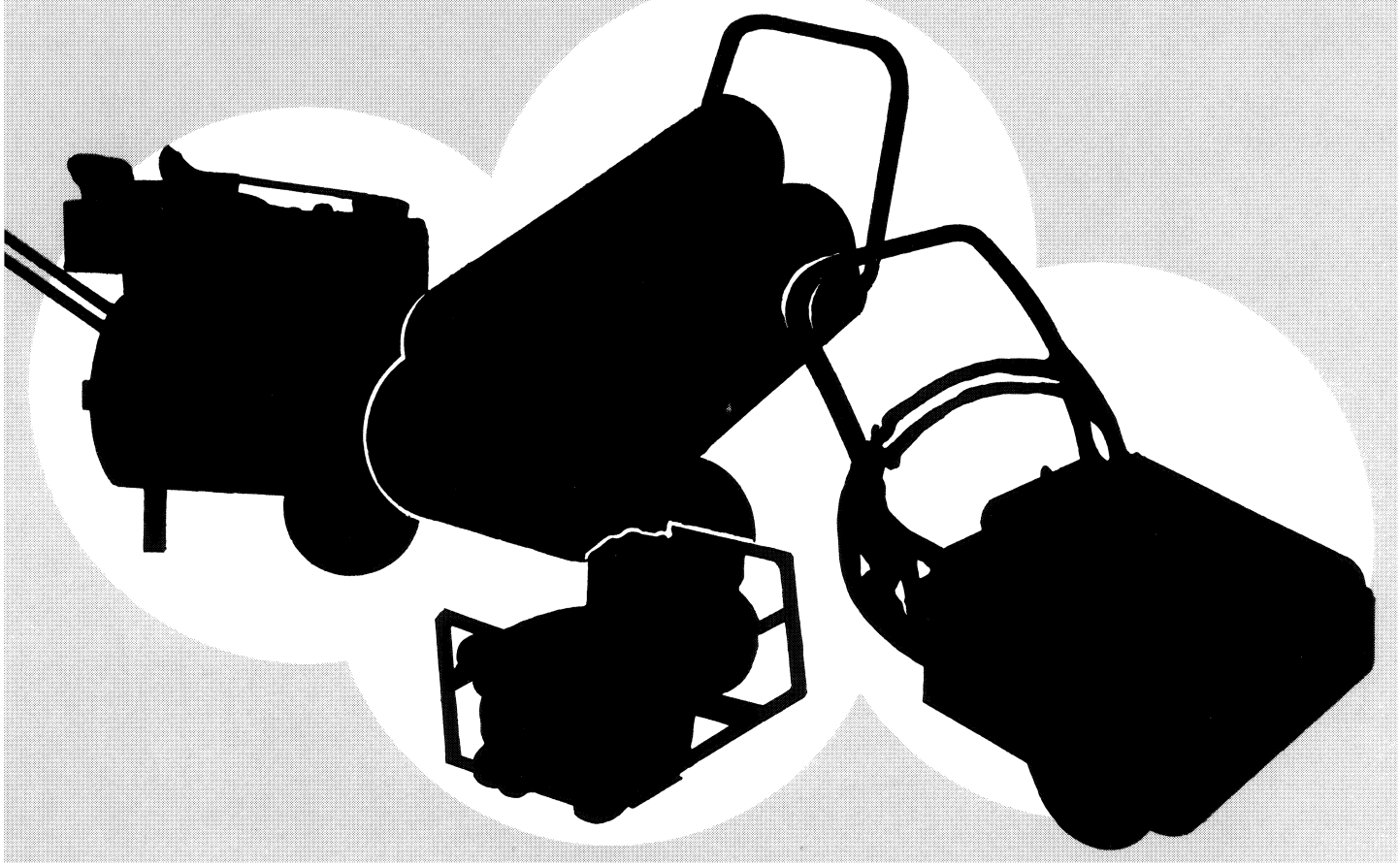
FORD TROUBLESHOOTING GUIDE

FORD AIR COMPRESSORS
FORD PORTABLE GENERATORS
FORD PORTABLE HEATERS
FORD HIGH PRESSURE WASHERS



Ford Tractor Operations

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Reprinted

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FORD AIR COMPRESSORS
Torque Specifications

	CH 500 CH 500A	CH 1000 CH 2000 CH 4000
Head Plate	—	97 ± 7
Head Bolts	120-150	120-150
Connecting Rod Bolts	80-130	80-130
Bearing Cap Bolts	30-35	55
Check Valve	120	150
Crankshaft End Play	.016 min.	.016 min.
Crankshaft End Play	.040 max.	.045 max.
Bore and Stroke	2-1/4 x 1-3/4	2-3/4 x 2

NOTE: All Torques are in inch pounds
Compression Ring Gap 180° apart

Trouble Shooting

CONDITION	POSSIBLE CAUSE
1. Motor will not start	A. If motor overload switch has tripped, push red reset button located on motor. B. Insure correct voltage is available to unit. Check fuse or circuit breaker. C. Pressure in tank must be below cut-in setting. Reduce pressure if necessary. D. Make sure current passes across pressure switch and is reaching motor terminals. An inoperative pressure switch will not provide current to motor. Check and replace if necessary. (If the above items have been checked and the motor is still inoperative, return motor to authorized motor repair shop). E. Using incorrect gauge extension cord will result in voltage drop and motor may not start under load. Refer to instruction sheet for proper gauge extension cord to be used.

CONDITION	POSSIBLE CAUSE
2. Air leaks	A. Do to vibration certain fitting and nipples may develop air leaks. These should be corrected as soon as possible by re-tightening or remounting and applying pipe dope if necessary. B. Gaskets on the compressor or gaskets on check valve may require replacing occasionally. C. Air leak at safety valve. If safety valve sticks tap with a solid object or loosen tip nut and screw down until air stops and tighten nut. D. Any leaks that may develop in the steel tank should be repaired by a reputable welding shop.
3. Low discharge pressure	A. Restricted air intake. Often caused by dirty filter — clean or replace. B. Inlet and outlet valves not seating properly. Disassemble and inspect valves and seats for improper sealing. Remove any foreign material between seat and valve. Replace any broken parts. Re-tighten loose screws. C. Replace any blown gaskets and correct all air leaks. D. Check belts for proper tension. 3/8" to 1" deflection on center of belt. E. Be sure gauge is operative and giving correct reading. F. Dismantle and check rings and cylinder walls for wear. Replace parts as necessary.
4. Noisy operation	A. Loose motor bolts or pulley set screws. Check often to make sure they are tight. Also check compressor and flywheel screws. B. Lack of oil will cause knocking noises and permanent damage to compressor. CHECK OIL LEVEL FREQUENTLY. C. Worn piston pin. Check for excessive play. Replace if necessary. D. Loosened rod bolts. Check for damaged crankshaft or rod — replace if necessary. E. Excessive clearance between crankshaft and rod. Replace if needed. F. Remove head and inspect for carbon deposits or other foreign matter on top of piston, either clean or replace.
5. Excessive belt wear	A. Check motor pulley and compressor pulley alignment. Re-align if necessary. B. Check for worn crankshaft, key way, or worn pulley bore resulting from running the compressor with loose pulleys.

FORD AIR COMPRESSORS
Trouble Shooting

CONDITION	POSSIBLE CAUSE
6. Oil in the discharge air	A. Compressor air intake restricted. Replace air filter if necessary. B. Check oil level. Drain to proper level if compressor has been over filled. C. Oil too thin. Recommended oil is 10W40 HD. D. Worn or broken rings will allow oil to bypass. Replace as necessary. E. Compressor cylinder walls that show excessive wear or scarring should be replaced.
7. Oil leaks	A. Check gaskets between cylinder and crankcase. Replace any broken gaskets. Tighten bolts evenly. B. Over filling of crankcase will cause oil to come out of breather hole. Drain to correct level.
8. Gas engine will not operate	A. Before attempting to start unit, be sure that you have moved the stop switch away from spark plug, and opened the fuel valve on the gas tank. B. Check gas supply — refill if necessary. C. Check spark plug and replace if necessary. D. Any other repairs should be made by an authorized service station.
9. High pressure	A. The air governor is sticking. B. The safety valve is sticking. C. The check and unload valve is sticking.
10. Uses to much oil	A. Clean or replace air filter. B. Wrong oil type (Consult Operator's Manual).
11. Milky oil in crankcase	A. Water in the oil. Change more often (Consult Operator's Manual).
12. Oil in discharge air	A. Check oil level (Bottom of threads). B. Clean oil filter and check for other air restrictions. C. Check for plugged breather vent.
13. Air blowing out of air inlet	A. Broken inlet valve. Replace reed valve and gaskets.
14. Compressor vibrates	A. Motor or pump mounting bolts may be loose B. Check pulley and flywheel alignment. C. Check for loose belt.

SPECIAL NOTE: Alignment of Belt

To align belt, loosen fan pulley and pull it back on the shaft until it is flush with front of shaft. Sight down belt and see if alignment is correct or use a yard stick or other straight edged object. Placing this flush against the outer edge of the flywheel and let it extend toward the motor pulley. By sighting along belt, you can get your correct alignment.

FORD PORTABLE GENERATORS
Trouble Shooting

2

GENERAL

When troubleshooting a generator set, always consider the simplest causes first. Narrow the problem down to a functional system, such as fuel or ignition. To operate efficiently, an engine must have sufficient fuel, a good ignition spark and good compression. All adjustments must be correct. For a generator to produce the required electricity, all parts must be clean, all connections tight, and all components in working order.

ENGINE

Refer to Table 2-1 for engine troubleshooting. To make engine repairs, refer to the Kohler or Briggs and Stratton engine service manual which covers the engine model. A troubleshooting chart cannot cover every possible cause of malfunction. Always consider every possible cause of malfunction. Knowledge of four cycle engine and ignition systems can be applied.

CONDITION	POSSIBLE CAUSE
1. Hard starting or loss of power	A. Faulty Ignition. 1. Loose or grounded high tension or breaker point leads. 2. Improper breaker point gap and timing. 3. Defective breaker points. 4. Faulty spark plug or improper gap. 5. Faulty condenser or coil. 6. Shorted magnet-to-generator wire, or terminal strip capacitor. B. Faulty Fuel System. 1. Gasoline not getting to carburetor. a. Fuel tank cap vent plugged b. Dirt or gum in fuel line or sediment bowl. c. Fuel pump faulty. 2. Dirt in carburetor. 3. Carburetor improperly adjusted. 4. Air cleaner dirty.
2. Overheating	A. Insufficient available cool air. B. Dirty air intake screen, shroud or cooling fins. C. Improper fuel. D. Fuel mixture too lean. E. Improper ignition timing. F. Engine overloaded. G. Tight valve tappet clearance.
3. Backfiring	A. Fuel mixture too lean. B. Improper timing. C. Shorted magneto-to-generator wire, or terminal strip capacitor. D. Valve not closing properly.
4. Occasional "Skip" at high speed	A. Spark plug gap too wide. B. Improper carburetor setting or lack of fuel. C. Wrong type spark plug. D. Improper timing. E. Shorted magneto-to-generator wire, or terminal strip capacitor.
5. Operating Erratically	A. Clogged fuel line. B. Water in fuel. C. Faulty choke control.

Table 2-1. Engine Troubleshooting

2 FORD PORTABLE GENERATORS
Trouble Shooting

CONDITION	POSSIBLE CAUSE
5. Operating Erratically (Cont'd.)	D. Improper fuel mixture. E. Loose ignition connections. F. Shorted magneto-to-generator wire, or terminal strip capacitor. G. Air leaks in carburetor connections or intake. H. Vent in fuel tank cap plugged. I. Fuel pump faulty.

Table 2-1. Engine Troubleshooting (cont'd.)

GENERATOR TROUBLESHOOTING

The flow table below is a guide to troubleshoot your generator set. Refer to Table 2-2. Before beginning the troubleshooting procedures, read all safety precautions at the beginning of this manual. Additional safety precautions are included with the tests; do not neglect these precautions.

RESET CIRCUIT BREAKERS

Make certain power panel circuit breakers have not tripped. Reset if necessary.

FLASH FIELD

If your generator has no or low AC output, it may be necessary to magnetize the rotor. The rotor usually holds enough magnetism for 3-5 volts (AC), which is needed for initial start-up. If your generator has not run for a long length of time or the generator has been disassembled, it may be necessary to flash your generator. Use the following steps:

1. Unscrew power panel from the end bracket, Figure 2-1.

2. Raise the brushes from the slip rings and insert a length of wire or a paper clip. Figure 2-2.

WARNING: *ELECTRICAL SHOCK! Use extreme caution when removing battery power, do not touch wires or severe electrical shock will occur.*

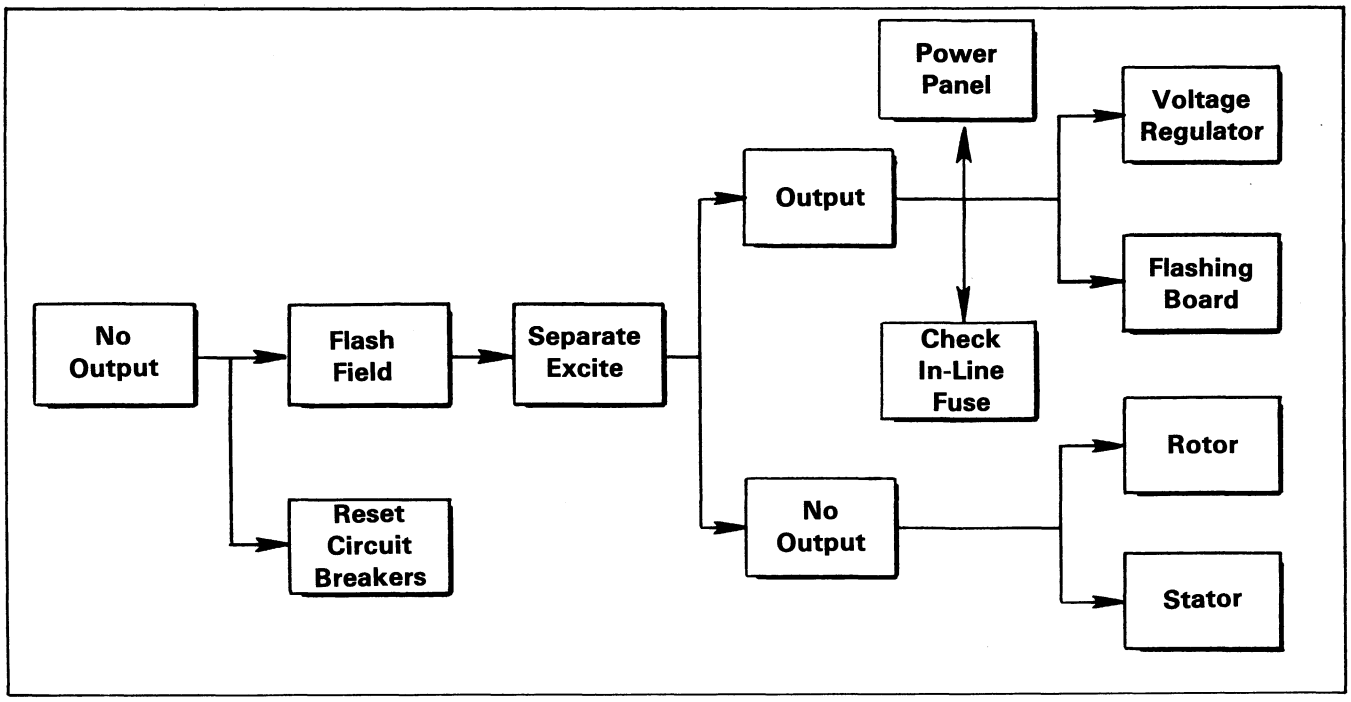


Table 2-2. Generator Troubleshooting

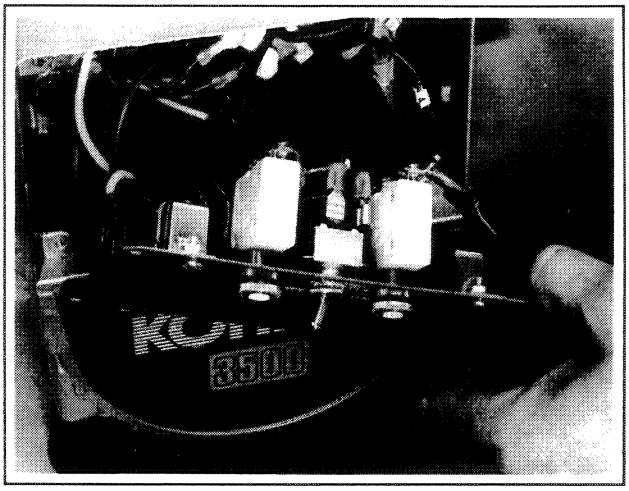


Figure 2-1. Removing Power Panel

3. Using a 9-volt transistor, 6-volt lantern or a 12-volt automotive battery, place the positive (+) lead on the outside slip ring and the negative (—) lead on the slip ring nearest the rotor core, for approximately 2 seconds. Figure 2-3.

4. Remove the wire or paper clip to set the brushes on the slip rings, make sure the brushes are centered within the holder and held in proper contact by the springs.

5. Remount the power panel. Start engine and check for rated voltage. Figure 2-4. If there is no AC output, proceed to Separate Field Excitation.

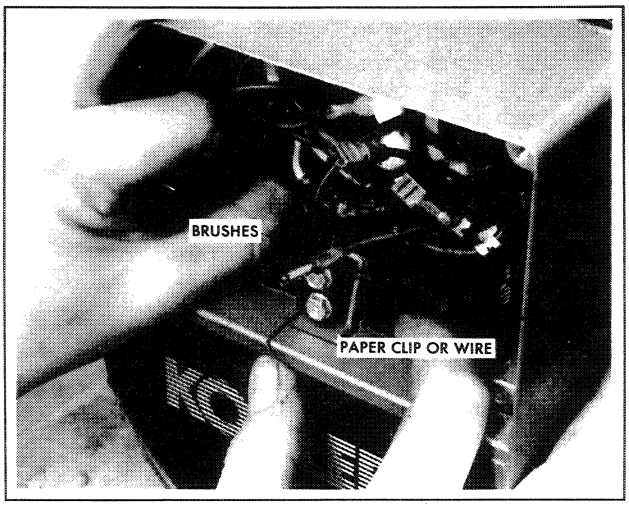


Figure 2-2. Raising Brushes

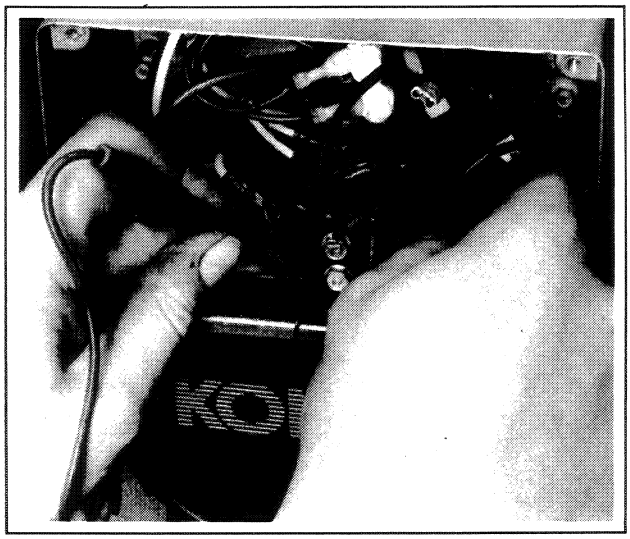


Figure 2-3. Flashing Field

Figure 2-4. Checking for Output

SEPARATE FIELD EXCITATION

As an aid to troubleshooting, the generator field (rotor) may be excited (magnetized) using an outside power source with the following procedure.

WARNING: *HIGH VOLTAGE! Remember the function of a generator set is to produce electricity and whenever electrical energy is present, there is the potential danger of electrocution. Be sure that generator and appliances are properly grounded. Do not touch electrical equipment when standing in water or on wet ground or when your hands are wet.*

2 FORD PORTABLE GENERATORS
Trouble Shooting

WARNING: *HIGH VOLTAGE! Voltage regulator heat sink contains high voltage. When testing or working with voltage regulator do not allow regulator heat sink, or regulator leads to touch your person or ground. Electrical shock or voltage regulator damage can occur.*

WARNING: *ELECTRICAL SHOCK! Use extreme caution when removing battery power, do not touch wires or severe electrical shock will occur.*

1. Remove generator cover from generator set.
2. Unscrew voltage regulator and disconnect all leads. Figure 2-5. Unscrew power panel and disconnect all leads.
3. Using a 6-volt lantern battery or a 12-volt automotive battery, attach battery positive (+) lead to voltage regulator positive (+) lead and battery negative (—) lead to voltage regulator negative (—) lead. Figure 2-6. Connect a DC amp meter in series with the circuit.
4. Start generator set and check DC amp meter reading.

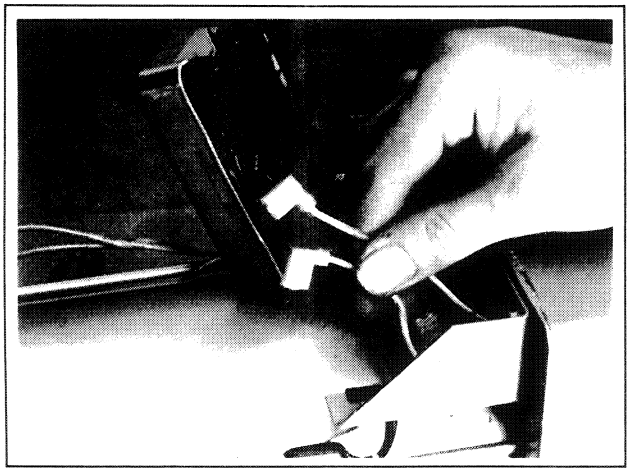


Figure 2-5. Disconnecting Regulator Leads

Reading should fall within the approximate ranges given in Table 2-3. If readings are incorrect, this indicates a faulty rotor or brush circuit.

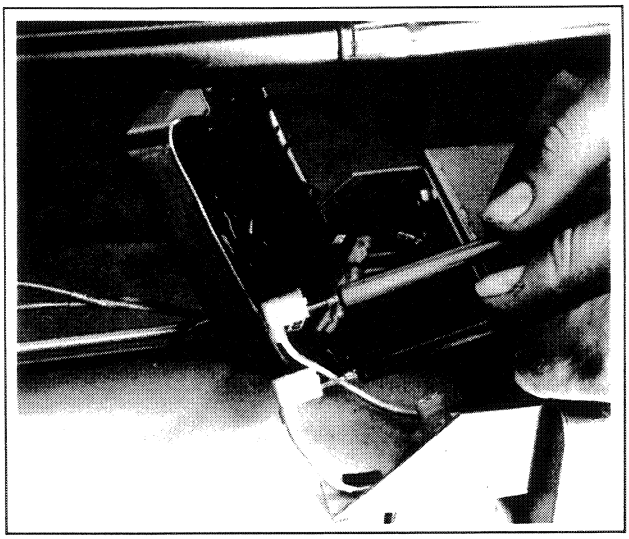


Figure 2-6. Connecting Battery Power to Voltage Regulator Leads

5. While generator is still running, check generator output leads for AC output with a voltmeter. Check leads 1 and 2; 3 and 4; 33 and 44; and 55 and 66. Readings should fall within the ranges given in Table 2-3. If readings are incorrect, this indicates a faulty stator.

IN-LINE FUSE

Check the in-line fuse. Replace if necessary. Proceed in testing as this indicates a fault either in generator wiring, voltage regulator or rotor.

OUTPUT

If you read AC output at all the generator leads, this indicates a fault in the voltage regulator, flashing board, or power panel. Refer to Component Testing, Page 9 or Wiring Diagrams, Pages 9 & 10.

NO OUTPUT

If you read no AC output at the power panel, this indicates a fault in the rotor or stator. Refer to Component Testing. Page 9.

Battery Type	Voltmeter Readings (Approximate)	DC Amp Reading (Approx.)
6-Volt Lantern Battery	70-75 Volts AC	6/10 (0.66)
12-Volt Automotive Battery	120-135 Volts AC	1-1/2 (1.57)

Table 2-3. Battery Charger Readings

Component Testing

COMPONENT TESTING

This section guides you in checking your generator components for proper operation. Follow the safety precautions in front of this manual. Additional safety precautions are included with the tests; do not neglect these precautions.

VOLTAGE REGULATOR TEST

This test is designed to check regulator output. To test, you will need the following components:

1 Variable Transformer, 0-140 Volts (less .5 amps)
1 to 1 Isolation Transformer (less .6 amp)
1 120 Volt AC Plug (60 Hz)
1 Single Pole, Single Throw Switch
1 120 Volt, 100 Watt Lamp
1 2 Amp Fuse
1 AC Voltmeter
Recommended #14 AWG Copper Wire (Minimum)

WARNING: *HIGH VOLTAGE! Remember the function of a generator set is to produce electricity and whenever electrical energy is present, there is the potential danger of electrocution. Be sure that generator is properly grounded. Do not touch electrical equipment when standing in water or on wet ground or when your hands are wet.*

WARNING: *HIGH VOLTAGE! The heat sink of the voltage regulator contains high voltage. Do not touch when testing voltage regulator, or electrical shock will occur.*

1. Connect components as shown in Figure 2-7.
2. Plug in variable transformer and AC plug.
3. Turn switch S1 on. Lamp should be on.
4. Turn variable transformer on. Slowly increase variable transformer, the lamp should go out at approximately 110 volts.
5. If the lamp does not go out or stays at a dull glow, this indicates a faulty regulator and should be replaced.

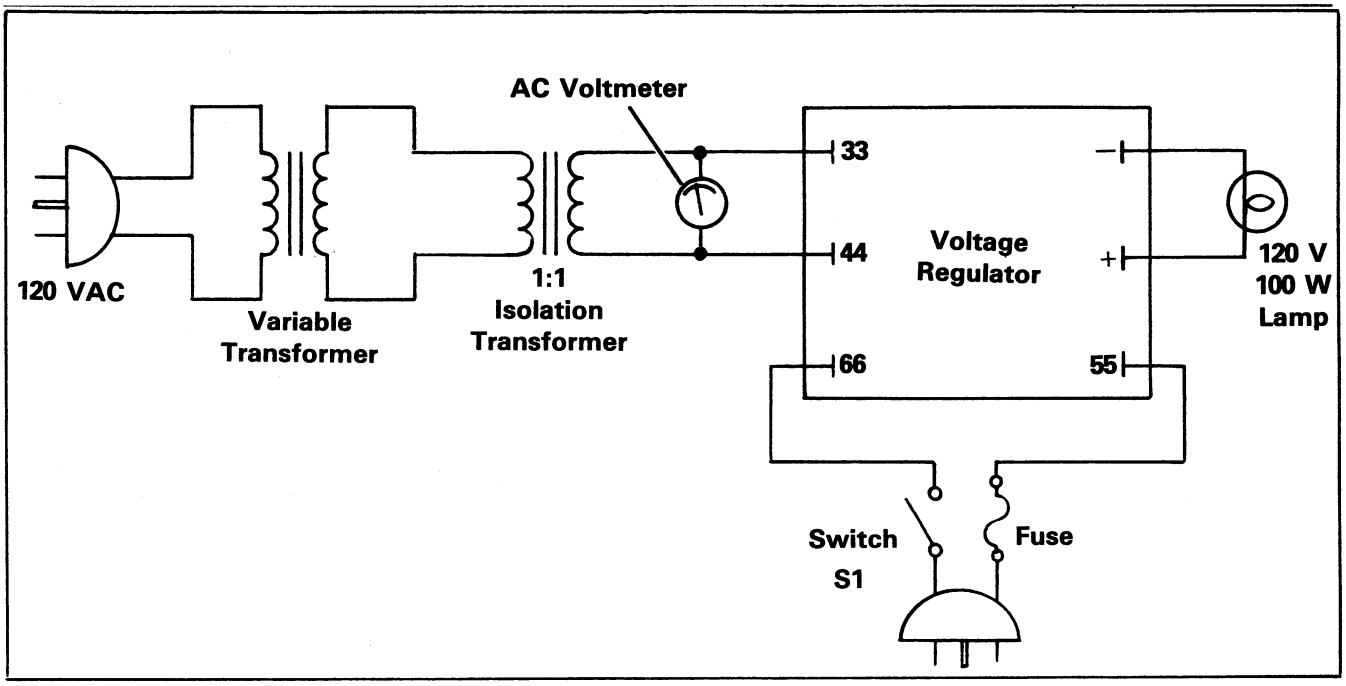


Figure 2-7. Voltage Regulator Test

2 FORD PORTABLE GENERATORS
Component Testing

FLASHING BOARD TEST

This test is designed to check the flashing board for proper operation. To test, you will need the following components:

1 120 Volt AC Plug (60 Hz)
1 Single Pole, Single Throw Switch
1 5 Amp Fuse
1 DC Amp Meter (Milliamp Scale)
1 Ohmmeter

1. Connect the components as shown in Figure 2-8.

2. Plug in the AC plug.

3. With switch (S1) in an open circuit:

   a. Using an ohmmeter, the posistor should measure approximately 15-30 ohms. If not, this indicates a faulty posistor and circuit board should be replaced.

   b. Using an ohmmeter, the diode should measure very high resistance in one direction and very low resistance in the opposite direction. If not, this indicates a faulty diode and circuit board should be replaced.

4. With switch (S1) in a closed circuit:

   a. Using a DC amp meter on the DC milliamp scale, the circuit should read less than 30 milliamps (DC). If not, circuit board should be replaced.

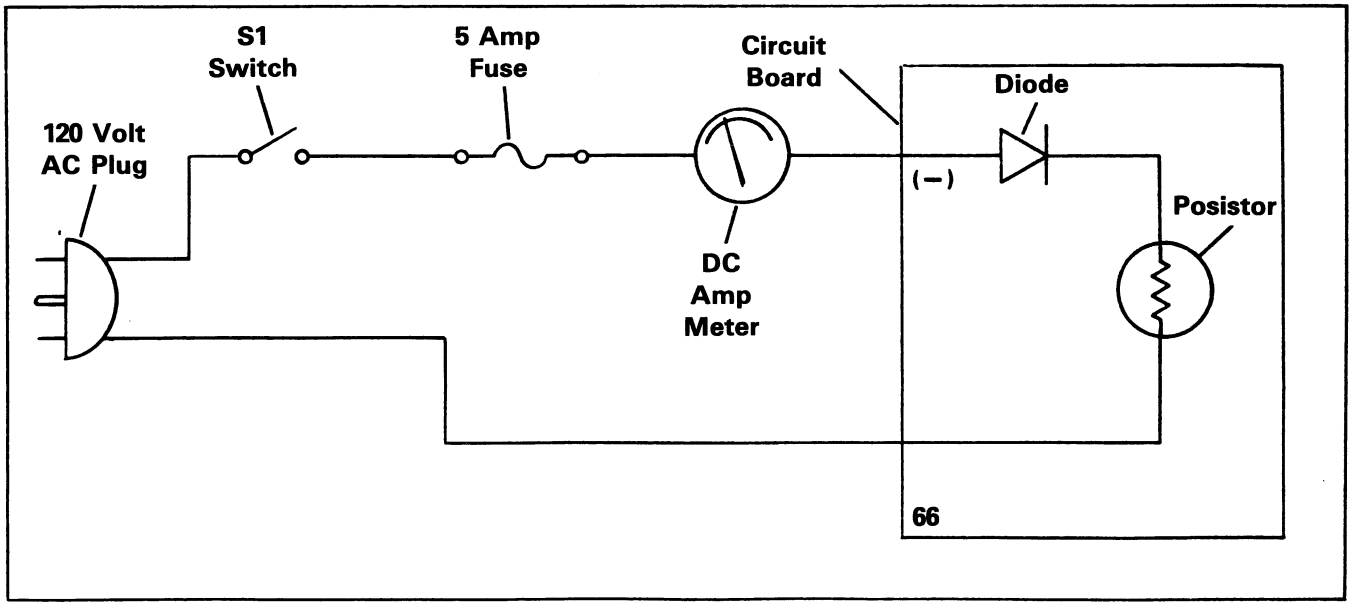


Figure 2-8. Flashing Board Test

STATOR

The stator consists of a series of coils of wire laid in a laminated steel frame. The stator leads supply voltage to the AC load and exciter regulator.

Prior to testing, inspect stator for visible damage to lead wires, exposed coil windings, exposed and varnished areas of frame laminations and housing, make sure stator is securely riveted in housing.

CHECKING STATOR CONTINUITY AND RESISTANCE

1. To check stator continuity, set ohmmeter on 1 ohm (1 x Ω) scale. Figure 2-9. Contact red and black meter leads; adjust meter to zero ohms. Check stator continuity, contacting meter leads to stator leads.

   - There must be continuity between leads 1 and 2.

- There must be continuity between leads 3, 4, 33 and 44.
- There must be continuity between leads 55 and 66.
- There should be no continuity between lead 1 and leads 3, 4, 33, 44, 55 and 66.
- There should be no continuity between lead 4 and leads 55 and 66.

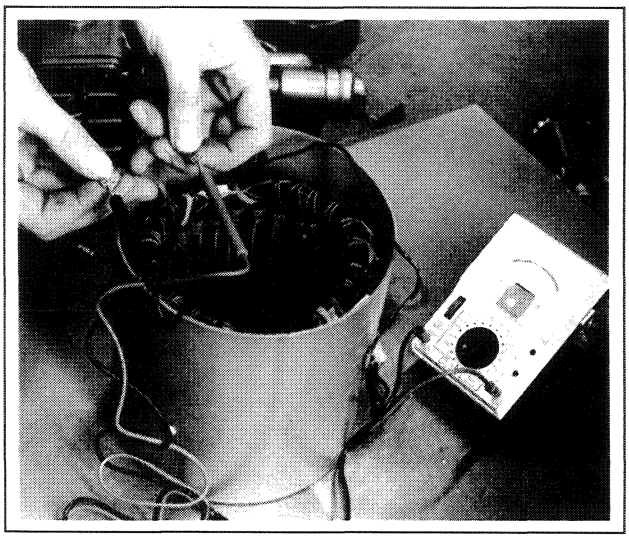


Figure 2-9. Checking Stator Continuity

- There must be no continuity between any stator lead and ground on the stator housing or frame laminations.

2. Contact red and black meter leads and readjust to zero ohms. Check cold resistance of stator windings contacting meter leads to stator leads 1 and 2, leads 3 and 4, leads 33 and 44, then to leads 55 and 66. Slight resistance readings of less than one ohm should register. Readings should be in the area of 0.35 ohms for 50 Hz sets and 0.25 ohms for 60 Hz sets. Contact meter leads to stator leads 55 and 66, readings of approximately 1.5 ohms should register.

Should any fault be found with the stator in any of the above tests, the stator must be repaired or replaced.

ROTOR

The rotor creates the magnetic field needed to raise alternating current in the stator windings. Rotors used in models covered by this manual have two poles and two slip rings. Prior to testing, inspect rotor for visible damage to pole shoes, insulation, exposed coil windings, slip ring surfaces, and threads in engine end of shaft. Check bearing for noise when rotated, wear, or heat discoloration.

Using a small thin-blade screw driver, carefully pry rubber seal from bearing. Inspect bearing for proper lubrication. Repack bearing with high temperature grease, or replace bearing as necessary.

Contact each slip ring with a meter lead as shown in Figure 2-10. Resistance readings for cold rotors at room temperatures should be as follows:

2.25 kW — 4.3-4.9 ohms
3.5 kW — 6.0-6.8 ohms
5 kW — 4.5-5.1 ohms

Should visual inspection or meter testing reveal any rotor faults, rotor must be replaced.

Figure 2-10. Checking Rotor Resistance

Slip rings acquire a glossy brown finish in normal operation. Do not attempt to maintain a bright, newly-machined appearance. Ordinary cleaning with a dry, lint free cloth is usually sufficient. Very fine sandpaper (#00)

may be used to remove roughness. Use light pressure on the sandpaper. Do not use emery or carborundum paper or cloth. Clean out all carbon dust from the generator. If the rings are black or pitted, remove the rotor and remove some of the surface material by using a lathe.

Check rotor for continuity and resistance. Set ohmmeter at highest scale. Touch ohmmeter leads together and adjust meter to zero ohms. Contact meter leads and adjust to zero. Touch one ohmmeter lead to either slip ring and other lead to rotor poles or shaft. Meter should register no continuity.

BRUSHES

The brushes transfer current from the voltage regulator to slip rings. The brushes carry a very low current (approximately 2 amps) and should last the life of the generator set. Abrasive dust on the slip rings could, however, shorten the life of the brushes. Excessive arcing at the brushes could damage the voltage regulator. Arcing could be caused by weak springs, damaged slip rings, sticking brushes, loose holder, or poor brush contact.

The brushes must be free to move within the holder and held in proper contact by the springs. When properly positioned, spring pressure on the brush surface will cause the brush to wear evenly. Figure 2-11 shows normal brush wear.

Replace the brushes if worn excessively or unevenly.

Replace the spring if damaged or discolored.

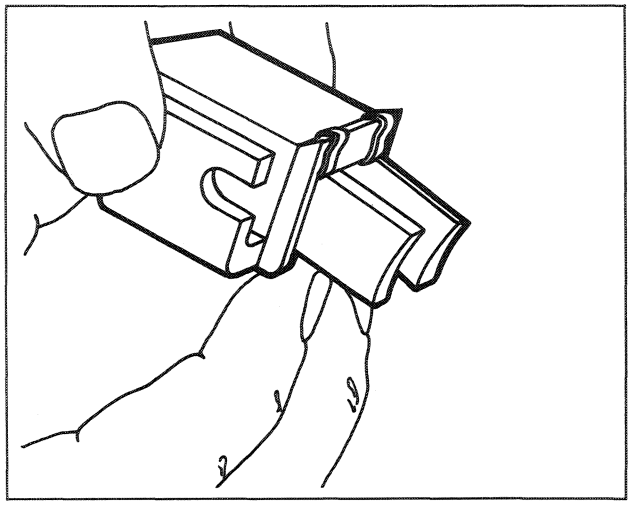


Figure 2-11. Brushes

Generator Disassembly /Reassembly

GENERATOR DISASSEMBLY/REASSEMBLY

When diassembling and reassembling your generator set, follow the safety precautions at the beginning of this manual.

Disassembly

1. Unscrew generator cover from generator set.
2. Clip tie-wraps at in-line fuse.
3. Unscrew regulator from mounting, Figure 2-12. Disconnect lead from regulator and remove.

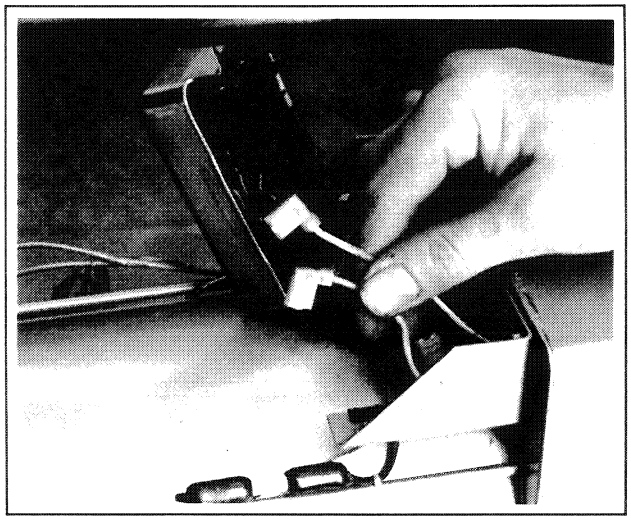


Figure 2-12. Removing Regulator

4. Unscrew power panel, Figure 2-13. Disconnect all leads running to power panel. Remove power panel.
5. Raise brushes in holder, pushing leads upward in slots. Retain brushes in holder inserting a length of wire or paper clip. Figure 2-14.

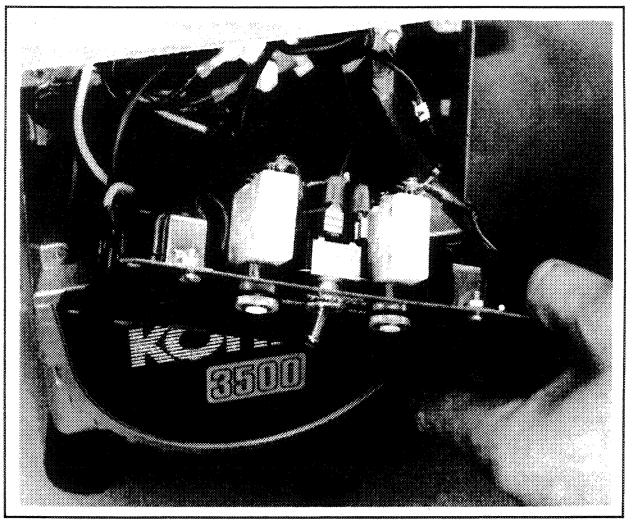


Figure 2-13. Removing Power Panel

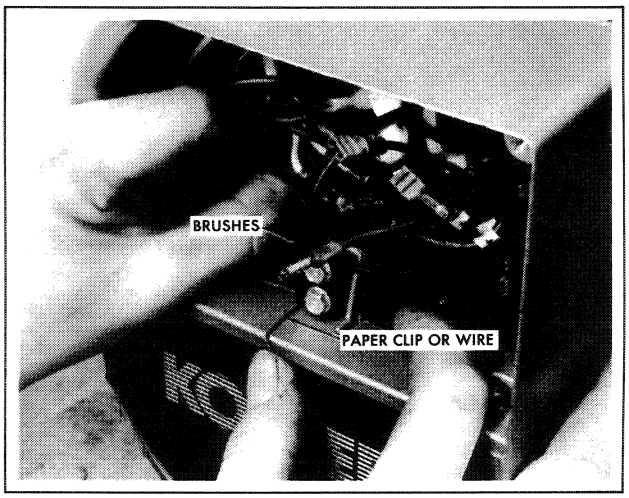


Figure 2-14. Raising Brushes

Brushes

Paper Clip or Wire

6. Remove split grommets where stator leads go through end bracket.
7. Pull stator leads through end bracket.
8. Clip tie-wraps holding leads to back of end bracket. Disconnect leads 2 and 3 going to the neutral stud. Clip tie wrap holding leads to Econo-Throttle transformer (if equipped). Pull leads through transformer.

9. Support set placing suitable prop under the generator adapter, between the stator frame and engine, Figure 2-15.

10. Remove four over-bolts which secure the end bracket to the stator and generator adapter. Figure 2-15.

11. Bump end bracket with a soft hammer, bumping alternately on either side until the end bracket can be removed, Figure 2-16.

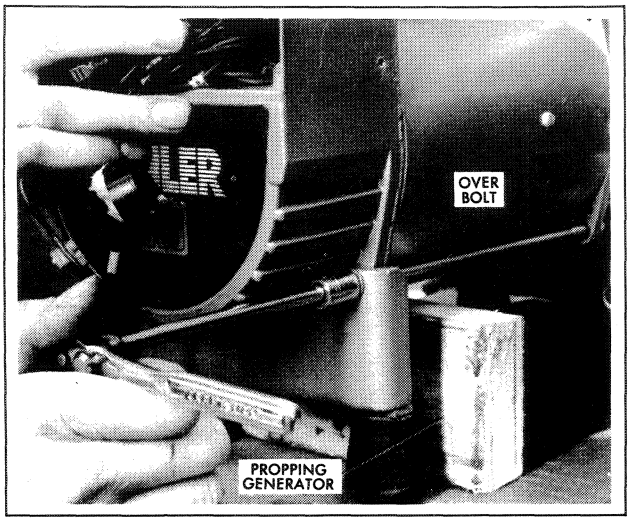


Figure 2-15. Propping Generator/Removing Overbolts

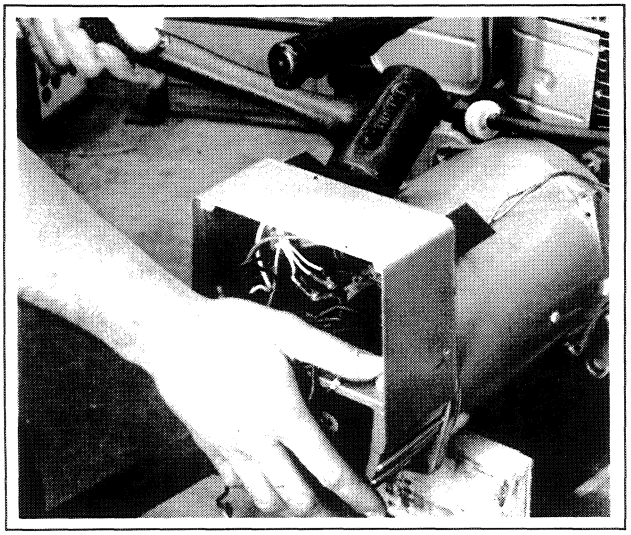


Figure 2-16. Removing End Bracket

12. Disconnect lead 66 from flashing board.

13. Remove stator by bumping with a soft hammer and pulling at the same time, Figure 2-17.

14. Draw stator over rotor carefully, avoiding damage to rotor or to stator. Figure 2-18.

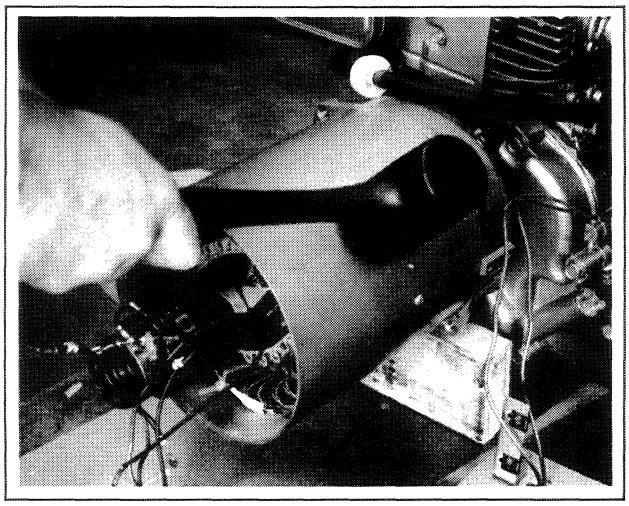


Figure 2-17. Removing Stator

15. The rotor is held to the engine crankshaft by right-hand threads on the crankshaft and in the rotor shaft. To remove rotor, place a wood block on a trailing edge of one rotor pole. One or two sharp, medium-force hammer blows to the wood block's end will free the rotor, allowing it to be turned off by hand. Figure 2-19.

CAUTION: *Do not attempt to remove rotor by blocking engine cooling fan and turning rotor with any kind of wrench, or damage to fan blades and rotor will result.*

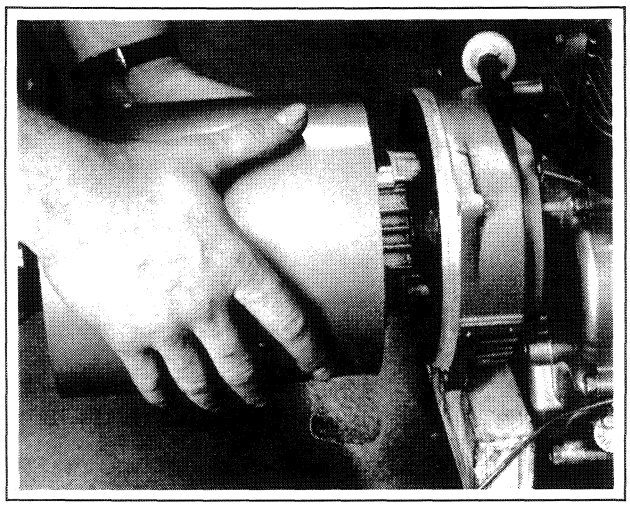


Figure 2-18. Drawing Stator Over Rotor

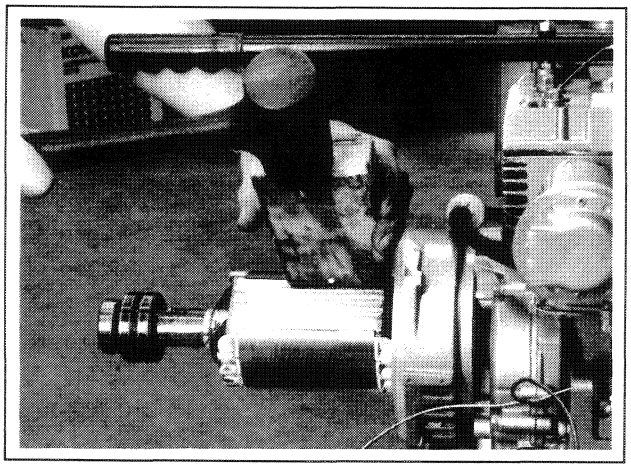


Figure 2-19. Removing Rotor

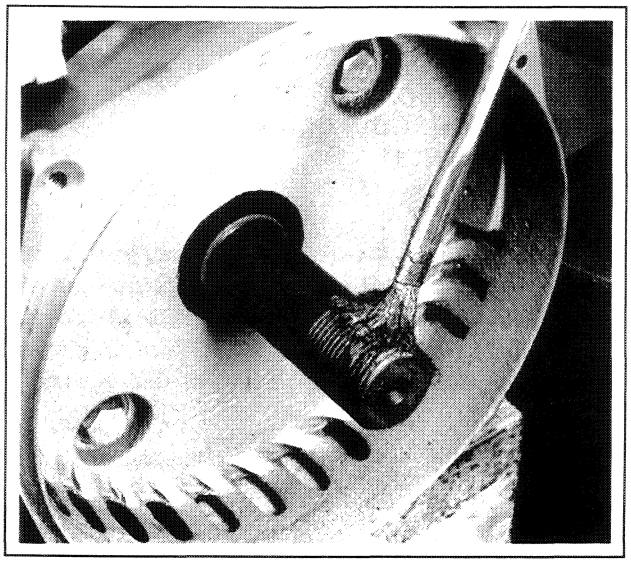


Figure 2-20. Applying Anti-Seize Compound

REASSEMBLY

1. Clean rotor shaft and crankshaft threads with compressed air. Coat crankshaft threads with anti-seize compound, and thread rotor onto crankshaft turning it handtight. Figure 2-20. Finally tighten rotor by placing a wood block against the leading edge of one of the rotor poles and tightening with one or two moderately-sharp hammer blows to the block's end.

2. Slide stator over rotor. Position stator tightly against adapter. Figure 2-21.

3. Connect lead 66 (on stator) to flashing circuit board terminal 66.

4. Mount end bracket to stator.

5. Install four over-bolts, securing end bracket, stator and generator adapter. Make sure hardened washers are installed properly on over-bolts when tightening. **Torque to 10 ft. lb. (1.383 kg/m).** When tightening over-bolts, make sure stator, end bracket and adapter all fit together tightly and properly. Visually check to see that end bracket and stator are positioned straight.

6. Pull the stator leads through end bracket. Install split grommets around leads and into end bracket.

7. Reconnect leads per the wiring diagram for your model, refer to Wiring Diagrams, Page 25. After wiring has been completed, tie wrap leads together to prevent contact with moving parts.

8. Remove wire or paper clip holding brushes. Make sure brushes are centered on the slip rings or improper positioning will cause improper wear.

9. Screw power panel to end bracket.

10. Reconnect leads to voltage regulator. Screw voltage regulator to mounting bracket.

11. Tie wrap in-line fuse to over-bolt.

12. Mount generator cover to generator set.

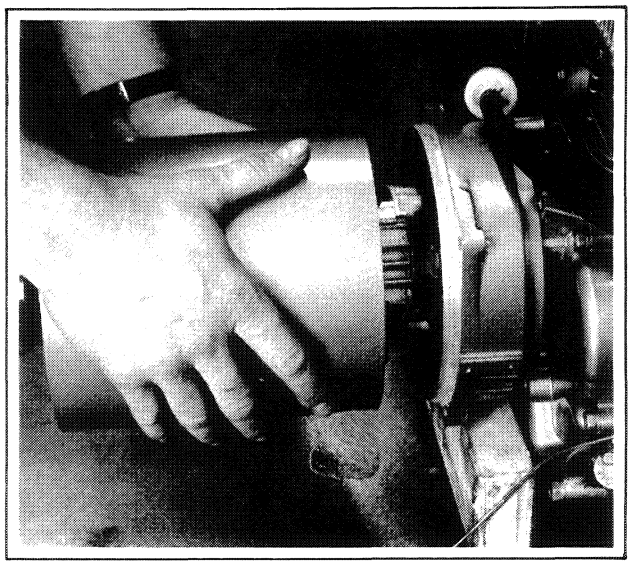


Figure 2-21. Drawing Stator Over Rotor

Carburetor, Governor, and Econo Throttle

CARBURETOR, GOVERNOR, AND ECONO THROTTLE

This section covers carburetor adjustment, governor adjustment, and Econo Throttle service. To perform major carburetor or governor service, refer to the appropriate engine service manual. Follow all safety precautions listed in the beginning of this manual.

CARBURETOR ADJUSTMENT

KOHLER POWERED — See Figure 2-22.

1. Turn main fuel screw in until tightly seated; turn out 2 turns.
2. Start engine allowing it to warm to normal operating temperature. Apply rated load (kW) and run set at rated frequency (Hz).

   NOTE: *To measure current frequency on straight 240-volt models, contact one meter probe to ground hole, and other probe to slot at panel receptacle.*

3. Turn main screw in (lean) until engine slows and note screw position. Turn screw out (rich) until engine again slows and note screw position. Finally set main fuel screw midway between lean and rich positions.
4. Turn idle fuel screw in until lightly seated, then out 1-1/4 turns.

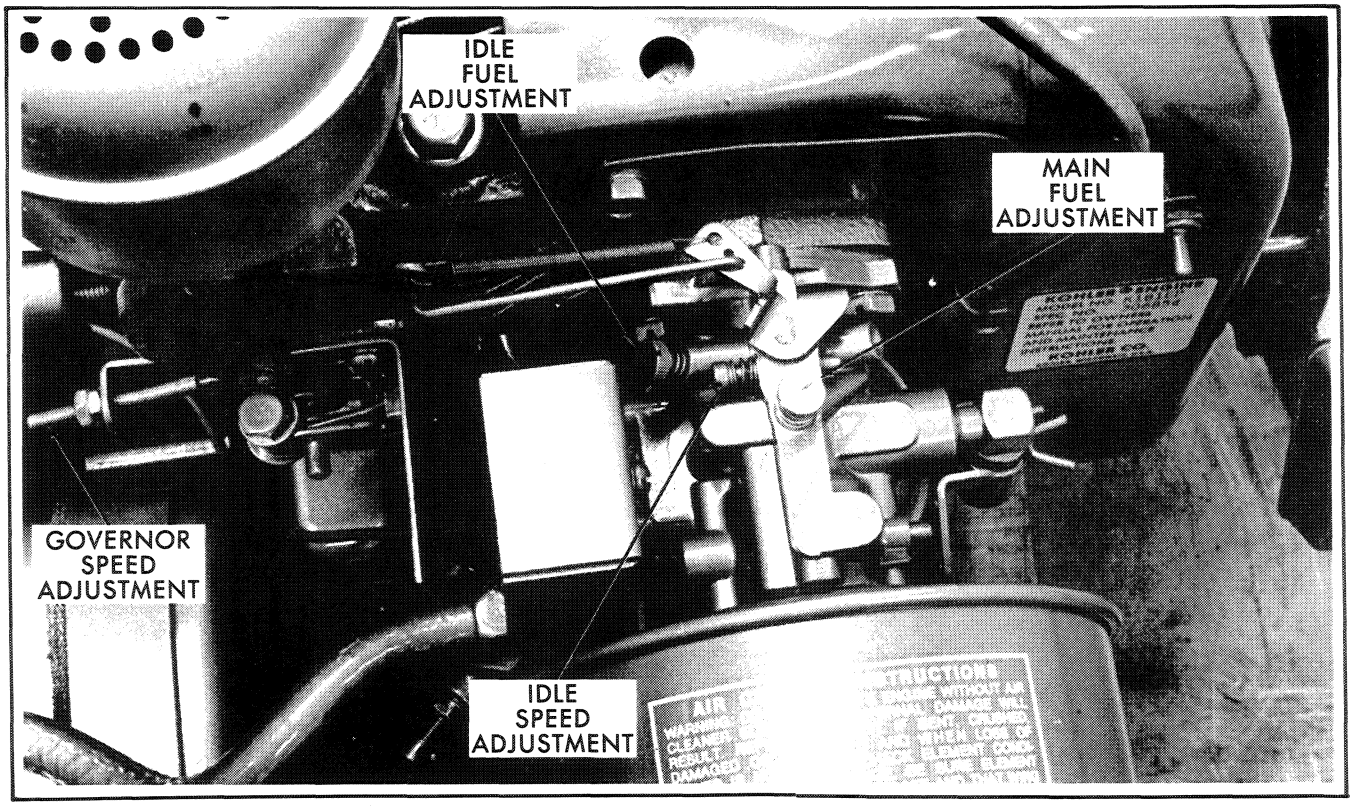


Figure 2-22. Carburetor and Governor Adjustments — Kohler Powered

BRIGGS & STRATTON POWERED — See Figures 2-23 and 2-24

1. Turn main fuel screw in until lightly seated; turn out 1-1/2 turns (2.25 kW models), or 1-1/8 turns (3.5 and 5 kW models). See Figures 2-23 and 2-24.

2. Start engine and allow to warm to normal operating temperature. Turn main screw in (lean) until engine slows, then turn out (rich) until engine again slows.

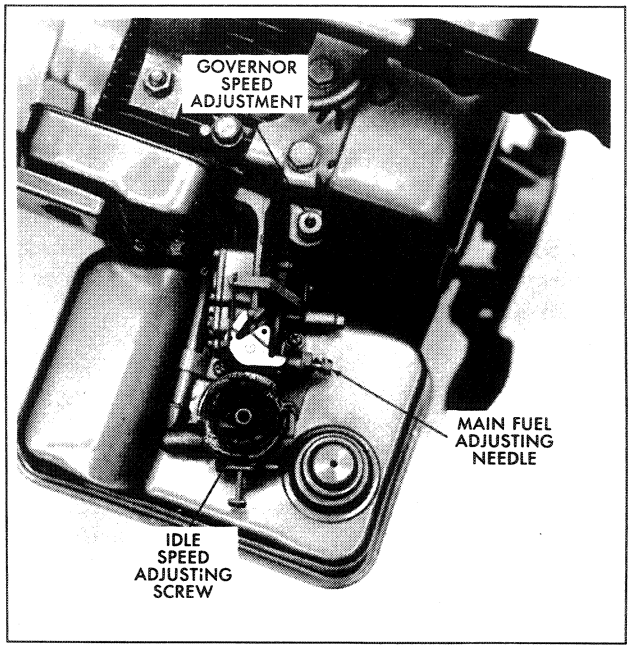


Figure 2-23. Carburetor and Governor Adjustments—2.25 kW, Briggs and Stratton Powered

3. Apply rated load (kW) and run set at rated frequency (Hz) (See SPECIFICATIONS in Section 1 for rated load and frequency of particular model).

   NOTE: *To measure current frequency on straight 240-volt models, contact one meter probe to ground hole, and other probe to one slot at panel receptacle.*

4. Adjust main screw, leaning to setting of smoothest operation.

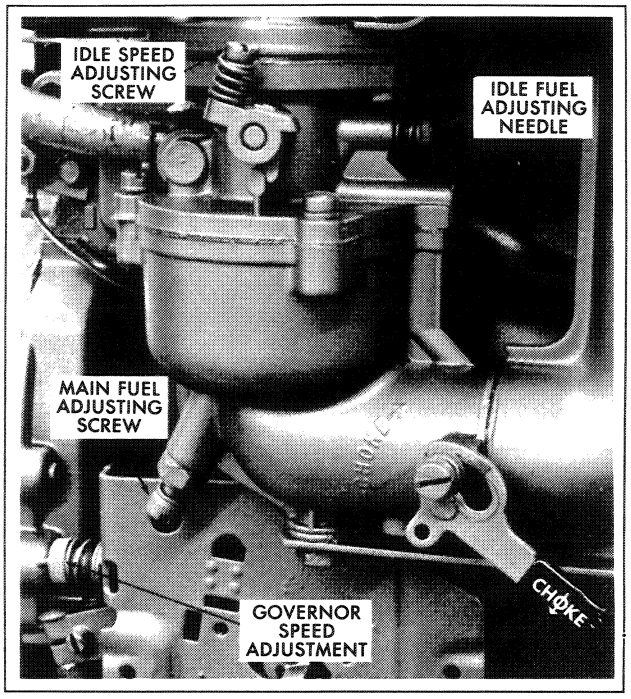


Figure 2-24. Carburetor and Governor Adjustments—3.5-5 kW, Briggs and Stratton Powered

GOVERNOR ADJUSTMENT

KOHLER POWERED — See Figure 2-25

The governor functions to maintain engine speed under changing load conditions and acts as a speed limiting device.

CAUTION: *Do not attempt to increase output by increasing governor speed. Readjustment should be made only if engine speed surges with changing load or if speed drops considerably when normal load is applied.*

INITIAL ADJUSTMENT: With engine stopped, loosen (do not remove) pinch bolt securing governor arm to governor shaft. Grasp end of governor shaft with pliers and turn shaft as far as possible in counterclockwise direction — tab on shaft will stop internally against governor gear mechanism. Hold shaft in this position, pull governor arm all the way away from carburetor then retighten pinch bolt to complete initial adjustment. See Figure 2-25.

FREQUENCY ADJUSTMENT: Generators are designed to produce 50 or 60 Hz current under load. To check output frequency, contact frequency meter probes in slots of 120-volt receptacle. On straight 240-volt models, contact meter probes to ground hole and one slot of 240-volt receptacle.

With engine running, adjust carburetor main fuel screw to obtain highest frequency over 50 or 60 Hz with rated load. For final frequency adjustment, loosen both lock nuts on adjusting link and turn either nut to raise or lower frequency as required to obtain 50 or 60 Hz (63 Hz no load) frequency. Secure lock nuts on adjustment arm to retain governor setting.

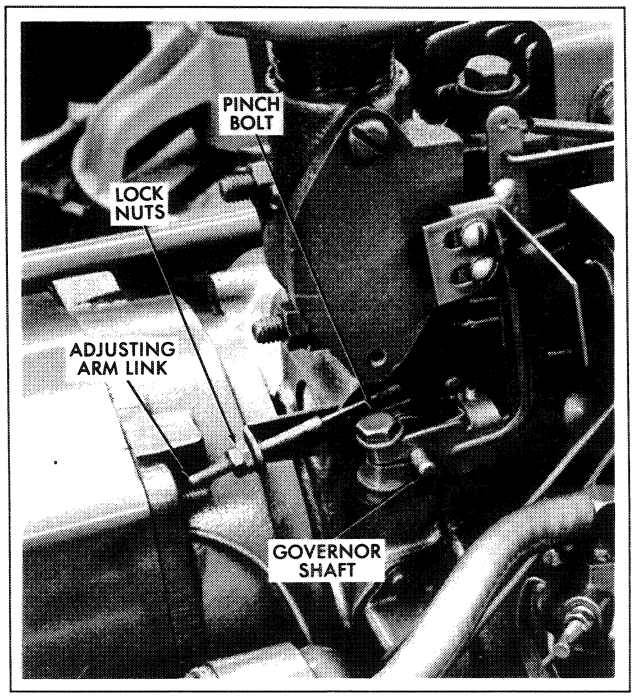


Figure 2-25. Governor Adjustment— Typical Kohler Powered

BRIGGS & STRATTON POWERED — See Figure 2-26

The governor functions to maintain engine speed under changing load conditions and acts as a speed limiting device.

CAUTION: *Do not attempt to increase output by increasing governor speed. Readjustment should be made only if engine speed surges with changing load or if speed drops considerably when normal load is applied.*

INITIAL ADJUSTMENT: With engine stopped, loosen (do not remove) pinch bolt securing governor arm to governor shaft. Insert screw driver in slot at end of governor shaft and turn shaft as far as possible in clockwise direction — tab on shaft will stop internally against governor gear mechanism. Hold shaft in this position, pull governor arm all the way from carburetor then retighten to complete initial adjustment. See Figure 2-26.

FREQUENCY ADJUSTMENT: Generators are designed to produce 50 or 60 Hz current under load (See SPECIFICATIONS in Section 1 for rated load (kW) and frequency (Hz) of particular model). To check output frequency, contact frequency meter probes in slots of 120-volt receptacle. With engine running, adjust carburetor main fuel screw to obtain highest frequency over 50 or 60 Hz with rated load. For final adjustment turn knurled nut on adjustment link to obtain 50 or 60 Hz (63 Hz no load) frequency.

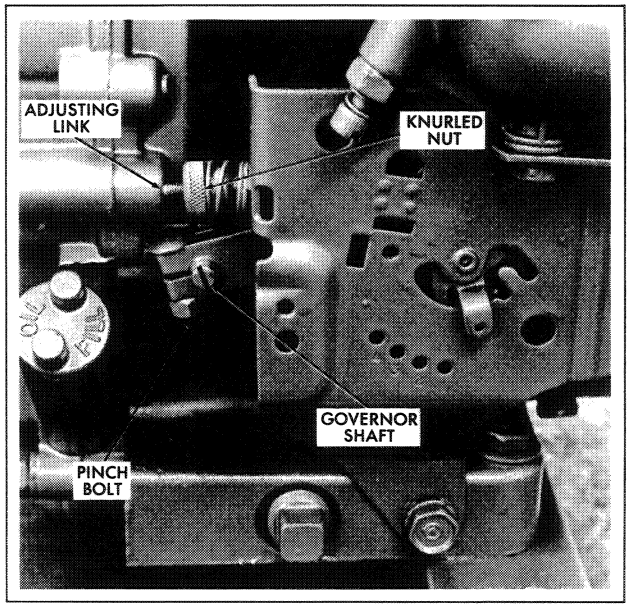


Figure 2-26. Governor Adjustment— Typical Briggs and Stratton Powered

ECONO THROTTLE

Kohler Econo Throttles function to reduce fuel consumption, engine noise and wear by lowering engine speeds to idle (1400 to 1800 rpm) as loads are decreased to 40 watts or less.

ECONO THROTTLE SWITCH

The Econo Throttle ON/OFF switch gives you the option of bypassing the Econo Throttle circuit. By turning the Econo Throttle switch to the OFF position, the engine will run at full speed, if, for certain applications the Econo Throttle is not needed or a fault is found in the Econo Throttle circuitry, turn the switch to the "OFF" position.

ADJUSTMENTS

KOHLER POWERED (3.5-5 kW)—See Figure 2-27

1. Start engine and warm to normal operating temperatures.

2. Loosen two screws securing plate to governor arm, and push arm toward carburetor until throttle crank stops against idle speed screw.

3. Turn idle speed screw reducing engine speed. Make final idle speed adjustment measuring AC voltage output at receptacles.See Figure 2-28. Adjust idle speed to obtain a reading of 60-75 volts on 3.5 and 5 kW models.

4. With governor arm and throttle plate held in idle position, push plate against solenoid and tighten screw securing plate to governor arm. See Figure 2-27. On 3.5 and 5 kW models, the slotted portion of plate must be installed away from solenoid, as shown in Figure 2-27.

CAUTION: *Generator will overheat if run at 2000-2700 rpm for extended periods. Check idle speed to ensure unit does not run in that range. Example: 60 rpm* = 1 Hz.

BRIGGS & STRATTON POWERED (3.5-5 kW) See Figures 2-29 and 2-30

1. Start engine and warm to normal operating temperatures.

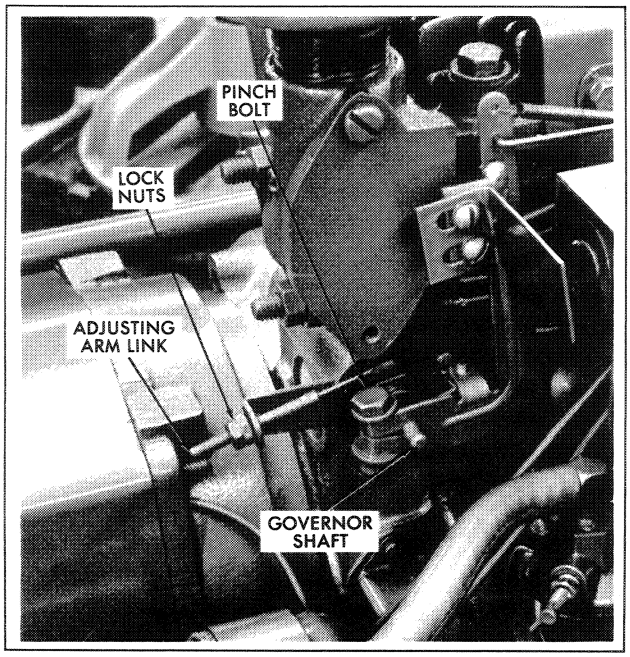


Figure 2-27. Idle Speed Adjustments—Kohler Powered, Typical

Figure 2-28. Idle Speed/Voltage Check

2. Loosen two screws securing solenoid bracket to governor control plate, rotate throttle shaft counterclockwise to idle speed screw stop.

3. Turn idle speed screw, reducing engine speed. Make final idle speed adjustment measuring AC voltage at output receptacles. See Figure 2-28. Adjust speed to obtain reading of 60-75 volts.

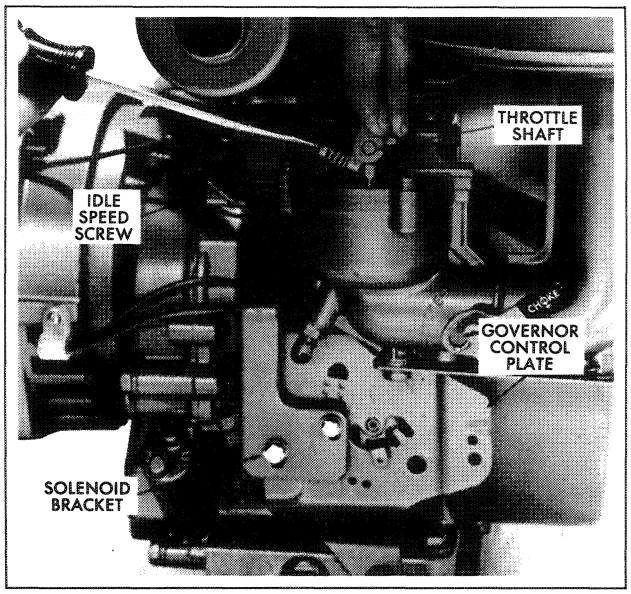


Figure 2-29. Idle Speed Adjustments—Briggs & Stratton Powered

4. With governor arm held in idle position, move solenoid bracket to contact plate on governor arm, and tighten two screws securing solenoid bracket to governor control plate. Check AC voltage to see that 60-75 volts reading is obtained. If the specified voltage cannot be obtained bend plate on governor arm either up or down for better contact and readjust solenoid bracket.

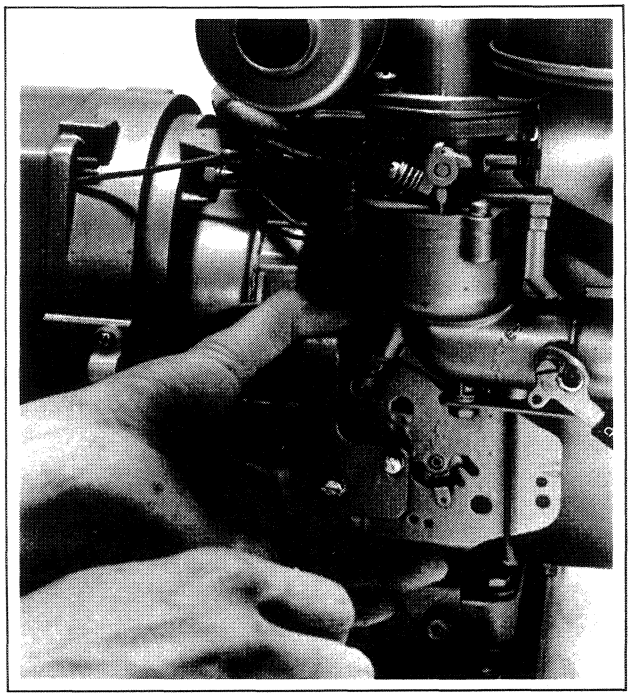


Figure 2-30. Solenoid Bracket Adjustment—Briggs & Stratton Powered

CAUTION: *Generator will overheat if run at 2000 to 2700 rmp for extended periods. Check idle speed to ensure unit does not run in that range. Example: 60 rpm* = 1 Hz.

ECONO THROTTLE TROUBLESHOOTING

PROBLEM: ENGINE WILL NOT IDLE		
Cause	**Correction**	**Reference**
Carburetor idle speed screw turned in too far.	Adjust idle speed to proper idle output voltage.	See "Adjustments" Kohler or Briggs and Stratton, Powered Page 16.
Improper governor arm plate — solenoid adjustment.	Adjust idle speed to proper idle output voltage. Adjust plate position. Adjust idle speed to proper idle output voltage. Adjust solenoid bracket position	See "Adjustments" Kohler Powered, Page 17. See "Adjustments" Briggs and Stratton Powered, Page 17.
Governor—throttle linkage binding.	Ensure that throttle and governor arm move freely from idle to fully open position.	
Solenoid not magnetizing, *faulty solenoid* (separate inline connectors on solenoid leads, measure DC-V output from circuit board. Output should read 35-50 DC volts).	Replace solenoid.	
Open circuit or poor connection to circuit board, check harness and connector.	Repair or replace harness or connector.	
Faulty transformer (disconnect transformer, check for 35-50 DC-V output to solenoid; transformer resistance should be 35-63 ohms).	Replace transformer if DC-V output registers after disconnection, or transformer resistance is low.	See "Generator Disassembly," Page 13.
Faulty circuit board.	Test circuit board; replace if necessary.	See "Testing Circuit Board," Page 22.
IDLE SPEED TOO HIGH		
Idle speed screw turned in too far.	Adjust.	See "Adjustments," Page 16.
Governor arm plate improperly installed, or bent (Kohler Powered).	Adjust or repair as necessary.	See "Adjustments," Page 16.
Governor linkage binding or bent.	Adjust or replace.	See "Adjustments," Page 16.
Governor arm spring incorrectly installed (Briggs and Stratton Powered).	Spring must be hooked in hole between linkage and plate.	
Improper governor adjustment.	Adjust.	See "Governor," Page 17.
Poor contact between solenoid and governor arm plate.	Adjust.	See "Adjustments," Page 17.
Loose connections at circuit board or current transformer.	Inspect connections, repair or replace as necessary.	See Wiring diagram, Page 24.
Faulty circuit board.	Test circuit board, replace if necessary.	See "Testing Circuit Board," Page 22.

Cause	Correction	Reference
ENGINE REMAINS IDLE WHEN LOAD IS APPLIED		
Governor linkage binding.	Ensure that throttle and governor arm move freely from idle to fully open position.	
Load leads not routed through center of transformer.	Leads 1 and 3 must route through transformer in same direction.	See Wiring diagram, Section 8.
Faulty transformer.	Check transformer for open circuit, and resistance (53-63 ohms); replace if necessary.	
Faulty circuit board.	Test circuit board, replace if necessary.	See "Testing Circuit Board," Section 7.
Sudden load too great.	Reduce load to allow engine acceleration (throttle may open, indicating Econo circuit is working, but engine will "bog" if one-step load is too great).	

TESTING CIRCUIT BOARD

This test provides a direct method of checking econo throttle circuit board B-269195, in addition to judging circuit board performance on solenoid, wiring harness or current transformer tests. A defective circuit board could keep the engine at idle when load is applied.

Equipment Multimeter

120 Volt AC Power Supply
12 Volt DC Power Supply or Battery

1. With generator stopped, loosen receptacle panel from end bracket pulling out as far as leads allow. See "Generator Disassembly," Page 13.

2. Remove both black leads from transformer terminals. Refer to appropriate wiring diagram in Pages 24-28 for part and lead locations.

3. Disconnect two solenoid leads at connectors located within wiring harness (Pin extractor part number 241919). (See the appropriate wiring diagram on Pages 24-28).

   Equipment setting: Set multimeter to R x 10 ohm scale. "Zero" meter by touching probe tips together. Adjust for zero ohms.

4. Touch probes between two solenoid leads to circuit board (terminals on end of lead). See Figure 2-31. Resistance should measure 150 to 330 ohms. Reverse leads. Resistance reading should be 1900 to 2100 ohms. If necessary, cut leads and install insulated inline connectors to make test.

   Equipment setting: Set multimeter to R x 1K scale. "Zero" meter by touching probe tips together. Adjust for zero ohms.

5. Connect black leads removed from transformer to meter. See Figure 2-31. Resistance should measure 10,000 to 15,000 ohms.

   NOTE: *If resistance readings do not coincide with those specified in steps 4 and 5, circuit board is defective. Proceed to step 6 if resistances are as specified.*

SAFETY WARNING: *HIGH VOLTAGE! Remember the function of a generator set is to produce electricity and whenever electrical energy is present, there's the potential danger of electrocution. Do not touch electrical equipment when standing in water or on wet ground or when your hands are wet.*

6. Remove complete end bracket assembly from generator. See "Generator Disassembly," Section 6.

7. Disconnect two brown leads at AC terminals of voltage regulator. Connect 120 volt AC power source to the two brown leads. See Figure 2-31.

   Equipment setting: Set multimeter at DC volts position, 100 volt range.

8. To determine polarity, momentarily connect DC voltmeter to the two white leads while observing meter deflection — reverse meter leads if necessary. Voltage should measure 35 to 45 volts DC.

9. Apply 12 volt DC supply to the two black leads leaving AC supply connected to brown leads and DC voltmeter connected to white leads. Voltage reading should fall to zero. Remove DC supply from black leads. Voltage reading should return to 35-45 volt range.

   NOTE: *If voltage tests do not coincide with steps 8 and 9, replace circuit board.*

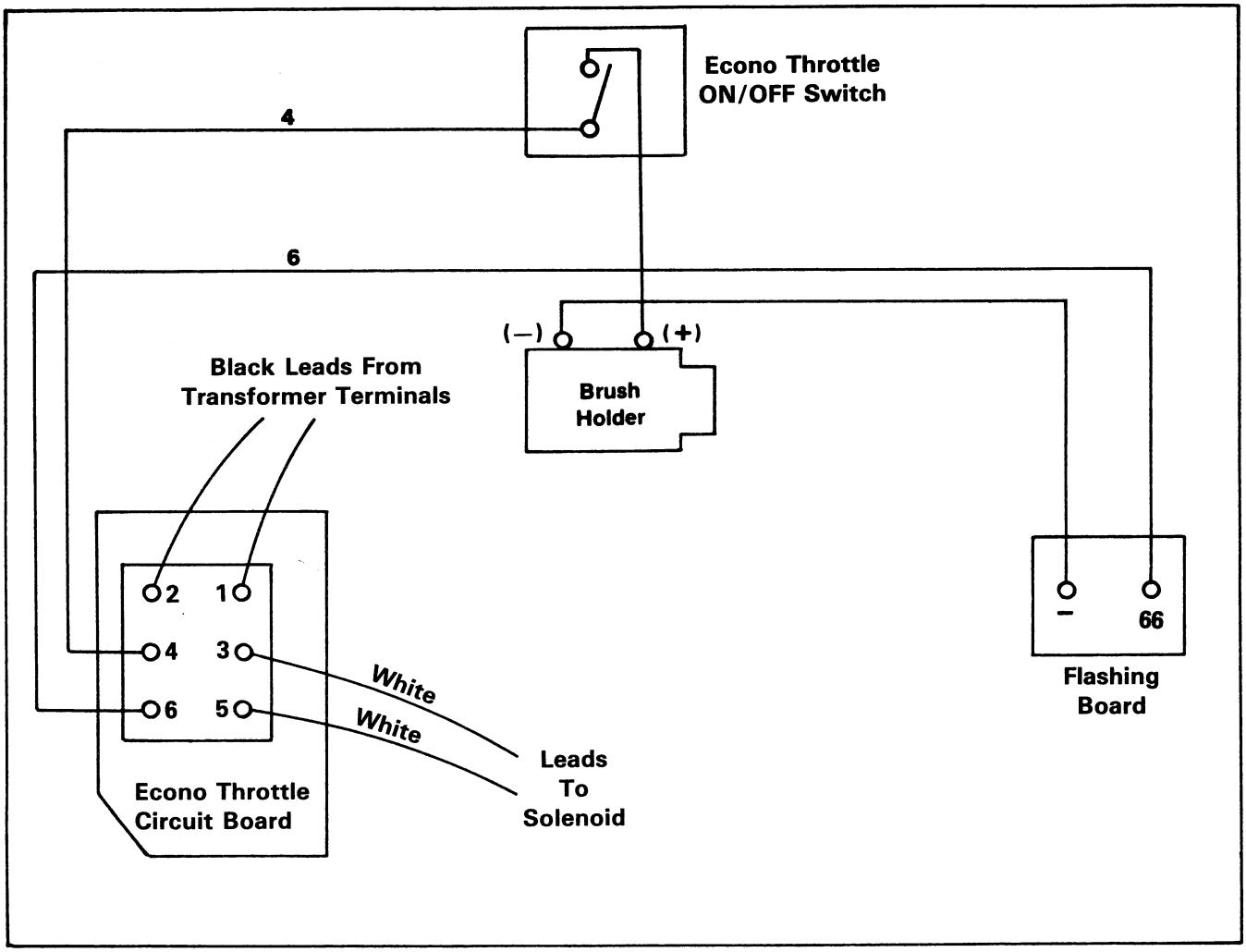
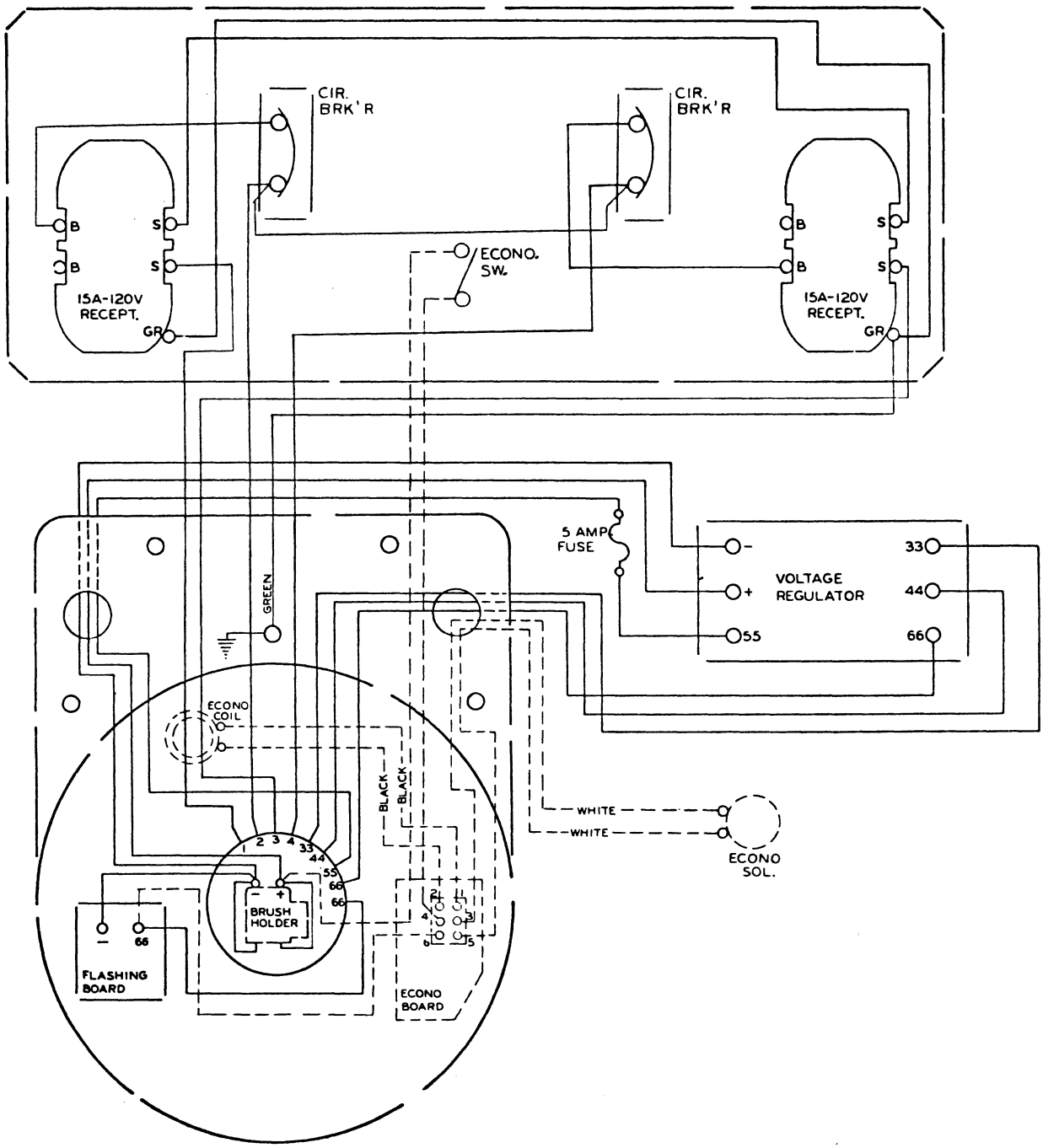


Figure 2-31. Econo Throttle Circuit

Wiring Diagrams



Model 2.25 and 3.5 kW Models - 120 Volt With or Without Econo-Throttle