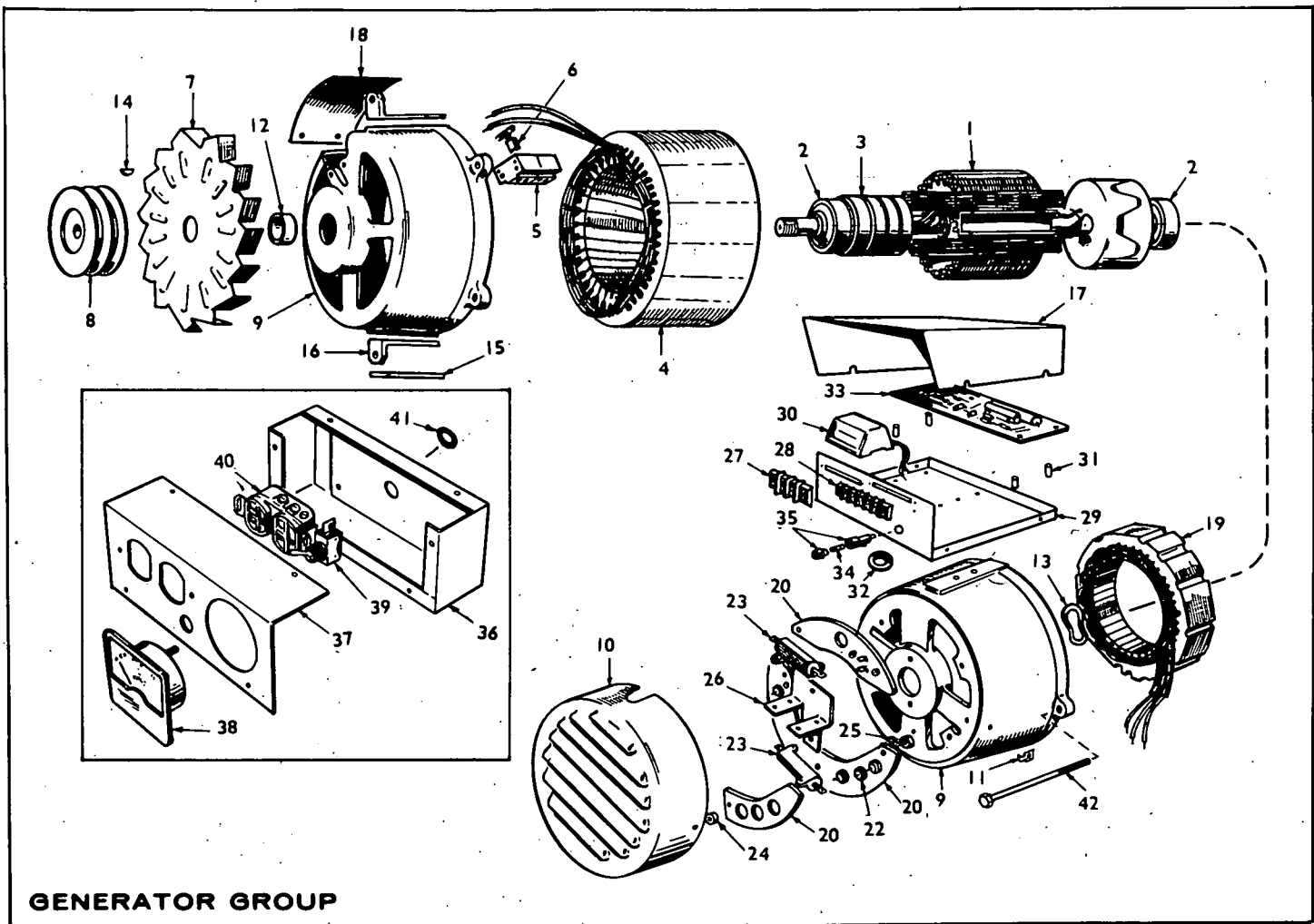
For parts or service, contact the dealer from whom you purchased this equipment or refer to your Nearest Authorized Parts & Service Center.

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

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

MODEL	<input type="text"/>		
SERIAL NO.	<input type="text"/>		
ALWAYS MENTION MODEL & SERIAL NO.			
	A.C.	D.C.	
KW	<input type="text"/>	<input type="text"/>	
V.R. RPM	<input type="text"/>	<input type="text"/>	
VOLTS	<input type="text"/>	<input type="text"/>	
AMPS	<input type="text"/>	<input type="text"/>	
PHASE	<input type="text"/>	<input type="text"/>	
FREQ.	<input type="text"/>	C.P.S. AT <input type="text"/>	RPM <input type="text"/>
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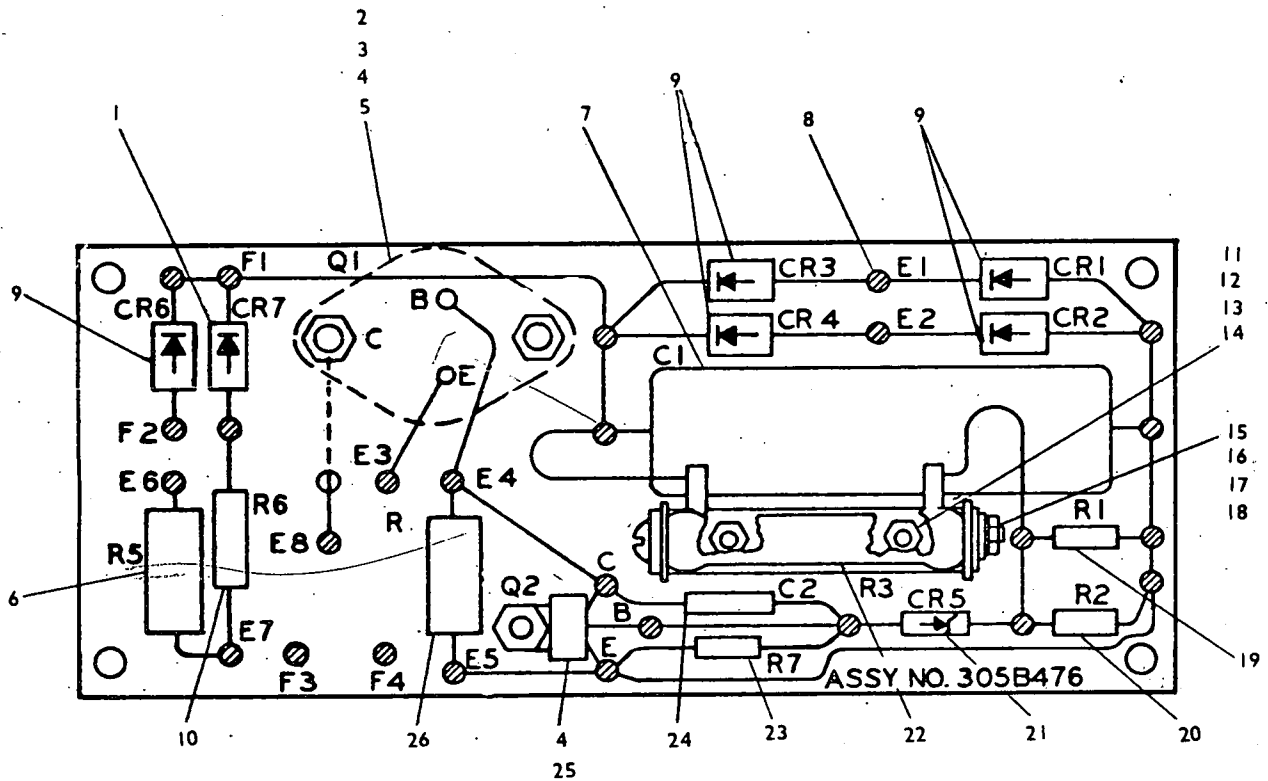
This catalog applies to the standard UG Generator. Each illustrated part is identified by a reference number corresponding to the same reference number below the illustration. Parts illustrations are typical. Unless otherwise mentioned in the description, parts are interchangeable between models. Pulley end is the front. The specification letter advances (A to B, B to C etc.) with manufacturing changes.



GENERATOR GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	201C1546	1	Rotor Assy., Wound - Includes Bearings (Front and Rear)
2	BEARING		
	510A99	1	Front End
	510A96	1	Rear End
3	204A105	2	Ring, Collector
4	220D1218	1	Stator, Wound
5	212A1224	1	Guide, Brush
6	214A94	4	Brush, AC
7	205C78	1	Blower
8	512A52	1	Pulley
9	BELL, END		
	211D168	1	Front End
	211B180	1	Rear End
10	234B304	1	Cover, End Bell
11	232A1557	2	Clip, End Bell Cover
12	232A2006	1	Spacer, Blower
13	232P2007	1	Washer, Spring
14	515P94	1	Key, Pulley
15	232A2051	2	Bracket, Stiffner
16	232A1987	3	Bracket, Mounting
17	305B466	1	Cover, Voltage Regulator
18	232A2038	1	Cover, End Bell Brush
19	220B1330	1	Stator and Lead Assembly
20	SINK, HEAT		
	363A41	1	For 5 Rectifiers
	363A40	1	For 3 Rectifiers

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
22	RECTIFIER		
	358B26	5	Negative Base (Black)
	358B25	3	Positive Base (Red)
23	RESISTOR, FIXED		
	353A33	1	500-Ohm, 50 Watt
	353A32	1	800-Ohm, 50 Watt
24	508A123	11	Washer, Insulating
25	508A124	7	Bushing, Insulating
26	304A675	1	Bracket, Resistor
27	332-1199	1	Block, Terminal - 2 Place
28	332A498	1	Block, Terminal - 5 Place
29	305C465	1	Chassis, Voltage Regulator
30	191C542	1	Regulator, Voltage
31	305P458	4	Spacer, Circuit Board Mtg.
32	508-109	1	Grommet, Rubber
33	305B476	1	Board Assembly, Printed Circuit (See Separate Group for Components)
34	321P166	1	Fuse, 15 Ampere
35	321P106	1	Holder, Fuse
36	301C3069	1	Box, Control
37	301C3070	1	Cover, Control Box
38	302P313	1	Voltmeter, AC
39	308P69	1	Switch, Toggle
40	323P184	1	Receptacle, Duplex
41	508A2	1	Grommet, Control Box
42	800-19	3	Screw, Cap (1/4-20 x 4")



CIRCUIT BOARD ASSEMBLY GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	305B476	1	Circuit Board Assembly, Complete.
1	305P240	1	Rectifier, Silicon (400 Volt, 1 Amp.)
2	362B23	1	Transistor, Power - Silicon NPN
3	853-3	2	Washer, External Shakeproof #6
4	812-61	3	Screw, - R.H.M. (#6-32 x 3/8")
5	871-6	4	Nut, Hex, Brass (#6-32)
6	350-960	1	Resistor (75-Ohm, 2 Watt)
7	356A36	1	Capacitor (200 Volt, 35 Mfd.)
8	332B954	26	Terminal, Single End
9	357B13	5	Rectifier, Diode (400 Volt, 3 Amp.)
10	350-830	1	Resistor (330-Ohm, 1 Watt)
11	304A663	1	Bracket, Resistor Mounting
12	812-29	2	Screw, Round Head (#4-40 x 3/8")
13	854-4	2	Washer, Internal Shakeproof (#4)
14	870-220	2	Nut, Hex (#4-40)
15	812-90	1	Screw, Round Head (#8-32 x 2-1/4")
16	850-25	1	Washer, Lock (#8)
17	860-8	1	Nut, Hex (#8-32)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
18	508-32	2	Washer, Insulation
19	350-380	1	Resistor (500-Ohm, 1/2 Watt)
20	RESISTOR (1/2 WATT) Select Correct Resistor By Color Of Bands.		
	350-378	As Req.	430-Ohm (Band Colors: Yellow, Orange, Black, Gold)
	350-379	As Req.	470-Ohm (Band Colors: Yellow, Violet, Black, Gold)
	350-380	As Req.	510-Ohm (Band Colors: Green, Brown, Black, Gold)
	350-381	As Req.	560-Ohm (Band Colors: Green, Blue, Black, Gold)
	350-382	As Req.	620-Ohm (Band Colors: Blue, Red, Black, Gold)
	350-383	As Req.	680-Ohm (Band Colors: Blue, Gray, Black, Gold)
21	359-24	1	Diode, Zener (8.2 Volt)
22	353-34	1	Resistor, Power (4000-Ohm, 10 Watt)
23	350-379	1	Resistor (470-Ohm, 1/2 Watt)
24	355P10	1	Capacitor, Mylar Dielectric
25	362B24	1	Transistor, Power - Silicon
26	350-1003	1	Resistor (4700-Ohm, 2 Watt)