RV GENERATOR SERVICE MANUAL

MODEL: 7CKM21-RV
7CKM22-RV
"PowerBoost III"

KOHLER® GENERATORS

TP-5348

TABLE OF CONTENTS

INTRODUCTION

This manual covers the operation, maintenance, troubleshooting and repair of the 7CKM21-RV "PowerBoost III" 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, SPECIFICATION, SERIAL, AND ENGINE SERIAL numbers from generator nameplate to receive current parts and literature 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 way to prevent accidents is to be aware of the potential dangers and to always use good common sense. In the interest of safety, some general precautions relating to operating of a Generator set follow. Keep these in mind. This manual contains several types of safety precautions which are explained below.

⚠ DANGER

Danger is used to indicate the presence of a hazard which *will* cause *severe* personal injury, death, or substantial property damage if the warning is ignored.

⚠ WARNING

Warning is used to indicate the presence of a hazard which *can* cause *severe* personal injury, death, or substantial property damage if the warning is ignored.

⚠ CAUTION

Caution is used to indicate the presence of a hazard which *will* or *can* cause *minor* personal injury or property damage if the warning is ignored.

NOTE

Note is used to notify people of installation, operation, or maintenance information which is important but not hazard-related.

⚠ CAUTION

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.

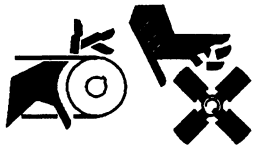
FIRE HAZARD! Keep the compartment and generator clean and free of debris and combustible material to minimize chances of fire. Do not locate electrical wiring, fuel lines, or combustible material above the exhaust muffler. If sub-flooring exists beneath the set, an opening must be provided to allow fuel and/or oil that may leak from the system to drain out of the compartment. Make sure this opening is kept clear at all times.

⚠ DANGER

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 must be well ventilated to prevent accumulation of explosive gases. Do not mount battery in generator compartment.

⚠ DANGER

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 must 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

MOVING PARTS! Do not open generator set compartment door when unit is running, except for servicing by qualified technicians. 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

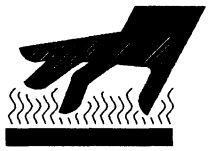
UNIT STARTS WITHOUT NOTICE! To prevent accidental starting on units with a remote start/stop switch, always disconnect battery (remove negative lead first and reconnect it last) to disable generator set before working on any equipment connected to generator.

⚠ WARNING

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.

⚠ CAUTION

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



⚠ CAUTION

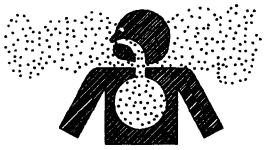
HOT PIPING! An engine gets hot while running and exhaust system components get extremely hot. Do not work on generator set until unit is allowed to cool.

⚠ WARNING

ELECTRICAL SHOCK! The heat sink of the voltage regulator contains high voltage. Do not touch when testing voltage regulator or electrical shock will occur.

⚠ 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.



⚠ DANGER

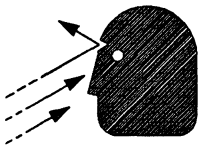
CARBON MONOXIDE! A gasoline/gas-engine discharges deadly carbon monoxide as part of the exhaust when operating. Carbon monoxide is particularly dangerous in that it is an odorless, tasteless, and nonirritating gas, but be ever mindful that it can cause death if inhaled for even a short period of time. Have only qualified technicians 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.

⚠ DANGER

CARBON MONOXIDE! When installing exhaust system, position tail pipe end so that discharged exhaust gases may not be drawn into vehicle interior through windows, doors, air conditioners, etc. Do not use flexible tail piping as this type could crack or break and allow lethal exhaust fumes to enter the vehicle.

⚠ CAUTION

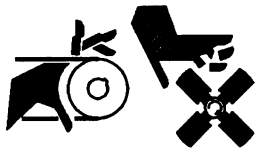
BACKFIRE! A sudden backfire can cause serious burns. Keep hands and face away from carburetor when the air cleaner is removed.



⚠ CAUTION

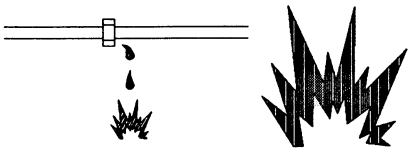
LOOSE COMPONENTS! When turning rotor for breaker point adjustment do not rotate thru bolt/crankshaft counterclockwise. Doing so can loosen thru bolt and result in serious injury when unit is running.

LOOSE COMPONENTS! When adjusting valves, do not use a ratchet wrench on crankshaft nut. Doing so can loosen nut and result in serious personal injury from nut or pulley flying off engine while unit is running.



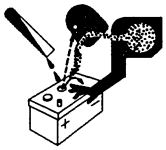
⚠ CAUTION

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).



⚠ CAUTION

EXPLOSION! Fuel leakage can cause an explosion. To prevent fuel leakage, the fuel system must be checked for leakage using a soap-water solution. Do not use solutions that contain ammonia or chlorine, for soap will not bubble for an accurate leakage test.



⚠ 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.

⚠ DANGER

HIGH VOLTAGE! When testing voltage regulator, always unplug power cord from AC power source before connecting or disconnecting wires to prevent danger of electrocution.

⚠ DANGER

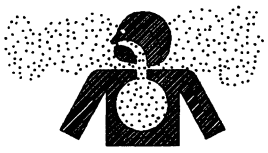
HIGH VOLTAGE! Remember that the function of a generator set is to produce electricity and that whenever electricity is present, there is the potential danger of electrocution. Take the same precautions with electrical appliances in your coach that you would observe in your home. Keep away from electrical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

⚠ DANGER

FIRE HAZARD! 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.

FIRE HAZARD! When removing fuel line or carburetor, use a proper container to catch all fuel. Do not smoke or permit flame or spark to occur near carburetor, fuel line, fuel pump, or other potential sources of spilled fuel or fuel vapors.

⚠ DANGER



HAZARDOUS FUMES! When installing exhaust system, position tail pipe end so that discharged exhaust gases may not be drawn into vehicle interior through windows, doors, air conditioners, etc. Do not use flexible tail piping as this type could crack or break and allow lethal exhaust fumes to enter the vehicle.

⚠ DANGER

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 technicians before resuming generator operation. Additional precautions must be taken when using the following fuels:

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

Propane (LP)--Adequate ventilation is mandatory. Propane is heavier than air; install gas detectors low in room. Inspect detectors often.

⚠ DANGER

ELECTROCUTION! The following procedure requires that the generator set be running while adjustments are made. Avoid contacting electrical connections with adjustment tool. Remove wristwatch, rings, and jewelry that can cause short circuits. Do not touch electrical equipment when standing in water, on wet ground, or when your hands are wet.

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.

NOTE

PRESSURIZATION! After all LP-Gas connections have been completed, the entire system shall be test pressurized to 6-8 ounces (10-14 inches water column).

NOTE

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

Warning Decals

Safety decals are affixed to the generator set in prominent places to advise the operator or service technician of potentially hazardous situations. The decals are reproduced here to improve operator recognition and thereby increase decal effectiveness. For a further explanation of decal warning, reference preceding safety precautions. Before operating or servicing the generator set, be sure you understand the message of these decals. Replace missing or damaged decals.

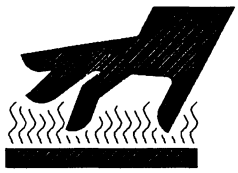
⚠ WARNING

carbon monoxide. Can cause severe nausea, fainting, or death.

Completlely seal off compartment to maintain vapor tightness to living space.
See operator's manual for complete installation instructions.

239796

⚠ CAUTION



Hot engine and exhaust system. Can cause severe burns.

Do not work on generator set until unit is allowed to cool.

249809

WARNING ! THIS IS A POSITIVE TERMINAL ONLY. DO NOT ATTACH NEGATIVE LEAD !

238402

⚠ WARNING

Fire or accident hazard. Can cause severe injury or death.

Install unit only in accordance with manufacturer's detailed installation instructions.

239773

⚠ WARNING

Hazardous voltage Backfeed to utility system can cause electrocution or property damage.

Do not connect to any building electrical system without connecting through an approved device and after building main switch is open.
See operator's manual.

239771

SECTION 1. SPECIFICATIONS

General Specifications

Dimensions – L x W x H –-in. (mm)	26.8 x 21.5 x 17.5 (681 x 546 x 445)			
Weight – lbs. (kg)	322 (145)			
Air Requirements				
Combustion – cfm (cmm)	25 (0.7)			
Cooling – cfm (cmm)	650 (18.4)			
Fuel Consumption				
Load	25%	50%	75%	100%
Gasoline				
Gal./hr. (L/hr.	0.57 (2.2)	0.72 (2.7)	0.97 (3.7)	1.27 (4.8)
LP Gas				
Gal./hr. (L/hr.)*	0.70 (2.6)	0.79 (2.9)	0.96 (3.6)	1.1 (4.2)

* One gallon of LP gas will produce approximately 0.4 cubic feet (0.012 m^3) of propane vapor per hour in ambient temperature down to 0°F (–18°C).

Engine

Some general engine specifications are listed below. Refer to the appropriate service section and the engine service manual for specific service details.

Manufacturer	Kohler
Model	K–582EP
Cycle	4
Number of Cylinders	2
Compression Ratio	7:1
Displacement – cu.in. (cc)	57.7 (945.7)
Rated Horsepower	13.8
RPM	1800
Bore – in. (mm)	3.50 (88.9)
Stroke – in. (mm)	3.0 (76.2)
Valve Material	
Intake	Forged Steel
Exhaust	Stellite (with rotator)
Valve Clearance	
Intake – in. (mm)	0.008/0.010 (0.202/0.253)
Exhaust – in. (mm)	0.017/0.020 (0.430/0.506)
Cylinder Block Material	Cast Iron
Cylinder Head Tightening Torque – ft. lbs (Nm)	35 (47)
Cylinder Head Material	Aluminum Alloy

Piston Rings	2 Compression/ 1 Oil
Crankshaft Material	Ductile Iron
Bearings	Replaceable Sleeve
Connecting Rod Material	Tin Plated Aluminum Alloy
Governor	Oil Bathed Flyweight
Lubrication System	Pressure
Oil Capacity - qts. (L)	4 (3.78)
Oil Type (API)	SE, SF, SG
Oil Pressure - psi (kPa)	30–50 (206–345)
Fuel Type -	
Model 7CKM21–RV	Gasoline - Regular Grade Unleaded Minimum Octane 86
Model 7CKM22–RV	LP Gas Blended for Season and/or Geographic Location
Choke Type	Automatic Thermal Electric
Fuel Pump Type	Electric
Battery Voltage	12
Battery Ground	Negative
Battery Recommendation	290 Cold Cranking Amps. (55 Amp./ hr. minimum)
Spark Plug Type	Champion RH10
Spark Plug Size - in. (mm)	0.56 (14)
Spark Plug Gap - in. (mm)	
Gasoline	0.025 (0.64)
LP Gas	0.018 (0.46)
Spark Plug Tightening Torque - ft. lbs (Nm)	18/22 (24–30)
Starter Motor	Bendix Automotive Type
Cooling System	Kohler Air Vac™
Direction of Rotation (viewed from generator end)	Counterclockwise

Generator

Rated kW – 7CKM21–RV (Gasoline)	7.0
7CKM21–RV (Gasoline – 6 kW Model)	6.0
7CKM22–RV (LP Gas)	6.3
Frequency – Hz	60
Rated Amps. – 7CKM21–RV (Gasoline)	58
7CKM21–RV (Gasoline – 6 kW Model)	50
7CKM22–RV (LP Gas)	52.5
Rated Voltage	120
Excitation Method	Static, Brush–Type
Coupling Type	Tapered Shaft, Thru–Bolt
Thru–Bolt Torque – ft. lbs. (Nm)	50 (68)
Overbolt Torque – in. lbs. (Nm)	70 (8)
Rotor Resistance (ohms)	5.2
Stator Resistance (ohms)*	
Leads:	
1–2, 3–4	0.28
33–44	0.28
55–66	1.26
B1–B2	0.08
Voltage Regulator Type	PowerBoost III Volts/Hz
Voltage Frequency Regulation	Meets ANSI/EGS –1–1986 Standard
Number of Output Leads	4
Output Lead Conduit Size – in. (mm)	0.75 (19)
Insulation (Rotor and Stator)	Class F, Epoxy Varnish, Vacuum Impregnated
Fungus Resistance	Meets Mil–E–04970A Standard
Winding Material	Copper
Cooling System	Kohler Air Vac™
Bearing, Number and Type	1, Replaceable Ball
Circuit Protection	
Controller	Replaceable 10 Amp. Fuse
Generator (7 kW Models)	Two 30 Amp. Circuit Breakers
Generator (6 kW Model)	One 20 Amp and One 30 Amp. Circuit Breaker
Voltage Regulator	Replaceable 10 Amp. Fuse
Battery Charging Circuitry (if equipped)	Self–Resetting 10 Amp. Circuit Breaker

* Most ohmmeters will not give 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 (discoloration). Do not confuse a low resistance reading with a reading indicating a shorted winding.

DERATION: The kilowatts of the generator set will decrease 3% for each 1000 feet (305 meters) above sea level, 2% (6 kW model 1%) for each 10°F (5.5°C) increase in ambient temperature above 60°F (16°C) and 11.1% when converted to LP gas fuel. Ambient temperature is measured at air cleaner inlet.

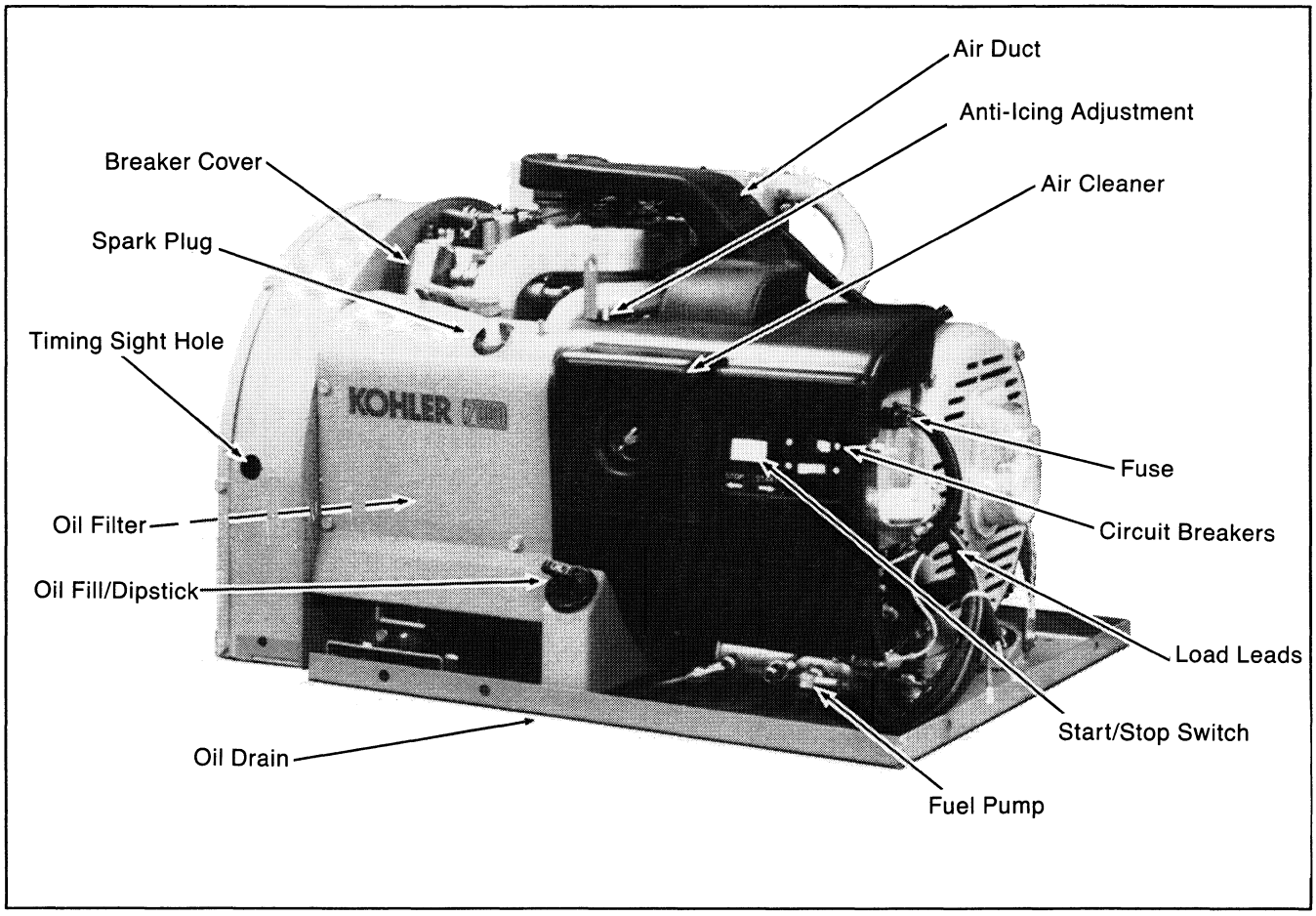


Figure 1-1. Service Views

SECTION 2. OPERATION

To insure continued satisfactory operation, the following items should be checked prior to each start-up. Observe all safety precautions listed at the beginning of this manual during generator operation.

Prestart Checklist

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

BATTERY: Remove caps (if used) and check the electrolyte level of each battery cell; add distilled water as necessary.

AIR INLETS: Must be clear and unobstructed.

COMPARTMENT: Interior must be clean and free of spilled fuel and oil.

AIR CLEANER: Element must be clean and properly installed.

AIR DUCTS: Must be tight and in proper position.

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

ELECTRICAL: All connections, including battery and remote controls, must be tight and in good condition.

Controller Features

For identification and function of controller components, refer to Figure 2-1 and the accompanying text.

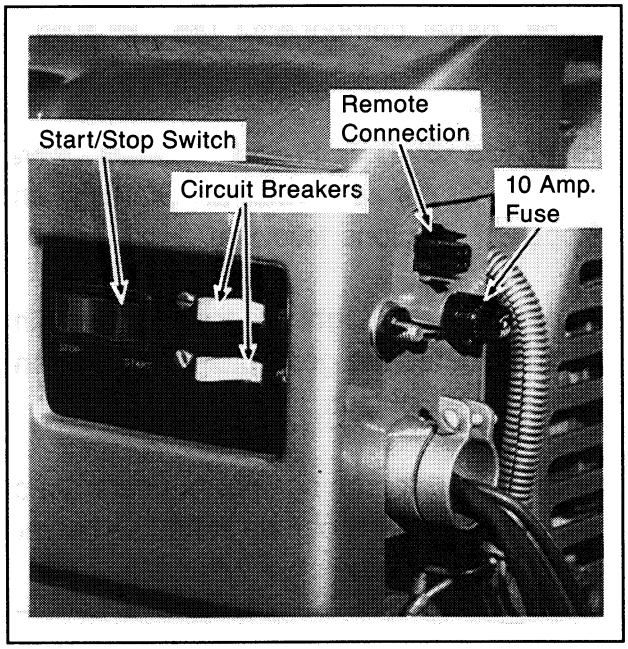


Figure 2-1. Controller Features

Start/Stop Switch: Allows test operation at generator set. See "Starting" and "Stopping" information following.

AC Circuit Breakers: Protect generator from damage due to overload or short circuits. See "Circuit Protection" section following.

Remote Control Connector: Allows connection of remote start/stop panel. See "Remote Start Panel Features."

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

Output Leads: Provide electrical output for coach AC circuitry.

Remote Start Panel Features (Optional)

Remote panel components are identified in Figure 2–2.

Start/Stop Switch: Provides remote operation of generator set – refer to "Starting" and "Stopping" sections following.

Generator "ON" Light: A green light on the switch indicates the generator is running and producing AC output.

Hourmeter: Records number of hours run so routine maintenance can be scheduled at recommended maintenance intervals.

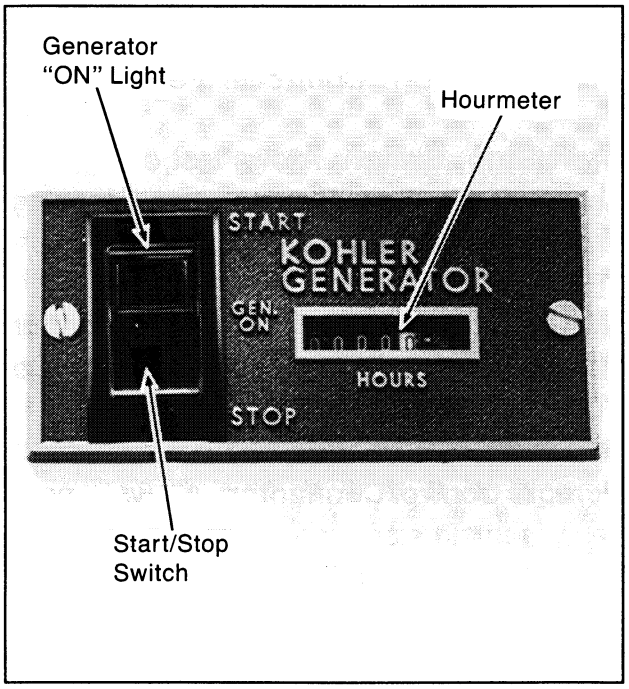


Figure 2–2. Remote Panel (Optional)

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" lamp located on the 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 ring gear is engaged, the pinion gear and ring gear will clash which may damage the ring gear teeth.

Start–up of early model sets may require operation of the manual anti–icing system (if equipped). See "Anti–Icing Systems" section following.

⚠ 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.

Anti-Icing Systems

Most 7CKM-RV generators are equipped with anti-icing devices designed to improve cold weather operation. Some models utilize an automatic anti-icing device while other sets are equipped with anti-icing devices requiring manual operation. Operation of both systems is explained in the following paragraphs.

Automatic Anti-Icing

The automatic anti-icing system utilizes an electric heat element to warm the carburetor whenever the generator set is running. The system is activated when the START switch is pressed; current flow to the anti-icing heat element stops when the generator is stopped. Current required to operate the automatic anti-icing system decreases from approximately 3 Amps. at start-up to 0.75 Amps. when the carburetor temperature reaches 100-110°F (38-43°C). No adjustment or manual intervention is required with this system. The automatic anti-icing system can be identified by the anti-icing heat element shown in Figure 2-3.

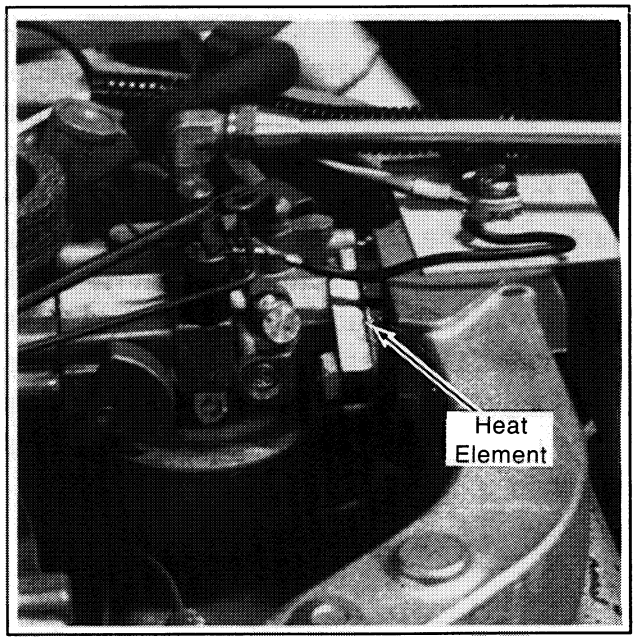


Figure 2-3. Anti-Icing Heat Element

Manual Anti-Icing

The manual anti-icing system functions by diverting heated manifold air to the carburetor intake. The system can be identified by the anti-icing adjustment lever shown in Figure 2-4. When operating the generator at temperatures below 40°F (44°C) with high humidity, move the anti-icing adjustment lever to the "Winter" position. At temperatures above 70°F (21°C), move the adjustment lever to the "Summer" position. Between 40°F (4.4°C) and 70°F (21°C), the adjustment lever may be left in either position.

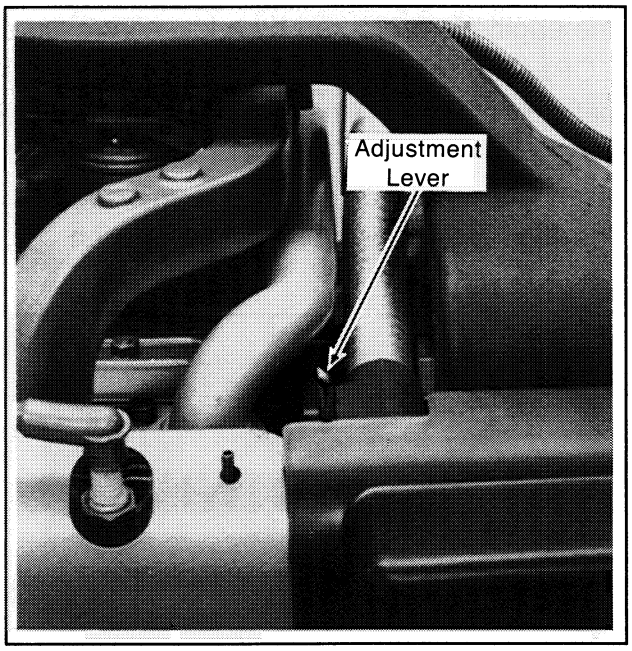


Figure 2-4. Anti-Icing Adjustment Lever (Manual)

☞ NOTE

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

Stopping

Run generator at low or no load for several minutes to allow engine to cool down. Move controller or remote rocker switch to "STOP" position and hold until generator comes to a complete stop. If the generator shuts down automatically, identify and correct the cause of shutdown before attempting to restart. If the generator has stopped due to a fault shutdown (low oil pressure) or blown controller fuse, the problem must be corrected before the set can be restarted.

Engine Shutdown

The engine is protected by a low oil pressure (LOP) shutdown switch. The engine will automatically stop when the oil pressure drops below 14 psi +/- 2 psi (97 kPa). The switch will reset after the problem has been corrected. See Figure 2-5 for LOP switch location.

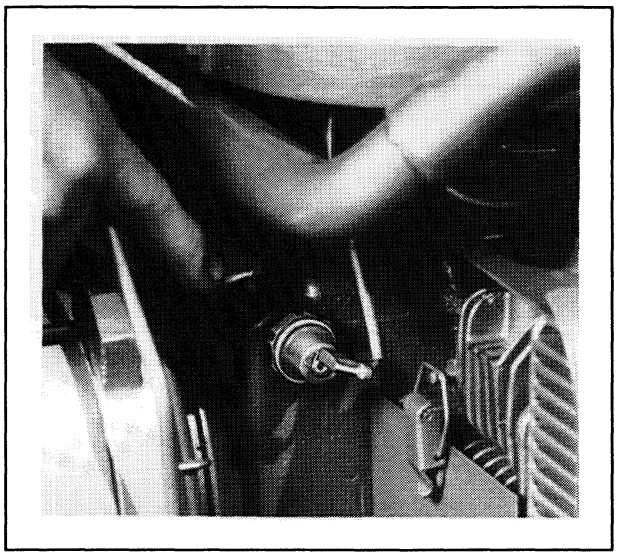


Figure 2-5. Low Oil Pressure Shutdown

Circuit Protection

10 Amp. Fuse

The controller circuitry and wiring harness is protected by a replaceable 10 Amp. fuse (located in controller). If fuse blows repeatedly, refer to Section 7. Component Testing to determine the source of trouble.

10 Amp. Circuit Breaker (if equipped)

Battery charging circuitry (if equipped) is protected by a self-resetting 10 Amp. circuit breaker. If there is no battery charging output or the circuit breaker trips repeatedly, refer to Section 7. Component Testing to determine the cause.

AC Circuit Breakers

Two circuit breakers located in the controller (Figure 2-1) protect the generator set from damage due to overload or short circuits. The standard 7 kW 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. If the circuit breakers trip repeatedly, refer to Section 7. Component Testing to determine source of trouble. The average wattage requirements of some common RV appliances and motor loads are listed in the following charts. Use these figures to calculate the total load on your set and avoid the inconvenience of having the circuit breaker trip due to overload

Appliance Ratings

Electrical Appliance	Rating (Watts)
Blanket	50–250
Blender	600
Broiler	1350
Conditioner, air (13,500 BTU)	1900
Fan	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	750–1200

Motor Requirements		
	Starting (in-Rush)	Running
1/4 HP	750	350
1/3 HP	1000	400
1/2 HP	1500	750
3/4 HP	2000	600
1 HP	3300	1100
2 HP	4000	2000
3 HP	5000	3000

Storage Procedures

If the generator set is to be out of service for a considerable length of time, the following steps should be taken to preserve the set before placing it in storage.

1. Drain the oil from the crankcase (while hot) then flush with clean light-weight oil. Refill crankcase with regular weight oil. See Section 3. "Oil Type."

2. Remove the spark plugs. Pour about 1 tablespoon of oil into each hole and crank the engine several times to lubricate the cylinders.

3. **Gasoline-fueled generators:**
Drain the carburetor bowl (or run unit until empty). This step is necessary to prevent the gasoline from becoming "stale" which results in formation of gum in the carburetor. The bowl can be removed by removing the retaining bolt on the bottom. Replace the bowl after draining the fuel. Use of a gas stabilizer for gasoline-fueled generators is permitted in lieu of draining the carburetor bowl; add the correct amount of gas stabilizer to the fuel and follow all recommendations of the gas stabilizer manufacturer.

⚠ DANGER

FIRE HAZARD! When removing fuel line, fuel filter, carburetor, or carburetor bowl, use a proper container to catch all fuel. Do not smoke or permit flame or spark to occur near carburetor, fuel line, fuel pump, or potential sources of spilled fuel or fuel vapors.

LP gas-fueled generators:
With the generator running, shut off LP gas fuel supply. Run generator set until set stops from lack of fuel.

4. **Gasoline-fueled generators only:**

On early models with round fuel pump (internal filter), drain the electric fuel pump by removing the pump cover. Clean the filter with solvent and wipe the magnet and internal surfaces with a clean rag before reassembling. On later models with rectangular fuel pumps (external filter), remove the fuel line at the pump outlet to drain fuel line to carburetor. The

pump itself requires no additional maintenance.

5. Clean the exterior surfaces of the generator set then spread a light film of oil over any unpainted metallic surfaces which could rust or corrode.

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" in Section 2). If the generator will be subject to extreme operating conditions, service the unit more frequently. Instructions to perform most of the scheduled service is provided in the following pages. Refer to the engine service manual for engine maintenance procedures not provided in this manual.

☞ **NOTE**

The items listed in the service schedule must be performed at the designated intervals for the life of the generator. For example, an item to be serviced "Every 50 Hours or 6 Months" must also be serviced after 100 hours or 12 months, 150 hours or 18 months, etc. The generator will eventually accumulate enough hours to warrant a complete overhaul. The exact time at which extensive service will be necessary cannot be predicted. However, rough operation, lack of power, and excessive oil use indicate serious generator problems. As part of a preventative maintenance program, service the engine (clean cylinder heads, lap valves, check compression, etc.,) and generator (replace bearing, inspect wiring, remove debris, etc.) at the earliest indication that a serious problem exists.

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 for obstructions	X			
Check engine oil level	X			
Check fuel supply	X			
Check cooling air inlets and outlets for obstructions	X			
Remove loose dirt from compartment	X			
Check electrolyte level in battery		X		
Clean engine external surfaces		X		
Check air cleaner element (replace if dirty)		X		

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
Change engine lube oil (change oil initially after first 5 hours of operation)			X	
Replace lube oil filter			X	
Check battery specific gravity			X	
Service or replace spark plugs			X	
Service fuel pump internal filter (early models only)			X	
Check and service breaker points			X	
Check and tighten electrical connections			X	
Check condition of generator brushes			X	
Blow dust out of generator			X	
Service fuel valve internal filter (LP gas-fueled sets only)			X	
Check compression				X
Check valve-tappet clearance				X
Service cylinder heads				X
Check ignition timing				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
Replace fuel filter (external – later models only)				X

☞ NOTE

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

Lubrication

THE 7CKM engine has a positive pressure lubrication system and a low oil pressure shutdown.

Low Oil Pressure Shutdown

The low oil pressure shutdown feature protects the engine against internal damage if the oil pressure drops below 14 psi +/- 2 psi (97 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 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 cap resting on the oil shaft collar. The 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.

NOTE

Do not check engine oil level when the set is in operation. The engine must be stopped during oil level check.

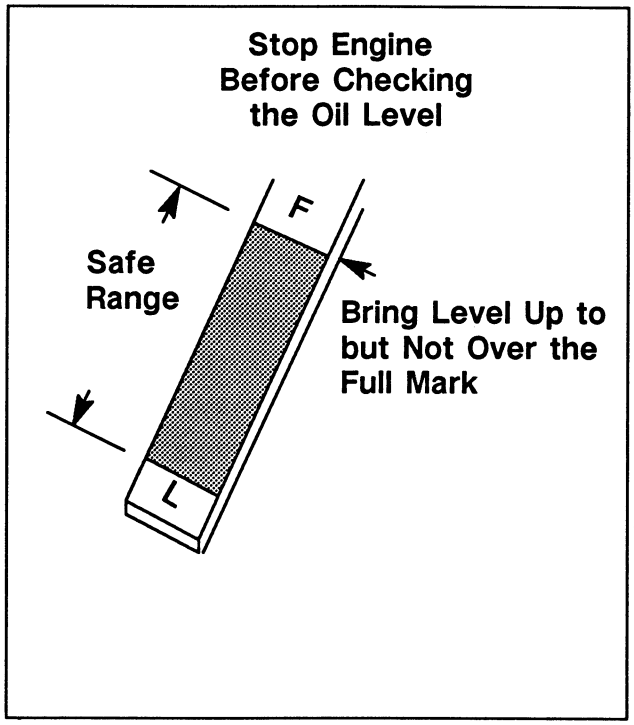


Figure 3-1. Lube Oil Level

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" following.

To Change Oil

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 oil drain plug located directly beneath the dipstick assembly. Allow adequate time for engine to drain completely. If the filter is being replaced, remove enclosure cover to expose oil filter. Remove oil filter by rotating filter counterclockwise with an oil filter wrench. See Figure 3-2.

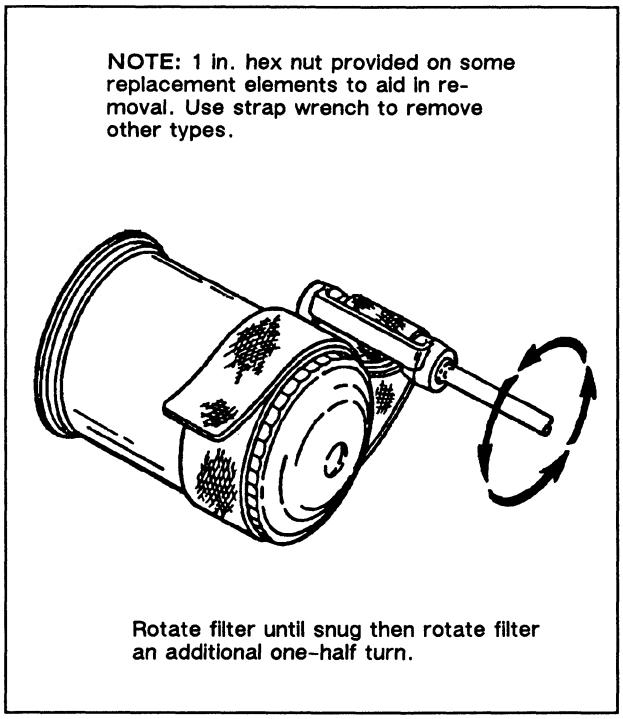


Figure 3-2. Removing Oil Filter

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 to eliminate leakage.

Engine Oil Capacity - 4 U.S. Quarts (3.78 L)*

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

Oil Type

High quality detergent oils meeting the requirements of SAE service class SE, SF, and SG 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 (0° C) or increased oil consumption and combustion deposits will result. Base oil weight selection on air temperature at time of operation. Consult the chart in Figure 3-3 to select proper weight oil.

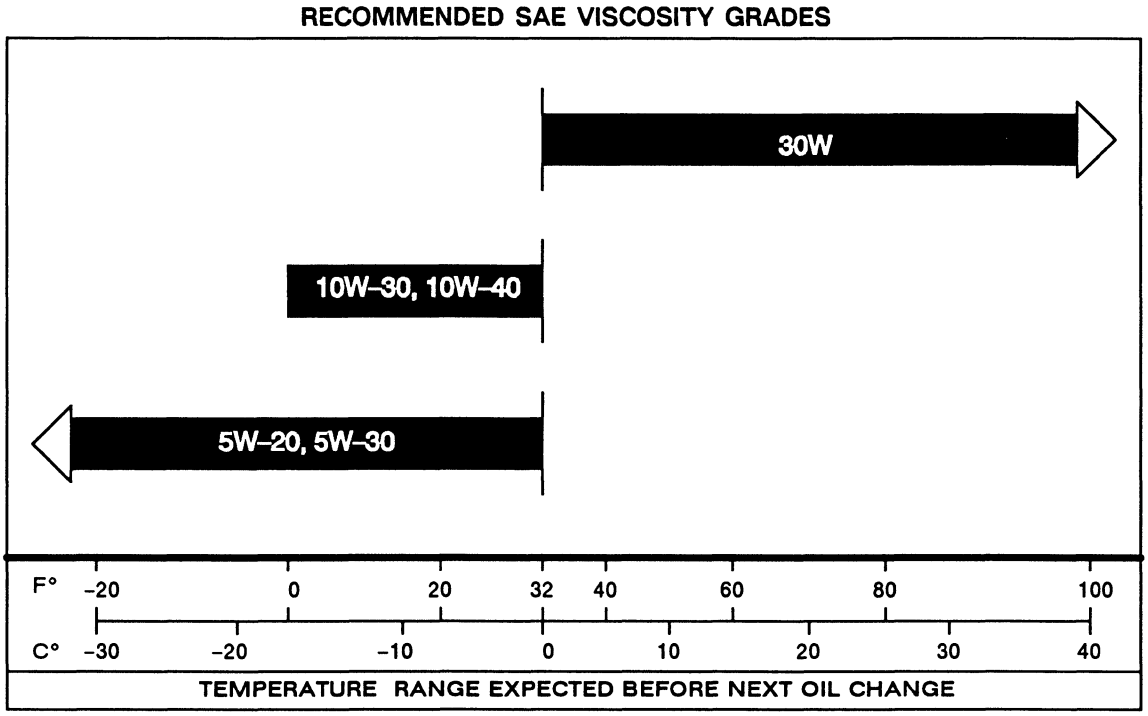
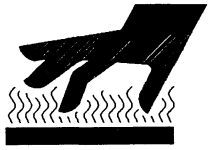


Figure 3-3. Recommended SAE Viscosity Grades

Ignition System

Spark Plugs



⚠ CAUTION

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

Recommended Spark Plug: Champion RH10

Every 100 hours of operation remove spark plug and check its condition. Proper generator operation is indicted 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 improperly adjusted carburetor. Do not sandblast, wire brush, or otherwise service plug in poor condition. Best results are obtained with a new plug. Remove spark plug as follows:

1. Remove spark plug cap and use a 13/16 in. wrench to remove spark plug.
2. Visually inspect the spark plug. The plug should be replaced if the insulation is cracked or chipped.
3. Measure the plug gap with a feeler gauge. See Figure 3-4. Adjust plug gap to 0.025 in. (0.64 mm) on gasoline-fueled sets; 0.018 in (0.46 mm) on sets fueled by LP gas. See Figure 3-5.

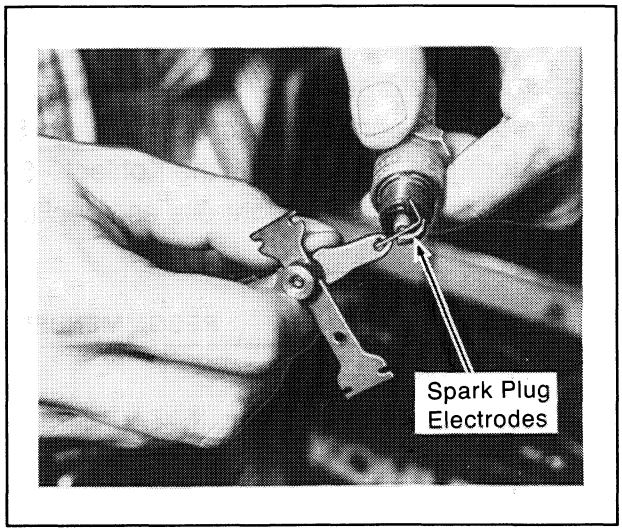


Figure 3-4. Measuring plug Gap

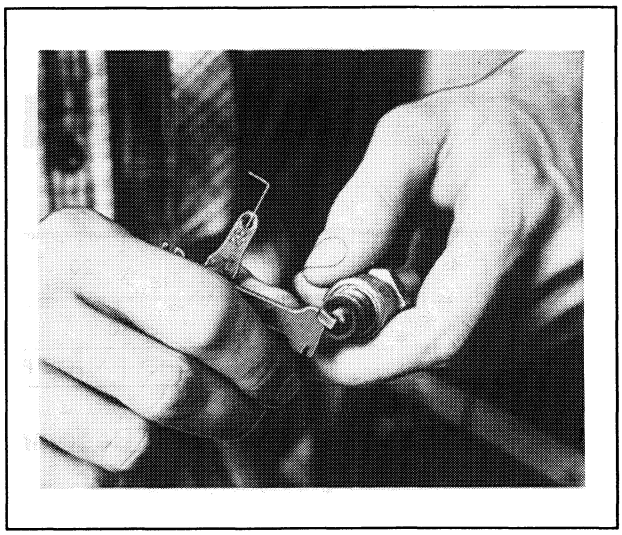
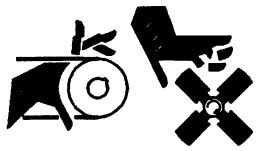


Figure 3-5. Plug Gap Adjustment

4. To prevent cross-threading, thread spark plug into engine by hand until snug.
5. Use a 13/16 in. plug wrench to final tighten spark plug to 18-22 ft. lbs. (24-30 Nm). replace spark plug cap.

Breaker Points Adjustment

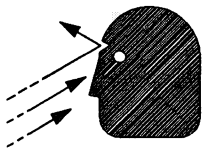


⚠ CAUTION

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 screws and washers to separate brush cover from end bracket.
3. Remove the breaker point cover. See Figure 3-6.
4. Using a 3/4 in. socket wrench, rotate the rotor thru bolt clockwise until the points reach the maximum opening. See Figure 3-7.



⚠ CAUTION

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

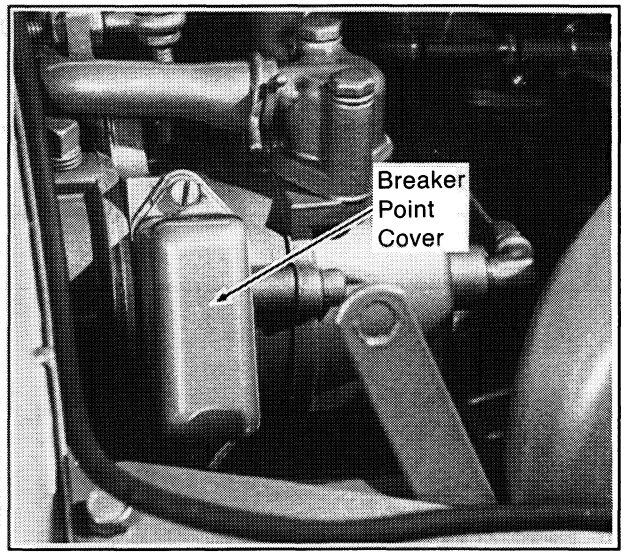


Figure 3-6. Breaker Point Cover

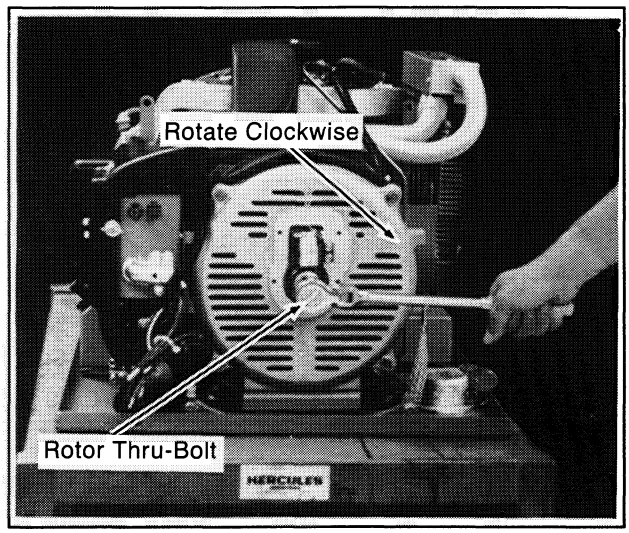


Figure 3-7. Breaker Point Gap Adjustment

5. Measure the gap with a feeler gauge. The gap at full open should be 0.020 in. (0.51 mm). If adjustment is necessary, loosen the point gap adjustment screw with an offset screwdriver or allen wrench. Adjust the gap to 0.020 in. (0.51 mm) by inserting a screwdriver blade in the adjusting notch and shifting the movable plate. See Figure 3-8. Securely tighten the adjusting screw after setting the gap.
6. Reattach brush holder cover to end bracket.
7. Replace breaker point cover.

8. Reconnect battery (negative lead last) and reconnect the spark plug leads.

9. Follow up with the final or precision adjustment using a timing light.

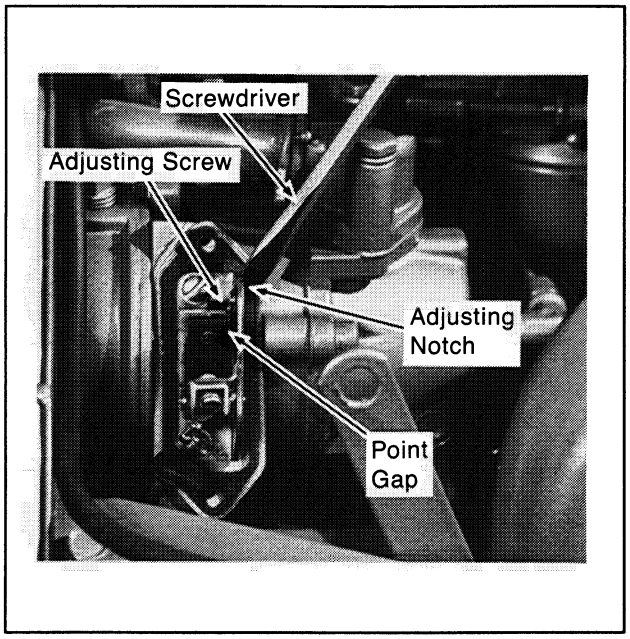


Figure 3-8. Breaker Adjustment

Timing

The governor includes and 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 breaker points were serviced or the governor has been removed. FINAL TIMING IS MADE WITH A TIMING LIGHT AND SHOULD ONLY BY DONE BY A QUALIFIED SERVICE SPECIALIST. 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. The light should flash just as "SP" mark lines up with the timing pointer inside the blower housing. If the light flashes before the mark is centered, the timing is over-advanced. If the light flashes after the mark is centered, the timing is retarded. To adjust timing, loosen (do not remove) governor flange mounting screws (Figure 3-9) and rotate governor assembly until timing mark is exactly centered as light flashes. Retighten flange mounting screws after exact timing is achieved. IF GOVERNOR HAS BEEN ROTATED, CHECK GOVERNOR LINKAGE FOR SMOOTH , NON-BINDING OPERATION.

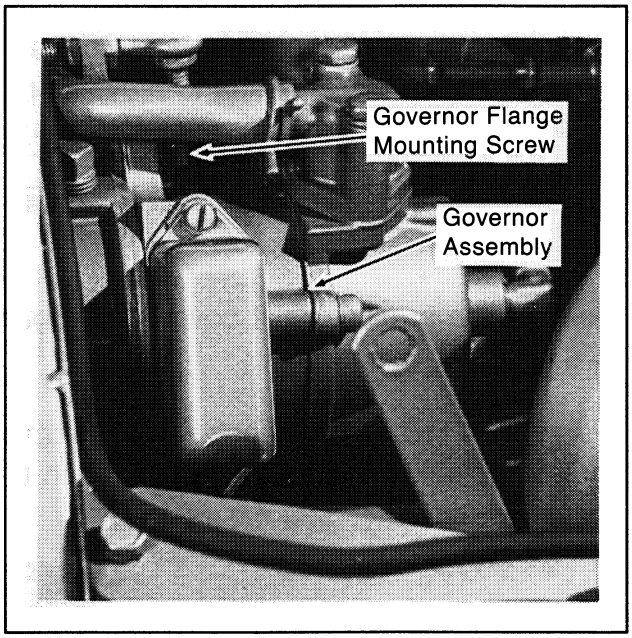


Figure 3-9. Timing Adjustment

Gasoline Fuel System

Fuel Specifications

For best results, use only clean, fresh, regular grade unleaded gasoline with a pump sticker 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 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.

Use fresh gasoline to be sure it is blended for the season and to reduce the formation of gum which could clog the system. Do not use gasoline left over from the previous season. OIL MUST NOT BE MIXED WITH FUEL.

Fuel Filter Service

⚠ DANGER

FIRE HAZARD! 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.

Early model generators were equipped with fuel pumps with built in fuel filters. See Figure 3–10. The internal filter on this type pump should be cleaned every 100 hours of operation. Remove the pump cover to remove the filter. Swish the filter in cleaning solvent to remove debris. Wipe the magnet and internal surfaces with a clean rag before reassembling.

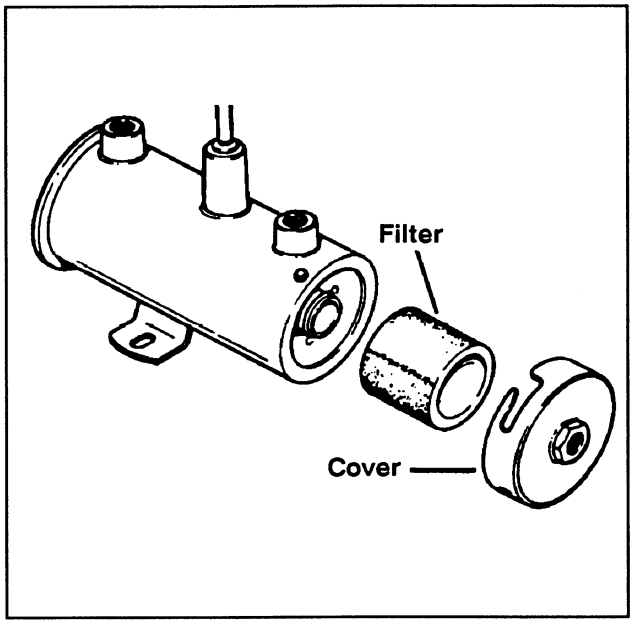


Figure 3–10. Fuel Pump with Internal Filter

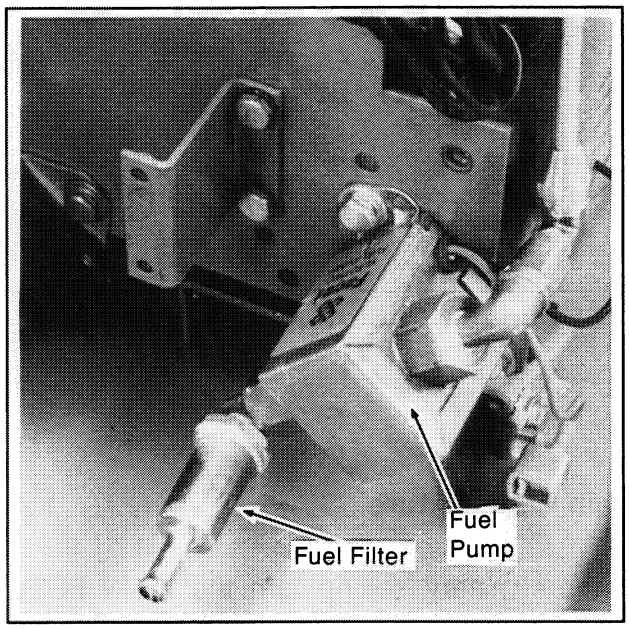


Figure 3–11. External Fuel Filter

Later model sets utilize a screw–in type fuel filter connected to the electric fuel pump. Replace the filter every 500 hours of running time or when rough operation indicates an engine tune–up may be necessary. Location of the fuel filter is shown in Figure 3–11.

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 fuel adjustment screws refer to Figure 3-12.

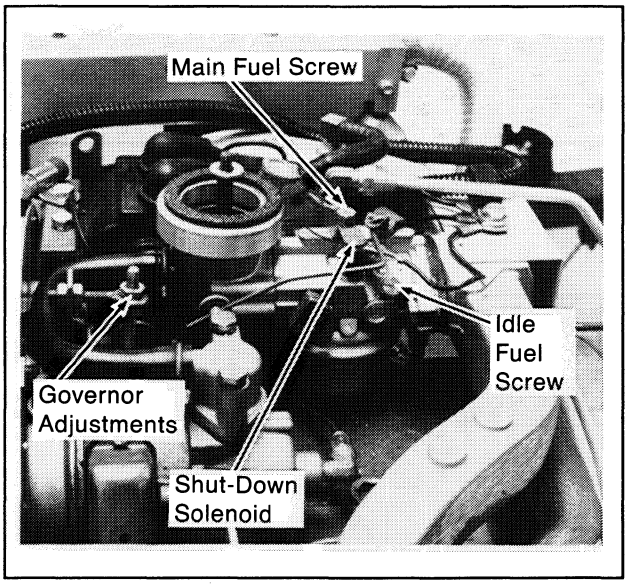


Figure 3-12. Carburetor Adjustment Screws

Main Fuel Mixture

For preliminary setting turn the MAIN FUEL screw clockwise until it bottoms lightly (do not force), then back out 3-1/2 turns. With the engine thoroughly warmed up and running at rated rpm under HALF LOAD, turn MAIN FUEL screw clockwise until the engine runs rough (lean setting), then screw counterclockwise 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 3-13) which stops all flow of fuel when the switch is moved to the stop position.

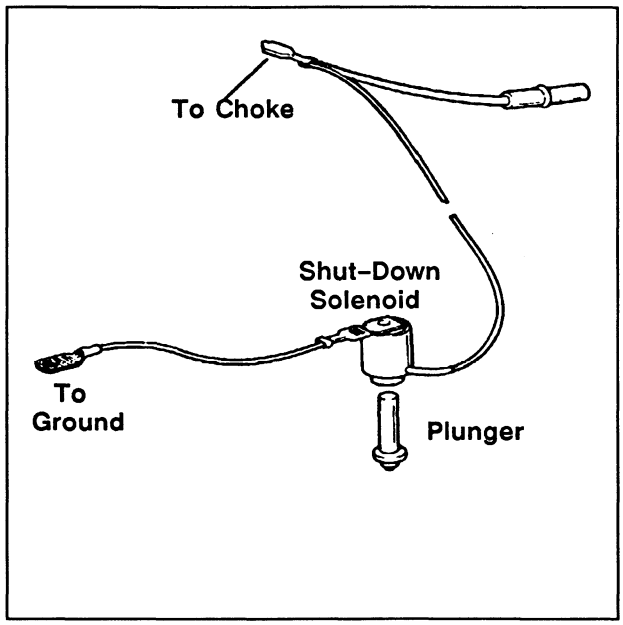


Figure 3-13. Shut-Down Solenoid

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, 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 and retaining bracket. Turn the main fuel screw in until it bottoms lightly, then back out the number of turns recorded earlier (minor adjustments may be necessary). The lead on top of the shutdown solenoid grounds to the intake manifold. It is extremely 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 3-14). When properly set, the choke plate will be within 5 to 10 degrees of full open at approximately 70° F (21° C).

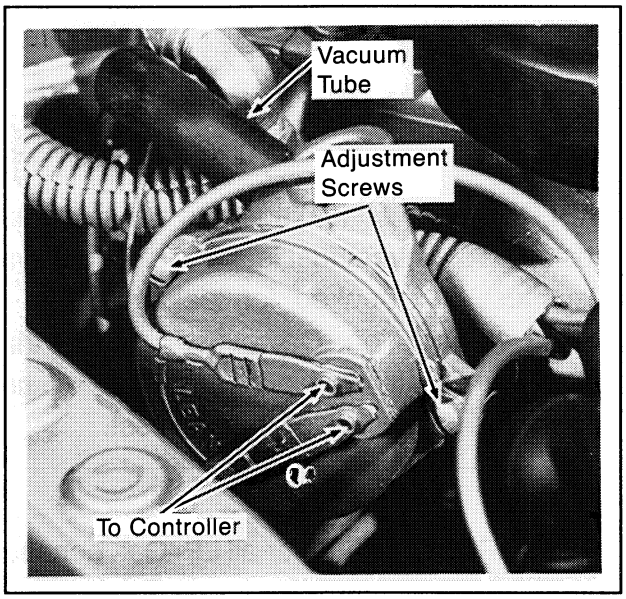


Figure 3-14. Automatic Choke Adjustment

LP Gas Fuel System

The LP gas liquid withdrawl fuel system utilizes a vaporizer/regulator to convert LP gas from a liquid to a gaseous state. Vaporized fuel is combined with air in the carburetor to produce the correct air/fuel mixture for proper combustion. When the "START" switch is pressed, the fuel valve opens to allow fuel to flow to the vaporizer. The vaporizer solenoid then pulses for approximately 3/4 of a second to send fuel into the vaporizer for initial start-up. After start-up, the engine draws fuel through the vaporizer to the carburetor to continue running.

⚠ CAUTION

EXPLOSION! Fuel leakage can cause an explosion. To prevent fuel leakage, the fuel system must be checked for leakage using a soap-water solution. Do not use solutions that contain ammonia or chlorine, for soap will not bubble for an accurate leakage test.

NOTE

PRESSURIZATION! After all LP-Gas connections have been completed, the entire system shall be test pressurized to 6-8 ounces (10-14 inches water column).

Troubleshooting the LP gas fuel system is done in the same manner as a gasoline fuel system. Make sure the engine and ignition system are okay before making any adjustments to the carburetor or other fuel system components. To determine which component of the LP fuel system (fuel valve, vaporizer, carburetor) may be defective, check for LP fuel at fuel valve, vaporizer, and carburetor fittings. (When checking for fuel at vaporizer outlet, manually depress primer button on vaporizer to allow fuel to flow to that point. See Figure 3-15.) Loosen fitting and apply a soap-water solution to test for fuel leakage. Fuel leakage indicates fuel is present to that point in the system. Retighten loosened fittings and again apply a soap-water solution to detect fuel leakage. DO NOT run generator if fuel leakage is detected.

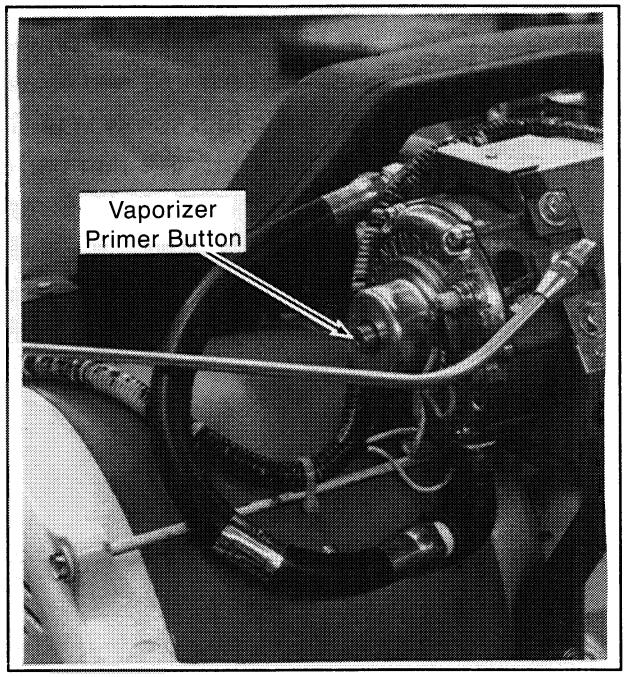


Figure 3-15. LP Gas Vaporizer

Refer to Section 7. "Engine/Generator Components" to test individual components of the LP gas fuel system.

LP Gas Carburetor Adjustments

LP gas carburetor adjustments are described in the following paragraphs. Refer to Figure 3-16 to identify LP carburetor adjustments.

Main Fuel Mixture

For preliminary setting turn the MAIN FUEL valve in a clockwise direction until it bottoms lightly (do not force); then back out four turns. With the engine thoroughly warmed up and running at rated rpm under full load, turn MAIN FUEL valve in until the engine slows down (lean setting) then turn valve out until the engine regains full speed. When properly adjusted, the engine will operate with steady governor action.

Idle Fuel Mixture

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

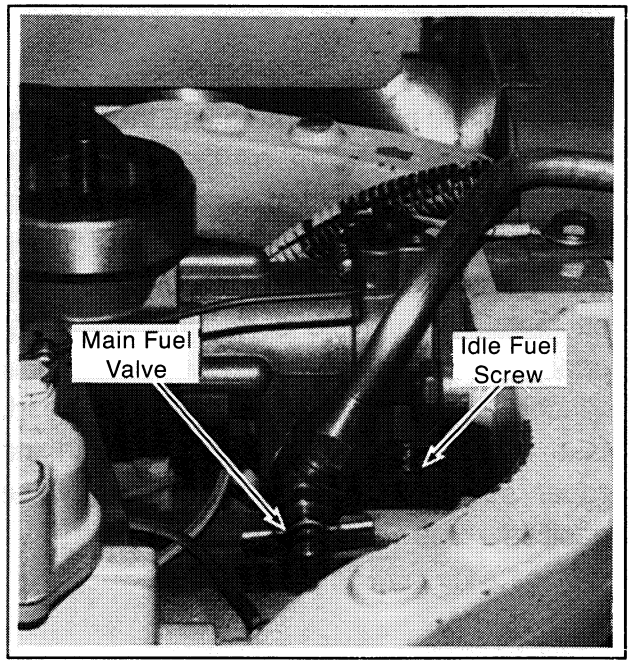


Figure 3-16. LP Gas Carburetor Adjustments

Fuel Valve and Filter

The LP fuel valve contains a replaceable filter which should be inspected yearly or after every 100 hours of operation. Normally the filter requires replacement only after accumulation of filtered debris restricts fuel flow to the regulator/vaporizer. Rough generator operation and/or the presence of frost on the fuel valve outer surface indicates filter replacement is necessary. Assembly of the LP gas fuel valve and location of the fuel filter is shown in Figure 3-17.

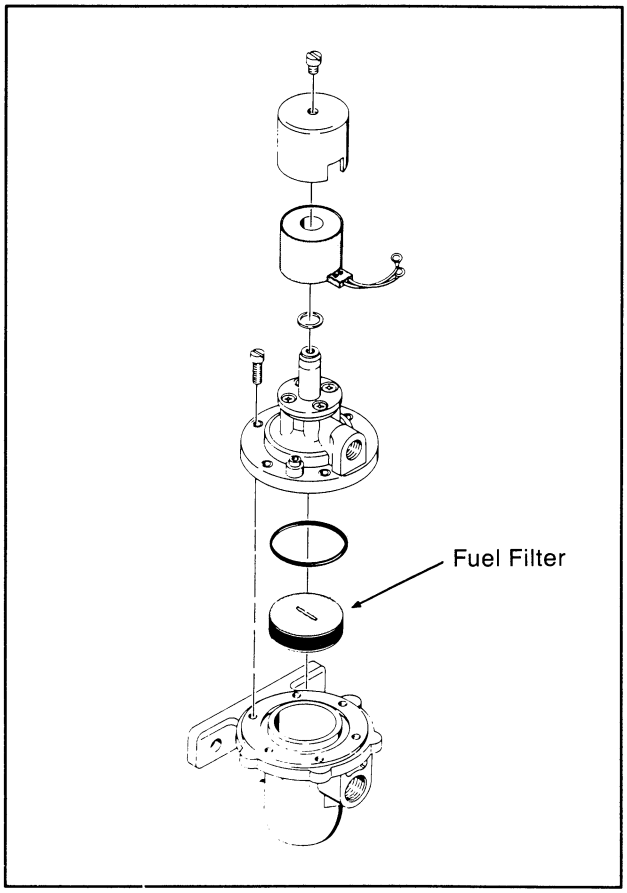


Figure 3-17. LP Gas Fuel Valve Assembly

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 (60 Hz). 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. See Figure 3-18. Proper no-load speed is 63 Hz (1890 rpm). When 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. To make governor control more sensitive, loosen the upper nut and tighten the lower nut to force the eyebolt 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.

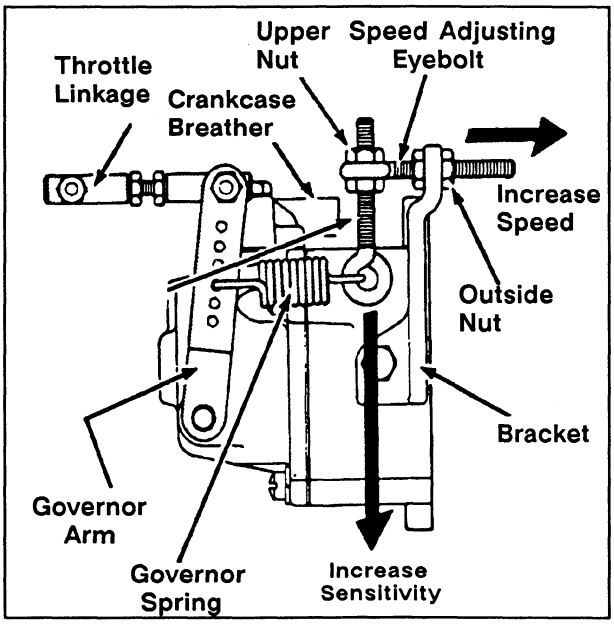


Figure 3-18. Governor Components and Adjustments

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 (or similarly soft material) to avoid scratching aluminum surfaces of cylinder head. Always use new cylinder head gaskets when reinstalling head. Make sure head bolts are tightened in the proper sequence and to the torque value specified. See Figure 3-19.

☞ **NOTE**

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

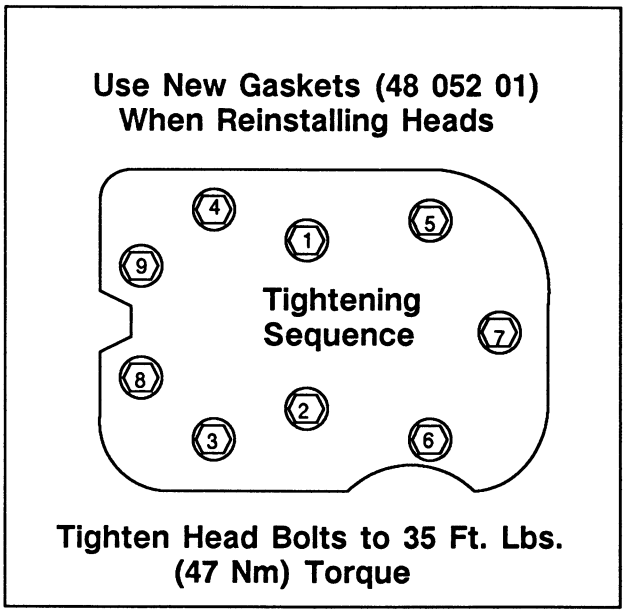


Figure 3-19. Cylinder Head Tightening and Torque Values

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 the flywheel) is at Top Dead Center on compression. In this position, both valves WILL BE CLOSED and cam will have no effect on tappets.

2. Measure the clearance between valve stem and tappet with a feeler gauge. See Figure 3-20. To adjust, turn adjusting screw on tappet in or out until proper clearance is attained.

COLD CLEARANCE

Intake . . . 0.008/0.010 in. (0.202/0.254 mm)
Exhaust . . 0.017/0.020 in.(0.430/0.506 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.

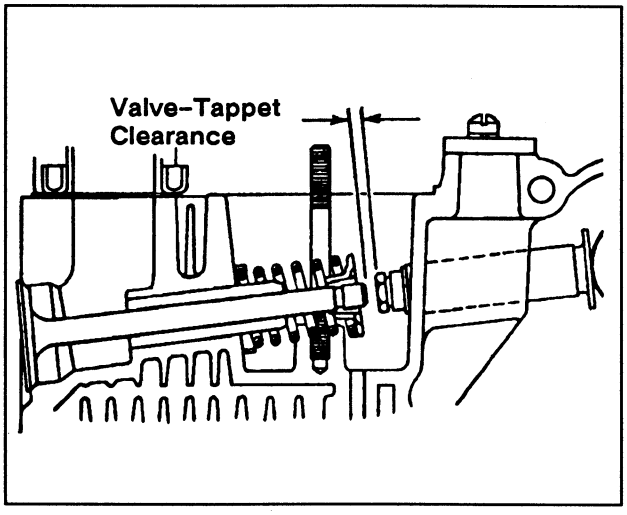


Figure 3-20. Valve-Tappet Clearance

Air Cleaner Service

The engine is equipped with a dry-type air cleaner. Every 50 hours remove the element and service by tapping lightly against a flat surface to dislodge loose dirt. If the element is extremely dirty, replace it with a genuine Kohler replacement element. Do not clean in any liquid or blow out with compressed air as this will ruin filter material. To access air cleaner element, remove the generator side panel. Location of the air cleaner element is shown in Figure 3-21.

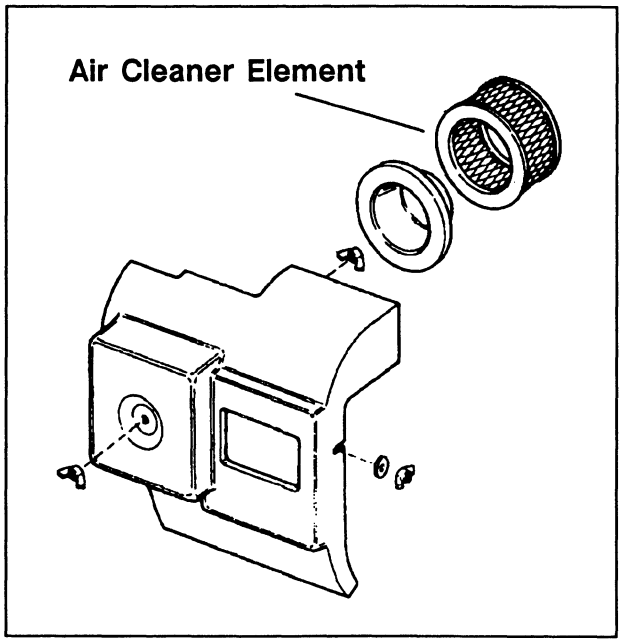


Figure 3-21. Air Cleaner Assembly

Cooling System

To prevent damage to the generator set from overheating, keep the cooling air inlets to the compartment clean and unobstructed at all times. A fan on the rotor of the generator draws cooling air into the compartment through the generator cooling slots and expels it at the engine-generator adapter. The engine of the generator set features an air-vac reverse flow cooling system. Fins on the engine flywheel pull cooling air past the fins on the cylinder heads and heated air is discharged downward and out of the compartment through the discharge chute. See Figure 3-22.

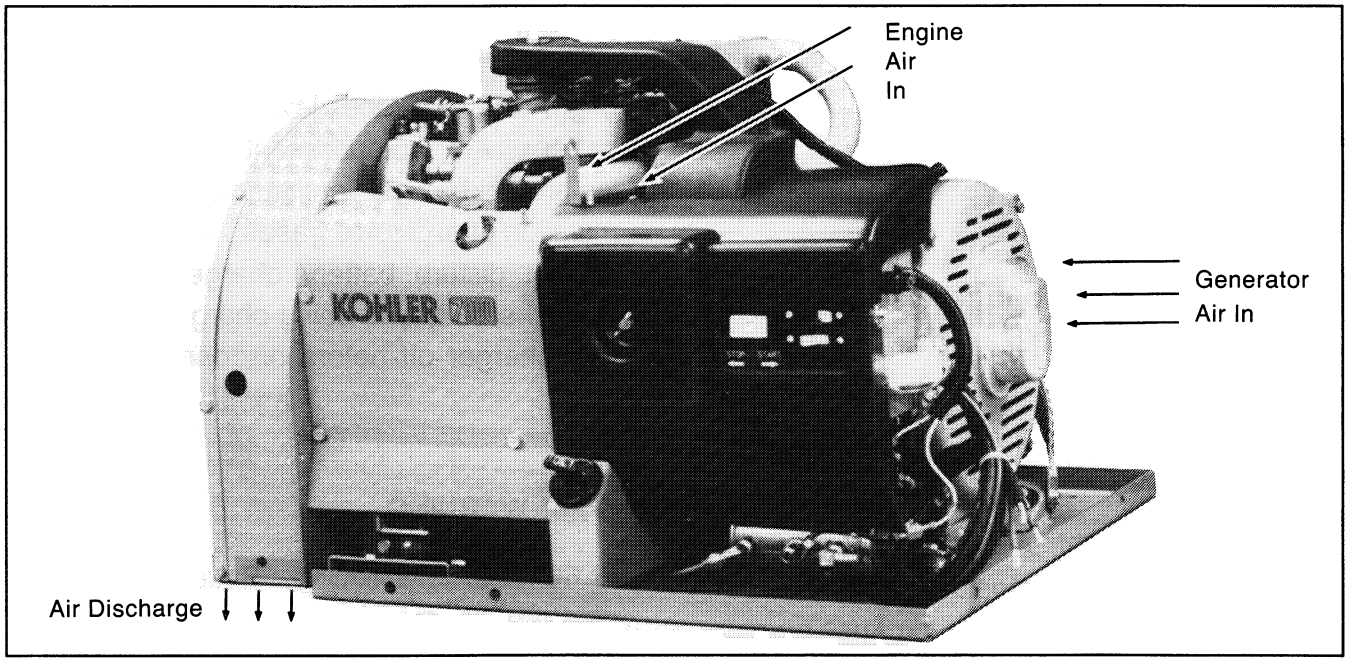


Figure 3-22. Cooling Air Circulation

Controller Fuse Replacement

There is one 10 Amp. fuse located at the controller. This fuse protects the controller against damage if a short develops in the wiring harness to the remote start-stop switch. See Figure 3-23. 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 and restart the generator. If the fuse blows again, refer to Section 7. Component Testing and the wiring diagram in Section 9 to locate the fault.

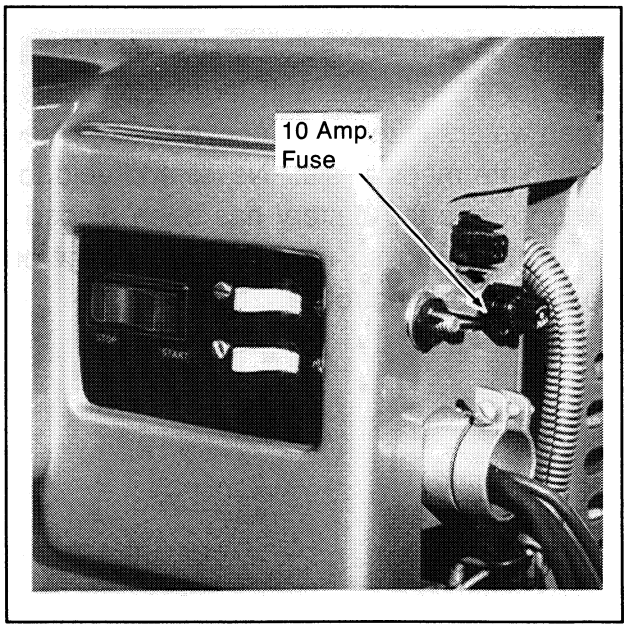


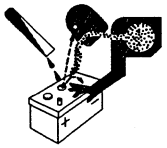
Figure 3-23. Fuse Location

Battery

Use a 12 Volt battery with a rating of at least 290 Cold Cranking Amps./55 Amp. Hr. When using a "maintenance free" battery, it is not necessary to check the specific gravity or electrolyte level. Otherwise, these procedures should be done at the intervals specified in the "Service Schedule." Battery connections are shown on the wiring diagram. Note that a negative (–) ground system is used. Make sure battery is properly connected and terminals are tight.

☞ NOTE

The generator set will not start if the battery connections are made in reverse.



⚠ 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.

⚠ DANGER

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.

⚠ 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.

Cleaning

Keep battery clean by wiping it with a clean, damp cloth. Keep all electrical connections dry and tight. If corrosion is present, disconnect cables from battery and remove corrosion with a wire brush. Clean battery and cables with a solution of baking soda and water. Be careful that cleaning solution does not enter battery cells. When cleaning is complete, flush battery and cables with clean water and wipe with a dry cloth. After the battery cables reconnected, coat terminals with petroleum jelly or other nonconductive grease.

Checking Electrolyte Level

Check the level of electrolyte before each start-up. Remove filler caps and check that electrolyte level is up to bottoms of filler holes. See Figure 3-24. Refill as necessary with distilled water or clean tap water. DO NOT add fresh electrolyte. Be sure filler caps are tight.

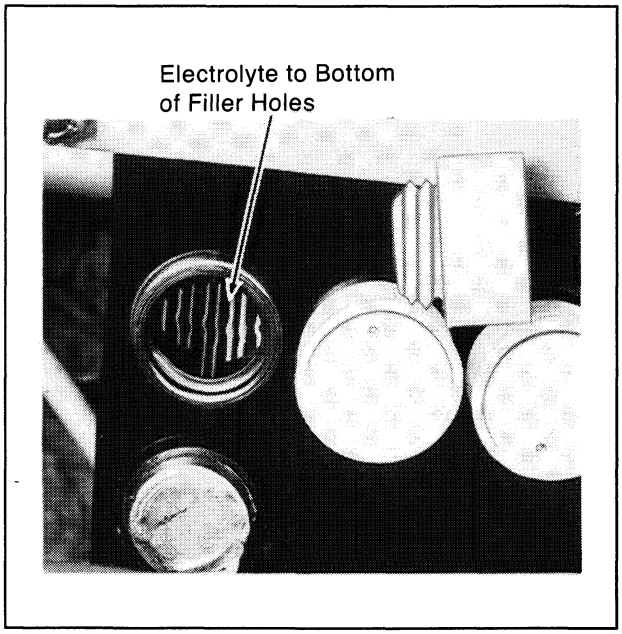


Figure 3-24. Battery Electrolyte Level

Checking Specific Gravity

Use a battery hydrometer to check the specific gravity of the electrolyte in each battery cell. While holding the hydrometer vertical, read the number on the glass bulb at the top of the electrolyte level. If the hydrometer used does not have a correction table, use the one in Figure 3-25.

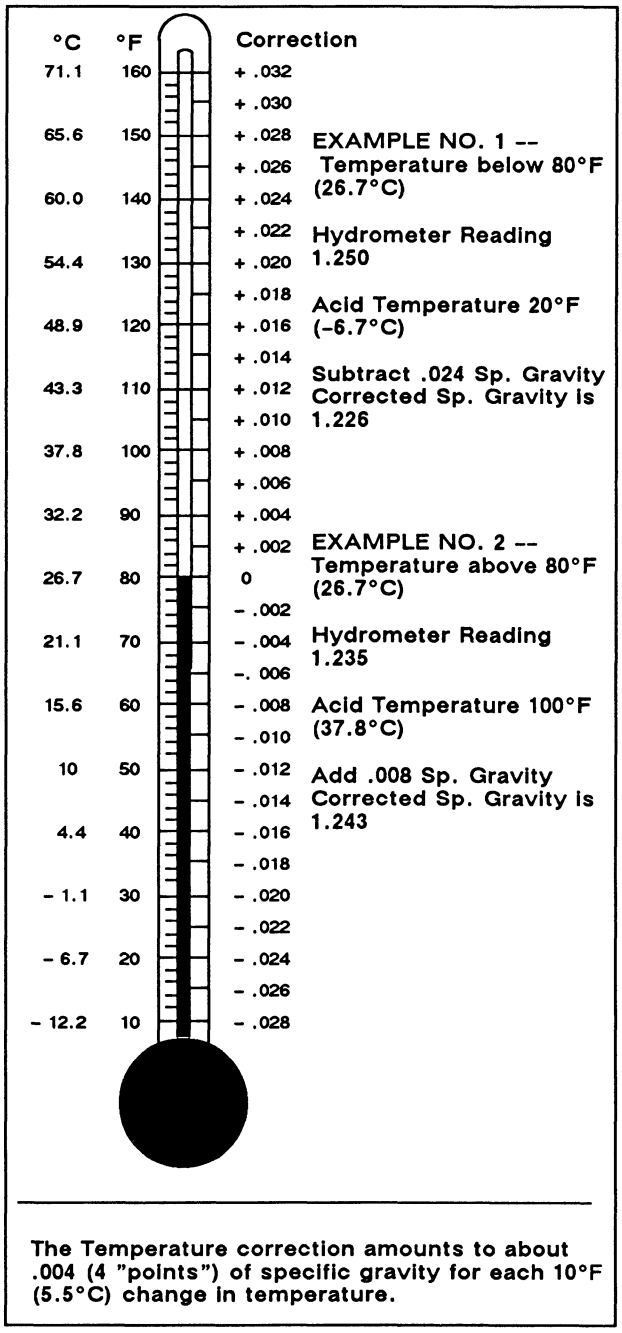


Figure 3-25. Specific Gravity Temperature Correction

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 possible causes and remedies. The source of more detailed information needed to correct a problem is indicated. Sources include various section of this manual, the Operation and Installation Manual (TP-5347), and the Kohler Engine Service Manual. Corrective action and testing often requires knowledge of electrical and electronic circuits. It is recommended that repairs 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 & Adjustment
	Battery disconnected	Check connections	Section 9. Wiring Diagrams
	Dead battery	Charge or replace	
	Corroded or loose terminal connections	Clean or replace	
	Defective starter	Rebuild or replace	See Engine Service Manual, "Starting Motors and Drives"
	Defective starter relay	Check continuity of circuit	Section 7. Component Testing & Adjustment Section 9. Wiring Diagrams
	Oil viscosity too heavy	Use proper viscosity oil	Section 3. Scheduled Maintenance
	Defective start/stop switch	Check continuity	Section 7. Component Testing & Adjustment Section 9. Wiring Diagrams
	Open wiring, terminal pin, foil, etc. (P1/P2 connectors)	Check continuity	Section 7. Component Testing & Adjustment Section 9. Wiring Diagrams

Problem	Possible Cause	Corrective Action	Reference
Will not start	No fuel in tank	Replenish	
	Defective fuel solenoid	Check continuity	Section 3. "Shut-Down Solenoid" Section 7. Component Testing & Adjustment
	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 & Adjustment, 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 & Adjustment
	Clogged fuel filter	Replace filter	Section 3. "Fuel Filter Service"
	K2 relay coil defective	Check continuity	Section 7. Component Testing & Adjustment Section 9. Wiring Diagrams
	Open wiring, terminal or pin (P1/P2 connector)	Check continuity	Section 9. Wiring Diagrams
	Engine defective (poor compression, stuck valves)	Troubleshoot Engine	Engine Service Manual

Problem	Possible Cause	Corrective Action	Reference
Will not start (continued)	Defective fuel valve, fuel vaporizer (LP gas fuel only)	Test and/or replace	Section 3. "LP Gas Fuel System" Section 7. Component Testing & Adjustment
	Defective choke circuit board (LP gas fuel only)	Test and/or replace	Section 7. Component Testing & Adjustment
	Low Oil Pressure Shut-down	Check oil level, oil pressure and oil pump. 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"

Problem	Possible Cause	Corrective Action	Reference
Engine starts, but stops after start switch is released	No generator output	Check AC voltage Check stator continuity	Section 7. Component Testing & Adjustment Section 9. Wiring Diagrams
	Open wiring (P1 or P2 connector	Check continuity	Section 9. Wiring Diagrams
	No or low oil pressure	Check oil level, oil pressure and oil pump. 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"
	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 performing test and/or replacing LOP shutdown switch	Section 2. Operation, "Engine Shutdown" (for location of LOP switch)
	K1 relay coil defective	Check continuity	Section 7. Component Testing & Adjustment Section 9. Wiring Diagrams

Problem	Possible Cause	Corrective Action	Reference
No generator output voltage	Line circuit breaker open or defective	Check position of circuit breaker Check AC voltage on generator side of circuit breaker	Section 1. Specifications "Service Views" for location Section 9. Wiring Diagrams
	No battery voltage to terminal (+) and (–) of regulator during cranking	Check for DC voltage at voltage regulator (+) and (–)	Section 9. Wiring Diagrams
	Blown fuse in regulator circuit (lead 55)	Replace fuse; if fuse blows again, check voltage regulator and stator aux. windings	Section 7. Component Testing & Adjustment Section 9. Wiring Diagrams
	Open wiring, terminal, or pin in build-up circuit (P1 connector)	Check continuity	Section 9. Wiring Diagrams
	Open D5 or D8 diode	Check for open or shorted diode. (A good diode has high resistance one way and low resistance the other way when measured with ohmmeter)	Section 7. Component Testing & Adjustment Section 9. Wiring Diagrams
	K1 relay (N.C.) contacts open	Check continuity	Section 7. Component Testing & Adjustment Section 9. Wiring Diagrams
	Brushes sticking in holder	Check alignment	Section 7. Component Testing & Adjustment
	Rotor slip rings dirty or corroded	Check and/or service	Section 7. Component Testing & Adjustment

Problem	Cause	Correction	Reference
No generator output voltage (continued)	Broken, weak, or missing brush spring	Check condition	Section 7. Component Testing & Adjustment
	Defective or misadjusted voltage regulator	Excite (rotor) separately	Section 6. Generator Troubleshooting
		Readjust voltage regulator	Section 7. Component Testing & Adjustment
	Defective rotor	Check continuity	Section 6. Generator Troubleshooting
		Check voltage	Section 7. Component Testing & Adjustment
	Defective stator (open, grounded, or shorted windings)	Check continuity	Section 6. Generator Troubleshooting
		Check voltage	Section 7. Component Testing & Adjustment
High Generator output voltage	Open or poor splice connection at terminals 33–3 or 44–4 on stator (regulator sensing	Check continuity	Section 7. Component Testing & Adjustment
	Voltage regulator misadjusted	Readjust	Section 7. Component Testing & Adjustment

Problem	Cause	Correction	Reference
Low generator output voltage	Low engine rpm	Check speed using tachometer or frequency meter NOTE: Hz x 120/No. of rotor poles = rpm	Section 3. "Governor Adjustments"
	Defective rotor or stator	Test and/or replace	Section 7. Component Testing & Adjustment
	Defective voltage regulator	Test and/or replace	Section 7. Component Testing & Adjustment
	Improperly adjusted voltage regulator	Readjust	Section 7. "Voltage Regulator Adjustment"
	Manual anti-icing adjustment lever in wrong position	Put lever in correct position for ambient temperature	Section 2. "Anti-Icing Systems"

Problem	Cause	Correction	Reference
No Battery Charging Output (if equipped)*	10 Amp. circuit breaker open	Allow circuit breaker to reset; if breaker fails to close, replace circuit breaker. If breaker trips again, examine battery charging circuitry	Section 7. "Engine/ Generator Components"
	Open connector/wiring or defective rectifier (BR2)	Inspect wiring; test BR2 rectifier	Section 7. "Engine/ Generator Components"
	Defective alternator (B1/B2 winding)	Isolate defective alternator component	Section 5. Generator Troubleshooting

*** See Battery Charging Troubleshooting Chart in Section 7 for additional information.**

Problem	Cause	Correction	Reference
Generator set shuts down by itself	No fuel in tank	Replenish	
	Fuel line restriction	Inspect fuel lines and tank	
	Clogged fuel filter	Replace filter	Section 3. "Fuel Filter Service"
	Fuel line drawing air	Check fuel lines and tank	
	Defective fuel pump	Check fuel pressure of 2.75 psi (19 KPa)	
	Engine overloaded	Reduce electrical load	TP-5347 "Electrical Load"
	Engine overheated	Check air intake, carburetor adjustment, oil level, timing, improper oil, etc.	Section 3. Scheduled Maintenance Engine Service Manual
	Low engine oil pressure	Check oil level, oil pressure and oil pump. 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 7. Component Testing & Adjustment Section 9. Wiring Diagrams
	Defective fuel valve, fuel vaporizer (LP gas fuel only)	Test and/or replace	Section 3. "LP Gas Fuel System" Section 7. Component Testing & Adjustment

Problem	Possible Causes	Corrective Action	Reference
Generator set shuts itself down (continued)	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 performing this test and/or 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-5347, "Installation - Fuel System"
Will not carry load or runs rough	Excessive load connected to generator	Reduce electrical load	TP--5347 "Electrical Load"
	Engine not operating at rated rpm	Check speed using tachometer or frequency meter NOTE: HZ x 120/No. of rotor poles = rpm	
	Carburetor not properly adjusted or defective	Check and/or adjust	Section 3. "Gasoline Carburetor Adjustments"
	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 & Adjustment, 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 defective or misadjusted	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)	

Problem	Possible Cause	Corrective Action	Reference
Will not carry load or runs rough (continued)	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-5347, "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-5347, "Compartment Size"
	Exhaust or air outlets not securely installed	Inspect for loose parts	TP-5347, "Installation"
	No compartment sound insulation	Install fireproof insulation	TP-5347, "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 5. CONTROLLER TROUBLESHOOTING

The following is the controller sequence of operation during generator run, stop and fault shutdown modes. Use this section as a starting point for controller fault identification. Refer to Figure 5-1 for accompanying wire schematic. This sequence of operation is reprinted on the following page adjacent to the generator schematics.

Starting

- Close the start/stop switch between N and 47 (local or remote).
- K2 relay is energized (LED 2 lights). Normally-open K2 contacts close to energize K3 relay (LED 3 lights), fuel pump, choke, anti-diesel solenoid, anti-icing heat element (if equipped), and ignition circuitry.
- Normally-open K3 contacts close to energize S relay (starter solenoid). S relay normally-open contacts close to energize starter, and on LP gas-fueled sets, vaporizer and choke board.

Running

- When proper output is obtained from B1/B2 winding, K1 relay is energized. (LED 1 lights). **NOTE:** Voltage to the K1 relay is regulated at 12 Volts DC by the VR1. Current from B1/B2 winding is rectified by BR2 to provide battery charging current (on models so equipped).
- Normally-open K1 contacts close to maintain voltage to K2 relay and to energize hourmeter and generator "ON" lamp (remote panel). Normally-open K2 contacts remain closed to maintain voltage to engine components.
- When the unit is running, start-switch contacts N and 47 are opened by releasing Start/Stop switch.
- Normally-closed K1 contacts in series with start switch open to deenergize K3 relay (LED 3 goes out). K3 contacts open to deenergize S relay (starter solenoid) and prevent accidental reenergizing of starter motor. (S relay contacts open to deenergize starter motor).

Stopping

- Close stop-switch between N and 43 (local or remote), K4 relay is energized (LED 4 lights) and normally-closed K4 contacts open to deenergize engine components. Unit shuts down.

Low Oil Pressure (LOP) Shutdown

- When engine lube oil pressure falls below a safe level, LOP switch closes and K4 relay is energized (LED 4 lights). Normally closed K4 contacts open to deenergize engine components (fuel pump, choke, ignition, etc.). Unit shuts down.

NOTE

The following sequence of operation is a duplicate of that printed on the previous page. It is reprinted here for ease in following the schematics on the following page.

Starting

- Close the start/stop switch between N and 47 (local or remote).
- K2 relay is energized (LED 2 lights). Normally-open K2 contacts close to energize K3 relay (LED 3 lights), fuel pump, choke, anti-diesel solenoid, anti-icing heat element (if equipped), and ignition circuitry.
- Normally-open K3 contacts close to energize S relay (starter solenoid). S relay normally-open contacts close to energize starter, and on LP gas-fueled sets, vaporizer and choke board.

Running

- When proper output is obtained from B1/B2 winding, K1 relay is energized. (LED 1 lights). **NOTE:** Voltage to the K1 relay is regulated at 12 Volts DC by the VR1. Current from B1/B2 winding is rectified by BR2 to provide battery charging current (on models so equipped).
- Normally-open K1 contacts close to maintain voltage to K2 relay and to energize hourmeter and generator "ON" lamp (remote panel). Normally-open K2 contacts remain closed to maintain voltage to engine components.
- When the unit is running, start-switch contacts N and 47 are opened by releasing Start/Stop switch.
- Normally-closed K1 contacts in series with start switch open to deenergize K3 relay (LED 3 goes out). K3 contacts open to deenergize S relay (starter solenoid) and prevent accidental reenergizing of starter motor. (S relay contacts open to deenergize starter motor).

Stopping

- Close stop-switch between N and 43 (local or remote), K4 relay is energized (LED 4 lights) and normally-closed K4 contacts open to deenergize engine components. Unit shuts down.

Low Oil Pressure (LOP) Shutdown

- When engine lube oil pressure falls below a safe level, LOP switch closes and K4 relay is energized (LED 4 lights). Normally closed K4 contacts open to deenergize engine components (fuel pump, choke, ignition, etc.). Unit shuts down.

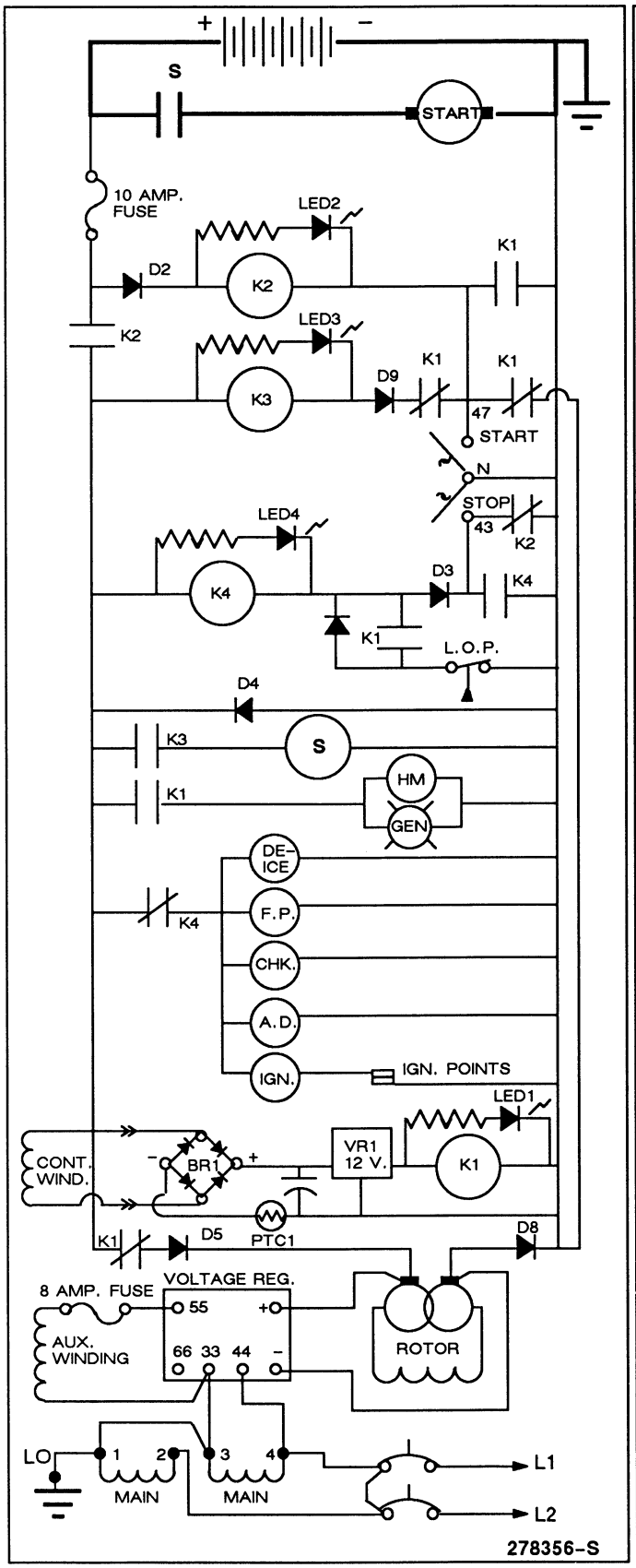


Figure 5-1. Sequence of Operation - Gasoline Fueled Sets

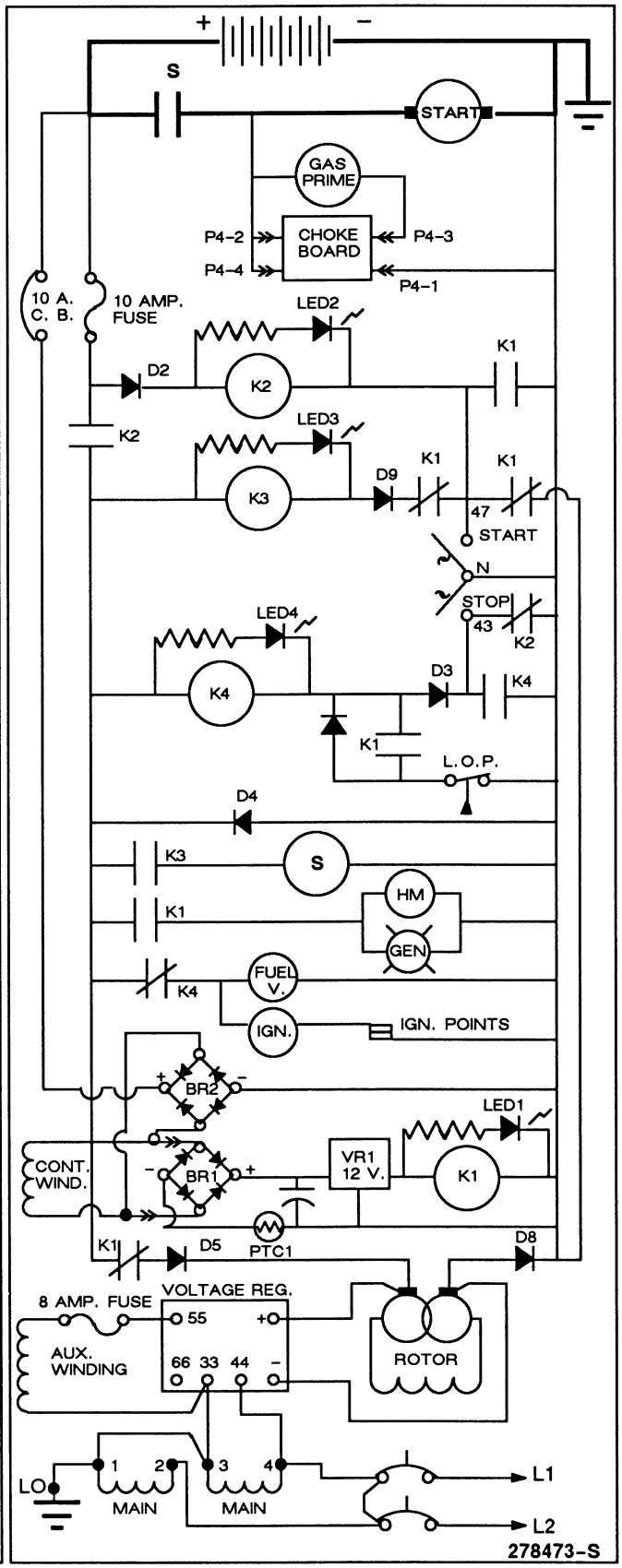


Figure 5-2. Sequence of Operation - LP Gas Fueled Sets w/ Battery Charging

SECTION 6. GENERATOR TROUBLESHOOTING

The flow chart below is a guide to troubleshoot the 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.

General

To determine the cause of no or low AC output, begin by checking the condition of the voltage regulator circuit 8 Amp. fuse. See Section 7. Component Testing. If fuse is okay, separately excite the generator. The generator field (rotor) may be excited (magnetized) using an outside DC power source (12 Volt automotive battery) and the following procedures. While separately exciting the generator to determine the presence of a faulty Voltage regulator, it is possible to determine if a running fault exists in the rotor and/or stator. A generator component that appears good while static (stationary) may exhibit a running open or short while dynamic (moving). This fault can be caused by centrifugal forces acting on the windings while rotating or insulation breakdown as temperatures increase. The flow chart in Table 6–1 summarizes the troubleshooting procedure.

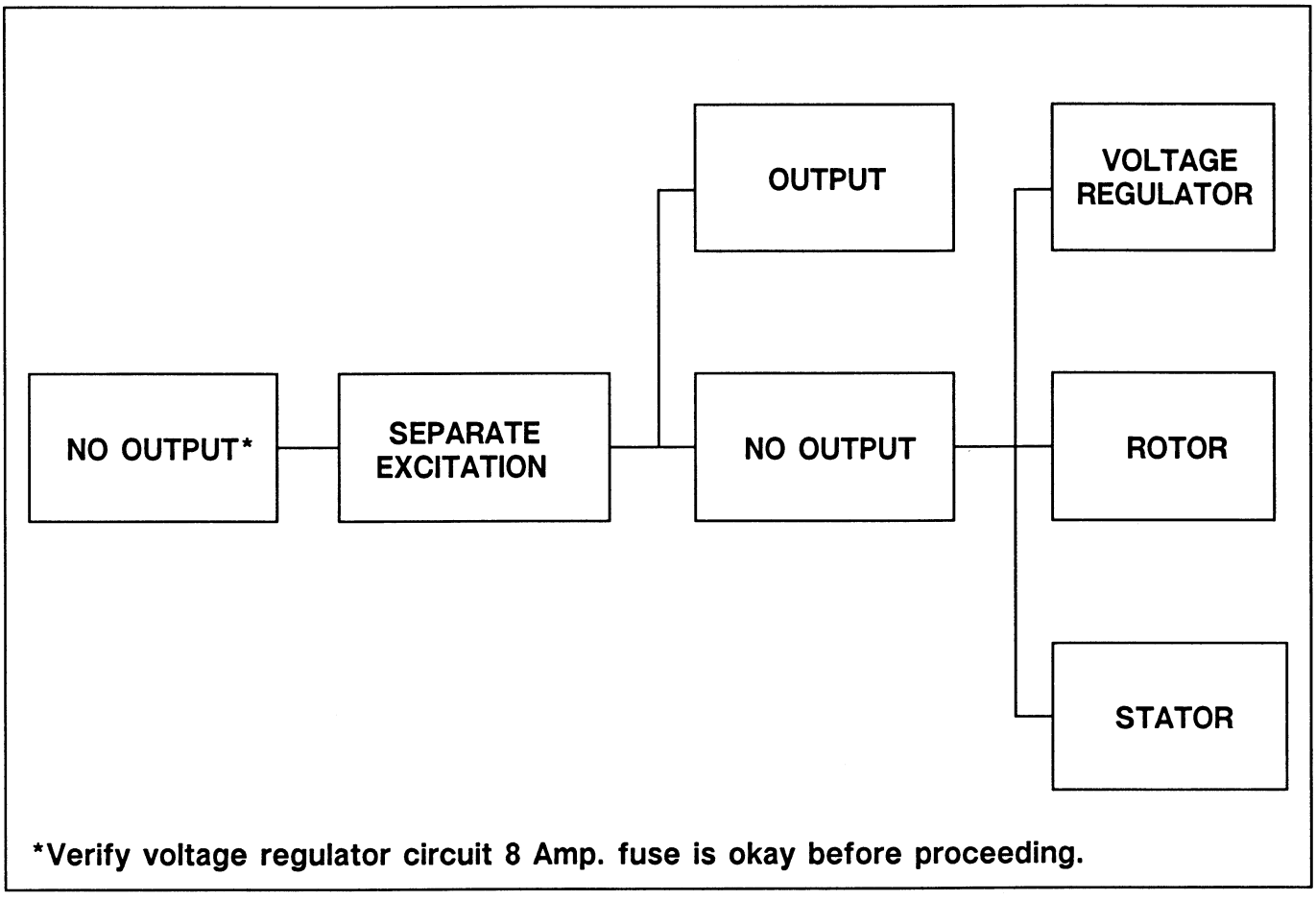


Table 6–1. Generator Troubleshooting

⚠ 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.

⚠ DANGER

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 prevalent under such conditions.

Separate Excitation

1. Disconnect all leads from voltage regulator. See Figure 6-1.
2. Connect an ammeter and a 12-Volt automotive battery to the positive (+) and negative (-) brush leads. Refer to Figure 6-2. Note and record the ammeter reading.
3. The approximate ammeter reading should be battery voltage divided by specified rotor resistance. Specified rotor resistance for the 7CKM-RV generator set is 5.2 ohms.

Example:

$$\frac{\text{12 Volts (Battery Voltage)}}{\text{5.2 Ohms (Rotor Resistance)}} = \text{2.3 Amps. Rotor Current}$$

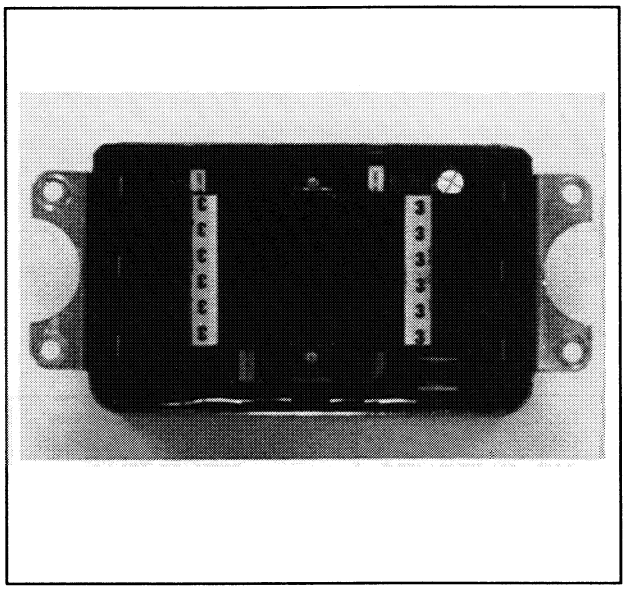


Figure 6-1. PowerBoost III Voltage Regulator

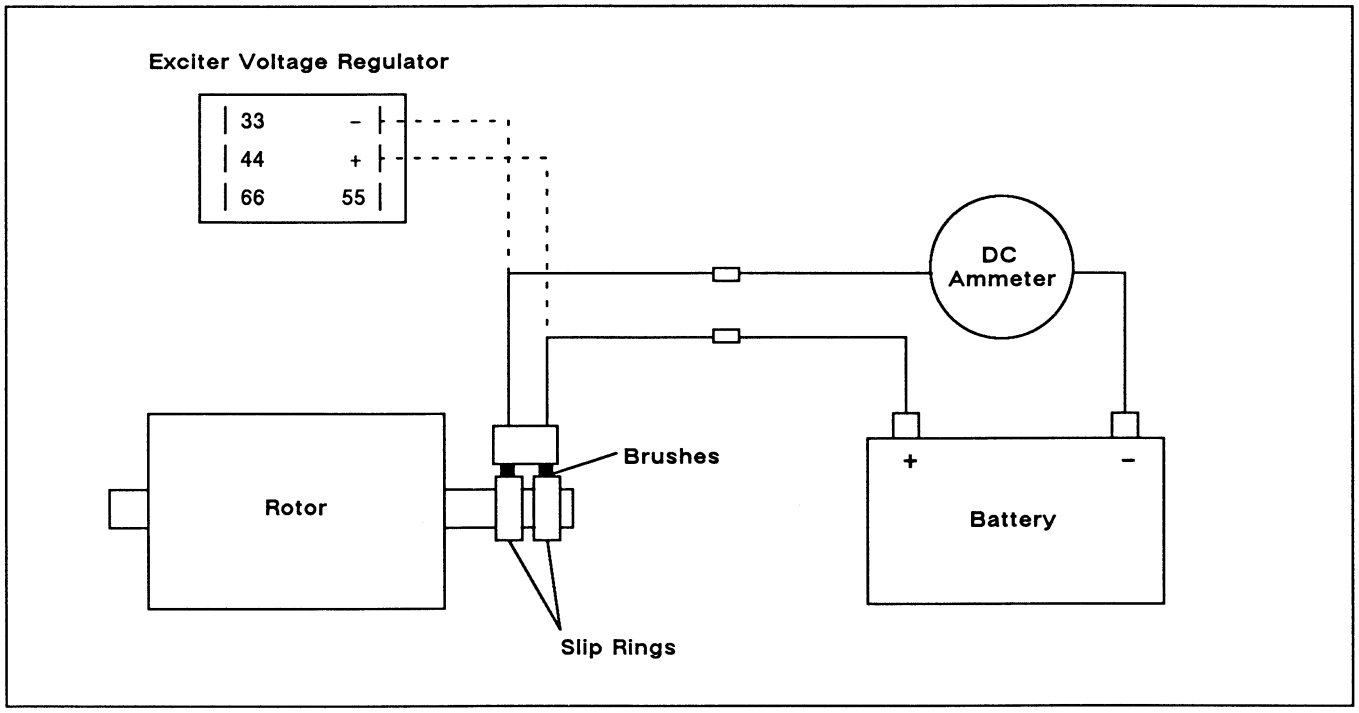


Figure 6-2. Separate Excitation Connections

4. Start engine and check that ammeter remains stable. An increasing meter reading indicates a shorted rotor. A decreasing meter reading to zero or unstable reading suggests a running open. Refer to "Component Testing." If ammeter is stable proceed to Step 5.

5. Check for AC output across stator leads (See Section 7. "Stator") and compare to readings in Table 6-2. If readings vary considerably from those in Table 6-2, a faulty stator is likely. Refer to Section 7. Component Testing for further information.

6. If rotor and stator test good in prior steps, the voltage regulator is probably defective.

Leads	7CKM
1-2, 3-4, 33-44,	53 Volts
55-66	63 Volts
B1-B2	7 Volts

Table 6-2. Stator Output Voltages with Separately Excited Rotor (12 Volt Battery)

SECTION 7. COMPONENT TESTING & ADJUSTMENT

This section is a guide for checking generator components for improper operation. Follow the safety precautions at the beginning of this manual during all test procedures. Additional safety precautions are included with the tests; OBSERVE THESE PRECAUTIONS!

Voltage Regulator Test

The voltage regulator monitors output voltage magnitude and frequency to supply current to the generator exciter field. If the regulator 8 Amp. fuse is blown, the generator will shut down; Verify regulator fuse is good before proceeding with test. To determine if the voltage regulator is functioning properly, reduce engine speed (Hz) and watch for a corresponding drop in AC voltage. AC voltage should remain constant until engine speed drops below 56.3 Hz (approximately). When frequency drops below 56.3 Hz, AC voltage should decline. If this test proves inconclusive, perform the following test to check regulator output. To test the voltage regulator the following components will be needed:

- Variable Transformer, 0–140 Volts (0.5 Amp Minimum)
- 120 Volt AC Plug
- 120 Volt, 100 watt Lamp
- AC Voltmeter
- #14 AWG Copper Wire (minimum)

⚠ DANGER

HIGH VOLTAGE! When testing voltage regulator, always unplug power cord from AC power source before connecting or disconnecting wires to prevent danger of electrocution.

⚠ DANGER

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 qualified 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 prevalent under such conditions.

⚠ WARNING

HIGH VOLTAGE! The heat sink of the voltage regulator contains high voltage. Do not touch voltage regulator when testing or electrical shock will occur. Use an insulated screwdriver when making voltage regulator adjustments.

1. Connect components as shown in Figure 7–1.

2. Turn variable transformer setting to zero. Plug in variable transformer.

3. Turn variable transformer on. Slowly increase variable transformer voltage to 100 Volts. The lamp should go on. If the lamp does not light the voltage regulator is defective and should be replaced.

4. Slowly increase voltage to 120 Volts. The lamp should go out and stay out as voltage is further increased. If the lamp does not go out replace the voltage regulator.

5. Turn variable transformer to zero and unplug AC cord.

CAUTION

If voltage regulator is removed or replaced, be sure regulator is properly reconnected to generator. Stator lead 66 must connected to voltage regulator terminal 33 or regulator damage will occur.

Voltage Regulator Adjustment

The PowerBoost III voltage regulator monitors generator output to control current flow to the generator field. However, unlike earlier PowerBoost regulators, PowerBoost III maintains generator output at 120 Volts under load until the generator engine speed drops to a pre–set level (factory setting 56.3 Hz). At this point the regulator allows generator voltage and current to drop to a level sufficient to handle load. When the generator speed returns to normal (60 Hz) as load is accepted, generator output also returns to normal. The voltage regulator is factory set for proper generator operation under a variety of load conditions., Under normal circumstances, no further adjustment is necessary. However, if the regulator is replaced or has been tampered with, or if 50 Hz operation is desired, readjust according to the following procedure. Voltage regulator components are identified in Figure 7–2 and described in the following paragraphs.

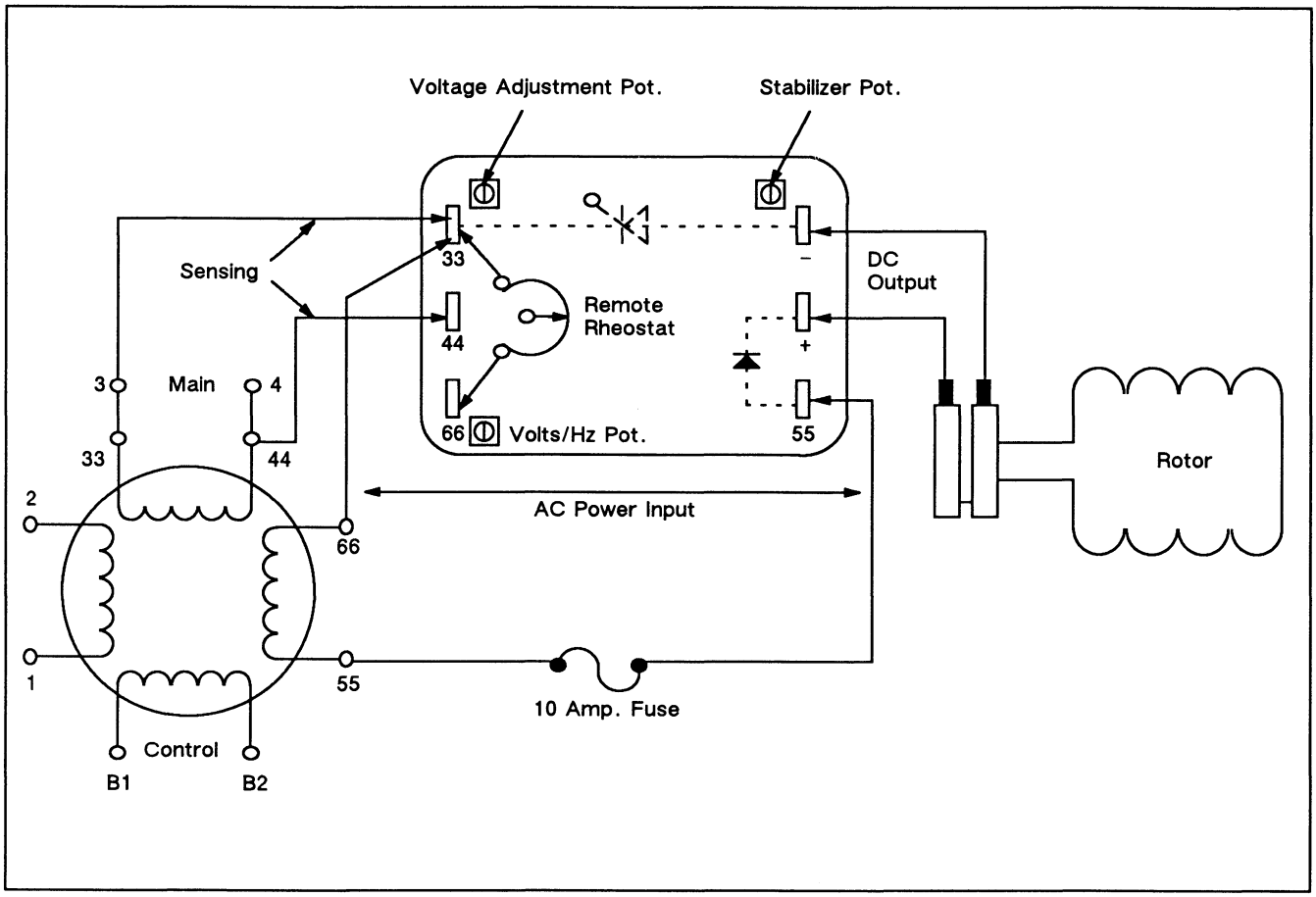


Figure 7-2. PowerBoost III Voltage Regulator

Voltage Adjustment Pot. - Adjusts generator output within range of 100-130 Volts.

☞ **NOTE**

A customer-provided rheostat may be connected across regulator terminals 33 and 66 to adjust generator output voltage from a location remote from the set. The rheostat (10k ohms, 1/2 watt minimum) will provide a 5 Volt adjustment range.

Stabilizer Pot. - "Fine-tunes" regulator circuitry to reduce light flicker in coach.

Volts/Hz Pot. - Adjustment determines engine speed (Hz) at which generator output voltage will begin to drop.

⚠ **WARNING**

HIGH VOLTAGE! The heat sink of the voltage regulator contains high voltage. Do not touch voltage regulator when testing or electrical shock will occur. Use an insulated screwdriver when making voltage regulator adjustments.

Adjustment - Generator Output Voltage

1. With generator set off, set remote rheostat (if equipped) and voltage adjustment pot. to mid-point. Connect voltmeter to coach AC circuit.

2. Start generator set. Rotate voltage adjustment pot clockwise (increase voltage) or counterclockwise (decrease voltage) until desired output voltage is achieved.
3. Use remote rheostat (if equipped) to make final adjustments.

Adjustment – Volts/Hz

1. With generator set off, rotate Volts/Hz pot. fully counterclockwise.
2. Connect voltmeter to coach AC circuit.
3. Connect frequency meter to generator (at set or coach AC circuit).
4. Start generator set and adjust engine speed to desired frequency (factory setting 56.3 Hz for 60 Hz operation; 46.3 Hz for 50 Hz operation) as measured on frequency meter. Generator load does not affect this adjustment.
5. Rotate Volts/Hz adjustment pot. clockwise until voltage level begins to drop (as measured on voltmeter). When set to these specifications, the generator will attempt to maintain normal output until engine speed drops to frequency set in step 4 (as load is applied).

Adjustment – Stability

1. With generator set off, rotate stability pot. fully counterclockwise. Start generator set.
2. Rotate stability pot. clockwise until minimum light flicker is obtained (in coach lights).

Rotor

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, exposed coil windings, and slip ring surfaces. Check bearing for noise when rotated, wear, or heat discoloration.

Slip rings acquire a glossy brown finish in normal operation. Do not attempt to maintain a bright, newly-machined appearance. Ordinary cleaning with a dry, lint-free cloth is usually sufficient. Very fine sandpaper (#00) may be used to remove roughness. Use light pressure on the sandpaper. Do not use emery or carborundum paper or cloth. Clean out all carbon dust from the generator. If the rings are black or pitted, remove the rotor and remove some of the surface material using a lathe.

Check the rotor for continuity and resistance. Measure the rotor resistance (ohms) between the two slip rings (Figure 7-3). See Table 7-1 for typical readings.

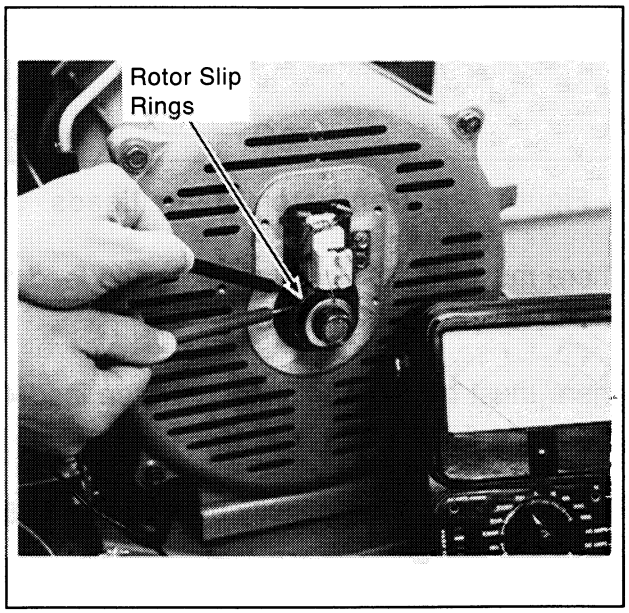


Figure 7-3. Rotor Resistance Check

MODEL	RESISTANCE +/- 10%
7CKM	5.2 OHMS

Table 7-1. Rotor Resistance

To check for rotor shorted to ground, adjust ohmmeter to zero ohms. Touch one ohmmeter led to either slip ring and other lead to rotor poles or shaft. Meter should register no continuity.

☞ **NOTE**

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

The rotor must be repaired or replaced if any faults are detected in the previous tests.

Stator

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

☞ NOTE

Disconnect all stator leads prior to performing stator continuity tests.

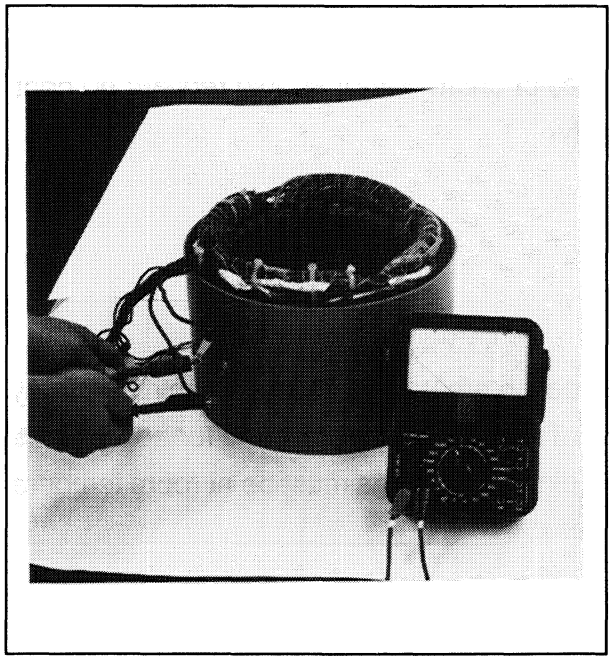


Figure 7–4. Testing Stator Windings

Leads 1, 2, 3, and 4 are the generator output leads. Leads 33, 44, 55, and 66 are the voltage regulator supply and sensing leads. The output of leads B1 and B2 is rectified (BR1) to supply control voltage. 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 NO continuity between lead 1 and leads 3, 4, 33, and 44.

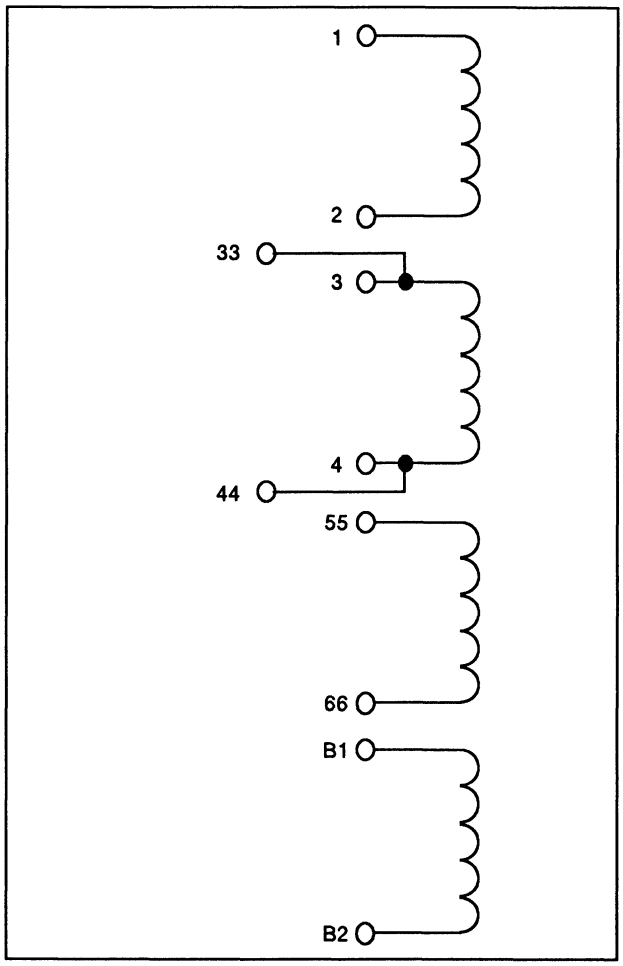


Figure 7–5. Generator Stator Leads

- There must be NO continuity between lead 1 and leads 55, 66, B1, and B2.
- There must be NO continuity between lead 4 and leads 55, 66, B1, and B2.
- There must be NO continuity between lead 55 and leads B1 and B2.
- 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, 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 taken 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 d iscoloration).

STATOR LEADS	RESISTANCE (OHMS) +/- 10%
1-2, 3-4	0.28
33-44	0.28
55-66	1.26
B1-B2	0.08

Table 7-2. Stator Winding Resistance

Brushes

The brushes transfer current from the voltage regulator to the slip rings. Since the brushes carry a very low current (approximately 2 Amps.), they should last the life of the generator. Abrasive dust on the slip rings could, however, shorten the life of the brushes. Excessive arcing at the brushes could damage the voltage regulator. Arcing could be caused by weak springs, damaged slip rings, sticking brushes, loose holder, or poor brush contact. The brushes must be free to move within the holder and be held in proper contact by the springs. When properly positioned, spring pressure on the brush surface will cause the brush to wear evenly. Brushes must ride 100% on the rings or arcing will occur and cause burned rings or failure of the voltage regulator. Figure 7-6 shows the correct positioning of the brushes. Add or remove shims as necessary to center brushes on slip rings.

Replace brushes if they show excessive or uneven wear.

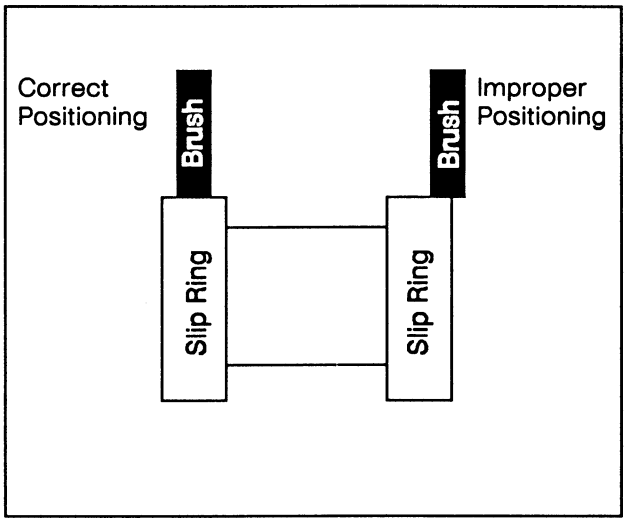


Figure 7-6. Brush Positioning

Battery Charging Circuit (If Equipped)

Some models are equipped with a battery charging circuit which uses alternating current (AC) from the stator B1/B2 winding to charge the battery. The AC from the stator is converted to direct current (DC) by rectifier BR2 to provide battery charging current. A 10 Amp. self-resetting circuit breaker protects the battery charging circuit from overload and short circuits. If the battery does not charge properly, first check the condition of the battery. A worn out battery will not accept or hold

a charge. If the battery appears okay, examine all connections and wiring in the battery charging circuit. A loose connection or damage conductor will also cause poor battery charging. If the battery and wiring appear good, use the troubleshooting procedure following to test the battery charging circuit. Since the generator must be running when performing some of the tests, observe the following safety precautions during these procedures.

⚠ 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.

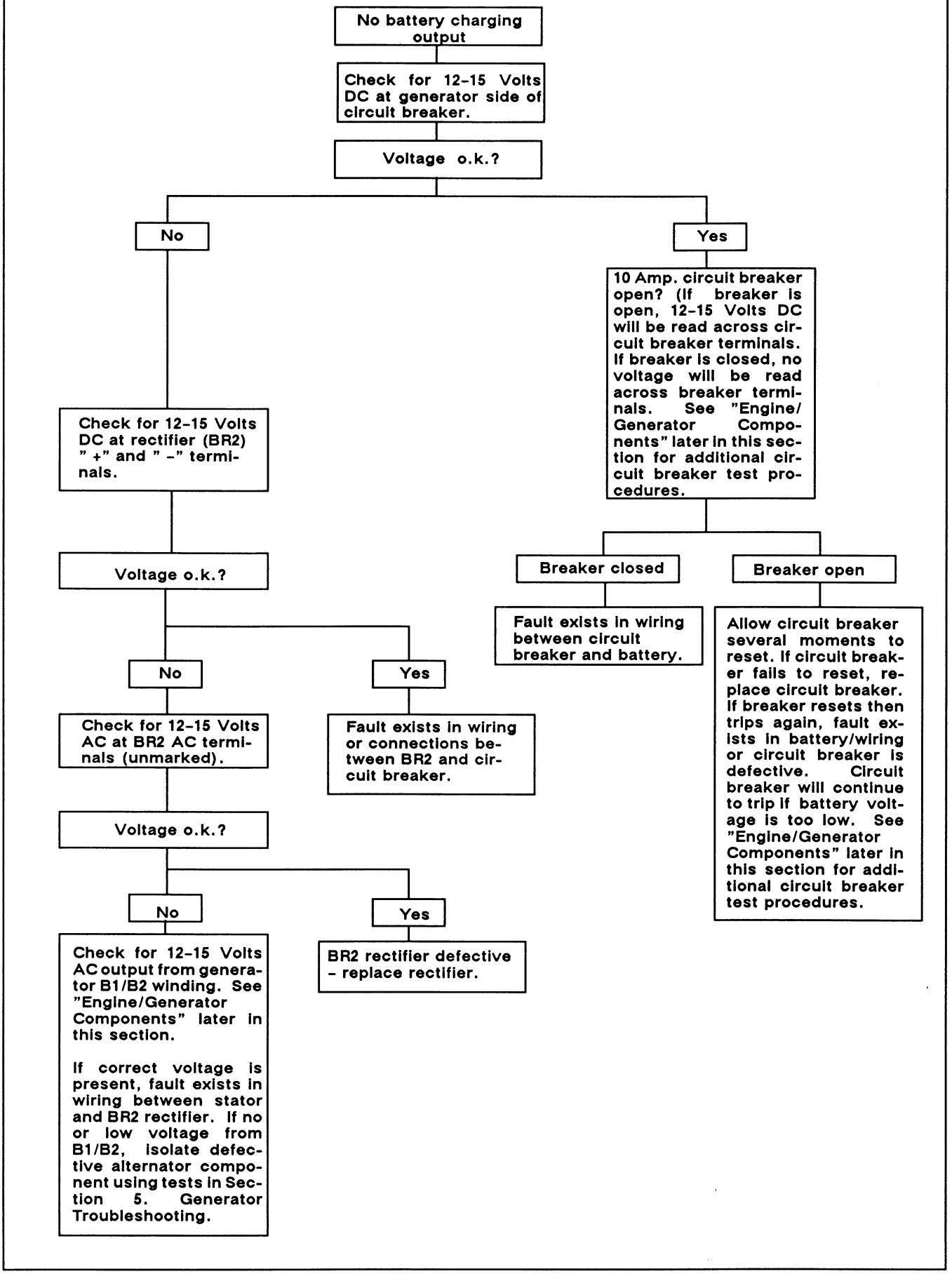
⚠ DANGER

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 must 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.

⚠ DANGER

HIGH VOLTAGE! Remember that the function of a generator set is to produce electricity and that whenever 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 technicians. 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 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.

Battery Charging Circuit Troubleshooting Chart



Controller Circuit Board

The controller circuit board is equipped with LED's (light emitting diodes) to indicate relay coil power and aid in circuit board and generator fault detection. When the K1, K2, K3 , or K4 relays are receiving power, the corresponding LED will light. The LED does not indicate whether the relay coil is energized. This conclusion can only be reached through analysis of generator faults and by performing a continuity test on the relay coil (covered later in this section). Use the following flow chart as an aid in troubleshooting the circuit board and generator set. If the prescribed remedy does not correct the problem, the circuit board may have to be replaced.

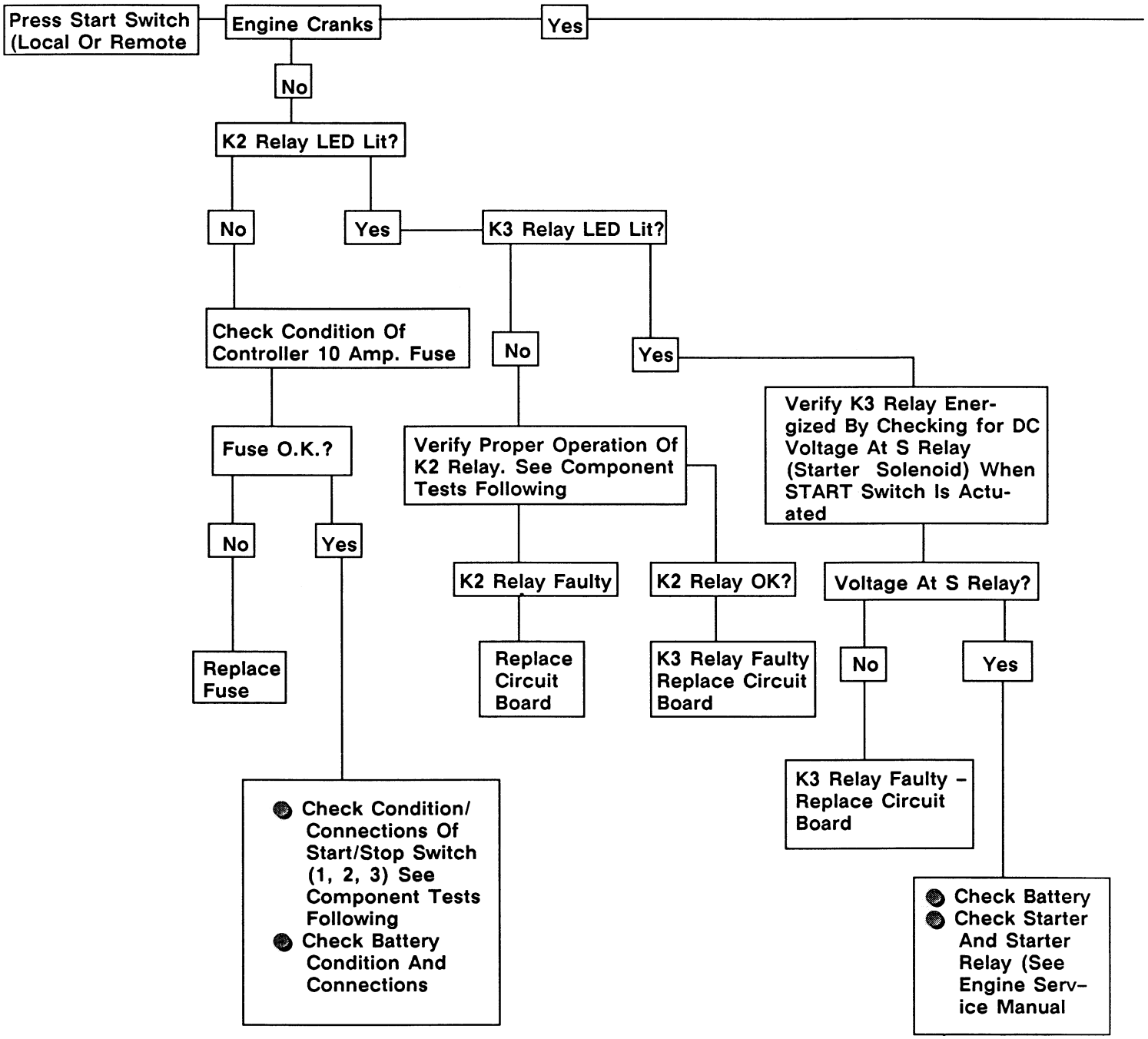
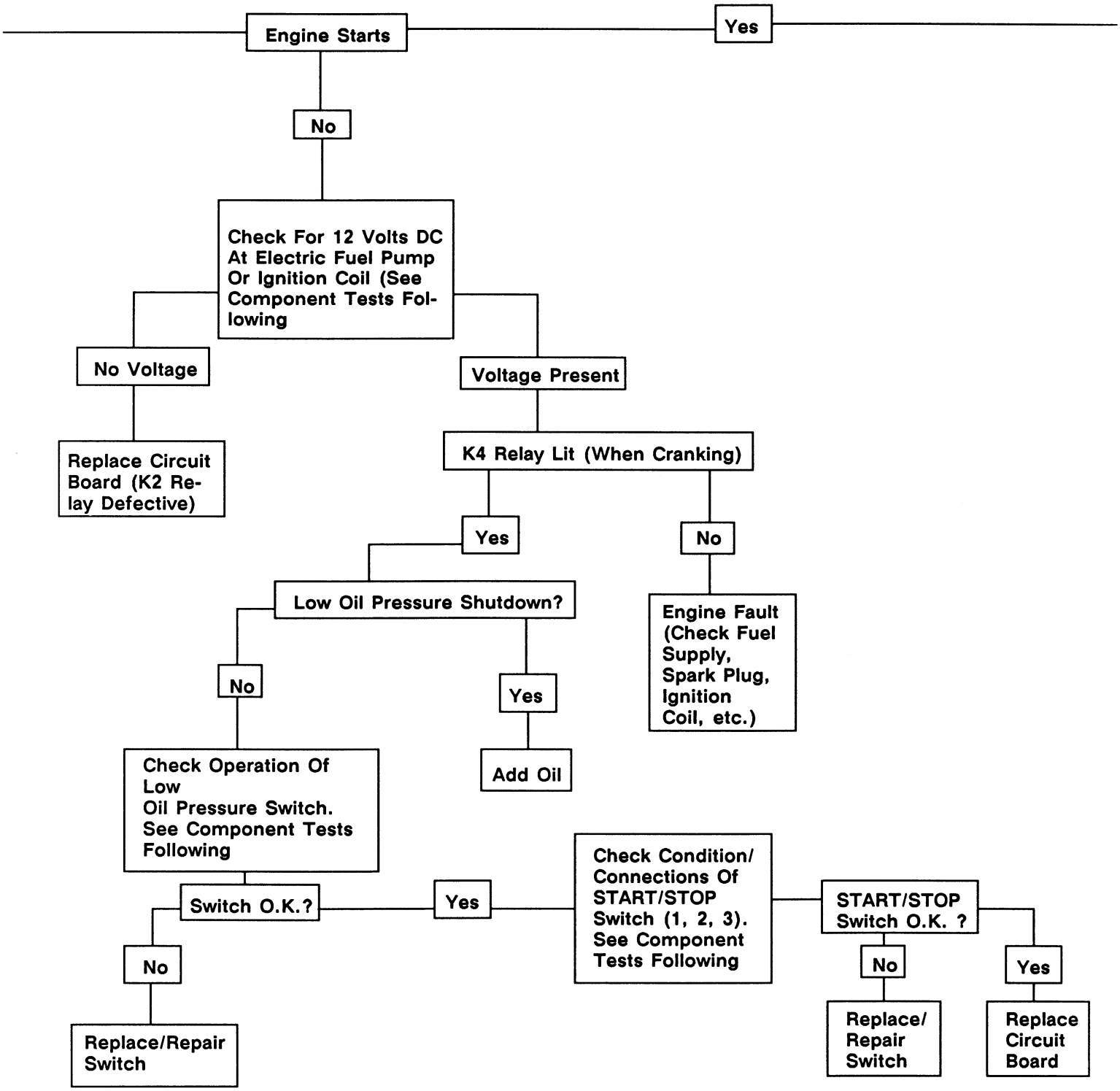
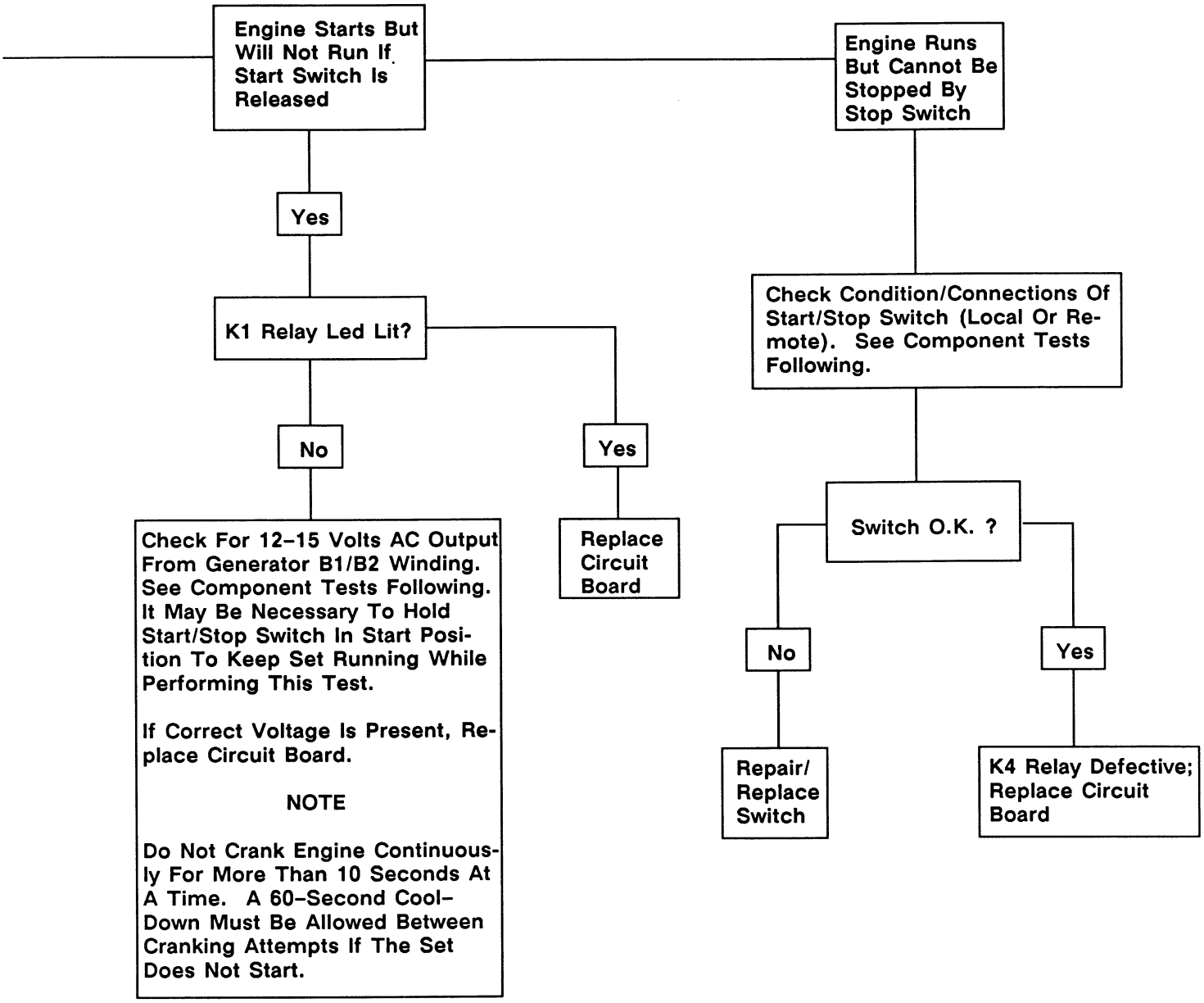


Table 7-3. Circuit Board Troubleshooting


Engine Starts
Yes
No
Check For 12 Volts DC At Electric Fuel Pump Or Ignition Coil (See Component Tests Following
No Voltage
Voltage Present
Replace Circuit Board (K2 Relay Defective)
K4 Relay Lit (When Cranking)
Yes
No
Low Oil Pressure Shutdown?
Engine Fault (Check Fuel Supply, Spark Plug, Ignition Coil, etc.)
No
Yes
Add Oil
Check Operation Of Low Oil Pressure Switch. See Component Tests Following
Switch O.K.?
Yes
Check Condition/ Connections Of START/STOP Switch (1, 2, 3). See Component Tests Following
START/STOP Switch O.K. ?
No
Yes
No
Replace/Repair Switch
Replace/ Repair Switch
Replace Circuit Board


Engine Starts But Will Not Run If Start Switch Is Released
Yes
K1 Relay Led Lit?
No
Yes
Check For 12–15 Volts AC Output From Generator B1/B2 Winding. See Component Tests Following. It May Be Necessary To Hold Start/Stop Switch In Start Position To Keep Set Running While Performing This Test.
If Correct Voltage Is Present, Replace Circuit Board.
NOTE
Do Not Crank Engine Continuously For More Than 10 Seconds At A Time. A 60–Second Cool–Down Must Be Allowed Between Cranking Attempts If The Set Does Not Start.
Replace Circuit Board
Engine Runs But Cannot Be Stopped By Stop Switch
Check Condition/Connections Of Start/Stop Switch (Local Or Remote). See Component Tests Following.
Switch O.K. ?
No
Yes
Repair/ Replace Switch
K4 Relay Defective; Replace 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 controller circuit board schematic (Figure 7-7).

Component	Ohmmeter Connection	Remarks	Results
K1 Relay Coil	K1 Coil Terminals (See relay schematic)	Ohmmeter on R x 10 scale	If good, approx. 200 ohms. Low resistance (continuity) - shorted coil. High resistance - open coil
K2 Relay Coil	K2 coil contacts (See relay schematic)	Ohmmeter on R x 10 scale	If good, approx. 160 ohms. Low resistance (continuity) - shorted coil. High resistance - open coil
K3 Relay Coil	K3 coil contacts (See relay schematic)	Ohmmeter on R x 10 scale	If good, approx. 400 ohms. Low resistance (continuity) - shorted coil. High resistance - open coil
K4 Relay Coil	K4 coil contacts (See relay schematic)	Ohmmeter on R x 10 scale	If good, approx. 160 ohms. Low resistance (continuity) - shorted coil. High resistance - open coil

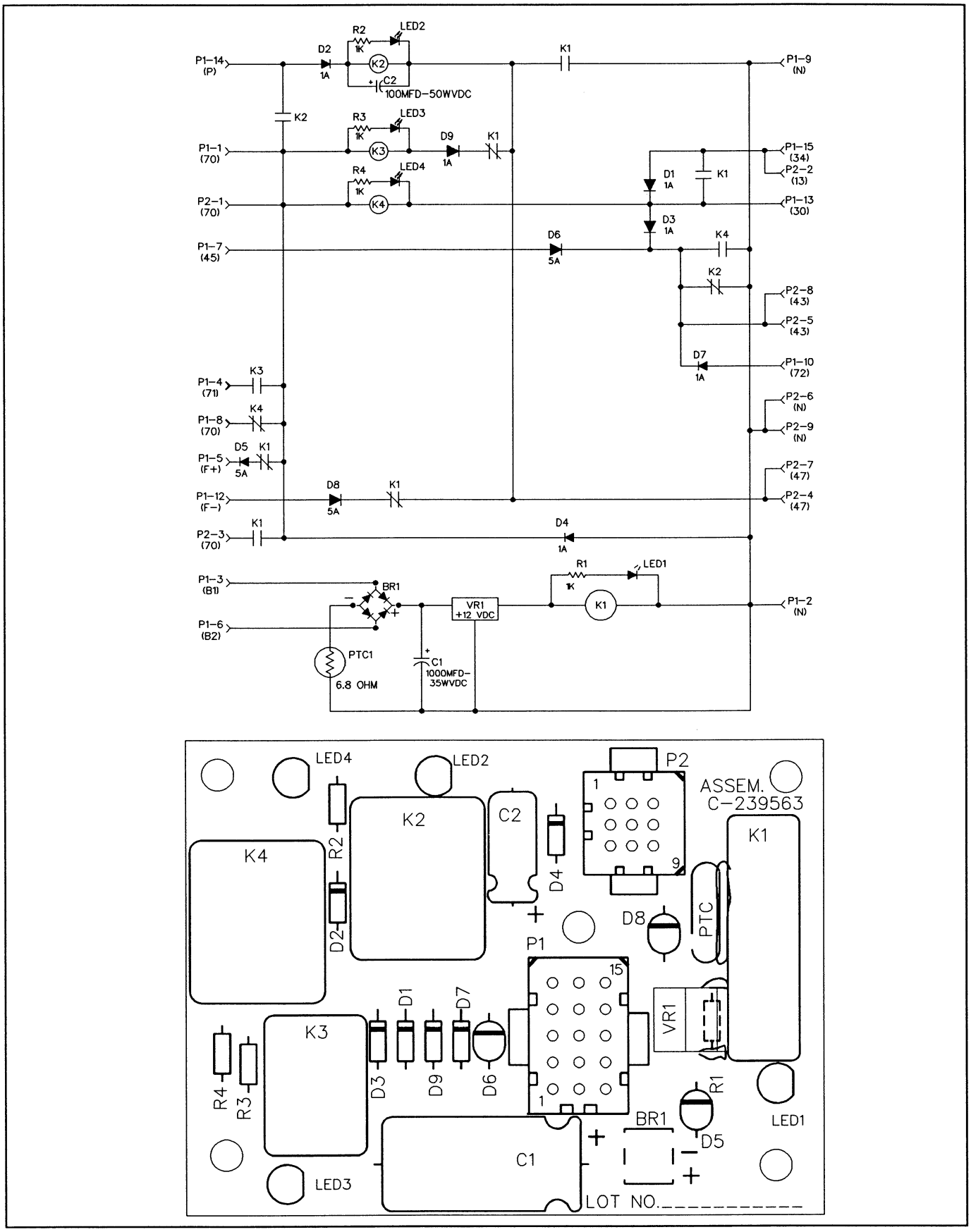


Figure 7-7. Controller Circuit Board Testing

Engine/Generator Components

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 prescribed 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.y

Component	Voltmeter Connections	Procedure	Results
Hourmeter and wiring	Red test clip to (+) terminal. Black test clip to (–) terminal.	Start generator set. Voltmeter setting 12 Volts DC or greater.	12 Volt DC reading indicates wiring harness is okay. Hourmeter will function if good.
B1 and B2 stator aux. winding	B1 and B2 leads in controller	Add fully–insulated push–on terminals to B1/B2 leads in controller.Voltmeter setting 20 Volts AC or greater. Start generator set and allow to reach rated speed.	Reading of 12–16 Volts AC indicates B1/B2 winding is good.
Ignition coil, choke, carburetor shutdown solenoid, fuel pump, fuel valve (LP), and vaporizer solenoid (LP)	Red test clip to each component positive (+) terminal. Black test clip to engine block (ground).	Place controller or remote switch to START position. Voltmeter setting 12 Volts DC or greater.	12 Volt DC reading indicates wiring harness is okay.To determine if fuel pump, fuel valve (LP), or vaporizer solenoid (LP) is good, proceed to next step. Also see engine component ohmmeter checks following.
Fuel Pump	None	Disconnect fuel pump battery positive (+) lead and apply 12 Volts DC. **DANGER:** See Safety Precautions before proceeding.	If good – fuel pump will operate.

Component	Voltmeter Connections	Procedure	Results
Fuel Valve (LP gas only)	None	Disconnect fuel valve battery positive (+) lead and apply 12 Volts DC. **DANGER:** See Safety Precautions before proceeding.	If good – fuel valve will actuate; fuel valve will make audible "click" sound.
Vaporizer Solenoid (LP gas only)	None	Disconnect solenoid battery positive (+) lead and apply 12 Volts DC. **DANGER:** See Safety Precautions before proceeding.	If good – manual prime button on solenoid will retract. If solenoid tests good, check for proper operation of choke circuit board in next step.
Choke Circuit Board (LP gas only)	Leads 8N and S of wiring harness to vaporizer solenoid	Crank generator engine	If good, a reading of 8–12 Volts DC will be obtained. No voltage – wiring harness or choke circuit board is defective.
BR2 (battery charging rectifier – if equipped)	BR2 "+" and "–" terminals. BR2 must remain connected for generator to start	Start generator set	If good – 12–15 Volts DC. If no voltage, proceed to next step.
	BR2 "AC" terminals		12–15 Volts AC should be read at AC terminals. If voltage is good, BR2 is defective. A no or low voltage reading indicates an alternator related fault. See Section 5, Generator Troubleshooting.

To further check generator set components, disconnect the battery and remove wiring harness plugs from the controller circuit board. Use an ohmmeter to check continuity and to isolate defective components. Use the following chart and Figure 7-8.

CAUTION

Before performing ohmmeter checks, disconnect generator set battery to prevent damage to the ohmmeter.

⚠ WARNING

ELECTRICAL SHOCK! The 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.

Component	Ohmmeter Connections	Procedure	Results
Controller switch	P2-4 (47) and P2-6 (N)	Ohmmeter on R x 1000 scale. Place start switch in START position.	If good - zero ohms. Any resistance other than zero - replace switch.
	P2-5 (43) and P2-6 (N)	Ohmmeter on R x 1000 scale. Place start switch in STOP position.	
Remote switch	P2-7 (47) and P2-9 (N)	Ohmmeter on R x 1000 scale. Place start switch in START position.	
	P2-8 (43) and P2-9 (N)	Ohmmeter on R x 1000 scale. Place start switch in STOP position.	
Remote switch light	(+) and (-) terminals	Ohmmeter on R x 1 scale.	If good - continuity. No continuity - replace switch.
Hourmeter	(+) and (-) terminals	Ohmmeter on R x 1 scale.	If good - continuity. No continuity - replace switch.
J3 wiring harness to remote switch	J3-3 and J3-4	Ohmmeter on R x 1000 scale. Place rocker switch in START position.	If good - zero ohms. Any other reading indicates J3 wiring or switch is defective. To check remote switch, disconnect leads and test separately.
	J3-1 and J3-4	Ohmmeter on R x 1000 scale. Place rocker switch in STOP position.	

Component	Ohmmeter Connections	Procedure	Results
J3 wiring harness to remote switch light and hour-meter	J3–2 and J3–4	Ohmmeter on R x 1000 scale.	If good – continuity. High resistance – open component and/or wiring harness. To determine which component is defective, disconnect leads and test separately.
Carburetor Shutdown solenoid	(+) and (–) leads	Ohmmeter on R x 1 scale.	If good, 4–5 ohms. Disconnect solenoid leads when testing. To bypass – see Section 3. "Shutdown Solenoid."
Choke heater	Choke terminals	Ohmmeter on R x 1000 scale.	If good – continuity.
P1 wiring harness	P1–9 and ground	Ohmmeter on R x 1 scale	If good – zero ohms. Any other reading indicates a poor ground connection.
	P1–3 and P1–6 (B1 and B2 stator leads)	Ohmmeter on R x 1 scale	If good – continuity.
Controller 10 Amp. fuse and wiring	P1–14 and starter relay "battery" side	Ohmmeter on R x 100 scale	If good – zero ohms. No continuity – open circuit and/or blown fuse.
Voltage regulator circuit 8 Amp. fuse	Fuse terminals (remove fuse from holder in end bracket).	Ohmmeter on R x 100 scale	If good, zero ohms. No continuity – blown fuse.
S relay coil (starter solenoid and wiring)	P1–4 and ground	Ohmmeter on R x 1 scale.	If good – 5–7 ohms. Low resistance – shorted S relay coil and/or wiring. High resistance – open S relay coil and/or wiring.

Component	Ohmmeter Connections	Procedure	Results
Low Oil Pressure (LOP) shutdown switch	LOP switch terminal and engine block (ground).	Ohmmeter on R x 100 scale. Engine lube oil at prescribed level. Start generator set and allow to reach normal oil pressure. Stop generator set	If good – high resistance. Zero ohms – defective LOP switch. If good – zero ohms (continuity)
BR2	BR2 "+" and "–" terminals	Ohmmeter on R x 1000 scale. BR2 disconnected. Take reading, reverse leads, then read again.	If good – high resistance one direction and low resistance in other direction
Battery charger 10 Amp. circuit breaker	Circuit Breaker terminals	Ohmmeter on R x 1000 scale	If good – zero ohms (continuity). No continuity – replace circuit breaker. Allow breaker to several moments to reset before testing.
Anti–Icing heat element (automatic de–icing systems only)	Heat element terminal and ground	Ohmmeter on R x 1000 scale	If good – zero ohms (continuity)

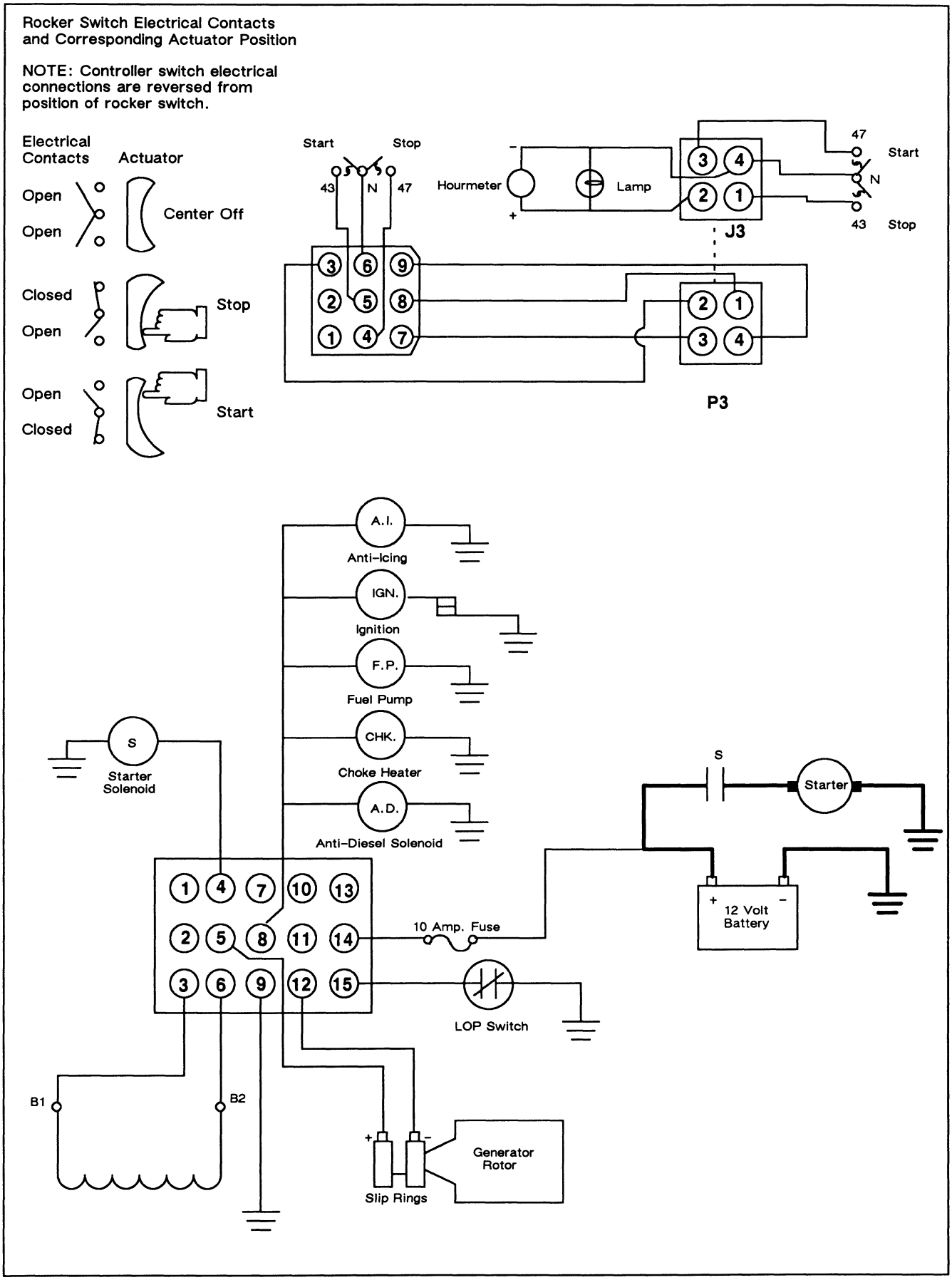


Figure 7-8. 7CKM Wiring Harness Connections - Gasoline-Fueled Sets

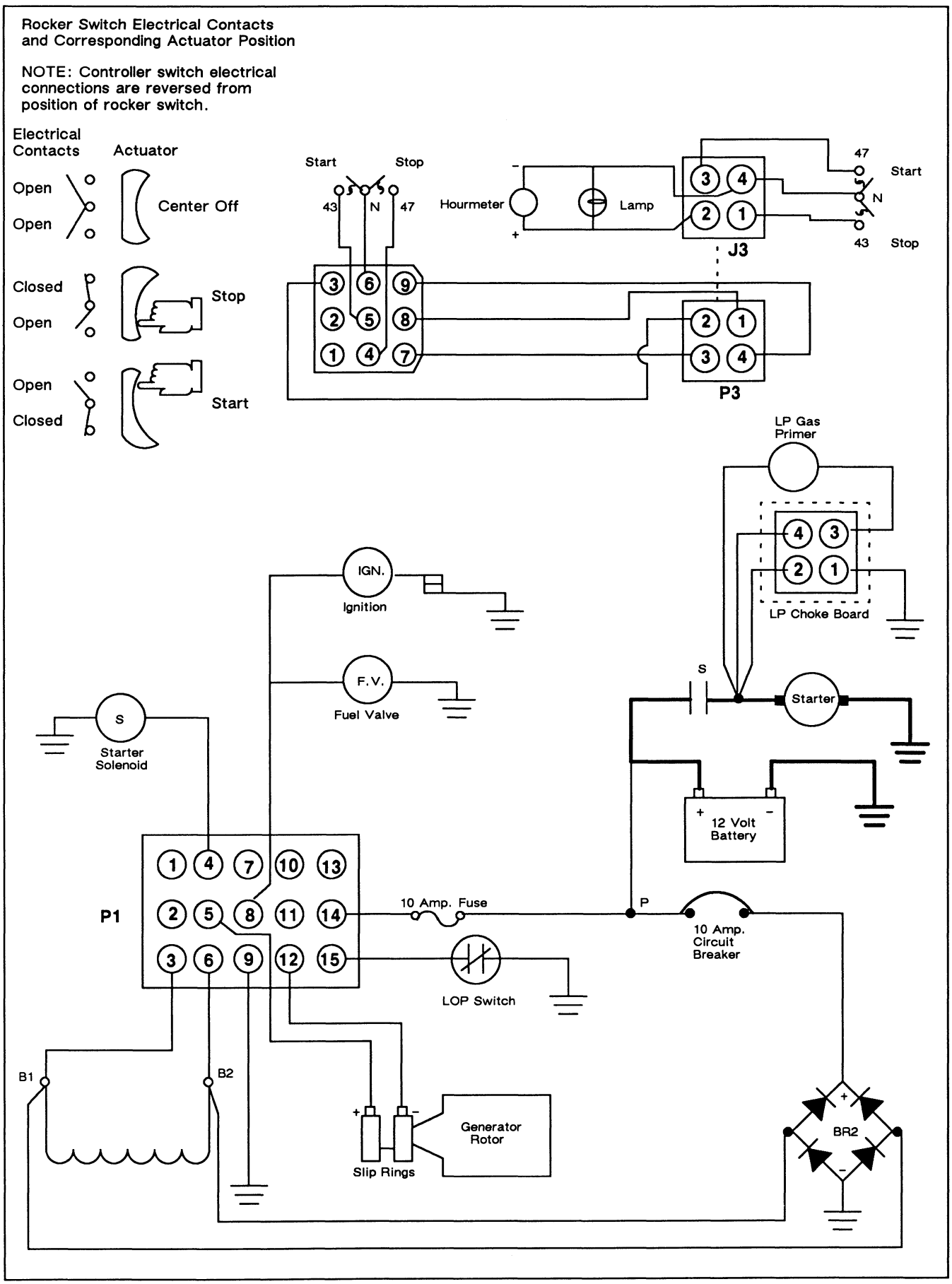


Figure 7-9. 7CKM Wiring Harness Connections - LP Gas-Fueled Sets w/Battery Charging

SECTION 8. DISASSEMBLY/REASSEMBLY

Prior to disassembly, the generator set must be removed from the coach. Disconnect battery, fuel line, exhaust system, remote switch leads, and load leads. Observe all safety precautions listed at the beginning of this manual during the disassembly/reassembly procedure.

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

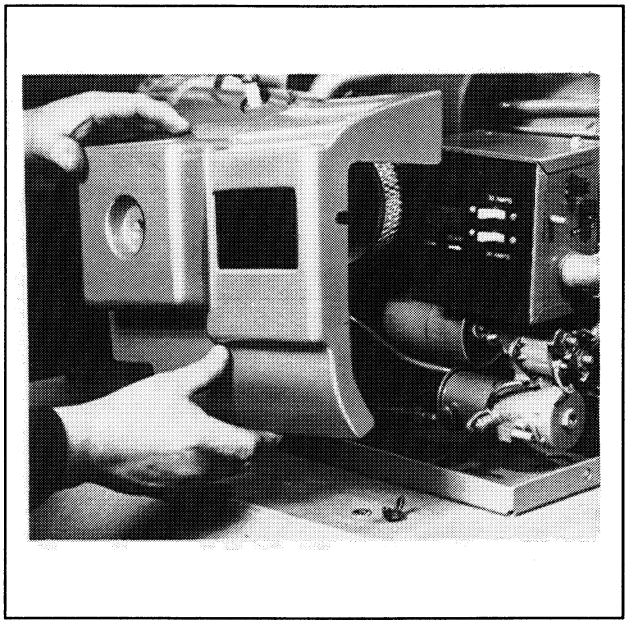


Figure 8-1. Removing Side Cover

2. Remove the wing nut securing the air cleaner element and seal. Separate air cleaner element and seal from air duct.

3. Disconnect anti-icing flex hose from anti-icing duct assembly by removing sheet metal screw. Remove anti-icing duct assembly (if equipped).

4. 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.

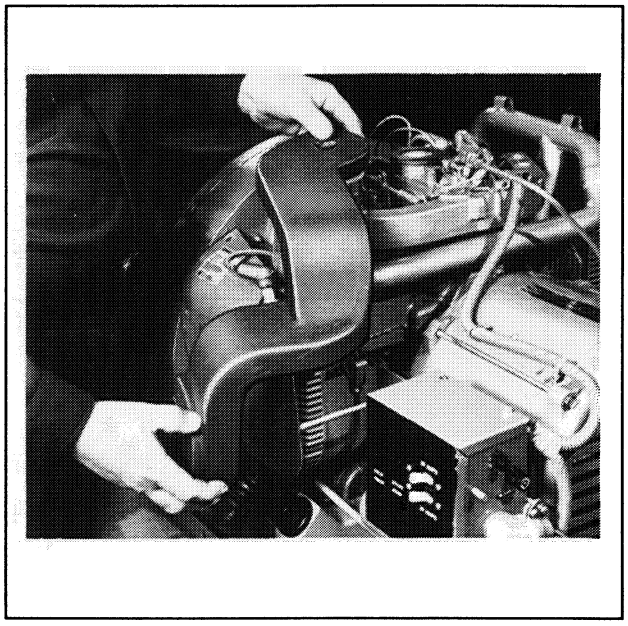


Figure 8-2. Removing Air Duct

5. Remove the four screws securing the controller cover. Lift the controller cover away from the controller box to disconnect circuit breaker leads. Figure 8–3. Upon removal of Start/Stop switch leads (N, 43, 47) from controller start/stop switch, the controller cover can be removed.

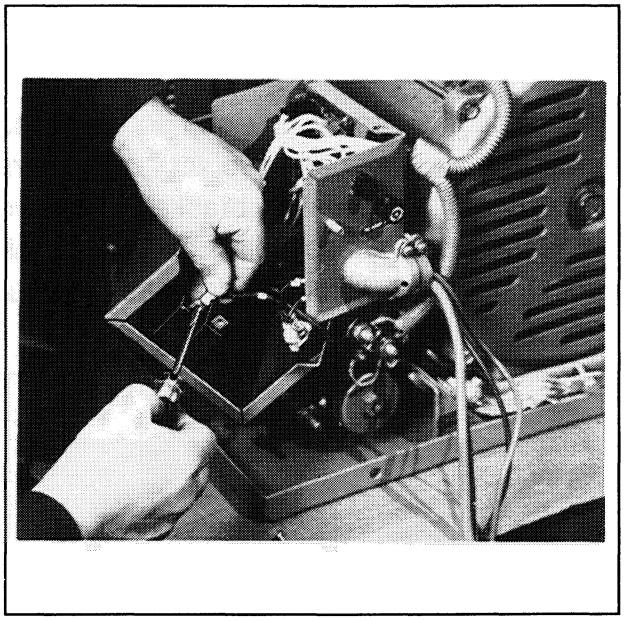


Figure 8–3. Removing Circuit Breaker Leads

6. Remove the two screws and washers securing the controller box to the mounting bracket.This will allow the controller box to be moved away from the end bracket. To completely remove controller box, unplug B1/B2 connector, remove stator leads and ground wires from ground lug, and remove all leads from voltage regulator (remove voltage regulator cover).

7. Gently pull engine/generator leads through controller box port while separating controller box from bracket.

8. Remove the screw and lock washer fastening the controller mounting bracket 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 voltage regulator, starter relay, or fuel pump, remove component mounting hardware. Reference the wiring diagram for proper reconnection.

9. Cut tie wraps securing engine leads to generator overbolt.

10. Remove center bolt from vibro–mounts attached to generator end bracket. See Figure 8–4.

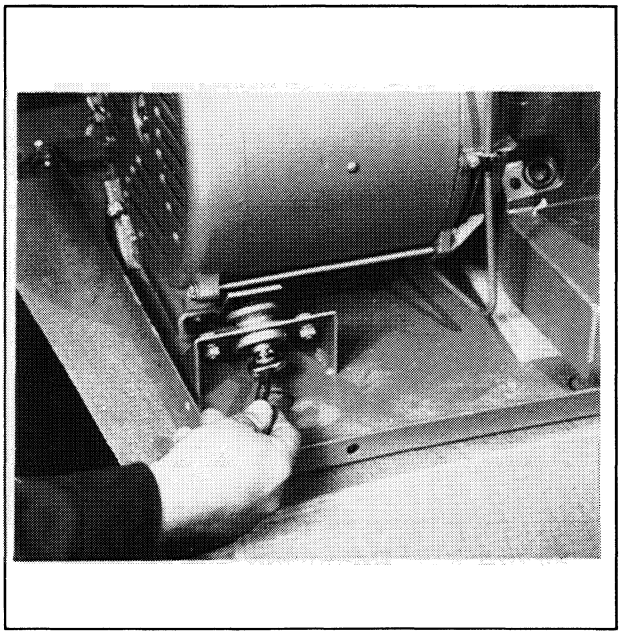


Figure 8–4. Removing Vibro–Mount Bolt

11. Disconnect ground strap from mounting tray.

12. Remove screws securing brush holder cover to end bracket. Figure 8–5.

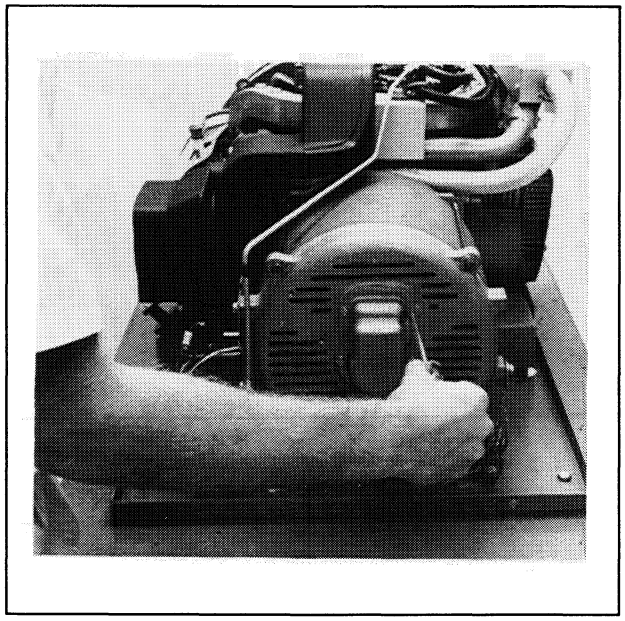


Figure 8–5. Removing Brush Holder Cover

13. Grasp brush leads and gently lift away from rotor slip rings. Lock in this position by inserting a brush retainer wire in hole in brush holder. See Figure 8–6.

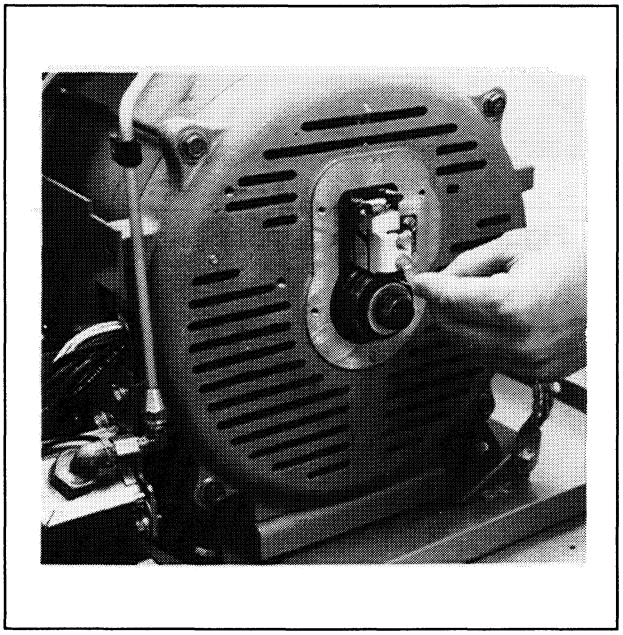


Figure 8–6. Inserting Brush Retainer

14. With lifting strap positioned around stator, use a hoist to raise generator end. Place a wood block under generator adapter and lower generator until generator is supported by block. Figure 8–7.

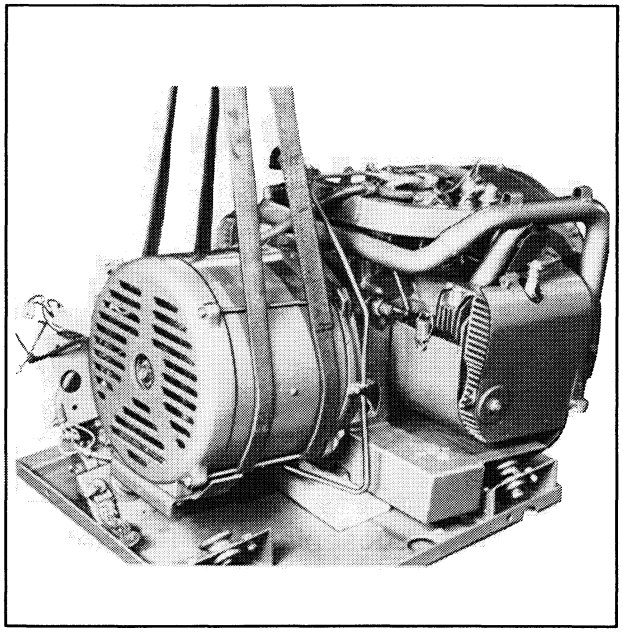


Figure 8–7. Hoisting Generator Set

15. Remove four overbolts securing generator end bracket. Figure 8–8.

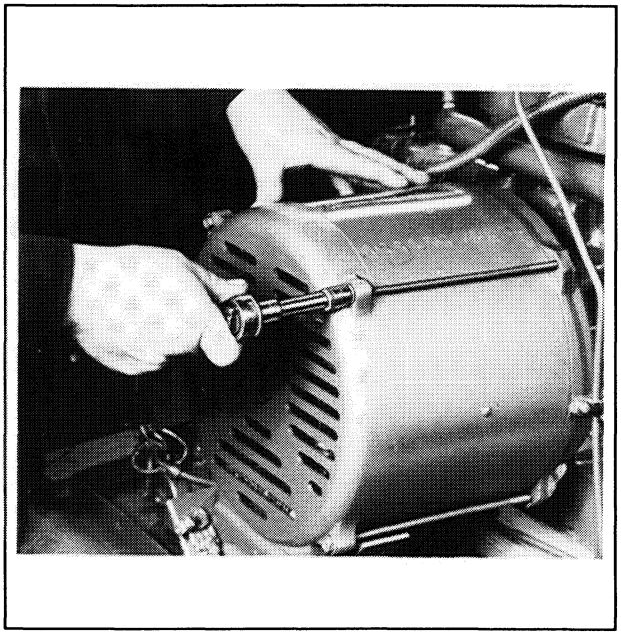


Figure 8–8. Removing Overbolts

16. Use a rubber mallet to bump end bracket away from stator housing. See Figure 8-9.

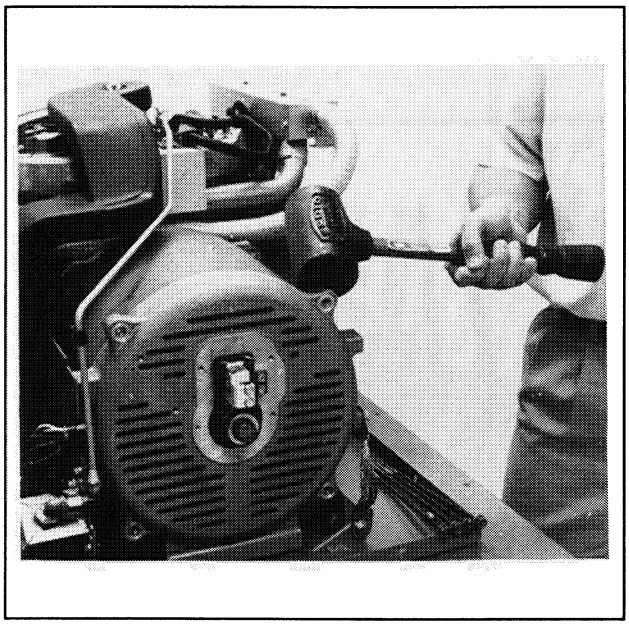


Figure 8-9. Loosening End Bracket

17. Push stator leads through port in side of end bracket while separating end bracket from stator.

18. Gently slide stator over rotor. Be careful not to damage rotor during stator removal. See Figure 8-10. Note position of stator leads before removing stator.

19. Loosen rotor thru-bolt by rotating bolt counterclockwise with a 3/4 in. socket. See Figure 8-11.

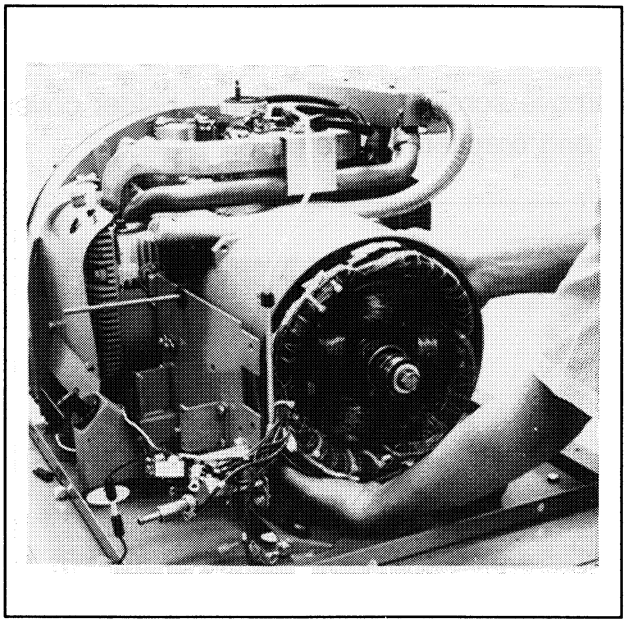


Figure 8-10. Removing Stator

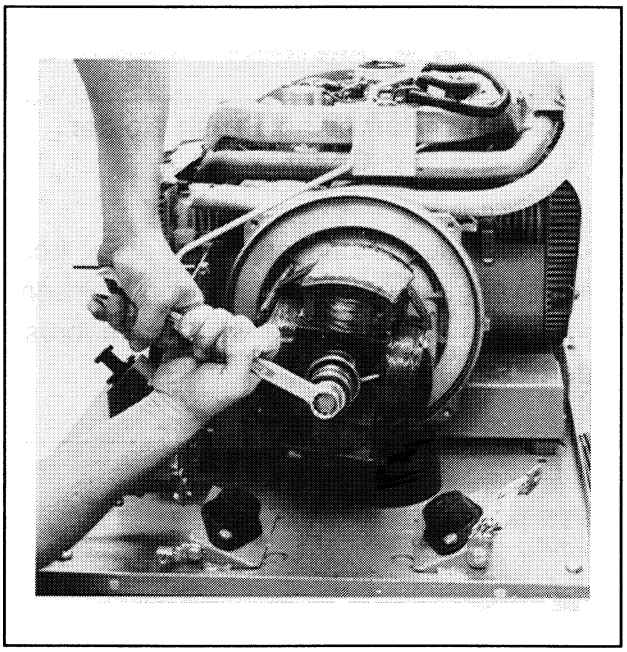


Figure 8-11. Loosening Thru-Bolt

20. Loosen the rotor from the tapered stub of the crankshaft by striking the thru-bolt head with a heavy mallet. See Figure 8-12. Remove rotor and fan.

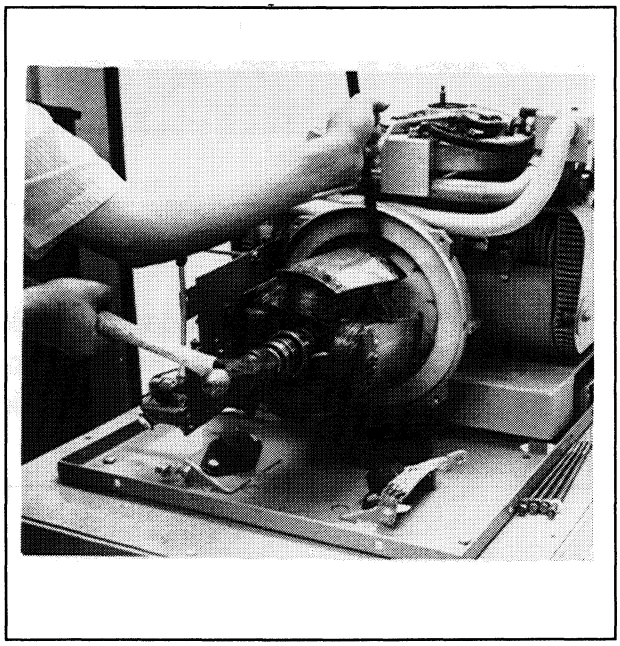


Figure 8-12. Striking Thru-Bolt

NOTE

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

21. Remove four adapter plate mounting bolts to separate adapter plate from engine. See Figure 8-13.

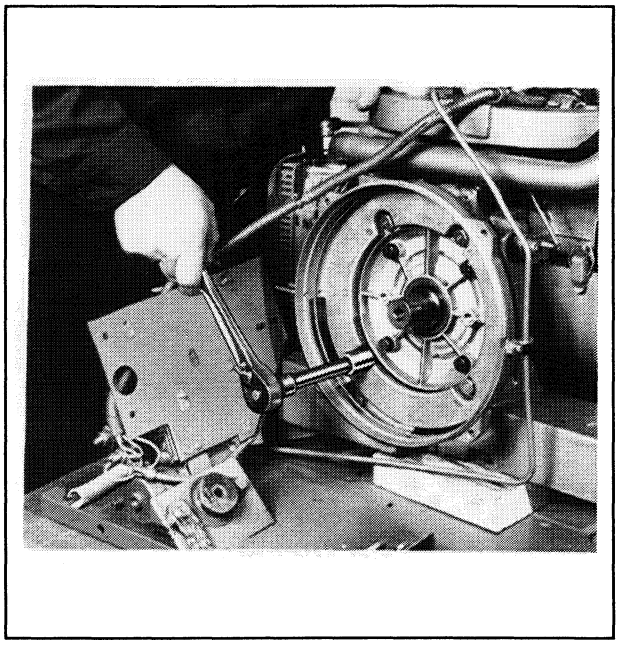


Figure 8-13. Removing Adapter Plate

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 8-14.

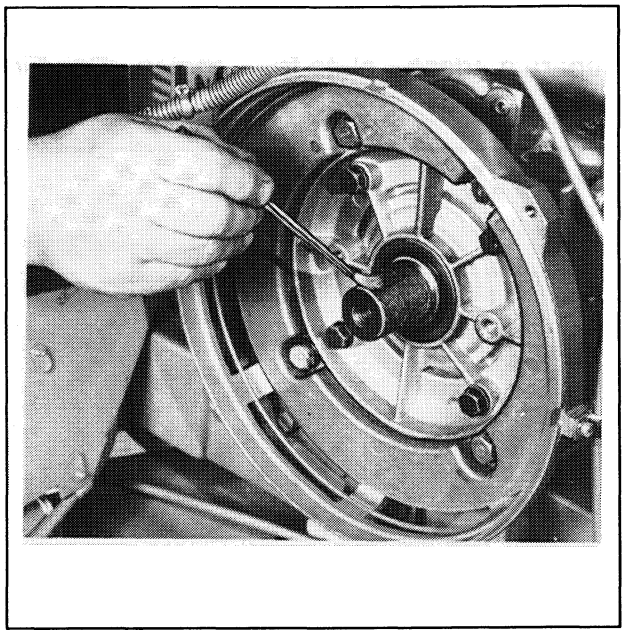


Figure 8-14. Applying Anti-Seize Compound

3. 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 8-15.

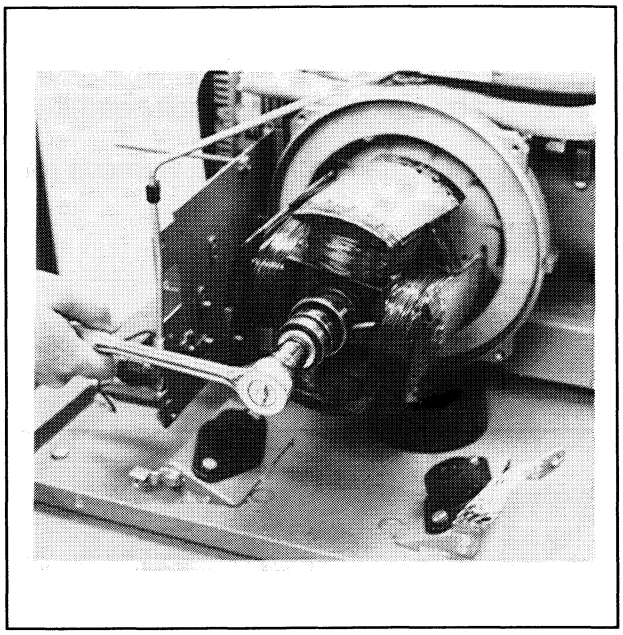


Figure 8-15. Torquing Thru-Bolt

4. 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 8-16.

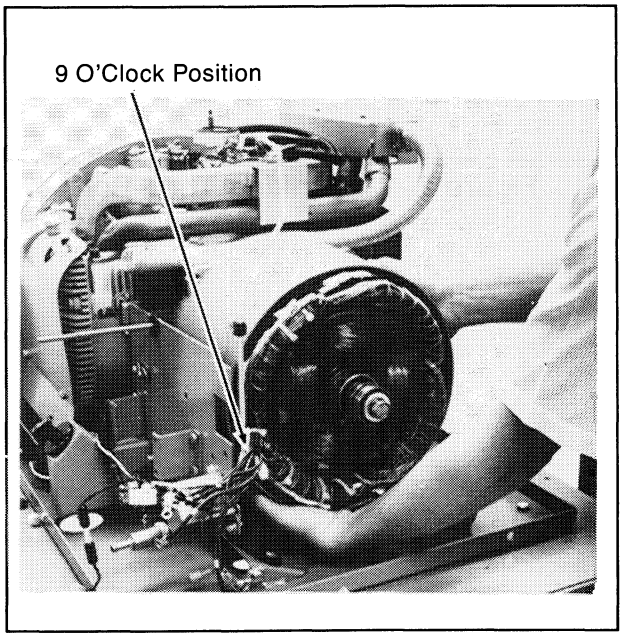


Figure 8-16. Proper Stator Position

5. Route stator leads through opening in end bracket while positioning end bracket on stator. Tap end bracket into position with a plastic mallet. Figure 8–17.

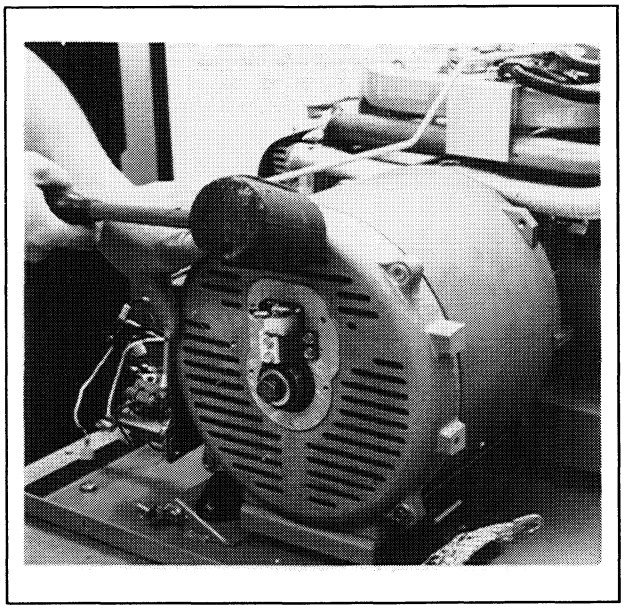


Figure 8–17. Positioning End Bracket

6. Replace the four overbolts which secure the end bracket and stator to the adapter plate. Torque overbolts to 70 in. lbs. (8 Nm). Figure 8–18.

7. Hoist the generator end slightly to remove support block. Lower generator onto vibro–mounts and remove the hoist. Replace the bolts securing vibro–mounts to the end bracket. See Figure 8–19.

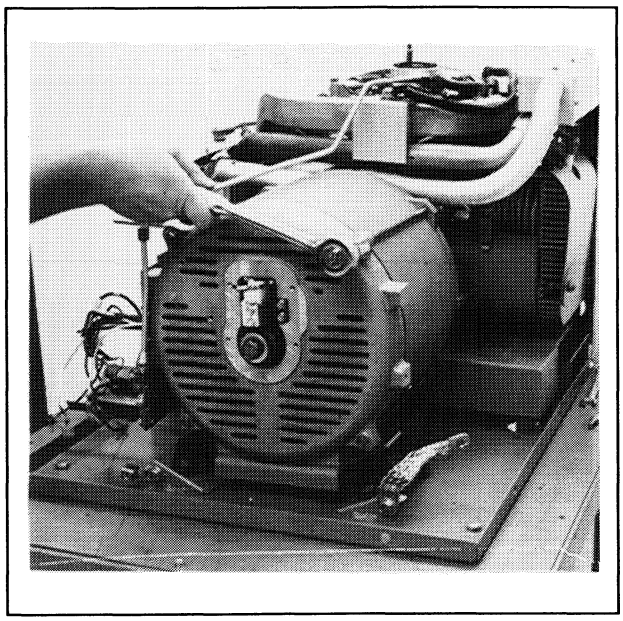


Figure 8–18. Torquing Overbolts

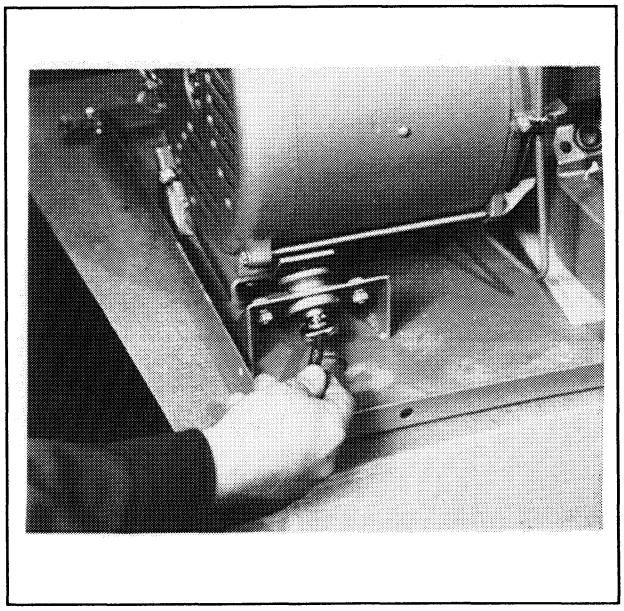
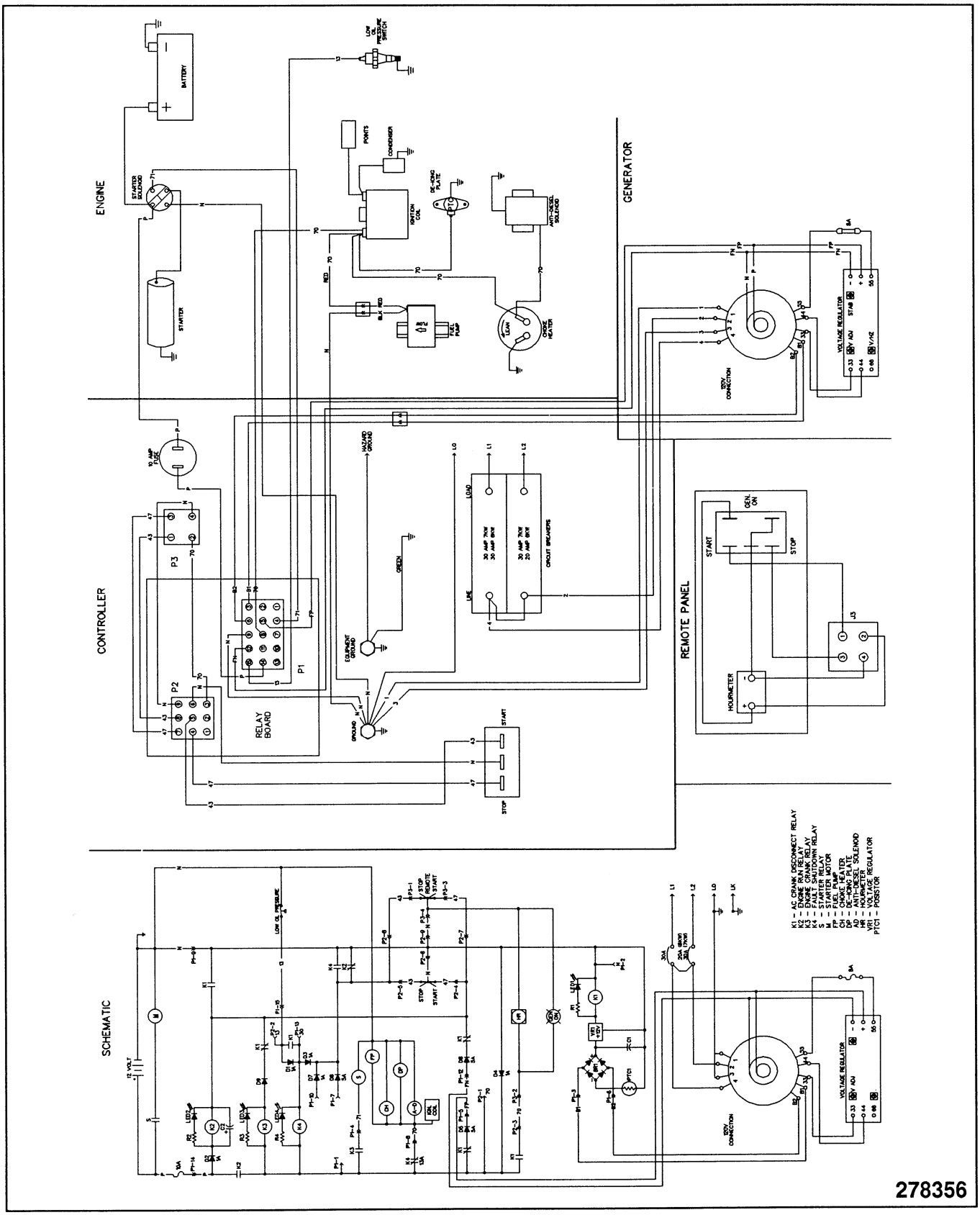
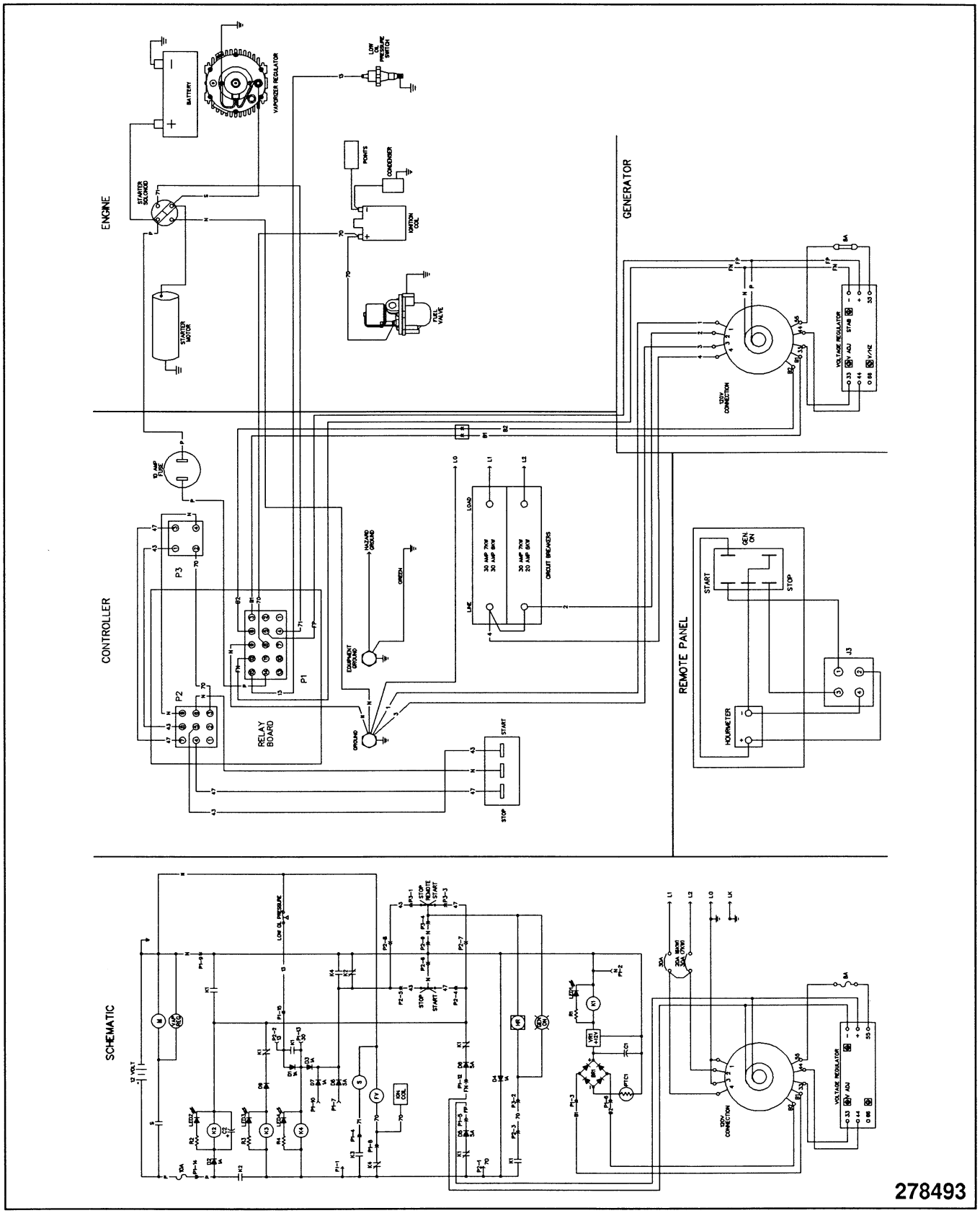


Figure 8–19. Refastening Vibro–Mounts

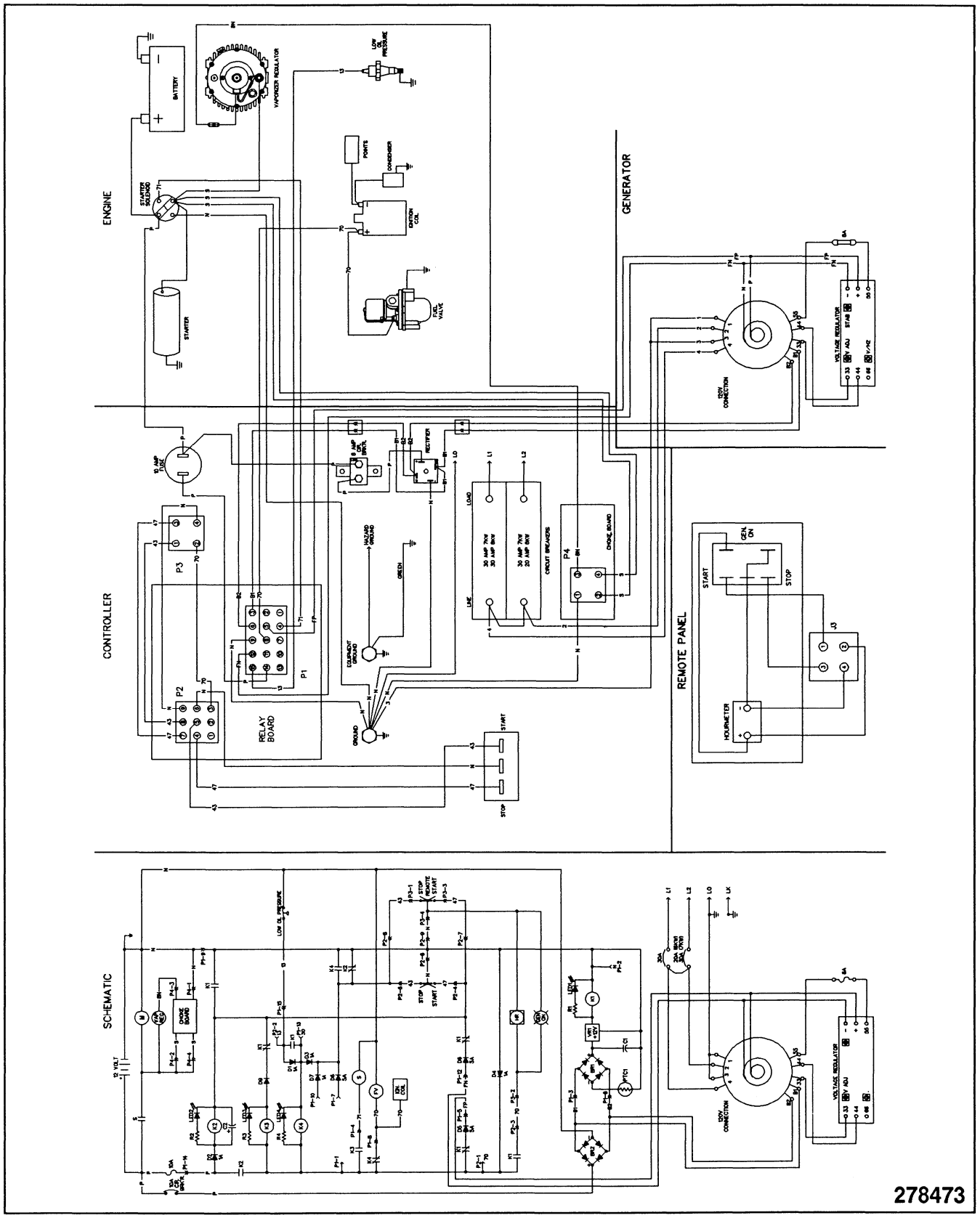
SECTION 9. WIRING DIAGRAMS



Wiring Diagram -- 7CKM-RV Gasoline, 120 Volt



Wiring Diagram --7CKM-RV LP Gas (No Battery Charging)



Wiring Diagram --7CKM-RV LP Gas w/Battery Charging

SECTION 10. SPECIFICATIONS

General Specifications

Dimensions – L x W x H –-in. (mm) ..... 26.8 x 21.5 x 17.5 (681 x 546 x 445)
Weight – lbs. (kg) 322 (145)
Air Requirements
  Combustion – cfm (cmm) ..... 25 (.7)
  Cooling – cfm (cmm) 650 (18.4)
Fuel Consumption

Load	25%	50%	75%	100%
Gasoline				
Gal./hr. (L/hr.	0.57 (2.2)	0.72 (2.7)	0.97 (3.7)	1.27 (4.8)
LP Gas				
Gal./hr. (L/hr.)*	0.70 (2.6)	0.79 (2.9)	0.96 (3.6)	1.1 (4.2)

* One gallon of LP gas will produce approximately 0.4 cubic feet (0.012 m^3) of propane vapor per hour in ambient temperature down to 0°F (–18°C).

Engine

Some general engine specifications are listed below. Refer to the appropriate service section and the engine service manual for specific service details.

Manufacturer ..... Kohler
Model K–582EP
Cycle 4
Number of Cylinders 2
Compression Ratio 7:1
Displacement – cu.in. (cc) 57.7 (945.7)
Rated Horsepower 13.8
RPM 1800
Bore – in. (mm) 3.50 (88.9)
Stroke – in. (mm) 3.0 (76.2)
Valve Material
  Intake ..... Forged Steel
  Exhaust ..... Stellite (with rotator)
Valve Clearance
  Intake – in. (mm) ..... .008/.010 (.202/.253)
  Exhaust – in. (mm) ..... .017/.020 (.430/.506)
Cylinder Block Material ..... Cast Iron
Cylinder Head Tightening Torque – ft. lbs (Nm) 35 (47)
Cylinder Head Material ..... Aluminum Alloy

Piston Rings	2 Compression/ 1 Oil
Crankshaft Material	Ductile Iron
Bearings	Replaceable Sleeve
Connecting Rod Material	Tin Plated Aluminum Alloy
Governor	Oil Bathed Flyweight
Lubrication System	Pressure
Oil Capacity - qts. (L)	4 (3.78)
Oil Type (API)	SE, SF, SG
Oil Pressure - psi (kPa)	30–50 (206–345)
Fuel Type -	
Model 7CKM21–RV	Gasoline - Regular Grade Unleaded Minimum Octane 86
Model 7CKM22–RV	LP Gas Blended for Season and/or Geographic Location
Choke Type	Automatic Thermal Electric
Fuel Pump Type	Electric
Battery Voltage	12
Battery Ground	Negative
Battery Recommendation	290 Cold Cranking Amps. (55 Amp./ Hr. Minimum)
Spark Plug Type	Champion RH10
Spark Plug Size - in. (mm)	0.56 (14)
Spark Plug Gap - in. (mm)	
Gasoline	0.025 (0.64)
LP Gas	0.018 (0.46)
Spark Plug Tightening Torque - ft. lbs (Nm)	18/22 (24–30)
Starter Motor	Bendix Automotive Type
Cooling System	Kohler Air Vac™
Direction of Rotation (viewed from generator end)	Counterclockwise

Generator

Rated kW - 7CKM21–RV (Gasoline)	7.0
7CKM21–RV (Gasoline - 6 kW Model)	6.0
7CKM22–RV (LP Gas)	6.3
Frequency - Hz	60
Rated Amps. - 7CKM21–RV (Gasoline)	58
7CKM21–RV (Gasoline - 6 kW Model)	50
7CKM22–RV (LP Gas)	52.5
Rated Voltage	120
Excitation Method	Static, Brush–Type
Coupling Type	Tapered Shaft, Thru–Bolt
Thru–Bolt Torque - ft. lbs. (Nm)	50 (68)
Overbolt Torque - in. lbs. (Nm)	70 (8)
Rotor Resistance (ohms)	5.2

Stator Resistance (ohms)*
Leads:
- 1-2, 3-4 ..... 0.28
- 33-44 ..... 0.28
- 55-66 ..... 1.26
- B1-B2 ..... 0.08

Voltage Regulator Type ..... PowerBoost III Volts/Hz
Voltage Frequency Regulation ..... Meets ANSI/EGS -1-1986 Standard
Number of Output Leads 4
Output Lead Conduit Size - in. (mm) 0.75 (19)
Insulation (Rotor and Stator) ..... Class F, Epoxy Varnish, Vacuum Impregnated
Fungus Resistance ..... Meets Mil-E-04970A Standard
Winding Material ..... Copper
Cooling System Kohler Air Vac™
Bearing, Number and Type ..... 1, Replaceable Ball
Circuit Protection
- Controller ..... Replaceable 10 Amp. Fuse
- Generator (7 kW Models) ..... Two 30 Amp. Circuit Breakers
- Generator (6 kW Model) ..... One 20 Amp. and One 30 Amp. Circuit Breaker
- Voltage Regulator ..... Replaceable 10 Amp. Fuse
- Battery Charging Circuitry (if equipped) ..... Self-Resetting 10 Amp. Circuit Breaker

* Most ohmmeters will not give 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 (discoloration). Do not confuse a low resistance reading with a reading indicating a shorted winding.

DERATION: The kilowatts of the generator set will decrease 3% for each 1000 feet (305 meters) above sea level, 2% (6 kW model 1%) for each 10°F (5.5°C) increase in ambient temperature above 60°F (16°C) and 11.1% when converted to LP gas fuel. Ambient temperature is measured at air cleaner inlet.

Minimum Clearance Requirements

Front ..... 1/2 in. (12.7 mm)
Side ..... 1/2 in. (12.7 mm)
Top ..... 1/2 in. (12.7 mm)
Rear ..... 1-1/2 in. (38.1 mm)

Battery Cable Size

Distance Between Generator Set and Battery	At 0°F (-18°C)	Cable Size (AWG) at 32°F (0°C)	At 75°F (24°C)
40 Feet (12.2 m)	00	0	1
30 Feet (9.1 m)	0	1	2
25 Feet (7.6 m)	1	2	4
20 Feet (6.1 m)	2	2	6
15 Feet (4.6 m)	2	4	6
10 Feet (3.0 m)	4	6	8
5 Feet (1.5 m)	6	6	8
2.5 Feet (0.8 m)	8	8	8

Electric Motor 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

Appliance Wattage Requirements

Electrical 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	750–1200
Hair Dryer	500–1200

Electrical Load Capabilities

Kohler Model	Wattage Capacity	Will Operate Air Conditioner(s) of Size Indicated
7 kW Model (Standard)	7000	Two 13,500 BTU
6 kW Model	6000	Two 13,500 BTU

Torque Values

Cylinder Head Bolts - ft. lbs (Nm)	35 (47)
Spark Plug - ft. lbs. (Nm)	18/22 (24/30)
Thru-bolt - ft. lbs. (Nm)	50 (68)
Overbolt - in. lbs. (Nm)	70 (8)

American Hardware

Size	Standard Bolts, Screws, Nuts, and Fasteners Assembled into Cast Iron or Steel			Fasteners Assembled into Aluminum
	Grade 2	Grade 5	Grade 8	Grade 2 or 5
8-32	20 in. lb.	25 in. lb.		20 in. lb.
10-24	32 in. lb.	40 in. lb.		32 in. lb.
10-32	32 in. lb.	40 in. lb.		
1/4-20	70 in. lb.	115 in. lb.	165 in. lb.	70 in. lb.
1/4-28	85 in. lb.	140 in. lb.	200 in. lb.	
5/16-18	150 in. lb.	250 in. lb.	350 in. lb.	150 in. lb.
5/16-24	165 in. lb.	270 in. lb.	30 ft. lb.	
3/8-16	260 in. lb.	35 ft. lb.	50 ft. lb.	
3/8-24	300 in. lb.	40 ft. lb.	60 ft. lb.	
7/16-14	35 ft. lb.	55 ft. lb.	80 ft. lb.	
7/16-20	45 ft. lb.	75 ft. lb.	105 ft. lb.	
1/2-13	50 ft. lb.	80 ft. lb.	115 ft. lb.	
1/2-20	70 ft. lb.	105 ft. lb.	165 ft. lb.	
9/16-12	75 ft. lb.	125 ft. lb.	175 ft. lb.	
9/16-18	100 ft. lb.	165 ft. lb.	230 ft. lb.	
5/8-11	110 ft. lb.	180 ft. lb.	260 ft. lb.	
5/8-18	140 ft. lb.	230 ft. lb.	330 ft. lb.	
3/4-10	150 ft. lb.	245 ft. lb.	350 ft. lb.	
3/4-16	200 ft. lb.	325 ft. lb.	470 ft. lb.	

KOHLER®
GENERATORS

KOHLER CO. KOHLER, WISCONSIN 53044

TP-5348 9/89
PRINTED IN U.S.A.