

RV GENERATOR SERVICE MANUAL

**“LOW PROFILE”
MODEL: 7CMZ21**



KOHLER
GENERATORS

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INTRODUCTION

This manual covers the operation, maintenance, troubleshooting and repair of the 7CMZ21-RV Low Profile Generator. Read through this manual and carefully follow all

recommendations and safety precautions to ensure proper generator operation and to avoid serious bodily injury.

SERVICE ASSISTANCE

See the Yellow Pages under GENERATOR — Electric for your closest Kohler Generator Dealer or contact your local RV Service Center. Provide MODEL, SPECIFICA-

TION, SERIAL, and ENGINE SERIAL numbers from generator nameplate to receive current parts and information for your generator.

SAFETY PRECAUTIONS

A Generator Set, like any other electro-mechanical device, can pose potential dangers to life and limb if improperly maintained or imprudently operated. The best safeguards against accident are to be ever mindful of the potential dangers and to always use good common sense. In the interest of safety, some general precautions relating to operation of a Generator Set are presented below. Keep these in mind.

WARNING

LETHAL EXHAUST GAS! An engine discharges deadly carbon monoxide as part of the exhaust when operating. Carbon monoxide is particularly dangerous in that it is an odorless, tasteless, and non-irritating gas, but be ever mindful that it can cause death if inhaled for even a short period of time. Have only qualified specialists install and replace exhaust system components and have the system inspected frequently. Be careful when parking your coach to avoid obstructing the exhaust outlet. The exhaust gases must discharge freely, otherwise carbon monoxide may deflect under and into the vehicle or enter through open doors, windows, or vents. Also make sure that your exhaust cannot be discharged toward neighboring RV's, campers, or any occupied building. Be especially watchful for exhaust accumulation under calm, windless conditions.

WARNING

ELECTRICAL SHOCK! Battery can cause electrical burns and shocks. Exercise reasonable care when working near the battery to avoid electrical connections through tools. Remove wristwatch, rings, and any other jewelry.

WARNING

EXCESSIVE NOISE! Never operate without adequate muffler or with faulty exhaust system — exposure to excessive noise is not only tiring, but can lead to impairment of hearing.

WARNING

HOT PIPING! An engine gets hot while running and exhaust system components get extremely hot. Do not work on generator set until unit is allowed to cool.

WARNING

UNIT STARTS WITHOUT NOTICE! To prevent accidental starting on units with a remote start/stop switch, always disconnect battery (remove negative lead first and reconnect it last) to disable generator set before working on any equipment connected to generator.

WARNING

FIRE HAZARD! Be careful when parking your RV to prevent grass fires started by hot exhaust gases and exhaust system. Keep away from hot engine and generator parts to avoid burning yourself.

WARNING

HIGH VOLTAGE! Remember that the function of a generator set is to produce electricity and that wherever electricity is present, there is the potential danger of electrocution. Take the same precautions with electrical appliances in your coach that you would observe in your home. Keep away from electrical circuits and wiring while the set is running and have electrical service performed only by qualified electricians. Make sure unqualified persons, especially children, cannot gain access to your set — keep the compartment door locked or securely latched at all times. Be sure that generator is properly grounded. Never touch electrical leads or appliances with wet hands, when standing in water, or on wet ground, as the chance of electrocution is especially prevalent under such conditions.

 **WARNING**

DANGEROUS ACID! Avoid contact with battery electrolyte. It contains acid which can eat holes in clothing, burn skin, and cause permanent damage to eyes. Always wear splash-proof safety goggles when working around the battery. If battery electrolyte is splashed in the eyes or on skin, immediately flush the affected area for 15 minutes with large quantities of clean water. In the case of eye contact, seek immediate medical aid. Never add acid to a battery once the battery has been placed in service. Doing so may result in dangerous spattering of electrolyte.

 **WARNING**

EXPLOSIVE BATTERY GASES! The gases generated by a battery being charged are highly explosive. Do not smoke or permit flame or spark to occur near a battery at any time, particularly when it is being charged. Avoid contacting terminals with tools, etc., to prevent burns and to prevent sparks that could cause an explosion. Remove wristwatch, rings and any other jewelry before handling battery. Any compartment containing batteries should be well ventilated to prevent accumulation of explosive gases. To avoid sparks, do not disturb battery charger connections while battery is being charged and always turn charger off before disconnecting battery connections. Turn automotive test equipment off when connecting or removing battery clips. When removing or reconnecting battery cables, make sure ignition switch and all accessories are turned off.

 **WARNING**

FLASH FIRE! A sudden flash fire can cause serious burns. To avoid the possibility of a flash fire, do not smoke or permit flame or spark to occur near carburetor, fuel line, fuel filter, fuel pump, or other potential sources of spilled fuel or fuel vapors.

 **WARNING**

MARINE APPLICATIONS! RV generator sets do not comply with United States Coast Guard (USCG) requirements and must not be used for marine applications. Use only generator sets specified for marine use in marine installations. USCG Regulation 33CFR183 requires a generator set to be "ignition protected" when used in a gasoline-fueled environment.

 **WARNING**

UNINTENTIONAL STARTING! To prevent accidental starting, disconnect battery (remove negative lead first and reconnect it last) and remove spark plug lead(s) at spark plug(s).

 **WARNING**

BACKFIRE! A sudden backfire can cause serious burns. Keep hands and face away from carburetor when the air cleaner is removed.

 **WARNING**

DANGEROUS FUELS! Use extreme caution when handling, storing, and using fuels — all fuels are highly explosive in a vapor state. Store fuel in a well ventilated area away from spark producing equipment and out of the reach of children. Never add fuel to the tank while the engine is running to prevent spilled fuel from igniting on contact with hot parts or from ignition spark. Keep fuel lines and connections tight and in good condition — don't replace flexible fuel lines with rigid lines. Flexible sections are used to avoid breakage due to vibration. Should any fuel leakage, fuel accumulation, or electrical sparks be noted, **DO NOT OPERATE GENERATOR SET.** Have systems repaired by qualified specialists before resuming generator operation. Additional precautions should be taken when using the following fuel:

Gasoline: Store gasoline only in approved red containers clearly marked GASOLINE. Don't store gasoline in any occupied building.

 **WARNING**

MOVING PARTS! Do not open generator set compartment door when unit is running, except for servicing by qualified specialists. Keep hands, feet, and clothing away from belts and related pulleys when unit is running. Replace guards, covers, and screens (if used) before operating generator set.

 **WARNING**

EXPLOSIVE BATTERY GASES! The gases generated by a battery being charged are highly explosive. Do not smoke or permit flame or spark to occur near a battery at any time, particularly when it is being charged. Any compartment containing batteries should be well ventilated to prevent accumulation of explosive gases. Do not mount battery in generator compartment.

 **WARNING**

LETHAL EXHAUST GAS! Do not use flexible tail piping as this type could crack or break and allow lethal exhaust fumes to enter the vehicle.

 **WARNING**

FIRE HAZARD! Keep the compartment and generator set clean and free of debris and combustible materials to minimize chances of fire. An opening is provided in the mounting tray of each set as a safety feature to allow any fuel or oil that might possibly leak out of the system to drain out of the compartment — make sure this opening is not blocked in any way.

 **WARNING**

HIGH VOLTAGE! When testing the capacitor, high voltage is present. Use caution when handling the capacitor; possible electrical shock can result. Discharge capacitor by shorting terminals together.

 **WARNING**

ELECTRICAL SHOCK! When flashing your generator set, 120 Volts AC will be present at the alligator clips when the pushbutton is pressed. Use caution when handling or electric shock could result.

 **WARNING**

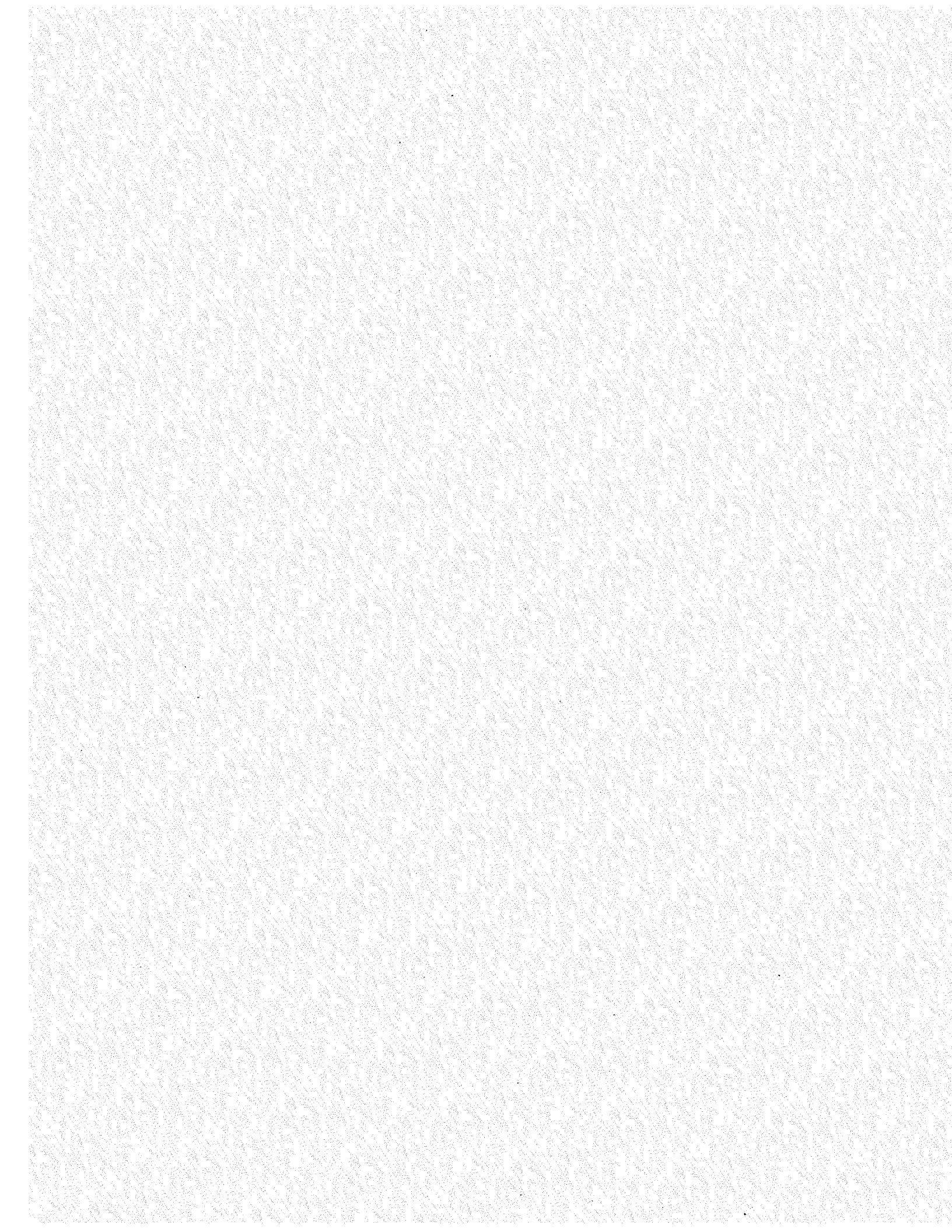
ELECTROCUTION! Your RV generator set must not be used to "backfeed" by connecting it to building/campground electrical circuits. Doing so can cause serious injury or death to utility personnel working on utility transmission lines and may also seriously injure persons in your household. Unauthorized connection may be unlawful in some states and/or localities. A transfer switch must be installed in the RV to prevent interconnection of generator and outside source of power.

 **WARNING**

LOOSE COMPONENTS! When turning rotor for breaker point adjustment, do not rotate thru-bolt/crankshaft counterclockwise. Doing so can loosen thru-bolt and result in serious personal injury when the unit is running.

 **WARNING**

EXPLOSION! Use generator sets specified for RV use in RV installations only.



SECTION 1. SPECIFICATIONS

Engine

The 7kW Low Profile generator is powered by a Kohler K-582 two cylinder, four-cycle, air-cooled gasoline engine. Some general specifications are listed below. Refer to the appropriate service section and the engine service manual for specific service details.

Oil Pressure	30-50 psi (3.4-5.6 Nm)
Number of Cylinders	2
Bore x Stroke	3.50 in. x 3.0 in. (88.9 mm x 76.2 mm)
Displacement	57.7 cu. in. (945.7 cc)
Compression Ratio	7:1
Horsepower	13.8
RPM	1800
Lube Oil Capacity	4.0 U.S. qts. (3.78 L)
Cylinder Head Tightening Torque ...	35 ft. lbs. (47 Nm)
Valve Clearance	
Intake008/.010 in. (.202/.253 mm)
Exhaust017/.020 in. (.430/.506 mm)
Battery Voltage	12 Volts
Battery Recommendation ...	290 Cold Cranking Amps. (55 Amp. Hr.)
Direction of Rotation	
(as viewed from generator end)	Counterclockwise
Fuel Type	Gasoline Regular Grade Leaded or Unleaded — Minimum Octane 86
Oil Type (API)	SC, SD, SE or SF
Spark Plug Type	Champion RH10
Spark Plug Size	0.56 in. (14 mm)
Spark Plug Gap025 in. (0.64 mm)
Spark Plug Tightening Torque	18/22 ft. lbs. (24-30 Nm)

Generator

The generator is direct-mounted to the engine for permanent alignment. It features safeguard circuit breakers

to protect against damage due to overload. This single-phase generator produces 7000 Watt, 120 Volt, 58.0 Amp. Alternating Current. (The 6 kW model produces 6000 Watt, 120 Volt, 50 Amp. Alternating Current.)

DERATION: The kilowatts of the generator set will decrease 3% for each 1000 feet (305 meters) above sea level and 2% (6kW model - 1%) for each 10°F (5.5°C) above 60°F (16°C).

Rated kW, 60 Hz (Standard Model)	7.0
Rated kW, 60 Hz (6 kW Model)	6.0
Rated Voltage	120
Rated Amperes, 120 Volt (Standard Model)	58.0
Rated Amperes, 120 Volt (6 kW Model)	50.0
Rotor Resistance (Ohms)	5.2
Stator Resistance (Ohms)	
1-2, 3-421
55-66	1.4
B1-B208
Coupling Type	Tapered Shaft, Thru-Bolt
Thru-Bolt Torque	50 ft. lbs. (68 Nm)
Over-Bolt Torque	70 in. lbs. (8 Nm)
Excitation Method	Brushless, Exciter Winding/Capacitor

Controller

The Kohler relay controller has a rocker type momentary contact START/STOP switch for test operating the set at the controller. The controller includes a keyed connector for operating the generator from a remote switch located inside the vehicle. The green "GENERATOR ON" lamp on the optional remote control panel will light whenever AC output is available from the generator. If the generator set has automatically stopped due to low oil pressure, 14 psi ± 2 psi (96 kPa) or less, the cause must be eliminated before the set can be restarted. For a description of the controller, see "Controller Features."

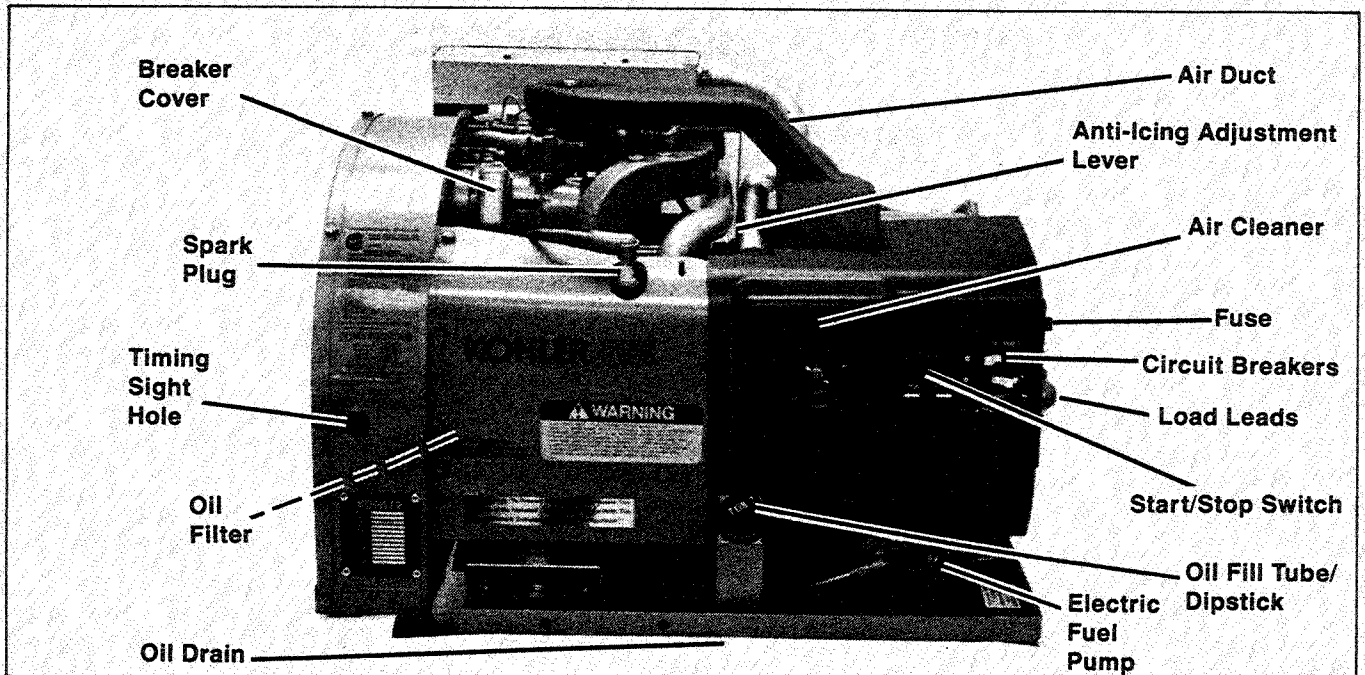


Figure 1-1. Service View

SECTION 2. OPERATION

Prestart Checklist

To ensure continued satisfactory operation, the following items should be checked before each start-up.

OIL LEVEL: Should be at or near FULL mark (not over) on dipstick.

NOTE

When checking lube oil level, do not thread oil cap/dipstick assembly into shaft. Accurate oil level readings are only obtained with the oil cap resting on the oil shaft collar.

AIR INLETS: Must be clear and unobstructed.

COMPARTMENT: Interior must be clean.

AIR CLEANER: Must be clean and properly installed.

AIR SHROUDING: Must be tight and in proper position.

EXHAUST: Tail pipe must be clear; muffler and piping tight and in good condition.

ELECTRICAL: All connections (including battery) must be tight.

Controller Features

For identification and function of controller components refer to Figure 2-1.

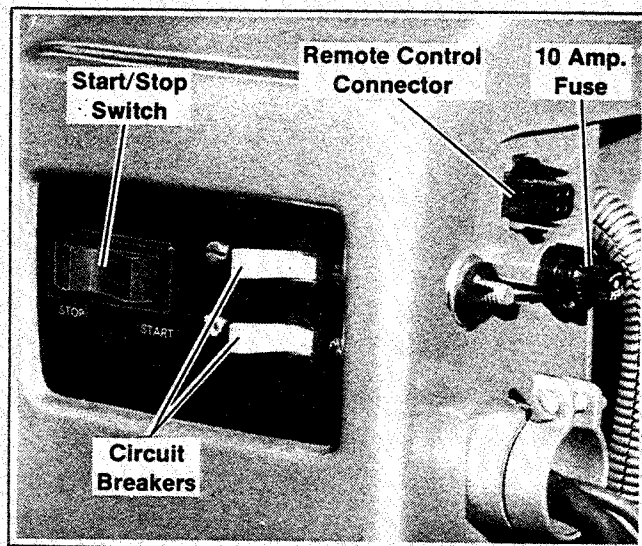


Figure 2-1. Controller

1. Start/Stop Switch: Allows test at generator set — refer to "Starting" and "Stopping" paragraphs following.
2. AC Circuit Breakers: Protect generator from damage due to overload or short circuits (See "Circuit Protection").
3. Remote Control Connector: Allows connection of remote start/stop panel. See "Remote Start Panel Features" (optional).

4. Fuse: 10 Amp. fuse protects controller circuitry and wire harness against short circuits and overloads.

Remote Start Panel Features (Optional)

Remote panel components are identified in Figure 2-2.

1. Start/Stop Switch: Provides remote operation of generator set — refer to "Starting" and "Stopping".
2. Generator "ON" Light: A green light on the switch indicates the generator is running and producing AC output.
3. Hourmeter: Records number of hours run so routine servicing can be scheduled at recommended maintenance intervals.

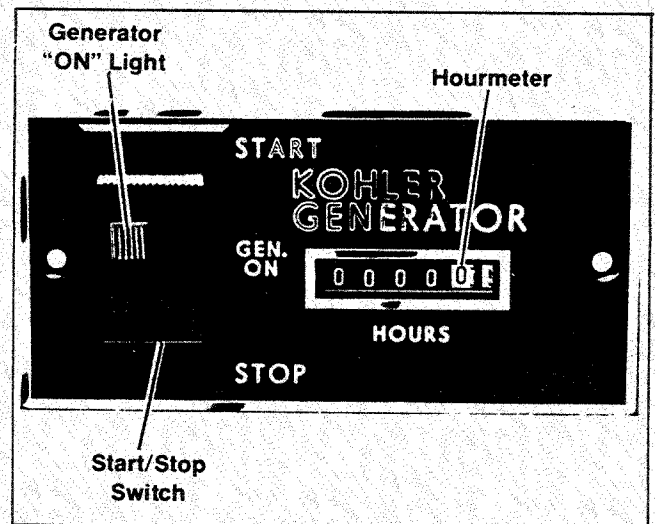


Figure 2-2. Remote Panel (Optional)

Starting

Move the rocker switch on controller or remote panel to the "START" position. Hold in this position until the engine starts, then release. Normally, the engine will start within 2 seconds. However, if it fails to start after cranking for 5 seconds, release the switch. The green "ON" light located on remote panel will light when the generator set is running. Wait for the engine to come to a complete halt before making a restart attempt. If the flywheel ring gear is still rotating when the starter pinion gear is engaged, the pinion gear and ring gear will clash which may damage the ring gear teeth.

CAUTION

Do not crank engine continuously for more than 10 seconds at a time. A 60 second cool-down period must be allowed between cranking attempts if the engine does not start. If the unit fails to start after three attempts, contact an Authorized Service Dealer for repair. Failure to follow these guidelines may result in burn-out of the starter motor.

Later model generators are equipped with anti-icing devices designed to improve cold weather operation. When operating the generator at temperatures below 40° F (4° C) with high humidity, move the anti-icing adjustment lever to the "Winter" position. (The adjustment lever is located near the engine air cleaner as shown in Figure 2-3.) At temperatures above 70° F (21° C) move the adjustment lever to the "Summer" position. Between 40° F (4° C) and 70° F (21° C), the adjustment lever may be left in either position.

CAUTION

At temperatures above 70° F (21° C), operation of the generator set with the adjustment lever in "Winter" position will result in decreased generator set output.

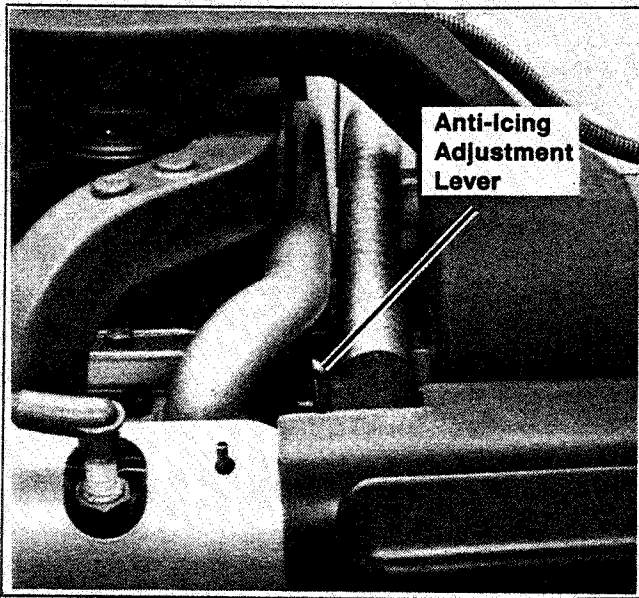


Figure 2-3. Anti-Icing Adjustment Lever

Stopping

Run generator at low or no load for several minutes to allow engine cool-down. Move rocker switch to "STOP" position and hold until generator comes to a complete halt.

Circuit Protection

Two circuit breakers located in the controller (Figure 2-1) protect the generator set from damage due to overload or short circuits. The Standard model is equipped with two 30 Amp. circuit breakers. The 6 kW model uses one 30 Amp. and one 20 Amp. circuit breaker. If the circuit breakers trip, reduce the load and switch the breakers back to the "ON" position. With the breakers in the "OFF" position, the engine will run but there will be no output voltage.

The controller circuitry and wiring harness is also protected by a replaceable 10 Amp fuse. If circuit breakers trip or fuse blows repeatedly, refer to Section 7. Component Testing to determine source of trouble.

Engine Shutdown

The engine is protected by a low oil pressure shutdown switch. The engine will automatically shutdown when the oil pressure drops below 14 psi \pm 2 psi (97 kPa). The switch will reset after the problem has been corrected. See Figure 2-4 for switch location.

NOTE

This switch is not a low oil level switch. It does not protect against damage due to operating with the oil level below the safe range.

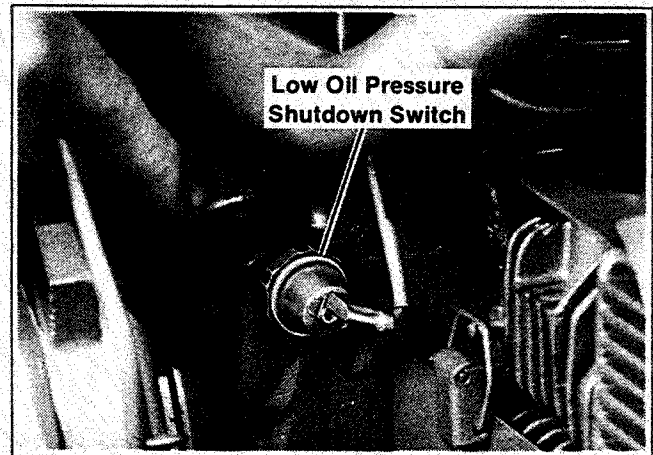


Figure 2-4. Low Oil Pressure Shutdown Switch

SECTION 3. SCHEDULED MAINTENANCE

General

Schedule routine maintenance using the "Service Schedule" following and the hourmeter located on the optional remote panel (see "Remote Start Panel Features"). If the generator will be subject to extreme operating conditions, service unit accordingly.

WARNING

UNIT STARTS WITHOUT NOTICE! To prevent accidental starting on units with a remote start/stop switch, disconnect battery (remove negative lead first and reconnect it last) to disable generator set before working on any equipment connected to generator.

NOTE

For maintenance work on engine components, refer to the appropriate Kohler engine service manual.

Service Schedule

Perform Service at Intervals Indicated (X)	Before Each Start-Up	Every 50 Hours or 6 Months	Every 100 Hours or 12 Months	Every 500 Hours
Check exhaust outlet	X			
Check oil level	X			
Check fuel supply	X			
Keep cooling air inlets and outlets clean	X			
Remove loose dirt from compartment	X			
Check electrolyte level in battery	X			
Clean engine external surfaces			X	
Check air cleaner (replace if dirty)			X	
Change lube oil (change oil initially after first five hours of operation)			X	
Replace lube filter			X	
Service fuel pump filter			X	
Service or replace spark plugs			X	
Check battery specific gravity			X	
Check and tighten electrical connections			X	
Blow dust out of generator			X	
Check and service breaker points			X	
Check valve-tappet clearance				X
Service cylinder heads				X
Check ignition timing				X
Check compression				X
Check and tighten mounting bolts and vibro-mounts				X
Service crankcase breather				X
Service starting motor and drive				X
Check remote control operation (initial check after 50 hours)				X

NOTE

Unleaded gasoline is recommended. If leaded gasoline is used, service cylinder heads every 250 hours.

Lubrication

Your engine has a positive pressure lubrication system and low oil pressure shutdown.

CAUTION

The low oil pressure shutdown feature protects the engine against internal damage in the event the oil pressure drops below 14 psi \pm 2psi (96.5 kPa) due to oil pump fault or other malfunction. It does not protect against damage due to operating with the oil level below the safe range — it is not a low oil level shutdown. The only protection against running out of oil is to check the oil level regularly and to add oil as needed.

Oil Check

Check crankcase oil level daily or before each start. To check oil level, remove oil cap/dipstick assembly and wipe dipstick clean. Reposition dipstick in crankcase but do not thread oil cap into shaft. Accurate oil level readings are only obtained with the oil cap resting on the oil shaft collar. Oil level should read between "L" and "F" on dipstick. See Figure 3-1. Do not operate set if oil level exceeds "F" or registers below "L" on dipstick.

CAUTION

Do not check oil level when the set is in operation. Engine must be stopped.

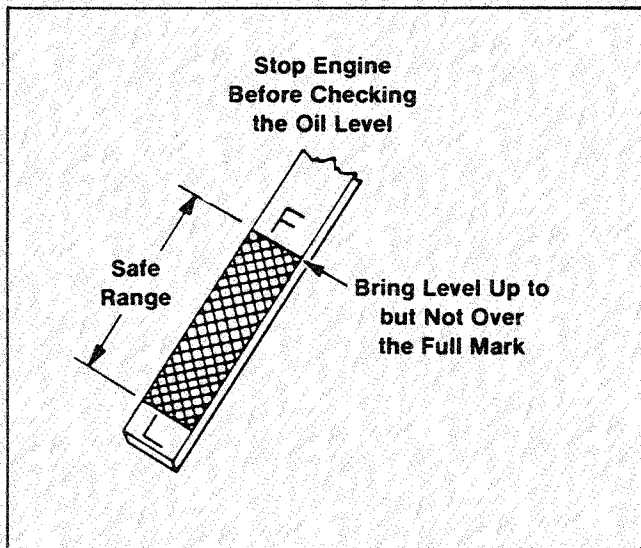


Figure 3-1. Lube Oil Level

Oil Change

Break-in Period Oil Recommendations

Generator set engines are shipped "dry"; the oil used in factory testing having been drained. Before operating a new set, the engine crankcase should be filled to specified capacity with a straight-weight, non-detergent oil having a

viscosity appropriate for your particular climate. Do not use synthetic oils during the first five hours of operation or the rings may not seat properly. This oil should be drained immediately after the first five hours of operation and replaced with the oil recommended for normal use. See "OIL TYPE."

On a new engine, change the oil after the first five hours of operation and thereafter at 100 hour intervals or every 12 months, whichever occurs first. Replace the oil filter (Kohler filter 52 050 02) at every oil change. Whenever possible, drain the oil while it is still warm. To drain, place container below unit and remove the oil drain plug located directly beneath the dipstick assembly. Allow adequate time for generator to drain completely. If the filter is being replaced, remove enclosure cover to expose oil filter. Remove filter by rotating filter counterclockwise with an oil filter wrench. After draining, replace drain plug then install replacement filter if applicable. Before reinstalling replacement filter, apply a light coating of oil to the rubber seal at the base of the filter. Add new oil of proper weight and grade as specified under "OIL TYPE" following. After restarting, check the area around the filter for evidence of leakage — tighten filter if needed to stop leakage.

Oil Refill Capacity 4 U.S. Quarts (3.8 L)*

*Additional 1/2 pint (0.23 L) required when filter is replaced.

RECOMMENDED SAE VISCOSITY GRADES

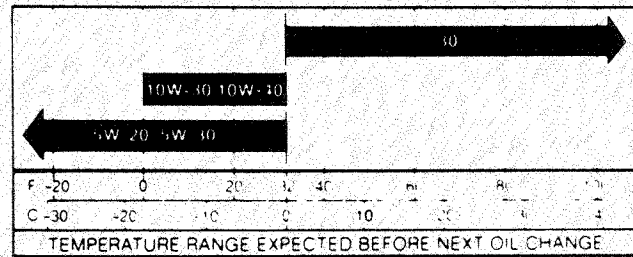


Figure 3-2. Recommended SAE Viscosity Grades

Oil Type

High quality detergent oils meeting the requirements of SAE service class SC, SD, SE and SF are recommended for use in the Kohler K-582 engine. Use straight weight oils as specified. Do not use multi-viscosity oils above 32° F or increased oil consumption and combustion deposits will result. Base oil weight selection on air temperature at time of operation. Consult the above chart to select proper weight oil.

Ignition System

Spark Plugs

Every 100 hours remove both spark plugs and check condition. Reset gap or replace plug if needed. Proper generator operation is indicated by a light deposit of gray or tan

material on plug electrodes. A dead-white, blistered coating could indicate overheating. A black (carbon) coating may indicate an "overrich" fuel mixture caused by a clogged air cleaner or improper carburetor adjustment.

NOTE

Do not sandblast, wire brush, scrape, or otherwise service plug in poor condition — best results are obtained with a new plug. Use only resistor type plugs. Set spark plug gap at .025 in. (0.64 mm). Tighten plug to 18-22 ft. lbs. (24-30 Nm) when installing.

Breaker Points Adjustment

WARNING

UNINTENTIONAL STARTING! To prevent accidental starting during breaker point adjustment, disconnect battery (remove negative lead first and reconnect it last) and remove spark plug lead(s) at spark plug(s).

Every 100 hours the breaker points should be inspected and serviced. If oxidized, dirty or oily, clean with coarse cloth — do not use emery cloth or sandpaper. Replace badly pitted or burned points. The gap must be adjusted after points are serviced or replaced since this setting establishes ignition timing. Read the following procedure before beginning the adjustment.

1. Disconnect battery (negative lead first) and remove the spark plug leads to prevent unintentional starting.
2. Remove the breaker point cover. See Figure 3-3.

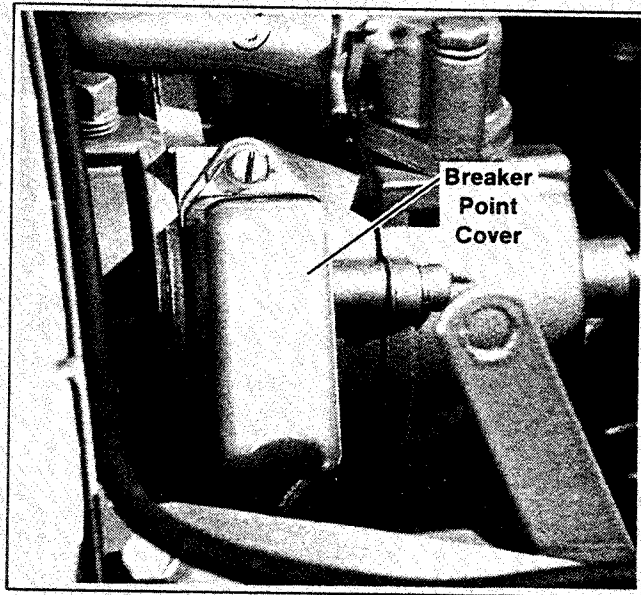


Figure 3-3. Breaker Point Cover

3. Using a 3/4 in. socket wrench, rotate the rotor thru bolt clockwise until the points reach the maximum opening. See Figure 3-4.

WARNING

LOOSE COMPONENTS! When turning rotor for breaker point adjustment, do not rotate thru bolt/crankshaft counterclockwise. Doing so can loosen thru bolt and result in serious personal injury when unit is running.

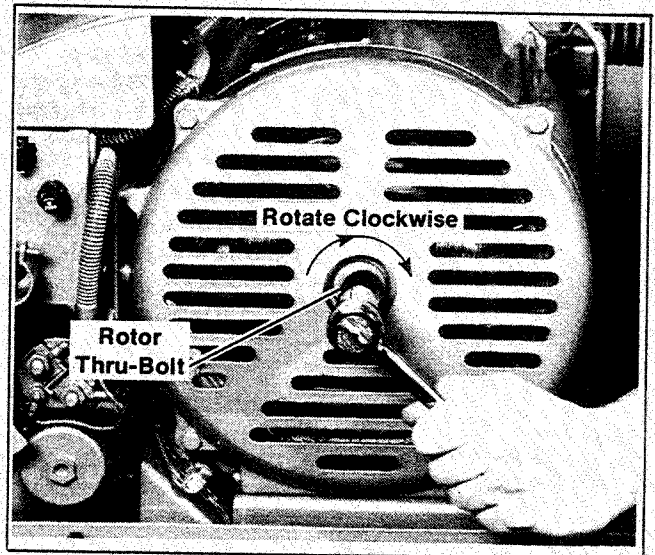


Figure 3-4. Rotating Rotor for Breaker Point Adjustment

4. Measure the gap with a feeler gauge. The gap at full open should be .020 inch (.51 mm). If not, loosen the point gap adjustment screw with an offset screwdriver or an allen wrench. Adjust the gap to .020 in. (.51 mm) by inserting a screwdriver blade in the adjusting notch and shifting the movable plate. See Figure 3-5. Securely tighten the adjusting screw after setting the gap.

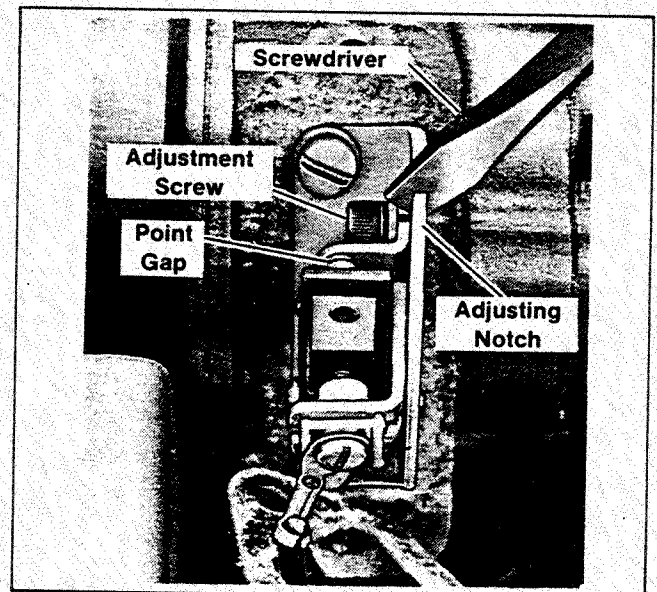


Figure 3-5. Breaker Point Gap Adjustment

5. Replace the breaker point cover.
6. Reconnect battery (negative lead last) and reconnect the spark plug leads.
7. Follow up with the final or precision adjustment using a timing light.

Timing

The governor includes an automatic spark advance retard mechanism. Retard is 8° BTDC while the advance point is 19° BTDC. Timing is changed by shifting position of the governor and should not require adjustment unless the governor has been removed. **FINAL TIMING IS MADE WITH A TIMING LIGHT AND SHOULD BE DONE BY QUALIFIED SERVICE SPECIALIST ONLY — THE FOLLOWING IS OFFERED AS A GUIDE TO THE SPECIALIST.** Set breaker point gap per above procedure then connect timing light leads per instructions included with light — timing can be done on either cylinder. Before starting, rotate engine until "SP" mark is observed in timing sight hole — chalk mark the line for easy reading. Start engine and operate at 1800 RPM. Aim timing light into sight hole — light should flash just as "SP" mark lines up with the timing pointer inside the blower housing. If light flashes before mark is centered, timing is over-advanced. If light flashes after mark is centered, timing is retarded. To adjust, loosen (do not remove) governor flange mounting screws (Figure 3-6) and shift or rotate governor assembly until timing mark is exactly centered as light flashes. Retighten flange mounting screws after exact timing is achieved.

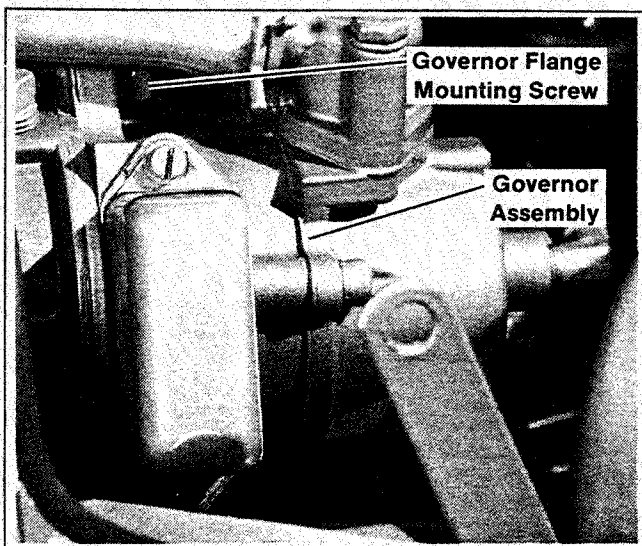


Figure 3-6. Timing Adjustment

Fuel System

Fuel Specifications

For best results, use only clean fresh, regular grade unleaded gasoline with a pump sticker octane rating of 86 or higher in the U.S.A. In countries using the research rating method, it should be 90 octane minimum.

Unleaded gasoline is recommended since it leaves fewer combustion deposits. Regular grade leaded gasoline may also be used; however, be aware that the combustion chamber and cylinder head will require more frequent service. Do not use gasahol or valve and carburetor damage will occur. Oil must not be mixed with the fuel.

Use fresh gasoline to ensure it is blended for the season and to reduce the formation of gum deposits which could clog the system. Do not use gasoline left over from the previous season.

Fuel Filter Service

The electric fuel pump (Figure 3-7) has a built-in filter which should be cleaned every 100 hours of operation. Remove the pump cover to remove the filter. Swish the filter in cleaning solvent or in fresh, clean gasoline. Wipe the magnet (if used) and internal surfaces with a clean rag before reassembling.

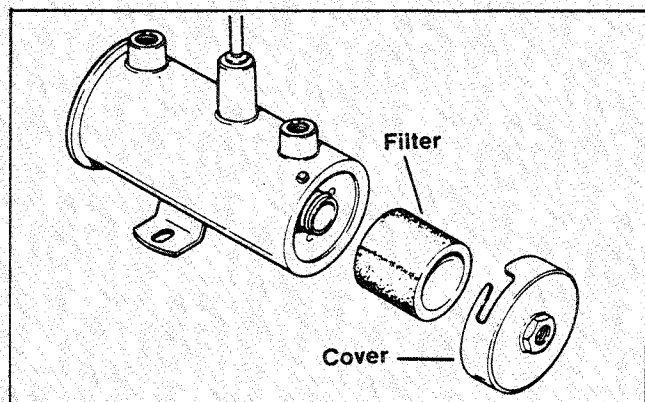


Figure 3-7. Electric Fuel Pump

Carburetor Adjustments

Lack of power and black sooty exhaust smoke usually indicate that the fuel mixture is too rich. An overrich mixture may be caused by a clogged air cleaner or improperly adjusted choke. Always check the air cleaner before readjusting the choke or carburetor. If the engine skips (misses) or backfires, the fuel mixture may be too lean. To locate adjustment screws refer to Figure 3-8.

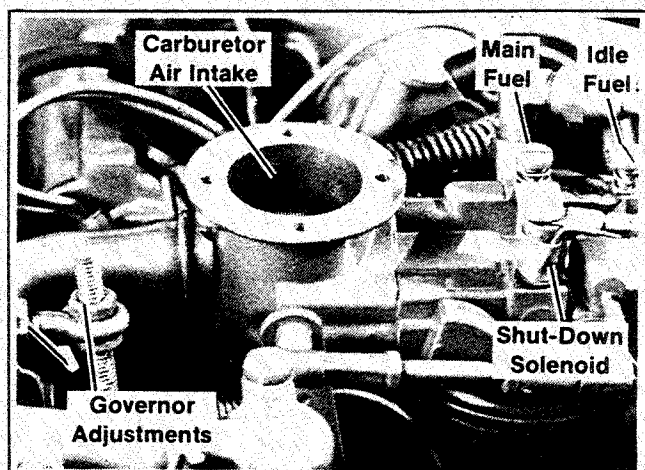


Figure 3-8. Carburetor Adjustment Screws

Main Fuel Mixture

For preliminary setting turn the MAIN FUEL screw in a clockwise direction until it bottoms lightly (do not force), then back out 2-1/2 turns. With engine thoroughly warmed up and running at rated rpm under full load, turn MAIN FUEL screw in until the engine slows down (lean setting) then turn screw out until the engine regains speed and then starts to slow down (overrich setting). Turn the screw back in until it is positioned halfway between lean and overrich settings. When properly adjusted, the engine will operate with steady governor action.

Idle Fuel Mixture

The idle system functions only as the engine comes up through idle range. For this reason, the idle setting has only a momentary effect. To adjust, stop the engine and then turn the IDLE FUEL needle all the way in (clockwise) until it bottoms lightly (do not force) then back out 2-1/2 turns. No further adjustment is needed.

Shut-Down Solenoid

After running with a heavy load, engines tend to continue running (diesel) after the switch is moved to the stop position. To prevent this, the carburetor on your engine is equipped with a shut-down solenoid (Figure 3-9) which stops all flow of fuel when the switch is moved to the stop position. When the engine is running, battery current through the solenoid attracts and holds a plunger. When the switch is moved to the stop position, the solenoid de-energizes and releases the plunger in the carburetor to equalize pressure and stop all flow of fuel. Should the solenoid fail, fuel cannot flow and the set will not run. As a temporary fix, the plunger can be removed until the solenoid is replaced. To remove, first turn the main fuel screw in until it bottoms lightly (do not force) and record the number of turns in; then turn the main fuel screw out far enough to shift the solenoid retaining bracket. Lift the solenoid and remove the plunger. Reinstall the solenoid

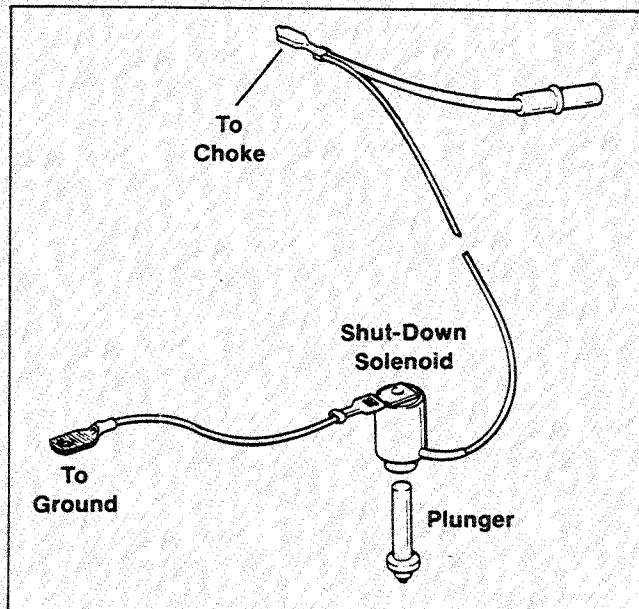


Figure 3-9. Shut-Down Solenoid

and retaining bracket. Turn the main fuel screw in until it bottoms lights, then back out number of turns recorded (minor adjustments may have to be made). The lead on top of the shut-down solenoid grounds to the intake manifold. It is important that both connections are secure.

Choke Adjustment

A Kohler Thermo-electric automatic choke is used to enrich the fuel mixture during starting. The choke automatically closes as the ambient air temperature cools or as the engine temperature decreases. As the engine warms, the coils inside the choke allow the choke plate to open. If readjustment is needed, loosen the two screws securing the choke bracket to the carburetor and shift the position of the choke assembly (Figure 3-10). When properly set, the choke plate will be within 5 to 10 degrees of full open at approximately 70° F (21° C).

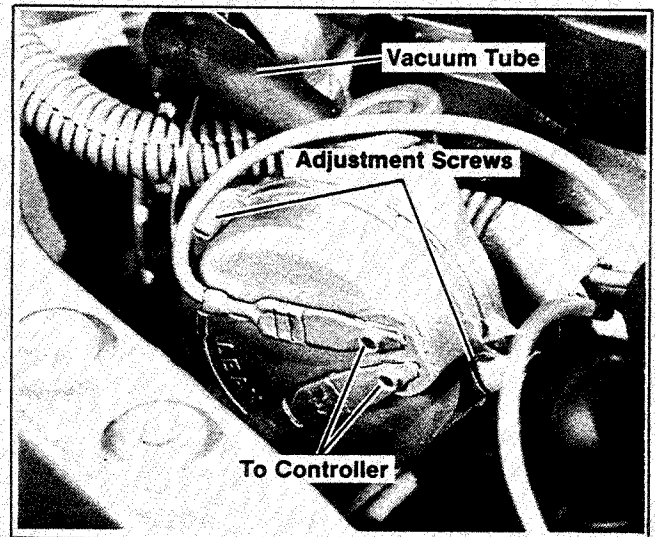


Figure 3-10. Automatic Choke Adjustment

Governor Adjustments

Speed

With the Constant Speed type governor, the throttle shaft is fixed at a definite length to establish a specific full load speed of 1800 RPM. Any variation in speed causes frequency changes in output of the generator — for this reason, only slight readjustment of speed is possible. To increase speed, loosen the inside speed adjusting locking nut and tighten the outside nut to draw the eyebolt closer to the bracket — to decrease speed, loosen the outside nut and tighten the inside nut (Figure 3-11). After speed is correct, tighten the nut that was loosened to lock the eyebolt at the new setting.

Sensitivity

If the governor is too sensitive, speed surging will occur with change in load. If a big drop in speed occurs when normal load is applied, the governor should be set for

greater sensitivity. Sensitivity is changed by repositioning the sensitivity adjusting eyebolt as shown in Figure 3-11. To make governor control more sensitive, loosen the upper nut and tighten the lower nut to force the eyebolt

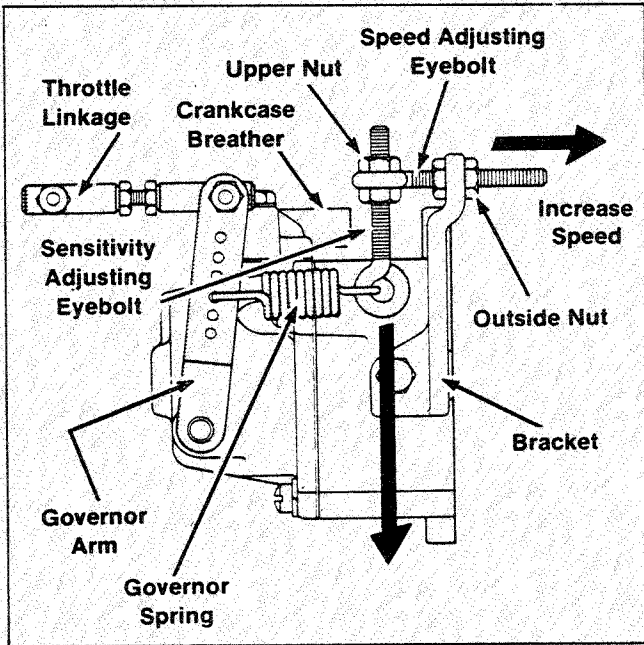


Figure 3-11. Governor Components and Adjustments

downward. To make control less sensitive, draw the eyebolt upward by loosening the lower nut and tightening the upper nut. Recheck speed after making sensitivity adjustment. Retighten nut that was loosened to lock eyebolt at the new setting.

Cylinder Head Service

After each 500 hours of operation, the cylinder heads should be taken off the engine and serviced. Remove carbon deposits from combustion chamber in head. Scrape and remove carbon with a sharp piece of wood. Wood or similar material is suggested to avoid scratching aluminum surfaces of head. Always use new cylinder head gaskets. Make sure head bolts are tightened in the proper sequence and to the torque value specified. See Figure 3-12.

NOTE

If engine is operated on leaded fuel or under certain conditions, such as continued light load or relatively constant speed, carbon may build up more rapidly. If there are early indications of this, such as heavy deposits of carbon on spark plug electrodes, service the heads more frequently. 250 hour intervals are suggested under these conditions.

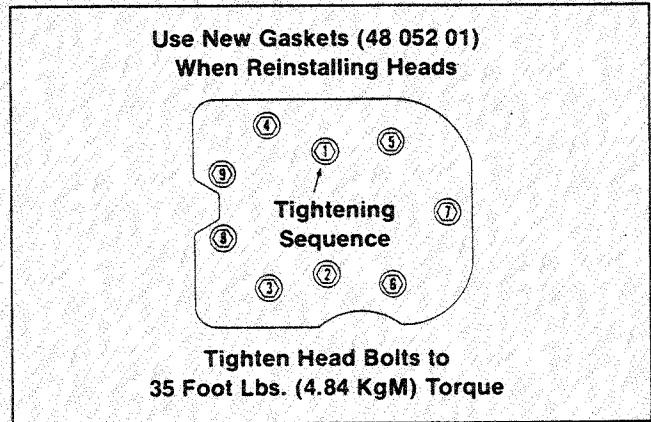


Figure 3-12. Cylinder Head Tightening and Torque Values

Valve Service

After each 500 hours of operation (or sooner if a loose valve is detected), check clearance between the valve stems and tappets. The engine must be stopped and cooled to normal ambient temperatures to accurately gauge and adjust valve clearances. Use the following procedure to adjust.

1. Turn engine over until piston in #1 cylinder (closest to flywheel) is at Top Dead Center on compression — in this position, both valves WILL BE CLOSED and cam will have no effect on tappet.
2. Measure clearance between valve stem and tappet with a feeler gauge. (See Figure 3-13.) To adjust, turn adjusting screw on tappet in or out until proper clearance is attained.

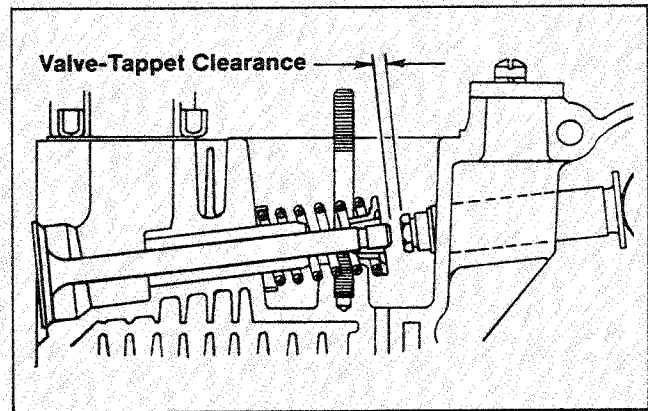


Figure 3-13. Valve-Tappet Clearance

COLD CLEARANCE

Intake008-.010" (0.203 mm-0.254 mm)
Exhaust017-.020" (0.432 mm-0.508 mm)

3. After adjusting valve tappet clearance on #1 cylinder, turn engine over until #2 cylinder is at TDC on compression and repeat adjustment on this cylinder.

Controller Fuse Replacement

There is one 10 Amp. fuse located at the controller. This fuse protects the controller against damage in the event a short develops in the wiring harness to the remote start-stop switch. See Figure 3-14. If this fuse "blows" the set will stop.

If the set has stopped due to causes other than lack of fuel, engine malfunction or low oil pressure, check the fuse. If blown, replace the fuse then restart the generator set. If the fuse blows again, refer to Section 7. Component Testing and the wiring diagram to locate the fault.

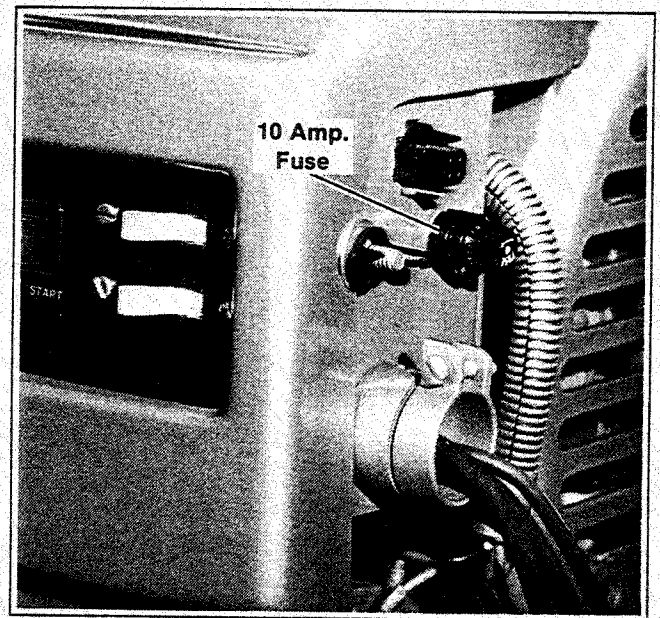


Figure 3-14. Fuse Location

SECTION 4. GENERAL TROUBLESHOOTING

Use the following table as a quick reference in troubleshooting individual problems. Generator faults are listed by specific groups and correlated with probable causes and remedies. The source of more detailed information needed to correct a problem is indicated. Sources include various sections of this manual, the Operation and Instal-

lation Manual (TP-5244) and the Kohler Engine Service Manual. Corrective action and testing often requires knowledge of electrical and electronic circuits. It is recommended that service only be done by Authorized Service Dealers. Improper repair by unauthorized personnel can lead to additional failures.

Problem	Possible Cause	Corrective Action	Reference
Will not crank (dead) or cranks slowly	Blown fuse	Replace fuse; if fuse blows again, check circuit and components.	Section 7. Component Testing
	Battery disconnected	Check connections	Section 9. Wiring Diagrams
	Dead battery	Charge or replace	
	Corroded or loose terminal connections	Clean or replace	See Engine Service Manual, "Starting Motors and Drives"
	Defective starter	Rebuild or replace	
	Defective starter relay	Check continuity of circuit Bypass relay using jumper wire. If starter cranks, replace relay	
	Oil viscosity too heavy	Use proper viscosity oil	TP-5244, "Lubrication"
	Defective start/stop switch (T1-T3)	Check continuity	Section 7. Component Testing Section 9. Wiring Diagrams
Open wiring, terminal, pin, foil, etc. (P2 connector)	Check continuity	Section 7. Component Testing Section 9. Wiring Diagrams	
Will not start (cranks okay)	No fuel in tank	Replenish	Section 3. "Shut-Down Solenoid" Section 7. Component Testing
	Defective fuel solenoid	Check continuity	
	Carburetor choke misadjusted or defective	Readjust or replace	Section 3. "Choke Adjustment", Engine Service Manual "Automatic Chokes"
	Defective/misadjusted spark plug	Regap or replace	Section 3. "Spark Plugs"
	Defective ignition coil	Test and/or replace	Section 7. Component Testing Engine Service Manual, "Ignition Coil"
	Defective/grounded breaker points	Replace and/or adjust	Section 3. "Breaker Points"
	Defective fuel pump	Verify operation with 12 Volts DC applied Check fuel pressure of 2.75 psi (19 kPa)	Section 7. Component Testing
	Clogged fuel filter K2 relay coil defective	Clean filter element Check continuity	Section 3. "Fuel Filter Service" Section 7. Component Testing Section 9. Wiring Diagram

Problem	Possible Cause	Corrective Action	Reference
Will not start (cranks okay) (continued)	Open wiring, terminal or pin (P2 connector)	Check continuity	Section 9. Wiring Diagrams
	Engine defective (poor compression, stuck valves, etc.)	Troubleshoot engine	Engine Service Manual, "Troubleshooting"
Engine starts, but stops after start switch is released	No generator output	Check AC voltage Check stator continuity	Section 7. Component Testing Section 9. Wiring Diagrams
	Open wiring (P1 or P2 connector)	Check continuity	Section 9. Wiring Diagram
	No or low oil pressure	Check oil pressure and pump	Engine Service Manual, "Oil Pressure — Oil Pumps"
	Defective low oil pressure (LOP) shutdown switch	Attempt start-up. If unit shuts down, remove lead from LOP switch. A successful restart attempt indicates a faulty LOP shutdown switch. LOP contacts close at approximately 14 psi (96 kPa) NOTE: Verify proper engine oil pressure before replacing LOP shutdown switch	Section 2. Operation, "Engine Shutdown" (for location of LOP switch)
	K1 relay coil defective	Check continuity	Section 7. Component Testing Section 9. Wiring Diagrams
No generator output voltage	Line circuit breaker open or defective	Check position of circuit breakers	Section 2. "Circuit Protection"
		Check AC voltage on generator side of circuit breakers	Section 9. Wiring Diagrams
	Loss of rotor magnetism	Remagnetize (flash) rotor	Section 6. "Field Flashing"
	Open wiring, terminals or pin in aux. winding/capacitor circuit (Field Flashing)	Check continuity	Section 9. Wiring Diagrams
	Defective capacitor	Test and/or replace*	Section 7. Component Testing
	Defective rotor circuit board	Test and/or replace	Section 7. Component Testing
Defective rotor (open, grounded or shorted windings)	Test and/or replace*	Section 7. Component Testing	
	Defective stator (open, grounded or shorted windings)	Test and/or replace*	Section 7. Component Testing
High generator output voltage	High engine rpm	Check engine speed using tachometer or frequency meter NOTE: HZ x 120 - rpm x no. of rotor poles	Section 3. "Governor Adjustments"
	Defective capacitor	Test and/or replace*	Section 7. Component Testing

***NOTE:** Replacement of the capacitor, rotor or stator may affect generator output voltage. If replacement of any of these components results in a significant change in AC voltage, see Section 6 "Stator Reconnection".

Problem	Possible	Corrective Action	Reference
Low generator output voltage	Low engine rpm	Check engine speed using tachometer or frequency meter NOTE: Hz x 120 = rpm x no. of rotor poles	Section 3. "Governor Adjustments"
	Anti-icing adjustment lever in wrong position	Move lever	Section 2. "Starting"
	Defective capacitor	Test and/or replace*	Section 7. Component Testing
	Defective rotor	Test and/or replace*	Section 7. Component Testing
	Defective stator	Test and/or replace*	Section 7. Component Testing
Generator set shuts itself down	No fuel in tank	Replenish	Section 3. "Fuel Filter Service"
	Fuel line restriction	Inspect fuel lines and tank	
	Clogged fuel pump filter	Clean filter	
	Fuel line drawing air	Check fuel lines and tank	TP-5244, "Electrical Load"
	Defective fuel pump	Check fuel pressure of 2.75 psi (19 kPa)	
	Engine overloaded	Reduce electrical load	
	Engine overheated	Check air intake, carburetor adjustment, oil level, timing, etc.	
	Low engine oil pressure	Check pressure and pump components Operating oil pressure 30-50 psi (3.4-5.6 Nm) LOP switch contacts close at oil pressure below 14 psi (97 kPa)	Engine Service Manual "Oil Pressure — Oil Pumps" Section 2. "Engine Shutdown"
	Loss of generator output voltage to K1 relay	Check AC at rectifier (BR1) Check continuity of B1 and B2 stator leads	Section 9. Wiring Diagram Section 7. Component Testing
Defective low oil pressure (LOP) switch	Attempt start-up. If unit shuts down, remove lead from LOP switch. A successful restart attempt indicates a faulty LOP shutdown switch NOTE: Verify proper engine oil pressure before replacing LOP shutdown switch	Section 2. Operation "Engine Shutdown" (for location of LOP switch)	
Fuel vapor lock	Reroute fuel lines away from exhaust system	TP-5244, "Installation — Fuel System"	
Will not carry load or runs rough	Excessive load connected to generator	Reduce electrical load	TP-5244, "Electrical Load"
	Engine not operating at rated rpm	Check speed using tachometer or frequency meter NOTE: Hz x 120/No. of rotor poles = rpm (Example: 60 x 120/2 = 3600)	Section 3. "Governor Adjustments"
	Anti-icing adjustment lever in wrong position	Move lever	Section 2. "Starting"
	Carburetor not properly adjusted or defective	Check and/or adjust	Section 3. "Gasoline Carburetor Adjustments"

*NOTE: Replacement of the capacitor, rotor or stator may affect generator output voltage. If replacement of any of these components results in a significant change in AC voltage, see Section 6 "Stator Reconnection."

Problem	Possible Cause	Corrective Action	Reference
	Defective/grounded breaker points	Adjust or replace	Section 3. "Breaker Points" Engine Service Manual, "Ignition Systems"
	Defective ignition coil	Test and/or replace	Section 7. Component Testing Engine Service Manual, "Ignition Systems"
	Defective/misadjusted spark plug	Regap or replace	Section 3. "Spark Plugs" Engine Service Manual, "Ignition Systems"
	Improper timing	Check timing	Section 3. "Timing"
	Carburetor choke misadjusted or defective	Check and/or adjust	Section 3. "Choke Adjustment"
	Fuel line restriction	Inspect fuel lines and tank. Check gasoline fuel pressure of 2.75 psi (19 kPa)	
	Dirty electric fuel pump filter	Clean filter	Section 3. "Fuel Filter Service"
	Defective electric fuel pump	Check fuel pressure of 2.75 psi (19 kPa)	
	Excessive carbon build-up	Clean cylinder head	Section 3. "Cylinder Head Service" Engine Service Manual, "Cylinder Heads"
	Valves not seating	Inspect valves and valve seats	Section 3. "Valve Service" Engine Service Manual, "Valve-Tappet Clearance"
	Clogged air cleaner	Service air cleaner element	TP-5244, "Air Cleaner"
Unit is noisy	Exhaust system leak	Check and replace as necessary	
	Broken or damaged vibro mounts	Check and replace as necessary	Section 8. Disassembly/ Reassembly
	Loose or vibrating sheet metal	Retighten screws. If necessary, add additional screws to secure	
	Inadequate compartment clearance	Check clearances	TP-5244, "Compartment Size"
	Exhaust or air outlets not securely installed	Inspect for loose parts	TP-5244, "Installation"
	No compartment sound insulation	Install fireproof insulation	TP-5244, "Compartment Size"
	Excessive vibration — engine/generator internal imbalance	Check rotor, crankshaft, bearing, etc. (Disassembly of engine and/or generator may be required)	Section 8. Disassembly/ Reassembly Engine Service Manual, "Inspection-Disassembly"

SECTION 6. GENERATOR TROUBLESHOOTING

The flow chart below (Table 6-1) is a guide to troubleshoot your generator set. 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.**

Individual test procedures to identify faulty components are covered in Section 7.

Loss of Rotor Residual Magnetism

The residual magnetism held in the rotor is sufficient to produce 2-5 Volts AC output from the stator. If the generator has been disassembled or has been subject to rough handling, the rotor may have to be remagnetized (flashed). To determine the cause of no or low AC output, it may be necessary to remagnetize (flash) the generator. The generator field (rotor) may be flashed (magnetized) using an outside power source according to the following procedures.

Restoring magnetism to the rotor can be accomplished by momentarily (1 second) applying 12 Volts DC to the rotor circuit board or 120 Volts AC to stator exciter leads 55 and 66. Both methods of field flashing (120 Volts AC or 12 Volts DC) are explained in the following paragraphs. Due to the hazards associated with 120 Volt AC current, flashing with 12 Volt DC (battery) current is advised.

WARNING

HIGH VOLTAGE! Remember that the function of a generator set is to produce electricity and that wherever electricity is present, there is the potential danger of electrocution. Take the same precautions with electrical appliances in your craft that you would observe in your home. Keep away from electrical circuits and wiring while the set is running and have electrical service performed

WARNING (continued)

only by qualified electricians. Make sure unqualified persons, especially children, cannot gain access to your set — keep the compartment door locked or securely latched at all times. Be sure that generator is properly grounded. Never touch electrical leads or appliances with wet hands, when standing in water, or on wet ground as the chance of electrocution is especially prevalent under such conditions.

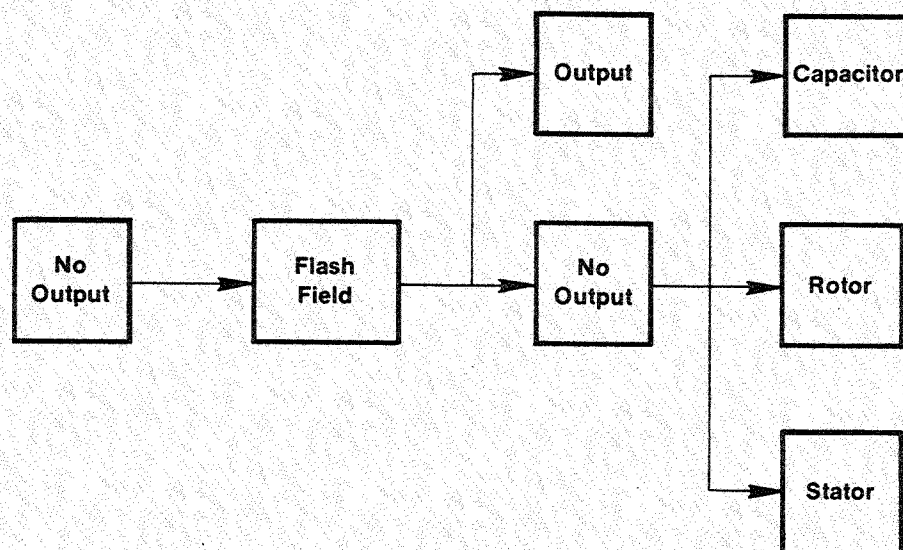
Flashing with DC (Battery) Voltage

WARNING

ELECTRICAL SHOCK! Battery can cause electrical burns and shocks. Exercise reasonable care when working near the battery to avoid electrical connections through tools. Remove wristwatch, rings, and any other jewelry.

WARNING

EXPLOSIVE BATTERY GASES! The gases generated by a battery being charged are highly explosive. Do not smoke or permit flame or spark to occur near a battery at any time, particularly when it is being charged. Avoid contacting terminals with tools, etc., to prevent burns and to prevent sparks that could cause an explosion. Remove wristwatch, rings, and any other jewelry before handling battery. Any compartment containing batteries should be well ventilated to prevent accumulation of explosive gases. To avoid sparks, do not disturb battery charger connections while the battery is being charged and always turn charger off before disconnecting.



TROUBLESHOOTING FLOW CHART
Table 6-1. Generator Troubleshooting

⚠ WARNING

DANGEROUS ACID! Avoid contact with battery electrolyte. It contains acid which can eat holes in clothing, burn skin, and cause permanent damage to eyes. Always wear splash-proof safety goggles when working around the battery. If battery electrolyte is splashed in the eyes or on skin, immediately flush the affected area for 15 minutes with large quantities of clean water. In the case of eye contact, seek immediate medical aid. Never add acid to battery once the battery has been placed in service. Doing so may result in dangerous spattering of electrolyte.

If flashing with 12 Volts DC, the battery positive (+) lead must be placed on the circuit board positive (+) terminal and the battery negative (-) lead must be connected to the circuit board negative (-) terminal. See Figure 6-1. This will create a current flow in the rotor, restoring the needed residual magnetism. Scrape off insulating varnish as necessary to get a good electrical connection.

CAUTION

Damage to rotor circuit board diodes will occur if circuit board polarity is not observed when flashing with 12 Volt DC current.

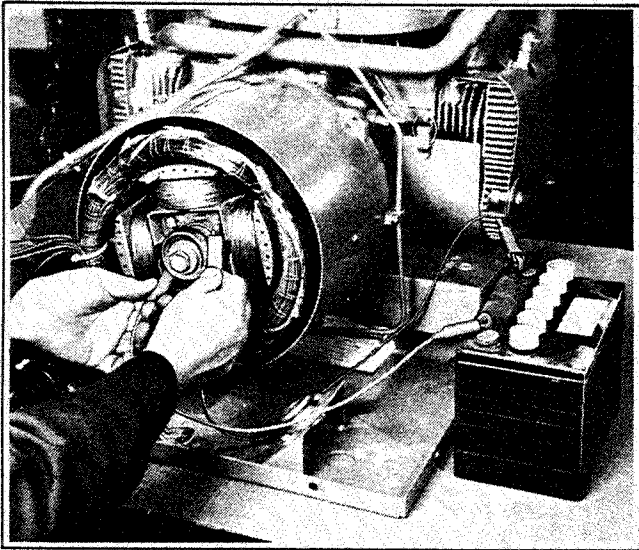


Figure 6-1. Flashing the Rotor (12 Volts DC)

Flashing with AC Voltage

To flash the rotor with 120 Volt AC current a flashing box must be assembled. See Figure 6-2. Components needed are a 120 Volt AC cord, double-pole switch, fuse holder, 20 Amp. fuse and a cord with alligator clips. Assemble in an insulated box.

Flash the rotor by momentarily applying 120 Volts AC to leads C1 and C2 (disconnect at capacitor). No load should be connected to the generator set during flashing. See Figure 6-3.

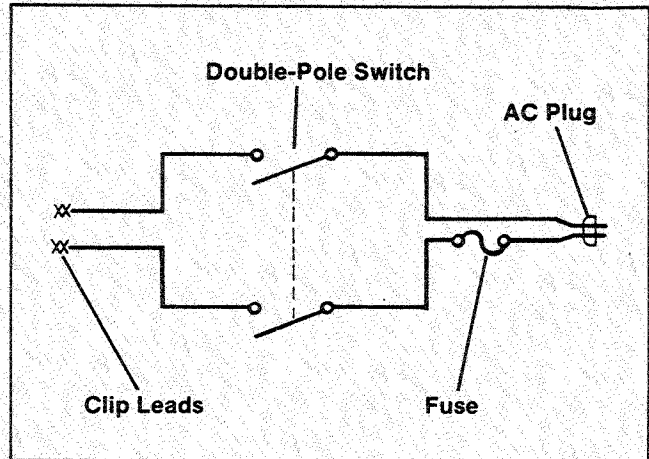


Figure 6-2. Flashing Box Assembly

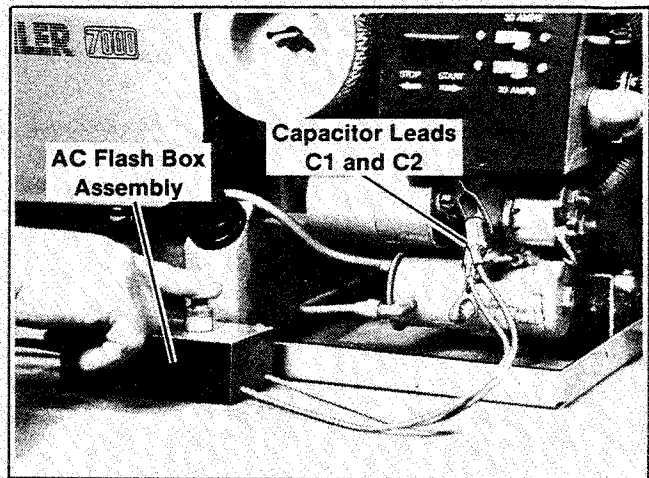


Figure 6-3. Flashing the Rotor (120 Volts AC)

⚠ WARNING

ELECTRICAL SHOCK! When flashing your generator set, 120 Volts AC will be present at the alligator clips when the pushbutton is pressed. Use caution when handling or electric shock could result.

After the generator set is assembled, start the unit and check for AC output. Should no AC output be observed, attempt restarting after applying at least a 200 watt load (rather than just connecting an AC voltmeter) to the generator set. This will strengthen the rotor field current. If still no AC output is noted, repeat "flashing" procedure. Regardless of which flashing procedure was used, if no AC output is observed after several flashing attempts, see Section 7, "Component Testing" to determine which component may be defective.

Stator Reconnection

If the capacitor, rotor or stator is repaired or replaced, proper reconnection of the stator is necessary to achieve desired output voltage. Refer to the following procedure if

replacement of any of these components results in a significant change in AC voltage. When the stator is properly connected, an output of 114-117 Volts AC is attained at no-load and 130 Volts AC at half-load. Under all load conditions, AC output must not exceed 132 Volts. Observe all safety precautions during this procedure.

⚠ WARNING

UNIT STARTS WITHOUT NOTICE! To prevent accidental starting on units with a remote start/stop switch, always disconnect battery (remove negative lead first and reconnect it last) to disable generator set before working on any equipment connected to the generator.

⚠ WARNING

HIGH VOLTAGE! Remember that the function of a generator set is to produce electricity and that wherever electricity is present there is the potential danger of electrocution. Take the same precautions with electrical appliances in your coach that you would observe in your home. Keep away from electrical circuits and wiring while the set is running and have electrical service performed only by qualified electricians. Make sure unqualified persons, especially children, cannot gain access to your set — keep the compartment locked or securely latched at all times. Be sure that generator is properly grounded. Never touch electrical leads or appliances with wet hands, when standing in water or on wet ground as the chance of electrocution is prevalent under such conditions.

NOTE

Replacement of the capacitor, rotor and stator is outlined in Section 8, Disassembly/Reassembly. Following installation, proceed to step 1 only if AC output voltage is significantly higher or lower than limits prescribed in the introduction.

1. Remove generator side cover to expose stator terminal box located behind the controller. Remove terminal box cover to access stator terminal strip. See Figure 6-4. Terminal strip lead connection on your generator may differ from that shown.
2. Consult the wiring diagram to verify that stator leads 55, 66, 77, 88 and 99 are properly connected to the stator terminal strip.
3. Generator output voltage is influenced by tap selection on the stator auxiliary winding. Tap selection is determined by lead position on the stator terminal strip. Consult the adjacent chart to determine proper connections for desired AC output voltage under varying load conditions.

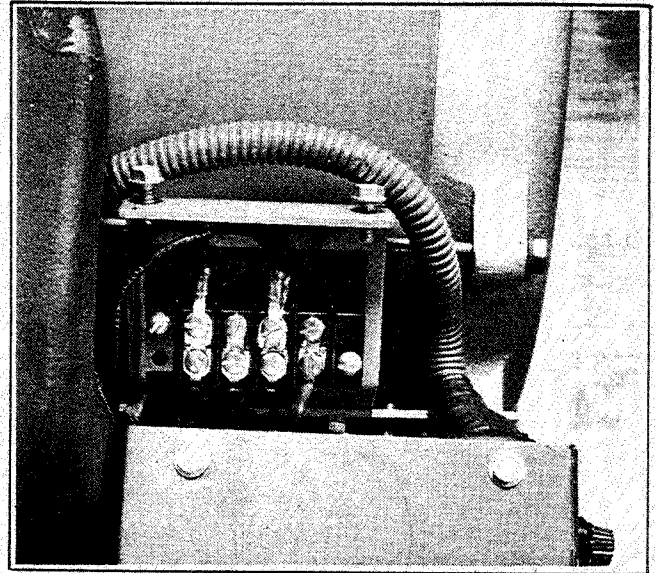


Figure 6-4. Stator Terminal Strip

AUXILIARY WINDING TAP CONNECTIONS

Volts Subtract		Connect Lead C2 To:	Connect Lead 66 To:
No-Load	Half-Load		
-12	-6	Terminal 88	Terminal 77
-8	-4	Terminal 88	Terminal 99.
-4	-2	Terminal 99	Terminal 77
0	0	Terminal 66	N.A.
Volts Add			
+4	+2	Terminal 77	Terminal 99
+8	+4	Terminal 99	Terminal 88
+12	+6	Terminal 77	Terminal 88

4. Capacitor lead C2 connections are made on the terminal strip by moving capacitor lead C2 from terminal 66 to the terminal indicated. To make lead 66 connections, disconnect lead 66 from the stator terminal strip and reconnect it to the terminal specified. Lead 66 must share its new terminal with the stator lead already occupying it. Capacitor lead C1 remains connected to terminal 55 at all times. Be certain stator leads are properly connected before proceeding.
5. With the generator set running at no-load or half-load, check output voltage. If AC output voltage does not fall within limits prescribed in the introduction, consult the voltage adjustment chart and reconnect accordingly.

SECTION 7. COMPONENT TESTING

Capacitor

This section guides you in checking your generator components for improper operation. Follow the safety precautions in front of this manual. Additional safety precautions are included with the tests; **OBSERVE THESE PRECAUTIONS.**

WARNING

HIGH VOLTAGE! When testing the capacitor, high voltage is present. Use caution when handling the capacitor; possible electrical shock can result. Discharge the capacitor by shorting the terminals together.

Disconnect stator exciter winding leads 55 and 66 from the capacitor. Check the capacitor charge and discharge readings using an ohmmeter on the R x 1000 scale. Figure 7-1. When the ohmmeter leads are placed on the capacitor terminals a meter deflection should be indicated (charging), followed by a slow return to infinity (discharging). Reverse the leads and repeat the procedure. No meter deflection or continuous continuity indicates an open or shorted capacitor. No continuity should be indicated between the capacitor case and terminals.

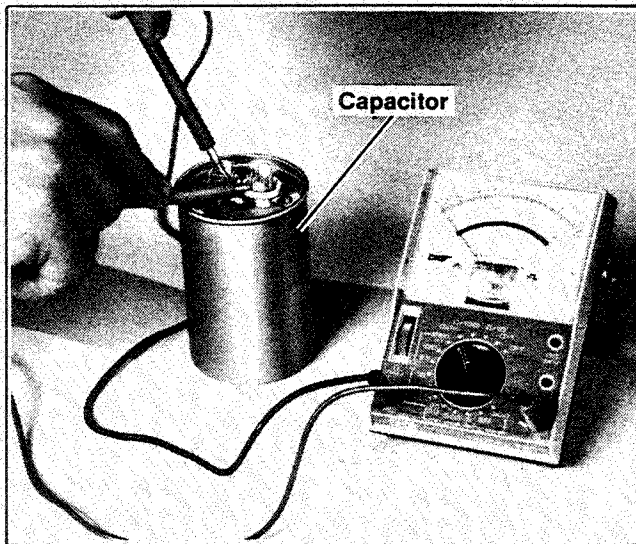


Figure 7-1. Checking The Capacitor

Rotor and Rotor Circuit Board

The four-pole rotor creates the magnetic field needed to raise alternating current in the stator windings. Prior to testing, inspect the rotor for visible damage to pole shoes, insulation and exposed coil windings. Check rotor bearing for noisy operation, excessive wear and heat discoloration. Replace or repair these components if any of the above conditions exist.

Check the rotor for continuity and measure resistance. Measure the rotor resistance (ohms) between the positive (+) and negative (-) terminals on the rotor circuit board (Figure 7-2). See Table 7-1 for typical readings.

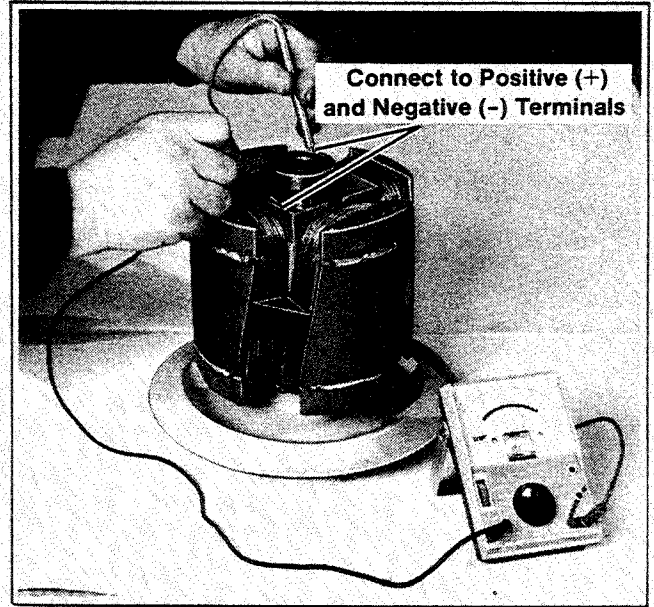


Figure 7-2. Testing Rotor

NOTE

Since ohmmeters do vary in their accuracy, use Table 7-1 figures as a reference for approximate readings. Readings must be taken at room temperature.

NOTE

To obtain good contact when testing, remove the insulating varnish from all test points. Revarnish all test points before reassembling the generator.

Model	Rotor Resistance $\pm 10\%$
7CMZ21-RV	4.6-5.7 Ohms

Table 7-1. Rotor Resistance

An open rotor winding is indicated by a reading of 50 ohms or more across the circuit board terminals. A resistance reading of less than one ohm (continuity) indicates a defective circuit board or shorted rotor. There should be no continuity between rotor windings and ground.

A preliminary circuit board diode test can be made by taking a resistance measurement across the current limiting resistors in the circuit board. See Figure 7-3. A high resistance value in one direction and low resistance in the reverse direction indicates a good circuit board. A high resistance value in both directions indicates open diodes. Low resistance values in both directions indicates shorted diodes. Conclusive evidence of shorted rotor windings or a defective rotor circuit board can only be obtained with the rotor leads unsoldered from the circuit board.

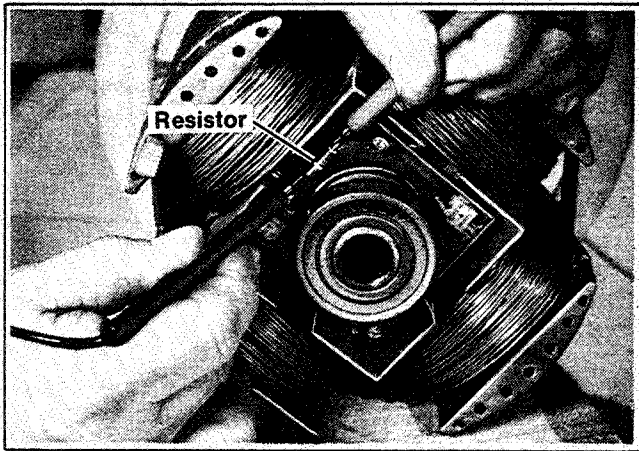


Figure 7-3. Testing Rotor Circuit Board

CAUTION

Solder splash can cause damage to rotor windings. When unsoldering circuit board from rotor, use desoldering wick or other removal tool to prevent solder splash onto rotor windings. Use care when reassembling to avoid excess solder from splashing or flowing onto rotor coils.

Should any fault be found with the rotor and/or circuit board in the above tests, the rotor and/or circuit board must be repaired or replaced.

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 capacitor (for rotor field flashing). Prior to testing, inspect stator for heat discoloration and visible damage to housing lead wires, exposed coil windings and exposed and varnished areas of frame laminations. Be sure the stator is securely riveted in the housing.

1. To check stator continuity, set ohmmeter on R x 1 scale. Contact the red and black meter leads; adjust ohmmeter to zero ohms. Check stator continuity by connecting meter leads to stator leads as shown in Figure 7-4.

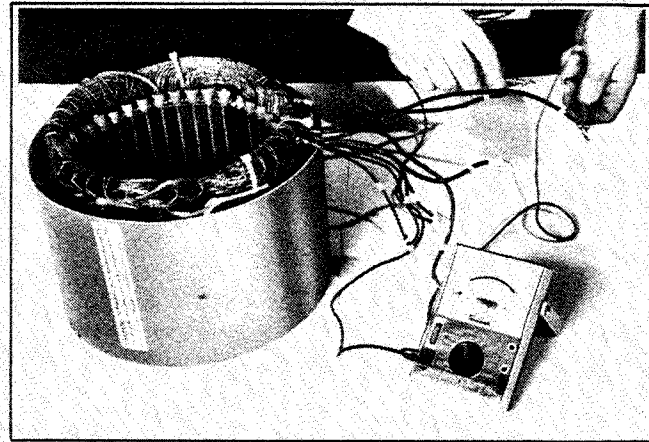


Figure 7-4. Testing Stator Windings

Leads 1, 2, 3 and 4 are the generator output leads. Leads 55, 66, 77, 88 and 99 are the exciter stator (field flashing) leads. The output of leads B1 and B2 is rectified before energizing the K1 relay. Refer to the schematic in Figure 7-5 when performing the following tests.

- There must be continuity between leads 1 and 2.
- There must be continuity between leads 3 and 4.
- There must be continuity between leads 55 and 66.
- There must be continuity between leads B1 and B2.
- There must be continuity between leads 77 and 99.
- There must be continuity between leads 88 and 99.
- There must be continuity between leads 77 and 88.
- There must be NO continuity between lead 1 and leads 3 and 4.
- There must be NO continuity between lead 1 and leads 55, 66, 77, 88, 99, B1 and B2.
- There must be NO continuity between lead 4 and leads 55, 66, 77, 88, 99, B1 and B2.
- There must be NO continuity between lead 55 and leads B1 and B2.

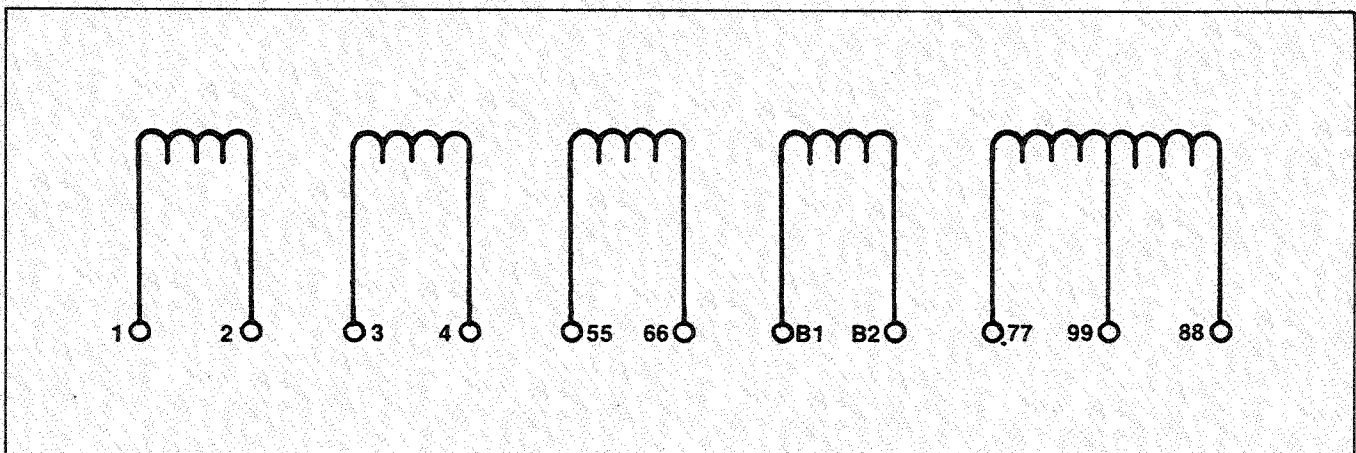


Figure 7-5. Generator Stator Leads

NOTE

If controller circuit board 239396 has failed due to foil damage, see Appendix A, "Circuit Board Foil Damage" prior to replacing circuit board and attempting start-up.

- There must be NO continuity between lead 55 and leads 77, 88 and 99.
 - There must be NO continuity between leads B1 and B2 and leads 77, 88 and 99.
 - There must be NO continuity between any stator lead and ground on stator housing or frame laminations.
2. Contact ohmmeter leads and readjust ohmmeter to zero ohms. Check cold resistance of stator windings by connecting meter leads to stator leads 1 and 2, 3 and 4, 55 and 66, 77 and 88 and B1 and B2. Typical stator winding resistance readings are listed in Table 7-2.

NOTE

Since ohmmeters do vary in their accuracy, use Table 7-2 as a reference for approximate readings. Ohmmeter readings must be at room temperature.

NOTE

Most ohmmeters will not provide accurate readings when measuring less than 1 ohm. The stator can be considered good if a low resistance reading (continuity) is obtained and there is no evidence of shorted windings (heat discoloration).

**Reading ± 10% (in Ohms)
Lead 7CMZ21-RV**

1 and 2	0.21
3 and 4	0.21
55 and 66	1.4
B1 and B208
77 and 8808

Table 7-2. Stator Winding Resistance

If any of the stator readings vary during the above tests, the stator must be repaired or replaced.

Controller Circuit Board

It is possible to check some controller circuit board components without removing the component from the board. These checks should be made prior to installing a new board and attempting start-up. Most of the tests are referenced in Section 4, General Troubleshooting. Use a high quality multimeter and follow the manufacturer's instructions. To obtain accurate readings when testing, remove all circuit board connectors and conformal coating (transparent insulation) from component leads. Use the following chart and see the appropriate controller circuit board schematic (Figure 7-6 or 7-7).

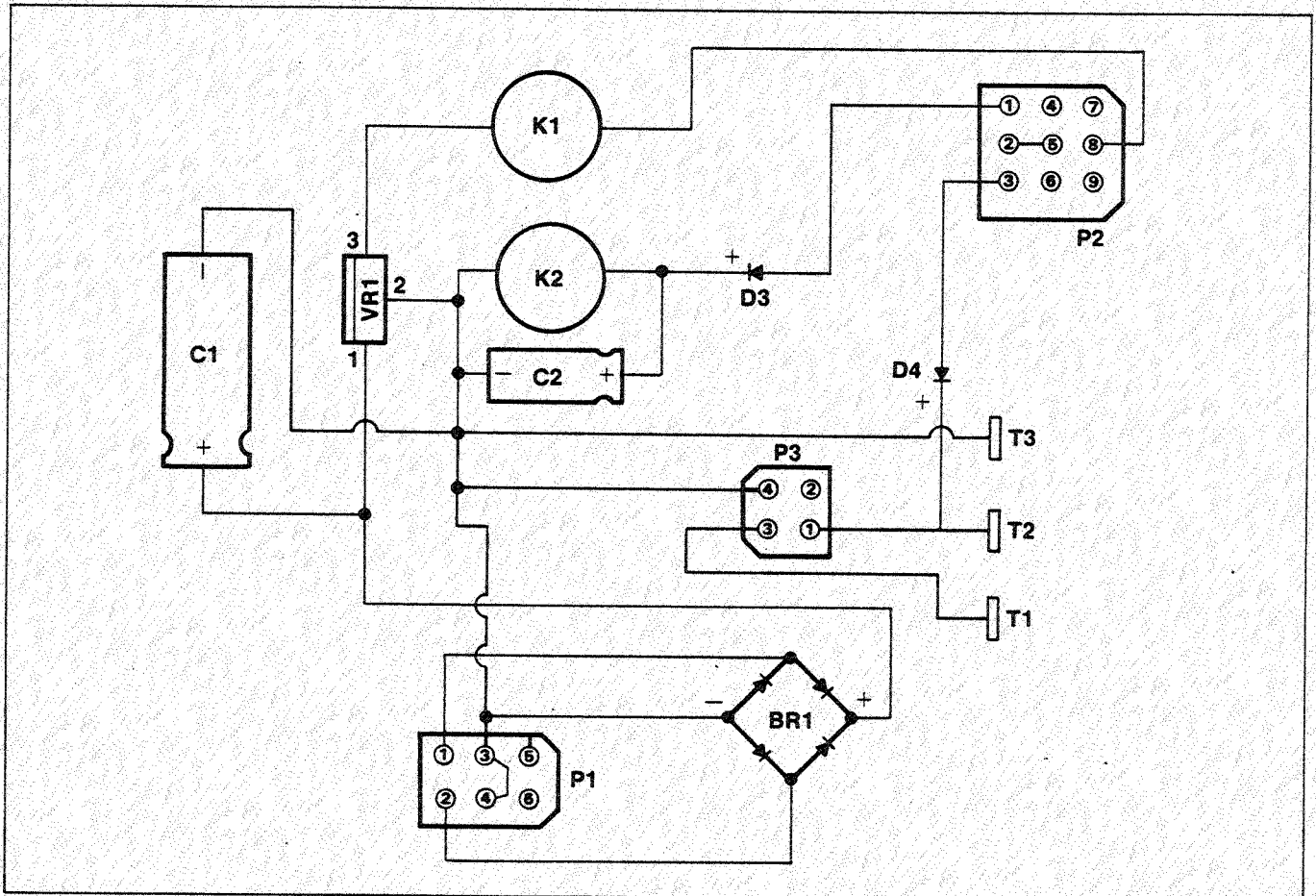


Figure 7-6. Controller Circuit Board C-239396 Testing

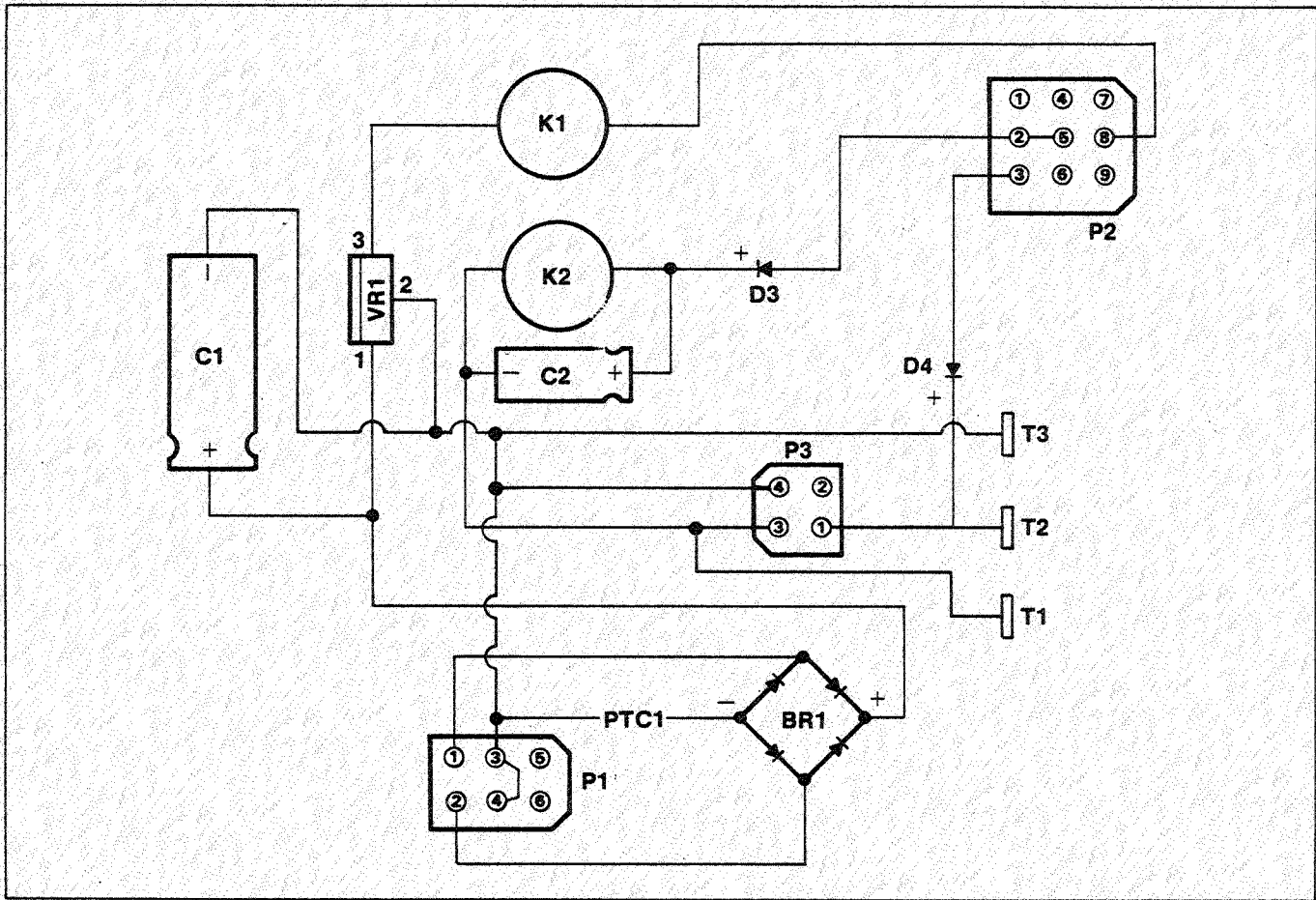


Figure 7-7. Controller Circuit Board E-239396 Testing

NOTE

Controller circuit board D-239396 was never released.

NOTE

Controller circuit board diodes D1 and D2 are not utilized on the 7CMZ21-RV generator.

Components	Ohmmeter Connections	Results	Remarks
K1 relay coil	VR1 terminal 3 (output lead) and P2-8.	If good — approx. 200 ohms. Low resistance — shorted. High resistance — open.	Ohmmeter on R x 100 scale.
K2 relay coil, C2, and D3	If circuit board C-239396 use P2-1 and P3-4. If circuit board E-239396 use P2-2 and P3-3. Take reading and reverse leads.	If good — high resistance one direction and low resistance the other direction. All other readings indicate one or more components are bad.	Ohmmeter on R x 1000 scale. Test components individually. Test D3 and test K2 relay coil and C2.
D3	If circuit board C-239396 use P2-1 and C2 (+) lead. If circuit board E-239396 use P2-2 and C2 (+) lead. Take reading and reverse leads.	If good — high resistance one direction and low resistance the other direction. Low resistance both ways — shorted. High resistance both ways — open.	Ohmmeter on R x 1000 scale.
K2 relay coil and C2	If circuit board C-239396 use C2 (+) lead and P3-4 If circuit board E-239396 use C2 (+) lead and P3-3	If good — approx. 400 ohms. This indicates relay coil is good, but C2 could be open.	Ohmmeter on R x 10,000 scale. If C2 is open, unit will start, but may not continue to run after start button is released.

Components	Ohmmeter Connections	Results	Remarks
D4	P2-3 and P3-1	Low resistance — K2 coil and/or C2 are shorted. High resistance — K2 coil and C2 are open. If good — high resistance one direction and low resistance the other direction. Low resistance both ways — shorted. High resistance both ways — open.	If K2 is open and C2 is good, C2 will charge and discharge when ohmmeter leads are connected and then reversed. Ohmmeter on R x 1000 scale.
C1	C1 (+) and P1-3. Take reading and reverse leads.	If good — capacitor will charge and discharge. No deflection in meter reading indicates C1 is bad.	Ohmmeter on R x 1000 scale. If BR1 is shorted, C1 cannot be checked.
BR1	P1-1 and C1 (+) lead; C1 (+) lead and P1-2; P1-2 and P1-3; P1-3 and P1-1. Take reading and reverse leads for each pair of terminals.	If good — high resistance one direction and low resistance the other direction. Low resistance both ways — shorted. High resistance both ways — open.	Ohmmeter on R x 1000 scale. Readings will show increasing resistance in one direction due to C1 discharging. This discharging is normal. If C1 is shorted, BR1 cannot be checked.
PTC1 (E-239396 circuit board only)	BR1 (-) at PTC1 and P1-3	If good — approx. 7.0 ohms.	Ohmmeter R x 1 scale. Allow PTC1 to cool before checking resistance.

Circuit Board Foil Damage

If controller circuit board — 239396 has failed due to foil damage, determine and correct the cause prior to replacing circuit board and attempting start-up. Controller circuit board — 239396 is susceptible to foil damage if subjected to the following conditions. Recent circuit board revisions should provide adequate circuit board protection against most of these possible conditions. See Figure 7-8 for circuit board foil damage locations.

1. Stator auxiliary winding shorted to ground.
2. Stator auxiliary winding B1/B2 shorted to ground.
3. Shorted starter solenoid terminals.
4. Defective starter solenoid (internal short).
5. Shorted rotor and/or brushes.

To detect conditions leading to circuit board foil damage, follow the test guidelines described in the following paragraphs. Refer to the appropriate section of this service manual for additional information on disassembly/reassembly and troubleshooting procedures. Observe all safety precautions while performing these tests.

Equipment Needed:

- Megohmmeter
- Ohmmeter

WARNING

HIGH VOLTAGE! Remember that the function of a generator is to produce electricity and that wherever electricity is present there is the potential danger of electrocution. Take the same precautions with electrical appliances in your craft that you would observe in your home. Keep away from electrical circuits and wiring while the set is running and have electrical service performed only by qualified electricians. Make sure unqualified persons, especially children, cannot gain access to your set — keep the compartment door locked and securely latched at all times. Be sure that the generator is properly grounded. Never touch electrical leads or appliances with wet hands, when standing in water, or on wet ground as the chance of electrocution is especially prevalent under such conditions.

WARNING

HIGH VOLTAGE! Use high voltage test only as directed. High voltage may cause personal injury, damage equipment, or lead to future failures. Follow manufacturer's instructions when operating tester.

1. Stator auxiliary winding shorted to ground

Foil damage between P1-6 and D1 (+) (anode) and/or D1 (-) (cathode) and K1 N.C. contact caused by auxiliary winding 55-66 shorted to ground. Reference 1 on Figure 7-8. Possible problem on A-, B-, and C- circuit boards. E- circuit boards make use of higher current carrying diodes. This problem may also occur if the 8 Amp. fuse in lead 55 is changed to one of a higher rating. Test stator windings with an ohmmeter using "Stator" section. If this test proves inconclusive, it will require testing with a megohmmeter using the following procedure.

With megohmmeter on 500 Volt scale, connect red (+) meter probe to stator lead 55 or 66. Connect black (-) meter probe to stator shell (ground). Be sure meter leads make good contact with test surface. Following the instructions of the megohmmeter manufacturer, perform megohmmeter test. A reading of approximately 500K ohms (1/2 megohm) and higher indicates a good stator auxiliary winding. A reading of less than 500K ohms (approx.) indicates deterioration of auxiliary winding insulation and possible current flow to ground. Repair or replacement of the stator is necessary.

2. Stator auxiliary winding B1/B2 shorted to ground

Foil damage between BR1 (AC) and P1-2 caused by auxiliary winding B1/B2 shorted to ground. Reference 2 on Figure 7-8. Possible problem on A-, B-, and C- circuit boards. E- circuit boards are equipped with PTC1 to reduce the likelihood of circuit board damage. Test stator windings with an ohmmeter using "Stator" section. If this test proves inconclusive, it will require testing with a megohmmeter using the following procedure.

With megohmmeter on 500 Volt scale, connect meter red (+) probe to stator lead B1 or B2. Connect meter black (-) probe to stator shell (ground). Be sure meter probes make good contact with test surface. Following the instructions of the meter manufacturer, perform megohmmeter tests. A reading of approximately 500K ohms (1/2 megohm) and higher indicates a good B1/B2 winding. A reading less than 500K ohms (approx.) indicates deterioration of B1/B2 winding insulation and possible current flow to ground. Repair or replacement of the stator is necessary.

3. Shorted starter solenoid terminals

Foil damage between K1 N.C. contact and P2-4 caused by battery positive (+) lead shorting to ground through P2-4 when start switch is activated. Reference 3 on Figure 7-8. This can occur due to improper starter solenoid connections, battery positive (+) lead contacting starter solenoid coil negative (-) terminal (P2-4) because of terminal bending, or by a short during "jumpstarting."

Verify that starter leads are connected to correct terminals and are not in electrical contact with each other.

4. Defective starter solenoid (Internal short)

Foil damage between K1 N.C. contact and P2-4 caused by starter solenoid component failing. Reference 4 on Figure 7-8.

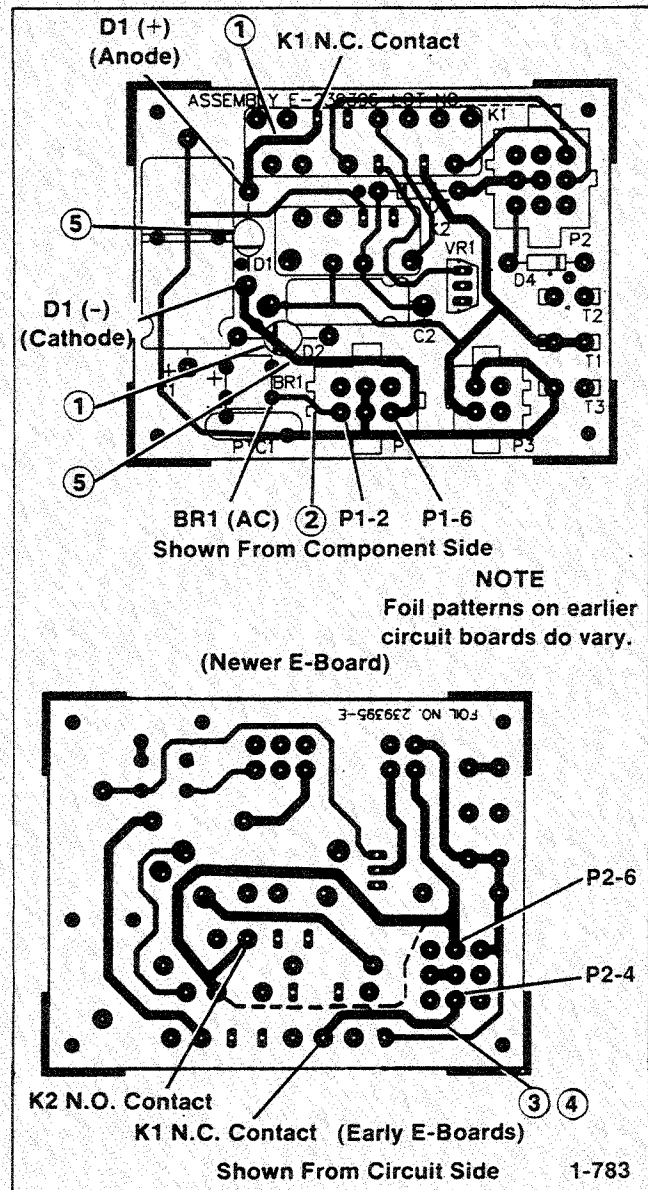


Figure 7-8. Circuit Board Foil Damage Locations

With ohmmeter on R x 1 scale, connect meter leads to solenoid coil. With all leads disconnected, connect ohmmeter to terminals where leads 71 and battery (+) were connected. Starter solenoid resistance should be 3 Ohms. If solenoid resistance is less than that given (continuity), starter solenoid may be shorted. No resistance reading at all indicates an open solenoid coil.

5. Shorted/defective rotor, voltage regulator, and/or brushes

D1 and/or D2 diodes damaged caused by shorted rotor or brush retaining tool not removed after disassembly. Reference 5 on Figure 7-8. Possible problem on A-, B-, and C- circuit boards. E- circuit boards have higher current carrying diodes. To test these components, see "Rotor" and/or "Brushes" sections.

WIRING HARNESS

With the generator set battery connected, the wiring harness and some engine/generator components can be checked. Place the controller or remote start/stop switch in the corresponding position and check for 12 Volts DC at each component using a DC voltmeter. This will verify that the switches function and 12 Volts DC is present at each component. To further check components, disconnect battery and remove wiring harness plugs from controller circuit board. Check continuity of components using an ohmmeter to isolate defective components. Use the following chart and see Figure 7-9.

CAUTION

When making ohmmeter checks, generator set battery must be disconnected or ohmmeter damage will result.



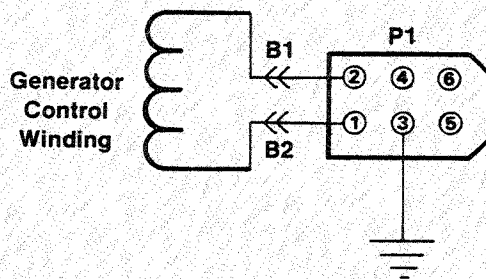
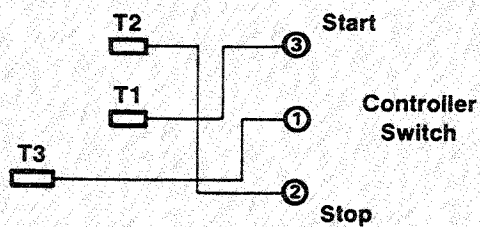
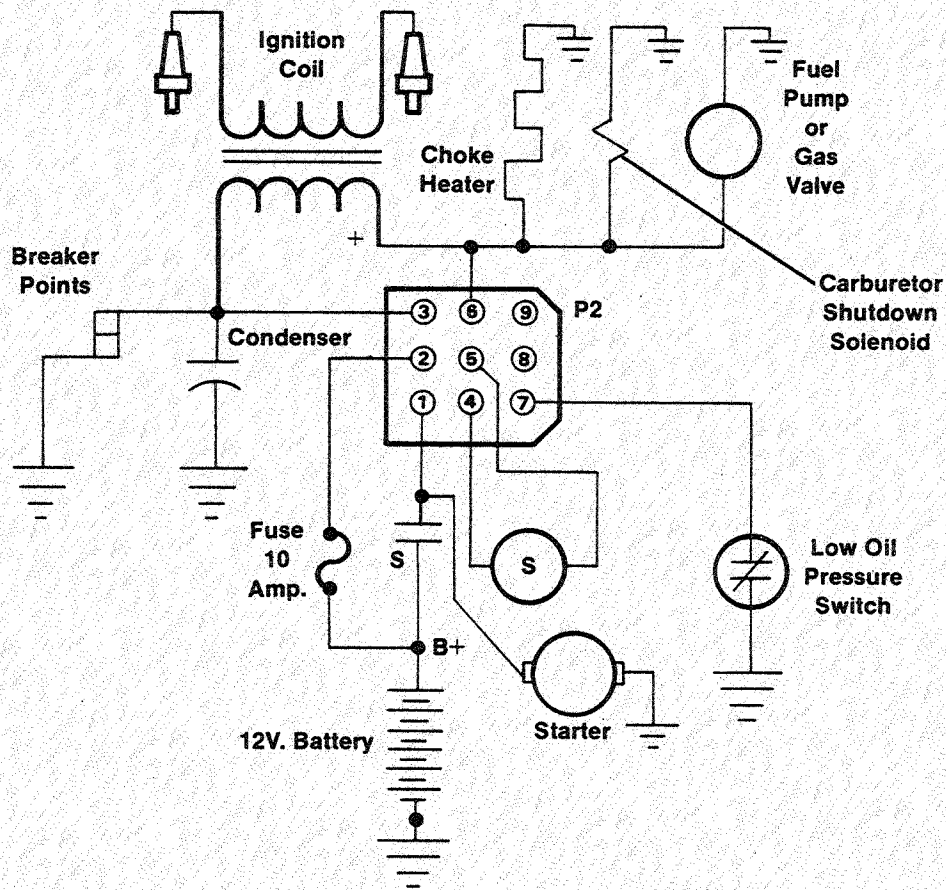
WARNING

ELECTRICAL SHOCK! Battery can cause electrical burns and shocks. Exercise reasonable care when working near the battery to avoid electrical connections through tools. Remove wristwatch, rings, and any other jewelry.

Components	Voltmeter Connections	Results	Remarks
Hourmeter and wiring	a. Red test clip to (+) terminal. Black test clip to (-) terminal. Place controller or remote switch to Start.	If good — 12 Volt DC reading indicates wiring harness is okay.	Voltmeter setting 12 Volts DC or greater. To determine if hourmeter is good, proceed to next step.
	b. None (See "Remarks")	If good — hourmeter will operate.	Disconnect hourmeter leads and apply 12 Volts DC to hourmeter. CAUTION: Hourmeter is polarity sensitive.
B1 and B2 aux. stator winding	B1 and B2 leads in controller NOTE: Add fully insulated push-on terminals to B1/B2 leads in controller. Place controller or remote switch to Start position.	If good — 12-16 Volt AC reading.	Voltmeter setting 20 Volts AC or greater. Unit must be running at proper speed for voltage test to be conclusive.
Ignition coil, choke, carburetor shutdown solenoid, and fuel pump	Red test clip to each component positive (+) terminal. Black test clip to engine block (ground). Place controller or remote switch to Start position.	If good — 12 Volt DC reading indicates wiring harness is okay.	Voltmeter setting 12 Volts AC or greater. To determine if fuel pump is good, proceed to next step. Also see choke heater, fuel pump shutdown solenoid ohmmeter check. Consult Engine Service Manual for all other component testing procedures.
Fuel Pump	None (see "Remarks")	If good — fuel pump will operate	Disconnect battery positive lead and apply 12 Volts DC. WARNING: See "Safety Precautions."

CAUTION

When making ohmmeter checks, generator set battery must be disconnected or ohmmeter damage will result.



NOTE: Controller switch electrical connections are reversed from position of rocker switch.

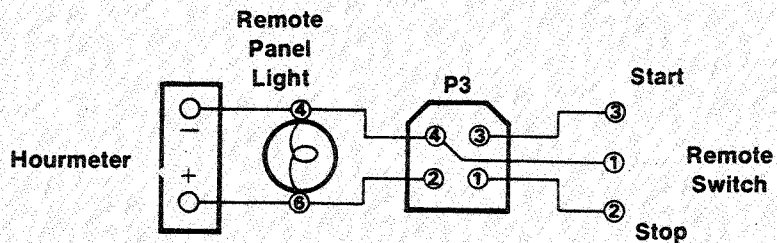


Figure 7-9. Wiring Harness Connections 7CMZ21-RV

Component(s)	Ohmmeter Connections	Results	Remarks
Controller switch or remote switch	1 and 3. Place rocker switch in Start position. 1 and 2. Place rocker switch in Stop position.	If good — zero ohms. Any resistance other than zero ohms, replace switch.	Ohmmeter on R x 1000 scale.
Remote switch light	4 and 6	If good — continuity. No continuity — replace switch.	Ohmmeter on R x 1 scale.
Hourmeter	(-) and (+) terminals.	If good — continuity. No continuity — replace hourmeter.	Ohmmeter on R x 1 scale.
P3 wiring harness to remote switch	P3-4 and P3-3. Place rocker switch in Start position. P3-4 and P3-1. Place rocker switch in Stop position.	If good — zero ohms. Any other reading indicates P3 wiring or switch is defective.	Ohmmeter on R x 1000 scale. To determine if remote switch is defective, disconnect leads and test separately.
P3 wiring harness to remote switch light and hourmeter	P3-2 and P3-4	If good — continuity. Zero ohms — shorted component and/or wiring harness. High resistance — open component and/or wiring harness.	Ohmmeter on R x 100 scale. To determine which component is defective, disconnect leads and test separately.
Carburetor shutdown solenoid	(-) and (+) leads.	If good — approximately 4-5 ohms.	Disconnect solenoid leads when testing. To bypass — see Section 3. "Shutdown Solenoid".
Choke heater	Choke terminals.	If good — continuity.	Test choke leads separately for continuity.
P1 wiring harness	P1-3 and ground. P1-1 and P1-2 (B1 and B2 stator leads).	If good — zero ohms. Any other reading indicates a poor ground connection. If good — B1 and B2 — .08 ohms. Low resistance — B1/B2 stator winding shorted. High resistance — B1/B2 stator winding open.	Ohmmeter on R x 1 scale. Ohmmeter on R x 1 scale. (See Section 7. "Stator").
P2 Wiring Harness to Engine Components			
10 Amp fuse and wiring	P2-2 and starter relay "battery" side.	If good — zero ohms. No continuity — open circuit and/or blown fuse.	Ohmmeter on R x 100 scale.
Ignition coil (primary coil)	P2-3 and P2-6 (disconnect breaker points lead from coil (-) terminal.	If good — 4-5 ohms. Low resistance — shorted ignition coil and/or wiring. High resistance — open ignition coil and/or wiring.	Ohmmeter on R x 1 scale. See Engine Service Manual "Ignition Coil Check" for additional procedures.
S relay coil (starter solenoid and wiring)	P2-4 and P2-5.	If good — 5-7 ohms. Low resistance — shorted S relay coil and/or wiring. High resistance — open S relay coil and/or wiring.	Ohmmeter on R x 1 scale.

Component(s)	Ohmmeter Connections	Results	Remarks
Low Oil Pressure (LOP) shutdown switch	<p>P2-7 and engine block (ground).</p> <p>NOTE: To determine if the low oil pressure shutdown switch is the cause for the generator set to shut down after the start switch is released, proceed to the next step.</p> <p>None (see "Remarks"). Place controller or remote switch to start.</p> <p>NOTE: Replace shutdown switch only after proper engine oil pressure is verified.</p>	<p>If good — zero ohms. High resistance — open wiring or switch.</p> <p>If generator set continues to run after start switch is released, LOP switch may be defective.</p>	<p>Ohmmeter on R x 100 scale. Test with LOP lead connected.</p> <p>Remove lead to LOP switch.</p>
Fuel pump	Fuel pump — fuel pump "hot lead" and fuel pump body (ground).	If good — low resistance (continuity). High resistance — open.	Ohmmeter on R x 1 scale.

SECTION 8. DISASSEMBLY/REASSEMBLY

Prior to disassembly, the generator set must be removed from the coach. Disconnect battery, fuel line, exhaust system and load leads. Observe all safety precautions during the disassembly/reassembly procedure.

Disassembly

1. Remove generator side-cover by removing wing nuts at air cleaner and controller box. Separate side-cover from generator. Figure 8-1.

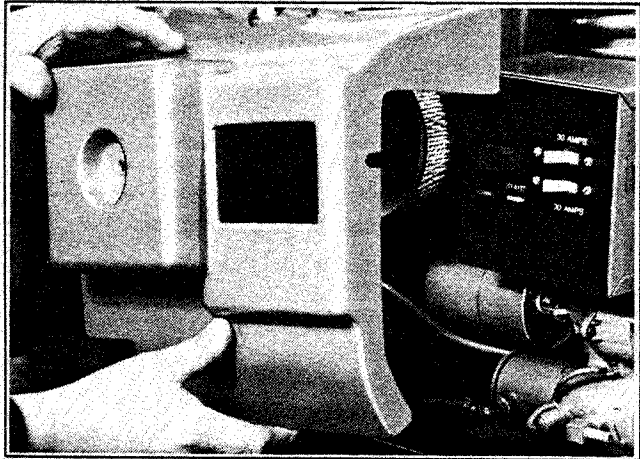


Figure 8-1. Removing Side Cover

2. Remove the wing nut securing the air cleaner element and seal. Separate air cleaner element and seal from air duct.
3. The air duct is secured by one screw at the carburetor air intake and two nuts w/washers at the controller mounting bracket. Remove the fasteners at these points to remove air duct. Figure 8-2. Remove gasket from carburetor air intake.

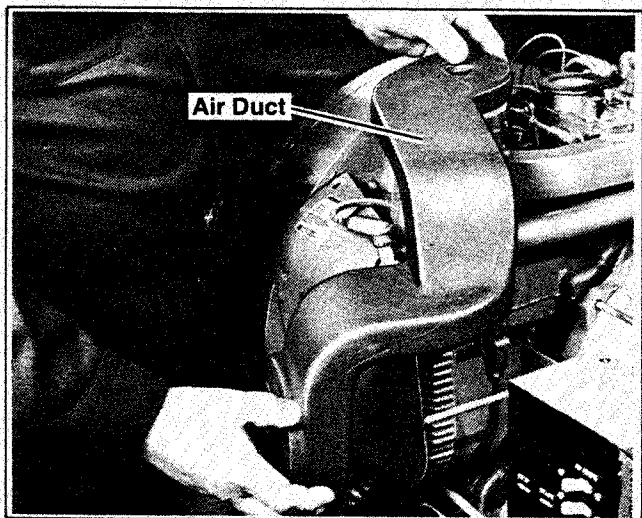


Figure 8-2. Removing Air Duct

4. Remove the four screws securing the controller cover. Lift the controller cover away from controller box to disconnect leads L1, 2, and 4 from circuit breakers.

See Figure 8-3. Upon removal of on/off switch leads (T1, T2, T3) from controller circuit board, the controller cover can be removed.

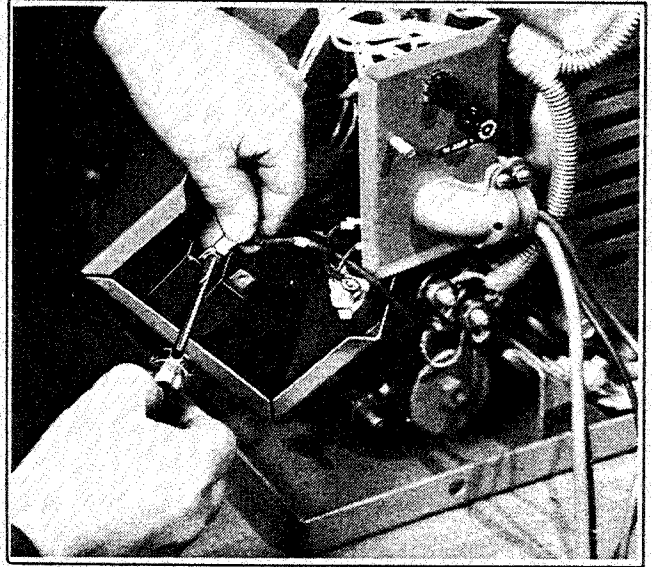


Figure 8-3. Removing Circuit Breaker Leads

5. Disconnect stator leads 1, 2, 3 and 4 from circuit breaker and ground lug connections. Remove stator lead B1 and B2 plug connector at controller.
6. Remove terminal strip cover and record position of stator leads 55, 66, 77, 88 and 99 on terminal strip. See Figure 8-4. Disconnect stator leads from terminal strip.

NOTE

Terminal strip lead connection on your generator may differ from that shown.

7. Remove the two screws securing the controller box to the mounting bracket. Retrieve the spacer as each screw is removed.

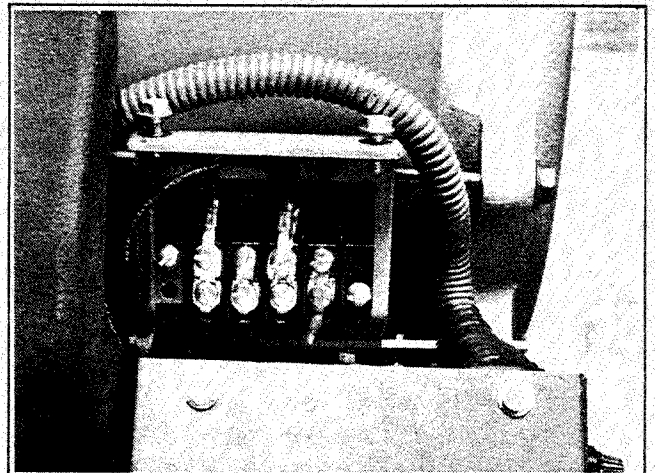


Figure 8-4. Stator Terminal Strip

8. Gently pull generator lead through controller box port while separating controller box from bracket.
9. Remove the two screws and star washers fastening the controller mounting bracket and ground terminal to the stator housing. Separate mounting bracket from stator until mounting bracket rests on tray. Removal of remaining components from mounting bracket is unnecessary for generator disassembly. To replace capacitor, starter relay or fuel pump remove component mounting strap. Reference the wiring diagram for proper reconnection.
10. Cut tie wraps securing engine leads to generator overbolt.
11. Remove center bolt from vibro-mounts attached to generator end bracket. Figure 8-5.

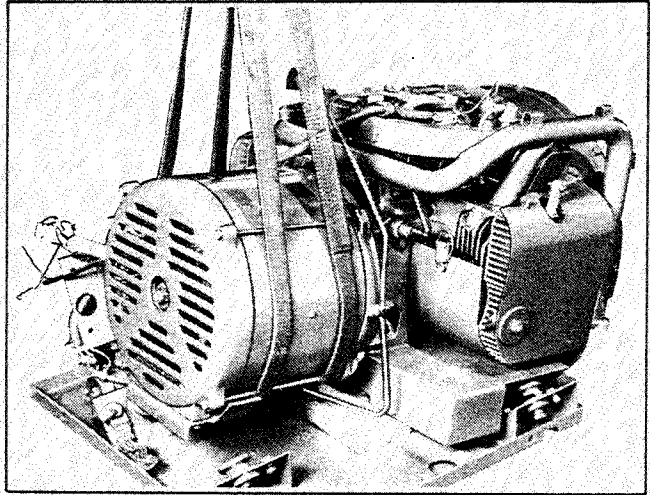


Figure 8-6. Hoisting Generator End

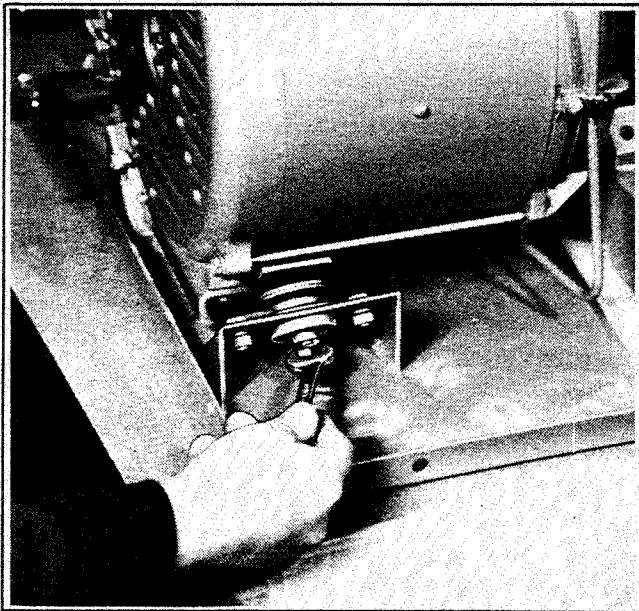


Figure 8-5. Removing Vibro-Mount Bolt

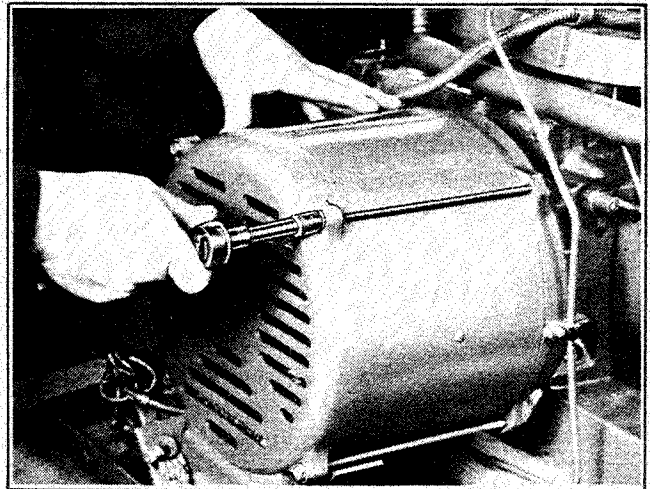


Figure 8-7. Removing Overbolts

12. Disconnect ground strap from mounting tray.
13. With lifting strap positioned around stator, use hoist to raise generator end. Place a wood block under generator adapter and lower generator until generator is supported by block. Figure 8-6.
14. Remove four overbolts securing generator end bracket. Figure 8-7.
15. Use a rubber mallet to bump end bracket away from stator housing. See Figure 8-8.

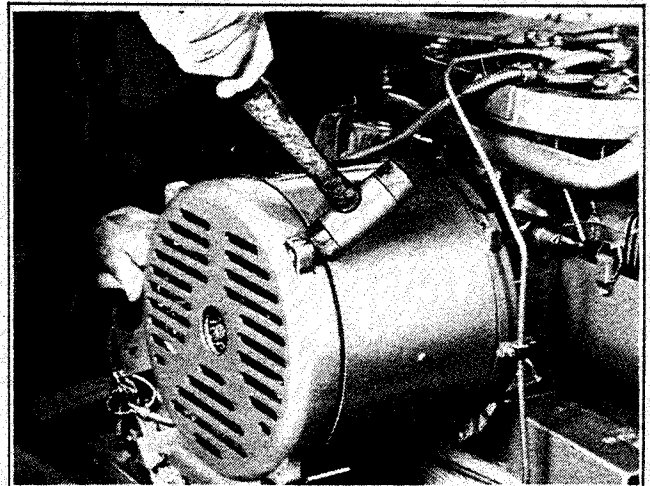


Figure 8-8. Loosening End Bracket

16. Push controller leads through port in side of end bracket while separating end bracket from stator.
17. Gently slide stator over rotor. Be careful not to damage rotor during stator removal. See Figure 8-9. Note position of stator leads before removing stator.

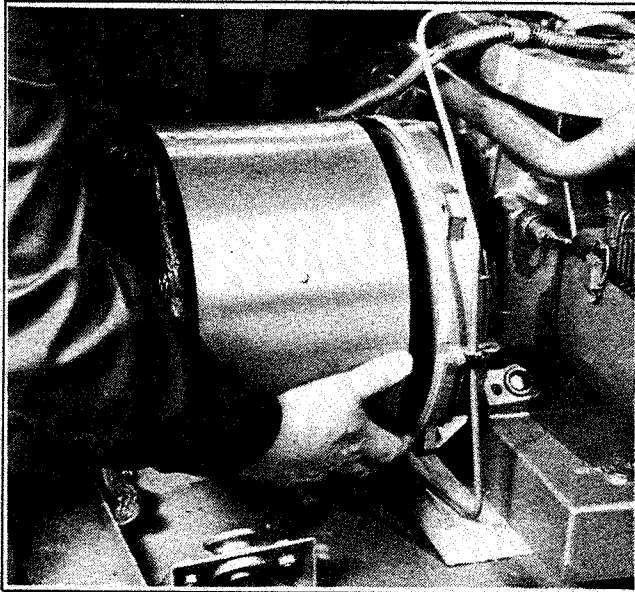


Figure 8-9. Removing Stator

18. Loosen rotor thru-bolt by rotating bolt counterclockwise with a 3/4 in. socket. Figure 8-10.

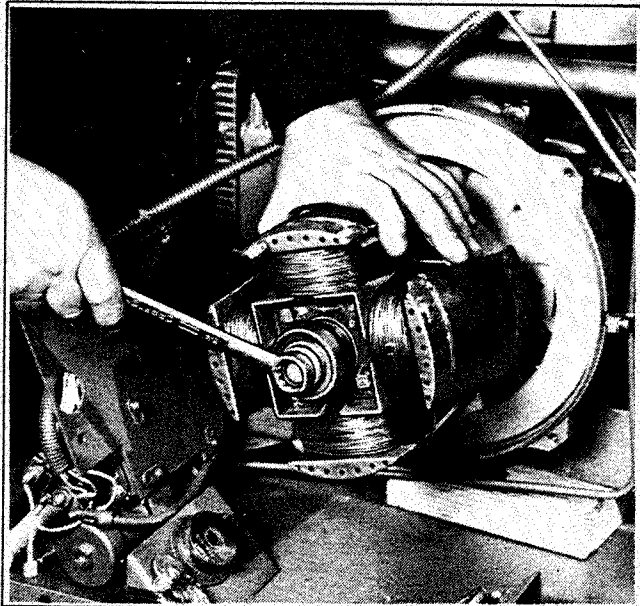


Figure 8-10. Loosening Thru-Bolt

19. Loosen the rotor from the tapered stub of the crankshaft by striking the thru-bolt head with a heavy mallet. See Figure 8-11. Remove rotor and fan.

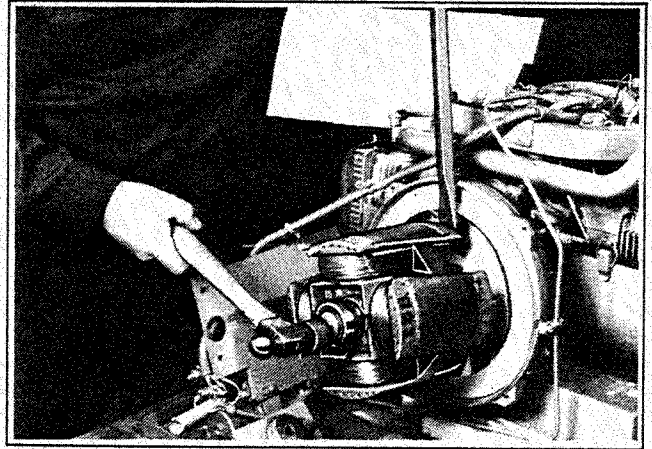


Figure 8-11. Striking Thru-Bolt

CAUTION

Do not attempt to remove rotor by blocking engine cooling fan and turning rotor with any kind of wrench. Damage to fan blades and rotor may result.

20. Remove four adapter plate mounting bolts to separate adapter plate from engine. Figure 8-12.

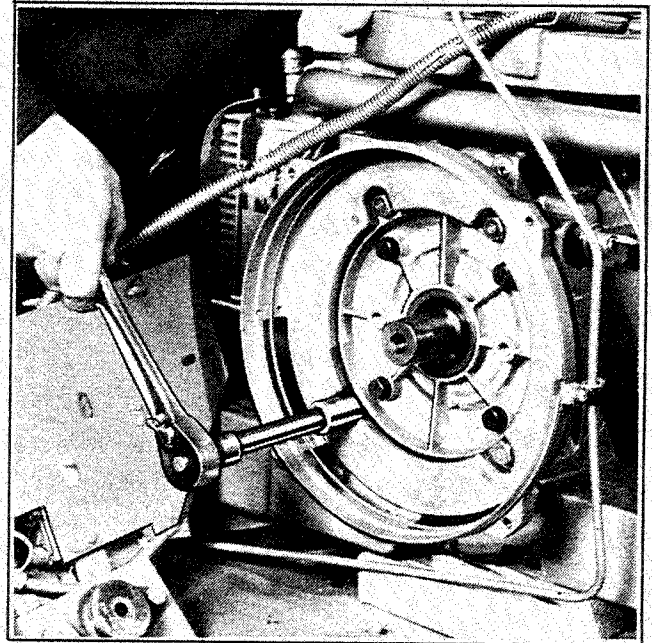


Figure 8-12. Removing Adapter Plate

Reassembly

1. Reposition adapter plate on engine. Secure with four mounting bolts
2. Apply anti-seize compound to the tapered end of the stub shaft. See Figure 8-13.

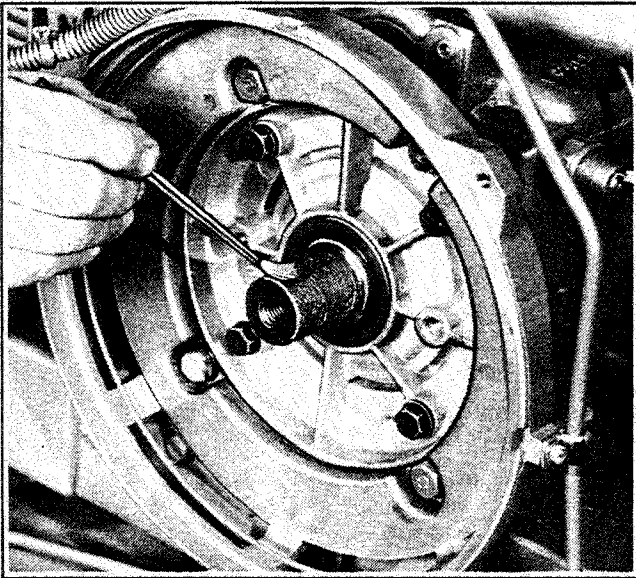


Figure 8-13. Applying Anti-Seize Compound

- Slide rotor onto stub shaft and hand-tighten rotor thru-bolt. Attach a strap wrench to rotor and torque thru-bolt to 50 ft.lbs. (68 Nm). See Figure 8-14.

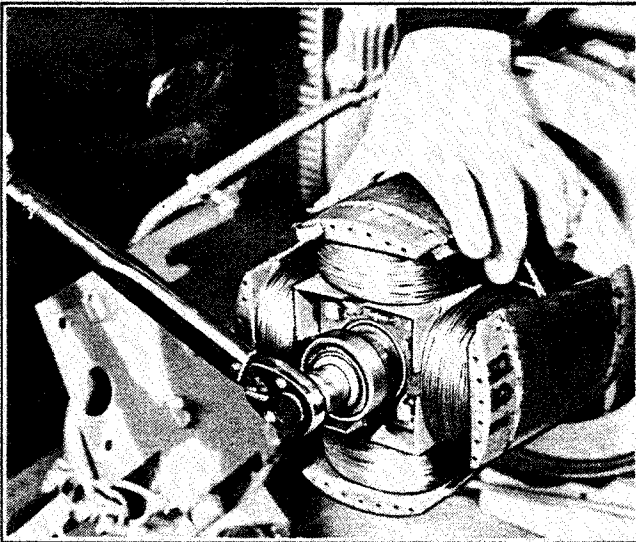


Figure 8-14. Torquing Thru-Bolt

- Slide stator over rotor and onto adapter lip. Be careful to avoid damaging rotor. Rotate stator until stator leads are at 9 o'clock position. See Figure 8-15.
- Route stator leads through opening in end bracket while positioning end bracket on stator. Tap end bracket into position with a plastic mallet. Figure 8-16.
- Replace the four overbolts which secure the end bracket and stator to the adapter plate. Torque overbolts to 70 in.lbs. (8Nm). Figure 8-17.

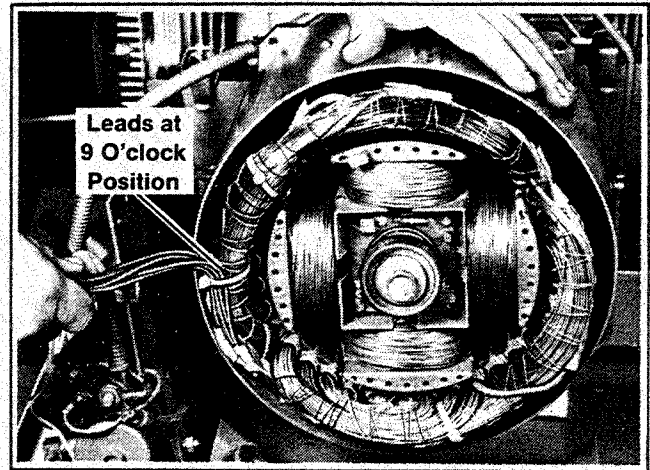


Figure 8-15. Proper Stator Position

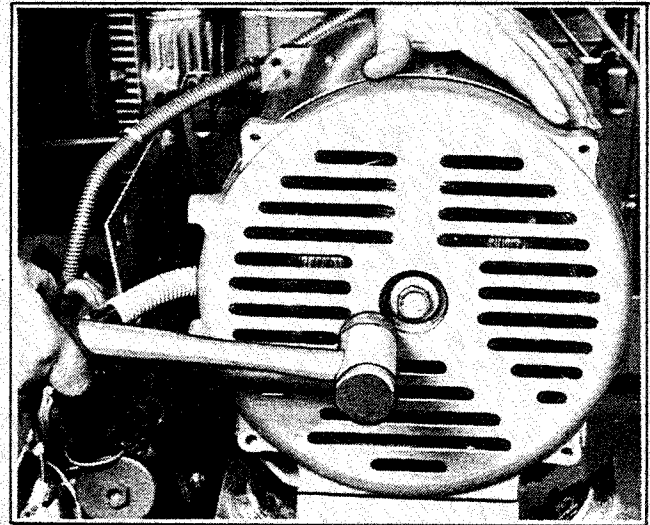


Figure 8-16. Positioning End Bracket

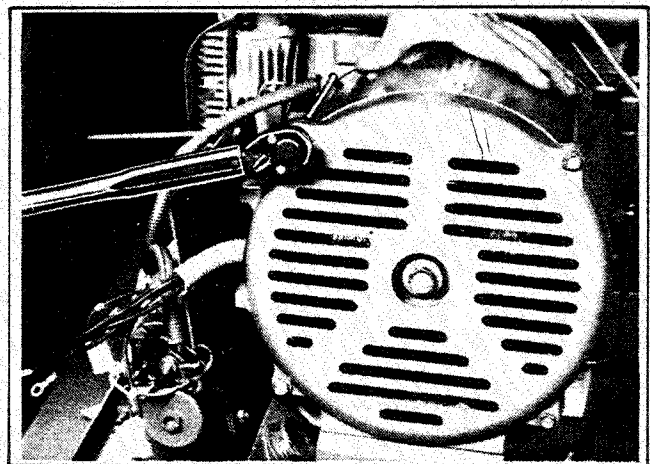


Figure 8-17. Torquing Overbolts

- Hoist generator end slightly to remove support block. Lower generator onto vibro-mounts and remove hoist.

Replace bolts securing vibro-mounts to end bracket.
Figure 8-18.

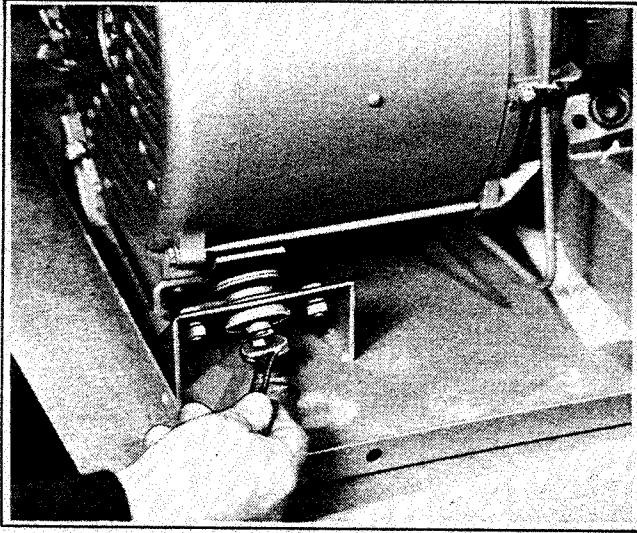
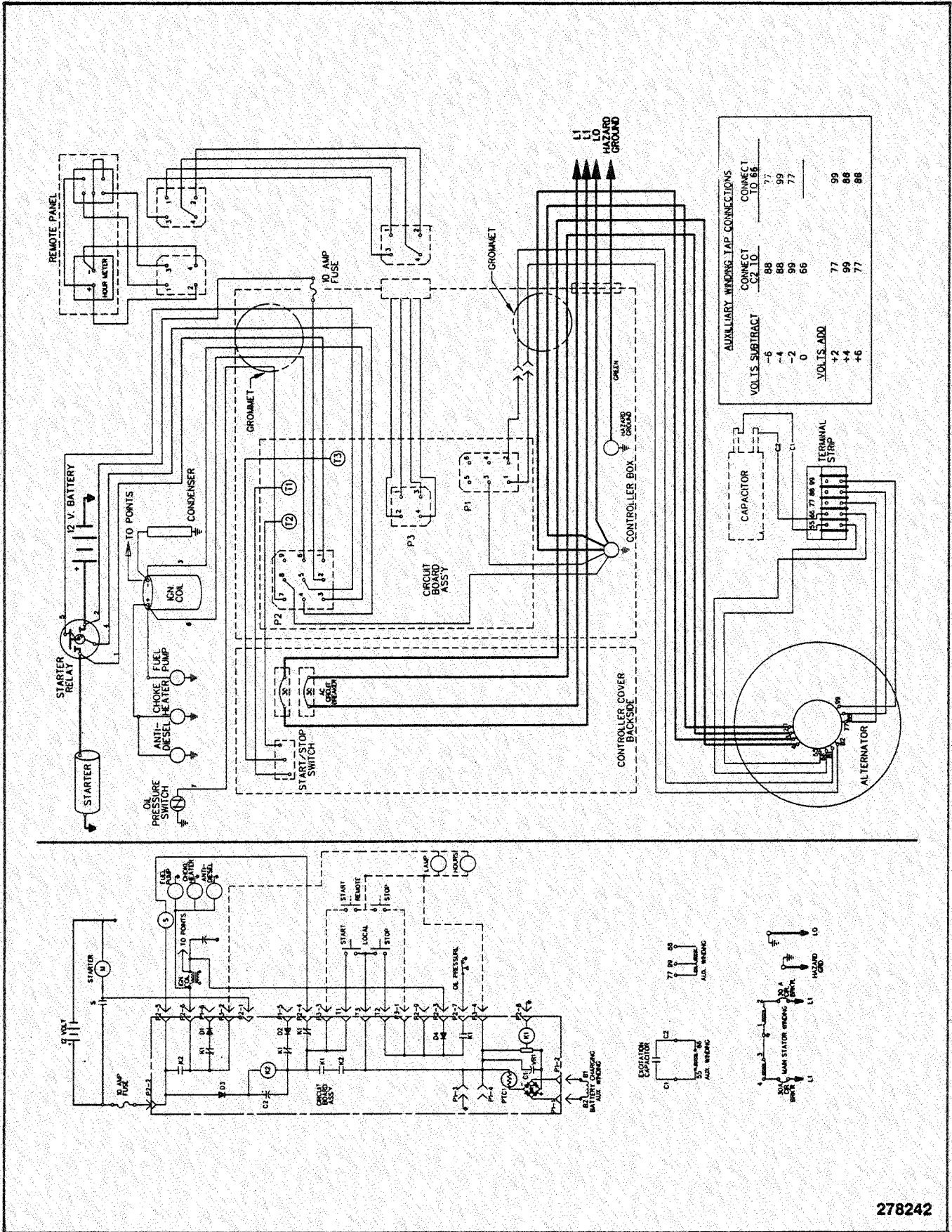
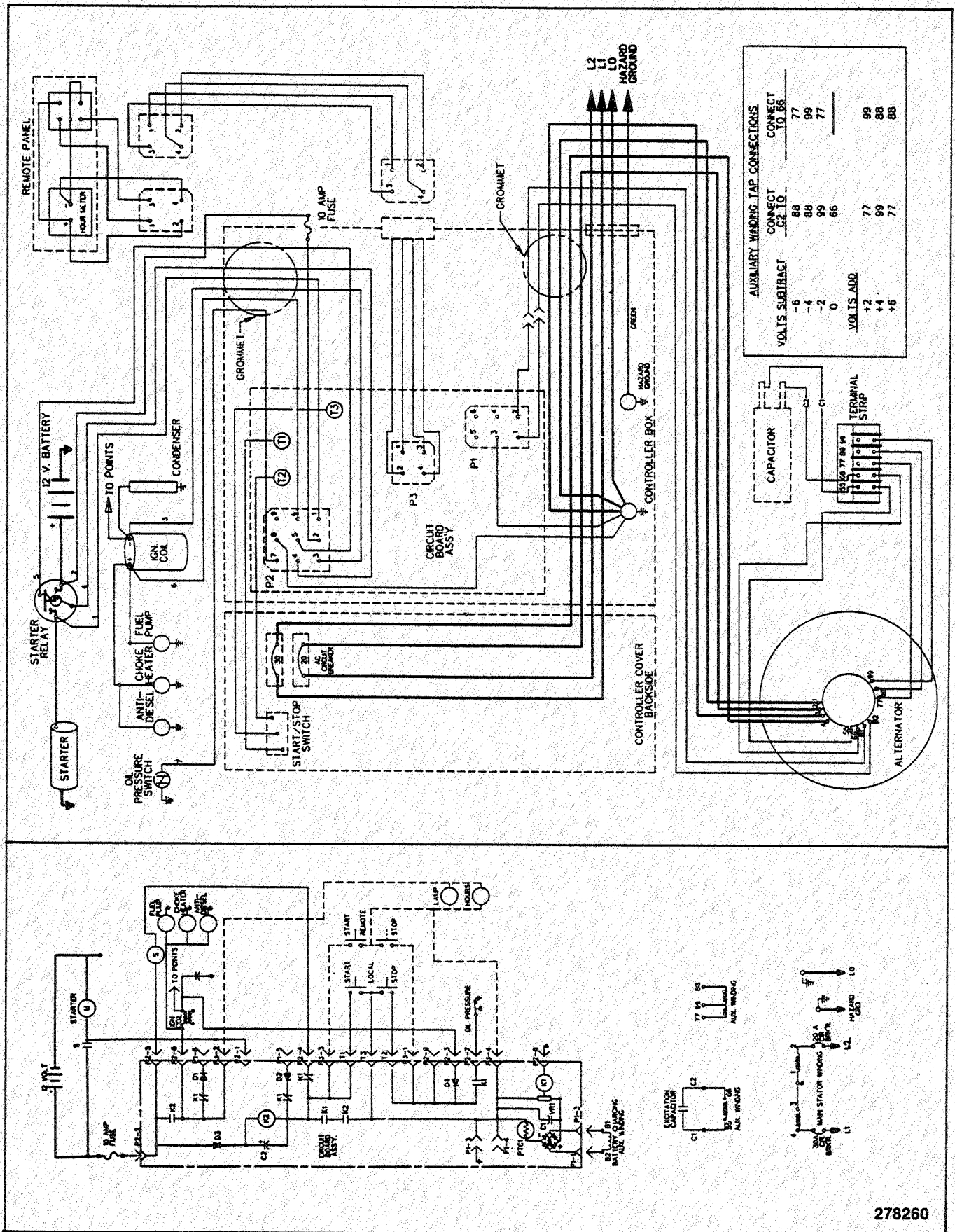


Figure 8-18. Refastening Vibro-Mounts

8. Reconnect ground strap to mounting tray.
9. Reconnect stator leads 55, 66, 77, 88 and 99 to the stator terminal strip. If the capacitor, rotor or stator was not replaced, reconnect stator leads to the terminal strip in the same position as previously. If any of these components was replaced, connect the stator leads to the terminal strip according to the wiring diagram. Refer to Section 6, "Stator Reconnection" if replacement of the capacitor, rotor or stator results in improper AC output voltage. Replace terminal strip cover.
10. Route stator leads 1, 2, 3, 4, B1 and B2 through mounting plate and into controller box. Be sure stator leads are protected by plastic conduit between stator and controller. Route leads from engine directly through remaining port into controller.
11. Replace the two screws and spacers to secure the controller box to the mounting bracket.
12. Align the controller mounting bracket and ground terminal with mounting tabs on the stator. Secure with two mounting screws and accompanying star washers.
13. See Section 9. Wiring Diagrams for proper reconnection of stator leads 1, 2, 3, and 4 in controller. Reconnect in-line connectors between circuit breakers and leads L1, 2 and 4. Reconnect start/stop switch push-on terminals T1, T2 and T3 and B1/B2 plug connector.
14. Align controller cover with controller box. Secure with four mounting screws.
15. Use tie-wraps to secure engine leads to generator overbolts.
16. Position air duct over carburetor air intake and studs extending through mounting bracket. Secure with mounting screw at carburetor air intake and two washers and nuts at mounting bracket. Be sure gasket is in position between air duct and carburetor air intake.
17. Replace air cleaner element and seal. Secure with wing-nut.
18. Place generator side cover over studs on air cleaner and controller. Secure with wing-nuts.



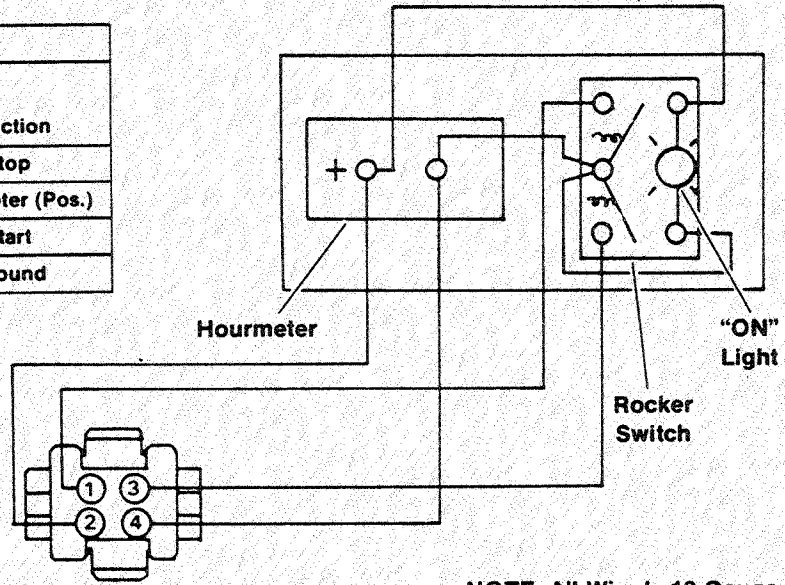
Wiring Diagram (Standard Model)—120 Volt (with E-239396 Circuit Board)



AUXILIARY WINDING TAP CONNECTIONS		
VOLTS SUBTRACT	CONNECT TO	CONNECT TO
-6	88	77
-4	88	99
-2	99	77
0	66	
VOLTS ADD		
+2	77	99
+4	99	88
+6	77	88

Wiring Diagram (6 kW Model)—120 Volt

Lead Designation			
Pin No.	Corr. Lead Color	Corr. Lead Color (for PA-239439 Only)	Function
1	White	Brown	Stop
2	Red	Green	Hourmeter (Pos.)
3	Black	Red	Start
4	Green	Black	Ground



NOTE: All Wire Is 18 Gauge

Remote Control Panel Wiring

Typical Wattage Requirements

Electric Motors	1/4 HP	1/3 HP	1/2 HP	3/4 HP	1 HP	2 HP	3 HP
Starting (In Rush)	750	1000	1500	2000	3300	4000	5000
Running Watts	350	400	600	750	1100	2000	3000

Electric Appliances	Rating (Watts)
Blanket	50-250
Blender	600
Broiler	1350
Fan, Air Circulating	25-100
Fan, Furnace	270
Heater, Space	750-1500
Heater, Water	1500
Pan, Frying	1200
Percolator, Coffee	650
Radio	50-100
Television	300-750
Toaster	750-120
Hair Dryer	500-1200

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