

SUGGESTED REPAIR PROCEDURES FOR S15W, S16W, S20W, S16F, S20F AND S20FS SERIES GENERATORS

1. Check engine speed (3720 RPM no load) and frequency 62 hertz no load.
2. Open end cover with receptacles exposed if equipped. See figure 1. Check lead wires 1,2,3 & 4 according to the resistance chart in the installation manual as follows:
 - Lead wires 1 (black) to lead 2 (white)
 - Lead wires 3 (white) to lead 4 (black)
 - Orange to orange (exciter) Disconnect the red wires to the capacitor before checking the resistance in the wires.

Important on some models, lead wire 2 (white) and 3 (white) are connected together. See figure 2. To test the stator lead wires and leads 1, 2, 3 and 4 must not be connected together. See figure 3. When checking lead wires, leads 2 and 3 are connected together at the factory on some models. You must disconnect these leads when testing resistance of the various coils or you will get incorrect readings.



Figure 1



Figure 2



Figure 3



Figure 4

In addition to checking each coil, test each coil to the ground terminal on the aluminum end bracket to see if any winding has gone to ground. If any lead wire indicates positive continuity to the ground, replace the stator.

3. Check the capacitor for the proper microfarad reading with a capacitor tester. If a capacitor tester is not available, use an ohmmeter set at 10k and touch both terminals at the same time. See figure 4. The meter should bounce up with a reading and immediately drop off. If the meter does not indicate anything or remains holding a reading, the capacitor is defective and must be replaced.
4. For a unit that has been out of service for a period of time, flashing the field is recommended. See attached instructions.

5. If the first four steps show no failures, remove the stator from the generators. With the stator removed, the diodes must be checked. To test each diode without disconnecting it from the circuit, use a 12-volt battery and a 45-watt light bulb (automotive type) as shown in illustration 950204. The light should turn on in one direction, as shown. If you cannot test the diodes as previously indicated, you must disconnect the copper wires from one end of the diode. You must also disconnect the varister (surge suppressor) from the diode. With the wire removed use an ohmmeter set to 10K and touch both terminals of the diode. Diodes pass current in one direction only. If you do not get a reading, reverse the terminals of the meter. If you do not get any readings or if you get readings in both directions, the diode is defective. Be sure to check both diodes. If you have only one defective diode, it is strongly recommended to replace both diodes. If the positions of the diodes are reversed, you will block the current flow and get no output from the generator. Pay careful attention to the marking to the current direction of each diode.
6. To check the winding on the rotor you must remove one end the diodes and varister. With an ohmmeter check the readings for each coil. The rotor coils are identical. See chart for the various ohm readings. Prior to testing resistance in each coil, be sure to zero out your ohm meter. All readings must be within 25% or less of the published ohms and be consistent (either at slightly higher or slightly lower, not some higher and some lower).

Out of Use for a Long Period

If the generator set has not been used in over 6 months and the generator worked properly when last used, it is very likely that the capacitor is discharged. The capacitor needs to be "flashed" or reenergized.

On S15W, S16W, S20W units, open the end cover where the receptacles are located if equipped. See picture #1. The capacitor is connected to the aluminum casting and has 2 red or orange wires from the generator exciter windings. Partially slide the 2 plastic wire covers back exposing the metal contacts on the capacitor. **Caution! Exposed generator wires present a danger and great care must be taken to not touch any exposed wires of the generator or electrical shock may occur. Be certain the ground surface is dry.** Start the engine with no load and apply 12 volt DC from a car battery to both terminals. There is no polarity issue so it does not matter which terminals you touch. **Danger!**—once you touch the capacitor terminals voltage will start and you will have live wires exposed. There will be a small arcing when you touch the capacitor and you will hear a grunt sound from the generator. Stop the engine. Carefully slide the 2 plastic wire covers completely back on the capacitor. Replace the end cover on the generator. Be sure the wires are away from the bearing and rotor through bolt area in the center of the casting and retighten the cover screws. Start the engine again and check the voltage from each receptacle for proper voltage (120/240 volts for 60 Hz and 110/220 for 50 Hz). Note- If, the generator does not produce voltage a day or two after flashing/reenergizing the capacitor, you must replace the capacitor.

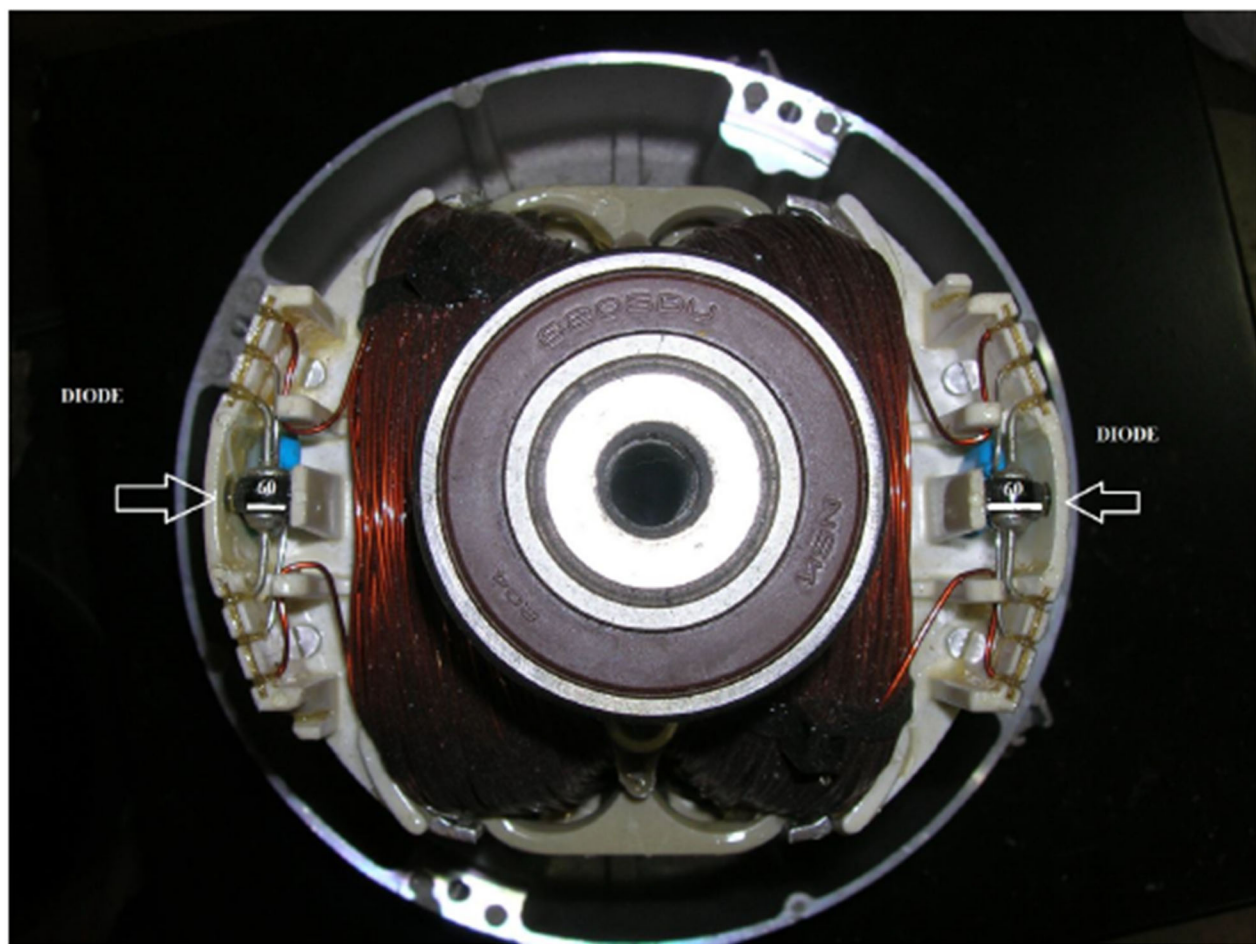
S16F, S20F AND S20FS Models

These units have the capacitor in the top terminal cover of the generator. See figure #2.

TROUBLE SHOOTING FOR S15W, S16W, S20W, S16F, S20F AND S20FS SERIES

PROBLEM	CAUSES	REMEDIES
No Voltage	<ol style="list-style-type: none"> 1. Low speed 2. Faulty capacitor 3. Faulty windings 4. Out of Service many months 5. Faulty Circuit Breaker 	<ol style="list-style-type: none"> 1. Check RPM of engine 3720 RPM 2. Check and replace 3. Check winding resistance 4. Flash capacitor (See page 4) 5. Check and replace.
High/no load Voltage	<ol style="list-style-type: none"> 1. Speed too high 2. Capacitor with high capacity 	<ol style="list-style-type: none"> 1. Check and adjust to 3720 RPM 2. Check and replace
Low no load Voltage	<ol style="list-style-type: none"> 1. Speed too low 2. Faulty diodes 3. Winding breakdown 4. Capacitor with low capacity 	<ol style="list-style-type: none"> 1. Check and adjust to 3720 RPM 2. Check & replace diodes 3. Check winding resistance 4. Check and replace
Voltage on 120 volt Side is 60-90 volts	<ol style="list-style-type: none"> 1. One defective diode 	<ol style="list-style-type: none"> 1. Replace both diodes and varistor
Circuit breaker trips	<ol style="list-style-type: none"> 1. Overload on circuit 2. Shorted electric load 3. Defective breaker 	<ol style="list-style-type: none"> 1. Reduce electric load 2. Repair short in device 3. Replace breaker
Proper no load Voltage But Low loaded Voltage	<ol style="list-style-type: none"> 1. Low loaded speed 2. Load too heavy 3. Diodes shorted 4. Engine governor 	<ol style="list-style-type: none"> 1. Check & adjust engine RPM 2. Check & reduce load 3. Check & replace 4. Adjust or repair governor
Proper no load but High loaded voltage	<ol style="list-style-type: none"> 1. Excessive RPM 	<ol style="list-style-type: none"> 1. Check & adjust
Unstable voltage	<ol style="list-style-type: none"> 1. Loose contacts 2. Uneven rotation 3. Loose rotor 	<ol style="list-style-type: none"> 1. Check connections at receptacles and circuit breakers 2. Check engine RPM 3. Tighten rotor through bolt
Noisy Generator	<ol style="list-style-type: none"> 1. Bearing 2. Poor coupling 3. Broken fan 	<ol style="list-style-type: none"> 1. Replace 2. Check & repair 3. Replace
Ground Fault Receptacle trips	<ol style="list-style-type: none"> 1. Receptacle too sensitive 2. Extension Cord 	<ol style="list-style-type: none"> 1. Replace 2. Replace extension cord
Voltage for a few Minutes then no Voltage	<ol style="list-style-type: none"> 1. Cracked windings 	<ol style="list-style-type: none"> 1. Replace rotor or stator

DIODE DIRECTION



FOR ALL S15W, S16W, S20W, S16F, S20F AND S20FS DIODE REPLACEMENTS

While looking at the rotor in this position, the numbers and letters on all diodes are readable as shown above. The numbers and letters may be different but all face the same direction in this position.

With the stator removed, cut the diode wire half way between the diode and its connection and re-solder the new diode to the half that remained. Note the direction of the wording on the original diode. Replace the varistor and diode with this same process. Do not keep solder gun on new diode leads for more than a few seconds or damage to the diode may occur.

CAPACITOR TESTING

1. The generator should NOT be running. Disconnect the two exciter lead wires to the capacitor. With a capacitor tester connect to the capacitor read the MFD indicated which should be exactly what is marked MF or UF on the capacitor. There are no polarity concerns when testing a capacitor.
2. If no capacitor tester is available, use a multi-meter set in the resistance (Ohms) position at 1K or 10K, connect the lead wires as noted in the drawings below. A good capacitor should make the meter have a momentary reading and then drop off to zero. A defective capacitor will either cause the meter to hold a reading or have no reading at all. You can only do this test a couple of times as you will be discharging the capacitor. Replace defective capacitors with like size MFD 450 volt capacitors.

MULTI-METER IN OHMS POSITION

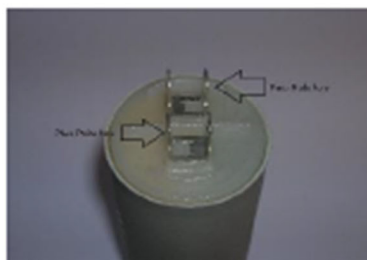
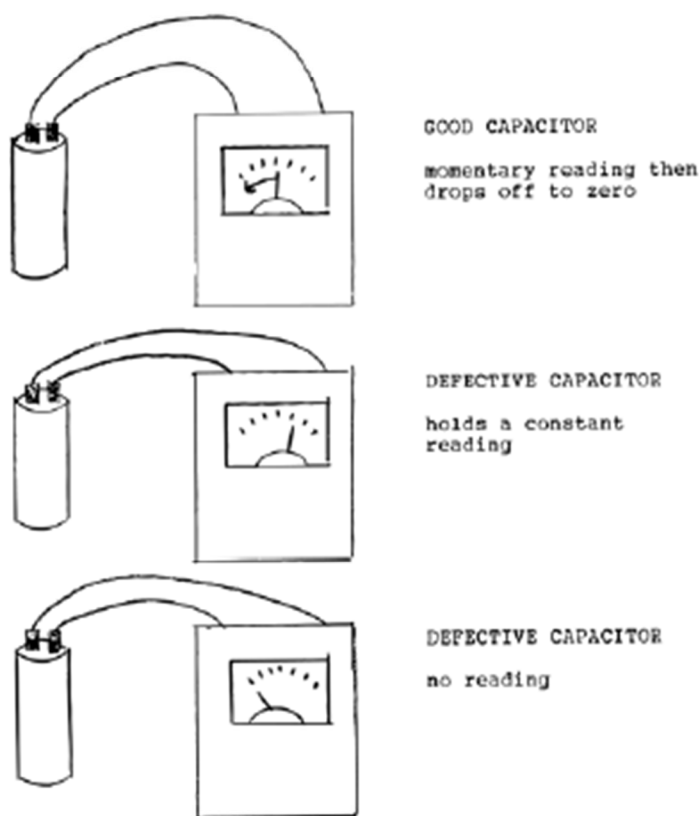
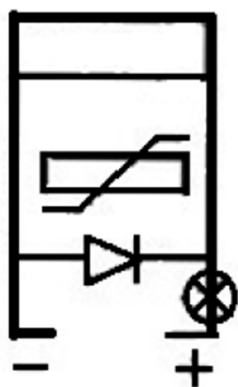


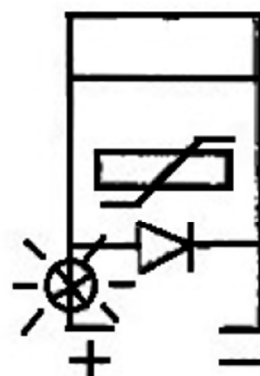
FIGURE 950204

DIODE TEST WITHOUT REMOVING THE DIODE FROM THE ROTOR

Connect a 12 volt DC battery and a 45 watt (automobile type) bulb as shown below. The light will turn on in one direction only as shown.



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