



MARINE

Operator's Manual

Admiral^{T.M.}

MCGBA MCGDA MDGDA
MCGCA MCGDB MDGDB
MCGGA

Platinum

MDGDC
MDGDD

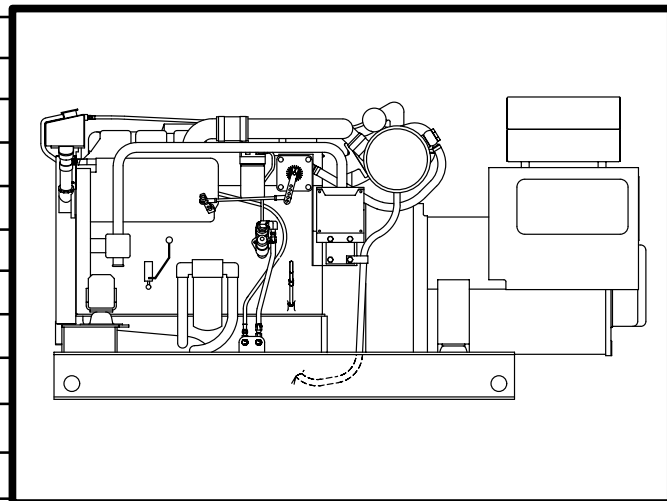


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California
Proposition 65 Warning
 Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Safety Precautions

Before operating the generator set, read the Operator's Manual and become familiar with it and your unit. **Safe and efficient operation can be achieved only if the unit is properly operated and maintained.** Many accidents are caused by failure to follow fundamental rules and precautions.

Throughout this manual you will notice symbols which alert you to potentially dangerous conditions to the operator, service personnel, or the equipment itself.

⚠ DANGER *This symbol warns of immediate hazards which will result in severe personal injury or death.*

⚠ WARNING *This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.*

⚠ CAUTION *This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.*

FUEL, ENGINE OIL, AND FUMES ARE FLAMMABLE AND TOXIC. Fire, explosion, and personal injury can result from improper practices.

- Benzene and lead, found in some gasoline, have been identified by some state and federal agencies as causing cancer or reproductive toxicity. When checking, draining or adding gasoline, take care not to ingest, breathe the fumes, or contact gasoline.
- Used engine oils have been identified by some state or federal agencies as causing cancer or reproductive toxicity. When checking or changing engine oil, take care not to ingest, breathe the fumes, or contact used oil.

⚠ WARNING *Wind, temperature, adjacent boats or structures can affect CO travel. Onan strongly recommends installing a CO detector.*

- Do not fill fuel tanks with the engine running. Do not smoke around the generator set area. Wipe up any oil or gas spills. Do not leave oily rags in engine compartment or on the generator set. Keep this and surrounding area clean.
- Inspect fuel system before each operation and periodically while running.
- Equip the engine fuel supply with a positive fuel shutoff.
- Always disconnect the battery ground (–) lead first and reconnect it last. Make sure you connect the battery correctly. A direct short across the battery terminals can cause an explosion. Do not smoke while servicing batteries. Hydrogen gas given off during charging is very explosive.
- Keep a fire extinguisher available in or near the engine compartment and in other areas throughout the vessel. Use the correct extinguisher for the area. For most types of fires, an extinguisher rated ABC by the NFPA is available and suitable for use on all types of fires except alcohol.

EXHAUST GASES ARE DEADLY

- Provide adequate ventilation. Equip the bilge with a power exhauster.
- Be sure propulsion and generator set engine exhaust systems are free of leaks. Perform thorough, periodic inspections of the exhaust system and repair leaks immediately. Exhaust gases are deadly.
- Never sleep in the vessel with the generator set running unless the vessel is equipped with an operating carbon monoxide detector.

HOT COOLANT CAN CAUSE SEVERE PERSONAL INJURY

- Hot coolant is under pressure. Do not loosen the coolant pressure cap while the engine is hot. Let the engine cool before opening the pressure cap.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not remove any belt guards or covers with the generator set running.
- Keep hands and loose clothing away from moving parts. Do not wear jewelry while servicing any part of the generator set.
- Never step on the generator set (as when entering or leaving the engine compartment). It can stress and break unit components, possible resulting in dangerous operating conditions. . . from leaking fuel, leaking exhaust fumes, etc.
- Before performing any maintenance on the generator set, disconnect its batteries to prevent accidental starting. do not disconnect or connect battery cables if fuel vapors are present. Ventilate the generator set compartment or bilge thoroughly with the power exhauster.

ELECTRICAL SHOCK WILL CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not make adjustments in the control panel or on engine with unit running. High voltages are present. Work that must be done while unit is running should be done only by qualified service personnel standing on dry surfaces to reduce shock hazard.
- **DO NOT CONNECT THE GENERATOR SET TO THE PUBLIC UTILITY OR TO ANY OTHER ELECTRICAL POWER SYSTEM.** Electrocutation or damage to property can occur at a site remote from the boat where line or equipment repairs are being made if the set is connected to the power system. An approved transfer switch must be used if more than one power source is to be made available to service the boat.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.

Copy and post these suggestions in potential hazard areas of the vessel.

1. Introduction

GENERAL

Each operator should read this manual before operating the set for the first time. A generator set must be operated and maintained properly if you are to expect safe, reliable and quiet operation. The manual includes a troubleshooting guide and a maintenance schedule.

The engine manual is included with the set. Where there is conflicting information, this manual takes precedence over the engine manual.

⚠ WARNING *Improper operation and maintenance can lead to severe personal injury or loss of life and property by fire, electrocution, mechanical breakdown or exhaust gas asphyxiation. Read the safety precautions inside the front cover and carefully observe all instructions and precautions in this manual.*

HOW TO OBTAIN SERVICE

When the generator set requires servicing, contact your nearest Cummins®/Onan® dealer or distributor. Factory-trained Parts and Service representatives are ready to handle all your service needs.

If you are unable to locate a dealer or distributor, consult the Yellow Pages. Typically, our distributors are listed under:

GENERATORS-ELECTRIC or
ELECTRICAL PRODUCTS

For the name of your local Cummins/Onan or Onan-only distributor in the United States or Canada, call 1-800-888-ONAN (this automated service utilizes touch-tone phones only). By entering your area code and the first three digits of your local telephone number, you will receive the name and telephone number of the distributor nearest you.

For outside North America, call Onan Corporation, 1-612-574-5000, 7:30 AM to 4:00 PM, Central Standard Time, Monday through Friday. Or, send a fax to Onan using the fax number 1-612-574-8087.

When contacting your distributor, always supply the complete Model Number and Serial Number as shown on the generator set nameplate.

⚠ WARNING

INCORRECT SERVICE OR PARTS REPLACEMENT CAN RESULT IN SEVERE PERSONAL INJURY, DEATH, AND/OR EQUIPMENT DAMAGE. SERVICE PERSONNEL MUST BE QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE.

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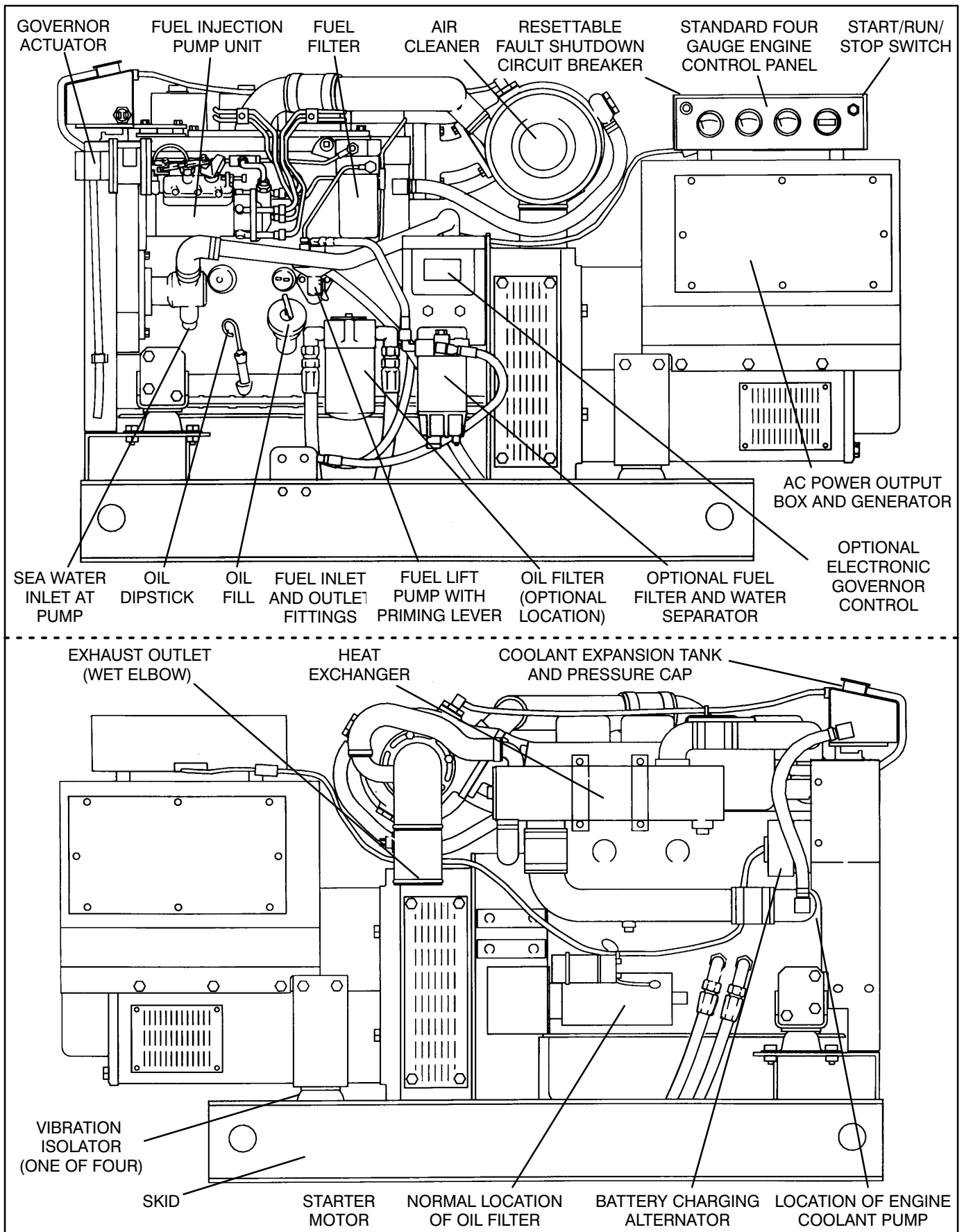


FIGURE 1-1. TYPICAL ADMIRAL GENERATOR SET (LOW PROFILE)

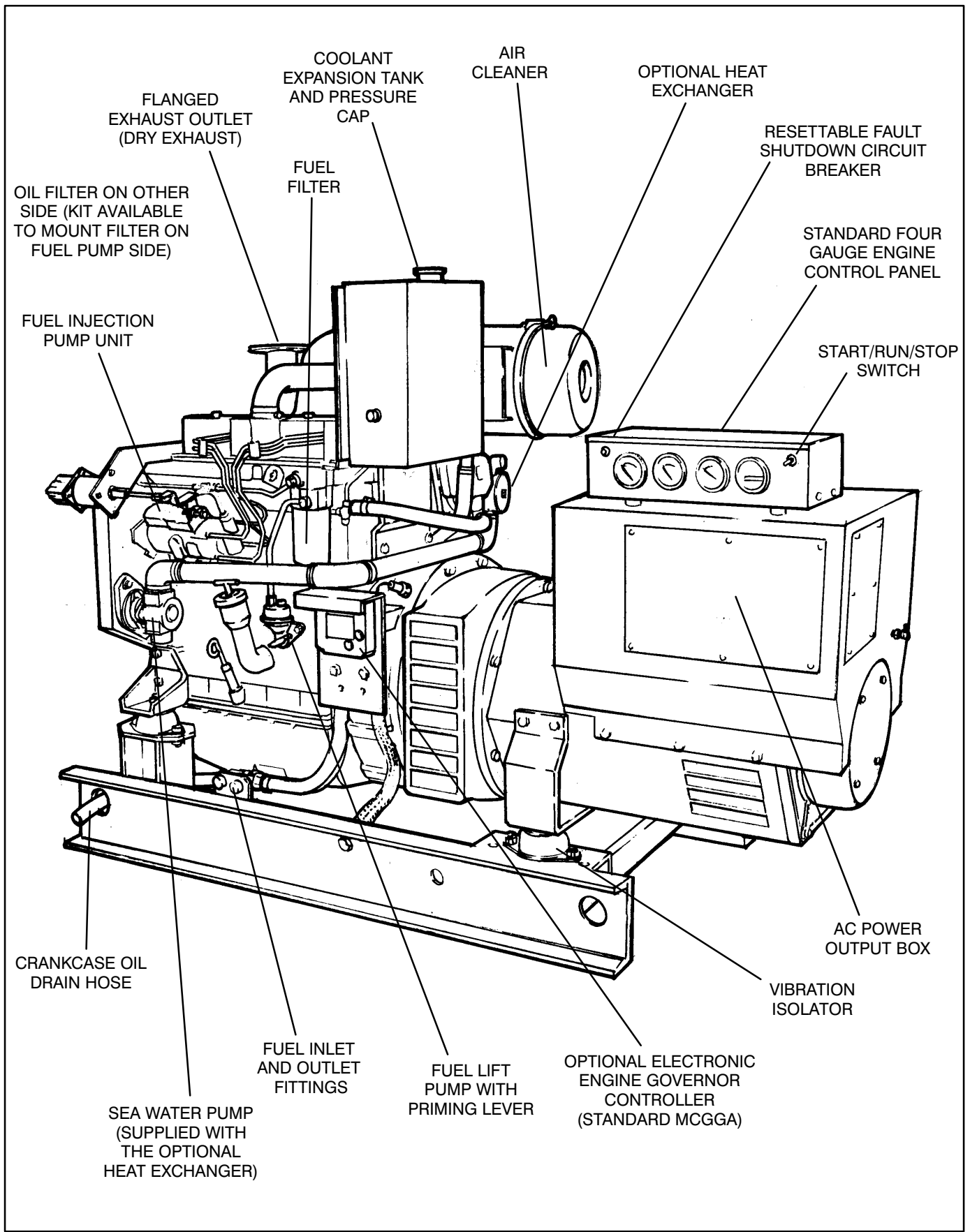


FIGURE 1-2. TYPICAL ADMIRAL GENERATOR SET (HIGH PROFILE)

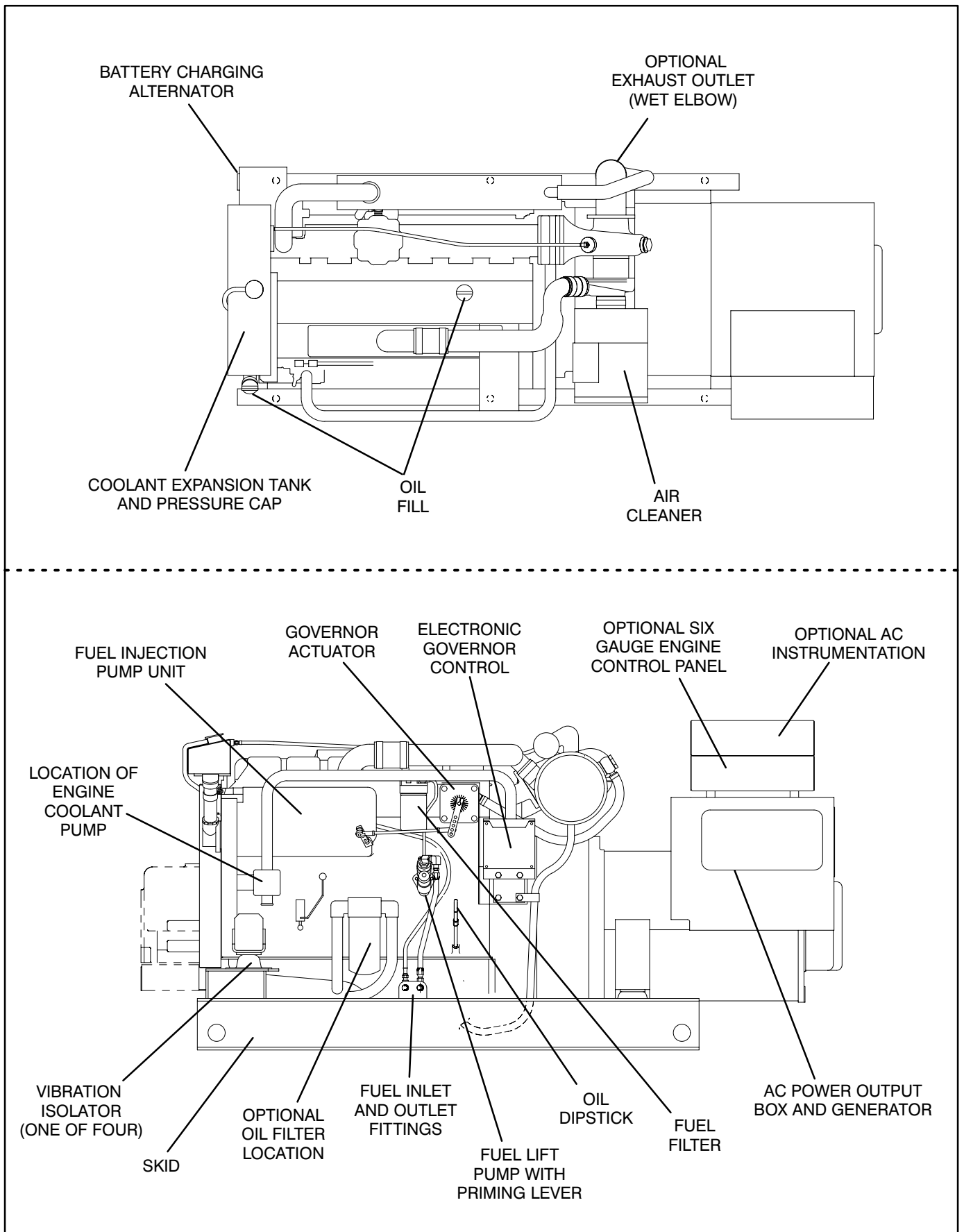


FIGURE 1-3. TYPICAL PLATIMUN GENERATOR SET (LOW PROFILE)

2. Specifications

MODEL NUMBER	MCGBA	MCGCA	MCGGA	MCGDA / MDGDA / MDGDC	MCGDB / MDGDB / MDGDD
FUEL SPECIFICATION	No. 2 Diesel	No. 2 Diesel	No. 2 Diesel	No. 2 Diesel	No. 2 Diesel
FUEL SUPPLY AND RETURN FITTINGS	1/4-18 NPTF	1/4-18 NPTF	1/4-18 NPTF	1/4-18 NPTF	1/4-18 NPTF
ENGINE OIL CAPACITY	11 qts. (11 L)	11 qts. (11 L)	11 qts. (11 L)	16 qts. (15 L)	16 qts. (15 L)
BATTERY VOLTAGE*	12 or 24	12 or 24	12 or 24	12 or 24	12 or 24
RECOMMENDED BATTERY RATING**	625	625	625	625	625
DRY EXHAUST CONNECTION***	3 inch Pipe Flange	3 inch Pipe Flange	3 inch Pipe Flange	3 inch Pipe Flange	3 inch Pipe Flange
WET EXHAUST HOSE REQUIRED	3-1/2 inch I. D.	3-1/2 inch I. D.	3-1/2 inch I. D.	3-1/2 inch I. D.	3-1/2 inch I. D.
KEEL COOLING SYSTEM					
COOLANT CAPACITY (Engine Only)	2.1 gallon (8 L)	2.1 gallon (8 L)	2.1 gallon (8 L)	3.1 gallon (12 L)	3.4 gallon (13 L)
COOLANT INLET HOSE REQUIRED	2-1/4 inch I.D.	2-1/4 inch I.D.	2-1/4 inch I.D.	2-1/4 inch I.D.	2-1/4 inch I.D.
COOLANT OUTLET HOSE REQUIRED	1-3/4 inch I.D.	1-3/4 inch I.D.	1-3/4 inch I.D.	1-3/4 inch I.D.	1-3/4 inch I.D.
HEAT EXCHANGER COOLING SYSTEM					
COOLANT CAPACITY (H. E. and ENGINE)	3.5 gallon (13 L)	3.5 gallon (13 L)	3.5 gallon (13 L)	5.4 gallon (20 L)	5.5 gallon (21 L)
SEA WATER INLET HOSE REQUIRED	1-1/4 inch I.D.	1-1/4 inch I.D.	1-1/4 inch I.D.	1-1/4 inch I.D.	1-1/4 inch I.D.
SEA WATER OUTLET HOSE REQUIRED****	1-1/4 inch I.D.	1-1/4 inch I.D.	1-1/4 inch I.D.	1-1/4 inch I.D.	1-1/4 inch I.D.
<p>* See Nameplate. ** SAE J537 cold cranking amps (CCA). *** The flange has four equally spaced 11/16 inch (17.5mm) holes on a six inch (152.4 mm) bolt hole circle. **** Not required when the set has a wet exhaust system.</p>					

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3. Operation

GENERAL

These sets are started and stopped by the manually operated **Start / Run / Stop** switch. The engine control automatically disconnects the starter when the engine starts up, and shuts down the engine when a fault condition is reached (low oil pressure, for example). The engine is equipped with either a mechanical or an electronic governor. An automatic voltage regulator regulates AC output voltage.

The engine control and speed governing systems are powered by the cranking battery. They are protected by a 30 amp cartridge fuse (**F101**) which has a twist-lock holder tied into the engine wiring harness above the flywheel housing. The set cannot start and operate without the fuse in place.

The engine control panel is mounted on top of the generator. A plug-in harness is supplied on the set control that allows connecting varying lengths of extension harnesses and remote accessory panels. A plug-in optional harness is also available for remote mounting of the set mounted panel if desired (maximum length is 20 feet (6.1 m)).

ENGINE CONTROL COMPONENTS

The following describes the function and operation of the control panel. All instruments and control switches are located on the face of the control panel as illustrated in Figures 1-1, 1-2, and 1-3. Note that the number and type of instruments contained on the control panel (standard or optional) will vary with each genset model.

Start / Run / Stop Switch (S103). The set will start up when the switch is held in the **Start** position and will continue to run when the switch is released to the **RUN** position. The starter will be automatically disconnected. The set will come to a stop when the switch is pushed to **Stop**.

Oil Pressure Gauge (M124). The oil pressure gauge indicates engine oil pressure.

Coolant Temperature Gauge (M127). The coolant temperature gauge indicates engine coolant temperature.

DC Voltmeter (M121). The DC voltmeter indicates battery charging voltage.

Running Time Meter (M119). The running time meter indicates the accumulated number of hours the set has run. It cannot be reset.

Common Fault Circuit Breaker (CB115). The common fault circuit breaker shuts down the engine when any fault shutdown sensor functions. Fault shutdown is indicated when the breaker reset button extends out past normal. Push the button to restore operation (after the engine has been properly serviced).

The fault shutdowns are:

- **Low Oil Pressure** (lower than 14 ± 2 PSI)
- **High Engine Temperature** (higher than $220 \pm 6^\circ\text{F}$).
- **High Exhaust Temperature** (higher than $190 \pm 9^\circ\text{F}$). Provided only on water cooled exhaust gensets.

Optional Oil Temperature Gauge (M129). The oil temperature gauge indicates engine oil temperature.

Optional Tachometer (M131). The tachometer indicates engine speed in RPM.

Optional Individual Fault Circuit Breakers (CB109 through CB114). An individual fault circuit breaker is provided in connection with each fault shutdown sensor to shut down the engine when the sensor functions. Each breaker is identified according to fault by marking next to it on the panel. Fault shutdown is indicated when the breaker reset button extends out past normal. Push the button to restore operation (after the engine has been properly serviced).

The fault shutdowns are:

- **Low Coolant Level**
- **Low Oil Level**
- **Overspeed.**

Fault Bypass Switch (S117). This switch is used to bypass the fault shutdown circuit to keep the set running for the sake of a critical operation. Visual and remote indications of the fault, while the set is running, are provided by the fault circuit breaker and the optional alarm relay.

⚠ CAUTION *This switch is for emergencies only—where it has been decided that the generator set must run to continue a critical operation, even though it might result in destruction of the set. Read the Warranty regarding possible exclusions when operating the set under these conditions.*

Alarm Relay (K109). The alarm relay closes a set of contacts to provide remote annunciation of a fault shutdown.

GOVERNOR

The engine is equipped with either a mechanical or an electronic governor. See *Adjustments* if output frequency needs to be adjusted.

AC METER PANEL

The optional AC meter panel is mounted on top of the engine control panel and may also be connected by a plug-in extension harness so that it can be mounted at a convenient location in the generator room. It includes the following components.

AC Voltmeter (M21). The voltmeter indicates output voltage for the phase selected.

AC Ammeter (M22). The ammeter indicates output amperage for the phase selected. Input to the ammeter is from current transformers CT21, CT22 and CT23 inside the AC power output box.

Frequency Meter (M23). The frequency meter indicates output frequency in Hertz (Hz). Note that engine RPM is 30 times Hz.

Phase Selector Switch (S21). The selector switch is used to select the phase for voltage and amperage readings.

AUTOMATIC VOLTAGE REGULATOR

The generator is equipped with an automatic voltage regulator. See *Adjustments* if AC output voltage needs to be adjusted.

PRESTART CHECKS

1. Check to see that an approved fuel / water separator has been installed upstream of the engine-mounted fuel lift pump. A fuel / water separator kit that mounts on the flywheel housing is available from your distributor (Figure 1-1).

CAUTION *Failure to provide an approved fuel/water separator and filter upstream of the engine-mounted fuel lift pump can lead to pump and injection unit failures and consequent disabling of the set.*

2. Check the **Fuel Supply**. Prime the engine fuel system, if necessary, as described in *Maintenance*.
3. Always check engine **Oil** and **Coolant** levels before starting the set. See *Maintenance*.

WARNING *To prevent severe scalding, always let the engine cool down before removing the coolant pressure cap. Turn the cap slowly, and do not open it fully until the pressure has been relieved.*

4. Make sure the **Sea Water Cock** is open when operating a heat exchanger-cooled set. Prime the sea water pump if prime has been lost. See *Maintenance*.

CAUTION *The sea water pump has a neoprene impeller that can disintegrate in a matter of seconds after the engine starts if pump prime has been lost.*

STARTING

Press the local or the pilot house control panel switch to **Start** and hold it there until the engine starts up.

CAUTION *Excessive cranking can overheat the starter motor and cause it to fail. Do not crank the engine for more than 30 seconds at a time. Wait two minutes before trying again.*

Watch the engine gauges after the engine has started up. Normal oil pressure is 35 to 60 psi at normal operating temperature. Normal charging voltage is 26 to 28 volts for 24 volt systems and 13 to 14 volts for 12 volt systems. Engine coolant temperature should be between 170°F and 210°F during operation.

STOPPING

Remove all loads from the set and let it run for five minutes to allow it to cool down before stopping. Momentarily press the control panel switch to **STOP**.

BREAK-IN

Change engine oil after the first 50 hours of operation. See *Maintenance*.

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4. Troubleshooting

The generator set has sensors that continuously monitor the engine for low oil pressure, high engine temperature and high exhaust temperature of a water cooled exhaust. If an abnormal condition occurs, the fault circuit breaker will trip and the engine shuts down. After the problem is corrected, reset the fault circuit breaker to restart the generator set.

Table 4-1 describes the operation of the fault condition system (including optional features) and lists troubleshooting procedures.

SAFETY CONSIDERATIONS

High voltages are present within the control box and generator output box when the generator is running. Do not open the control box or generator output box while the set is running.

⚠WARNING *Contacting high voltage components can cause severe personal injury or death. Keep control and output box covers in place during troubleshooting.*

Generator set installations are normally designed for remote starting. When troubleshooting a set that is shut down, make certain the generator set cannot be accidentally restarted. To prevent accidental

starting, always remove the negative battery cable from the set starting battery.

⚠CAUTION *Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits of the set.*

⚠WARNING *Accidental starting of the generator set while working on it can cause severe personal injury or death. Prevent accidental starting by disconnecting the starting battery cables (negative [-] first).*

Arcing can ignite the explosive hydrogen gas given off by batteries, causing severe personal injury. Arcing can occur if the negative (-) battery cable is connected and a tool being used to connect or disconnect the positive (+) battery cable accidentally touches the frame or other grounded metal part of the set. To prevent arcing, always remove the negative (-) cable first, and reconnect it last.

When a fault condition occurs during operation, follow the procedures in Table 4-1 to locate and correct the problem. For any symptom not listed, contact an authorized service center for assistance.

TABLE 4-1. TROUBLESHOOTING

⚠WARNING Many troubleshooting procedures present hazards that can result in severe personal injury or death. Only qualified service personnel with knowledge of fuels, electricity, and machinery hazards should perform service procedures. Review safety precautions on pages ii and iii.

SYMPTOMS	CHECKS AND CORRECTIVE MEASURES
1. The engine does not crank.	1a. Service the battery and battery terminals and cables. See <i>Maintenance</i> . b. Replace the control circuit fuse (above the flywheel housing in a twist-lock holder) if it has blown.
2. The engine cranks, but does not start.	2a. Check the fuel supply. b. If a fault circuit breaker has tripped, service the fault, and reset the circuit breaker. c. Service the battery if the engine cranks too slowly to start, refill with engine oil of suitable viscosity and plug in or service the engine coolant heater, if provided. Install an engine coolant heater if necessary. See <i>Maintenance</i> .
3. The engine coolant temperature gauge indicates 220° F or more while the engine is running.	3a. Shut down the set if possible. See <i>Maintenance</i> for servicing the cooling system. b. Disconnect as many non-critical loads as possible so that the engine will run cooler, and service as soon as possible.
4. The engine shuts down due to high engine temperature or low coolant level.	4a. Fill coolant, if necessary, after the engine has cooled down, and fix any leaks. b. See <i>Maintenance</i> for servicing the cooling system. c. Reset the tripped fault circuit breaker.
5. The engine shuts down due to high exhaust temperature.	5a. Clean out the sea water strainer and make sure the sea water cock is fully open. b. Call your distributor to service the water cooled exhaust system. c. Reset the tripped fault circuit breaker.
6. The engine oil pressure gauge indicates less than 20 psi.	6a. Shut down the set if possible. Fill oil, if necessary. b. Disconnect as many non-critical loads as possible so that the engine will run cooler, and service as soon as possible.
7. The engine shuts down due to low oil pressure or low oil level.	7a. Fill oil, if necessary. See <i>Maintenance</i> . b. Call your distributor to service the engine lubrication system. c. Reset the tripped fault circuit breaker.
8. The engine shuts down due to overspeed.	8a. Check the governor-throttle linkage. See <i>Adjustments</i> . b. Reset the tripped fault circuit breaker.
9. There is no output because the line circuit breaker (if provided) or the field circuit breaker has tripped.	9a. Determine the cause (overload or short circuit) and clear the fault. b. Reset the line circuit breaker. c. Reset the field circuit breaker.

5. Maintenance

Maintenance must be performed periodically. Table 5-1 is a recommended schedule. Perform the specified maintenance when the time interval has elapsed or running time has accumulated, whichever occurs first. Running time is recorded by a meter on the control panel.

Keep an accurate log of maintenance to support warranty claims. See *Introduction* for contacting help when service or repair has to be performed.

GENERAL INSPECTION

Always be alert when the set is running for problems that could lead to equipment damage or personal injury. If it is necessary to perform maintenance or service, always disconnect the starting battery cables (negative [-] cable first) to prevent accidental starting while working on the set.

⚠ CAUTION *Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits of the set.*

⚠ WARNING *Accidental starting of the generator set while working on it can cause severe personal injury or death. Prevent accidental starting by disconnecting the starting battery cables (negative [-] first).*

Make certain battery area has been well-ventilated before servicing battery. Arcing can ignite explosive hydrogen gas given off by batteries, causing severe personal injury. Arcing can occur when cable is removed or re-attached, or when negative (-) battery cable is connected and a tool used to connect or disconnect positive (+) battery cable touches frame or other grounded metal part of the set. Always remove negative (-) cable first, and reconnect it last. Make certain hydrogen from battery, engine fuel, and other explosive fumes are fully dissipated. This is especially important if battery has been connected to battery charger.

Check the following daily. If the set is equipped with a sound shield, unlatch the appropriate access panel, swing it towards you and lift it out from the bottom catches.

Engine Oil and Coolant Levels

Maintain engine oil and coolant at the prescribed levels. Always check before starting the set. See Engine Lubrication and Engine Cooling in this section.

Control Panel

Check the control panel engine gauges and AC meters (if provided) for indications of abnormal operation. Also, be alert for unusual noises, vibrations, smells and other indications that something may be going wrong.

Exhaust System

Look and listen for exhaust leaks, especially at joints in the system. Make sure the exhaust pipe or muffler is not overheating surrounding materials. Replace exhaust hose (wet exhaust systems) if it appears damaged from heat.

⚠ WARNING *Exhaust gas is deadly. All exhaust leaks must be fixed before running the set.*

Fuel System

Check the supply tank, fuel lines, fittings, shutoff valves and filters for leaks before and while running the set. Check flexible fuel lines for cuts, cracks and abrasions.

⚠ WARNING *Diesel fuel is highly combustible. Even a small leak can lead to an uncontrollable fire aboard the vessel. Fix fuel leaks immediately.*

Battery Terminals and Cables

Check for loose or corroded cable connectors and broken cable strands.

TABLE 5-1. MAINTENANCE SCHEDULE

HOURS OF OPERATION	MAINTENANCE TASK
One Day or 8 Hours of Running	<ul style="list-style-type: none">• Check the engine oil level.• Check the engine coolant level.• Drain water from the fuel filter.• Check for abnormal operation (noise, vibration, overheating, etc.) and for oil, fuel, coolant and exhaust leaks.
One Month or 100 Hours of Running	<ul style="list-style-type: none">• Check the battery fluid level and specific gravity.
Three Months or 250 Hours of Running	<ul style="list-style-type: none">• Change the engine oil and oil filter.• Check the heat exchanger corrosion protection (drain) plug (if provided).
Six Months or 500 Hours of Running	<ul style="list-style-type: none">• Check the anti-freeze concentration.• Change the air cleaner element (Admiral).• Clean the air filter elements (Platinum)• Change the fuel filters.
1000 Hours of Running	<ul style="list-style-type: none">• Replace the injectors (Platinum).**
One year or 1000 Hours of Running	<ul style="list-style-type: none">• Adjust the engine valve clearances.*• Check the engine accessory drive belt and pulleys.*
Two Years or 2000 Hours of Running	<ul style="list-style-type: none">• Change the engine coolant.

*. See the engine Operation Manual.

** . Have the Cummins service center perform.

EXHAUST SAFETY GUIDELINES AND CHECKLIST

Engine-driven generators can produce harmful levels of CO, causing injury or death. Reduce this hazard by having your generator checked on a routine basis for rusting, corrosion, damage caused by fatigue and vibration, and normal wearing out of parts.

Areas to inspect include:

- Water injection elbow
- Exhaust manifold
- Pipe nipple between water injection elbow and exhaust manifold
- Cylinder head gasket
- Exhaust pipe
- All clamps
- All exhaust hoses
- All fittings

- Shock mounts: worn mounts can cause fittings, clamps, screws and bolts to work loose.

What to look for includes:

- Exhaust leaks
- Cracks in hoses, pipes, components
- Black streaking: this can mean loose parts are allowing exhaust to escape
- Corrosion in hoses, pipes, components
- Corroded pipe nipple on exhaust elbow: move the elbow to check for looseness
- Change in exhaust sound
- Change in exhaust smell in engine room or boat interior (carbon monoxide is odorless, but may be mixed with other exhaust gases)

Check especially for pitting, pin holes, and cracks or loose rust at ends of pipe nipple and thread roots.

Figures 1-1, 1-2 and 1-3 illustrate these areas.

ENGINE LUBRICATION

Engine Oil Level

Wait at least 10 minutes to check the oil level if the engine has been running so that the oil can drain back into the crankcase. Keep the oil level just below the high level mark on the dipstick.

⚠ CAUTION *Running the engine when the oil level is low can lead to shutdown because of loss of oil pressure and to degradation of the oil because of high oil temperature. Overfilling can lead to foaming, which also degrades engine oil.*

Engine Oil Specifications

Use API (American Petroleum Institute) Class CC/CD engine oil. The oil should not contain more than 1.85 percent (by weight) of sulfated ash. Do not mix different classes or brands of oil since they can react chemically to form products harmful to the engine.

Temperature affects oil viscosity. Multi-grade oils are designed for ease of starting in cold weather as well as good lubrication at high operating temperatures. SAE (Society of Automotive Engineers) mul-

ti-grade 15W40 or 20W40 engine oil is recommended for temperatures down to 14°F (-10°C), and 10W30 engine oil for temperatures below that. See your distributor regarding oil for Arctic conditions.

Engine Oil and Filter Change

Change the engine oil and filter in accordance with the Maintenance Schedule in this section. Proceed as follows:

5. Run the engine until it is up to operating temperature and shut it off.
6. Open the oil drain valve and drain the oil into a suitable container.
7. Remove the oil filter with a filter wrench.
8. Fill the new filter with oil and apply a film of oil to the gasket. Screw the filter on by hand until the gasket just touches the filter head. Tighten the filter another 3/4 turn.
9. Close the oil drain valve and fill with oil to the high mark (H) on the dipstick.
10. Start the engine and check for leaks.
11. Shut off the engine and wait for 10 minutes. Refill with oil to the high mark (H), if necessary.

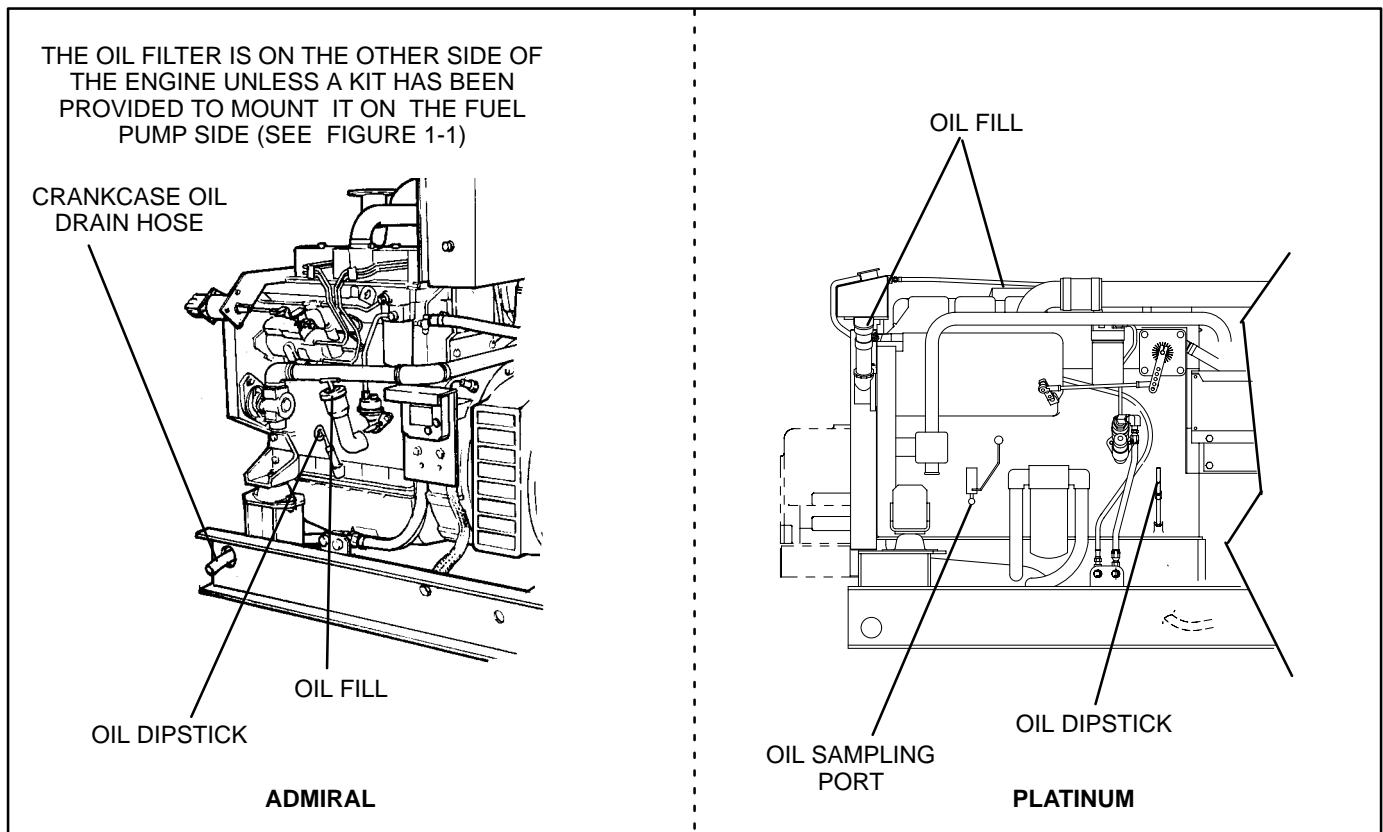


FIGURE 5-3. OIL DIPSTICK, FILL, DRAIN AND FILTER

ENGINE COOLING

Filling Coolant

It is recommended that the engine-heat exchanger or engine-keel cooler system be filled with a 50-50 mixture of fresh water and ethylene glycol anti-freeze. Proceed as follows.

1. If the set is heat exchanger cooled, prime the sea water pump by disconnecting the pump outlet hose and pouring water into the pump outlet (Figure 5-4). Reconnect the hose and open the sea cock.

⚠ CAUTION *The sea water pump has a neoprene impeller that can disintegrate in a matter of seconds after the engine starts if pump prime has been lost.*

2. Fill coolant until the expansion tank is approximately half full. Bleed air from any air vents in the system while filling coolant.
3. Run the engine while watching the coolant level in the expansion tank. (The level will drop as remaining air in the system escapes). Add coolant as necessary so that the expansion tank is full when the engine reaches normal operating temperature. Secure the pressure cap.

⚠ WARNING *To prevent severe scalding, always let the engine cool down before removing the coolant pressure cap. Turn the cap slowly, and do not open it fully until the pressure has been relieved.*

Changing Coolant

Change the coolant in accordance with the Maintenance Schedule in this section. Follow the instructions in the engine Operation Manual for cleaning the system.

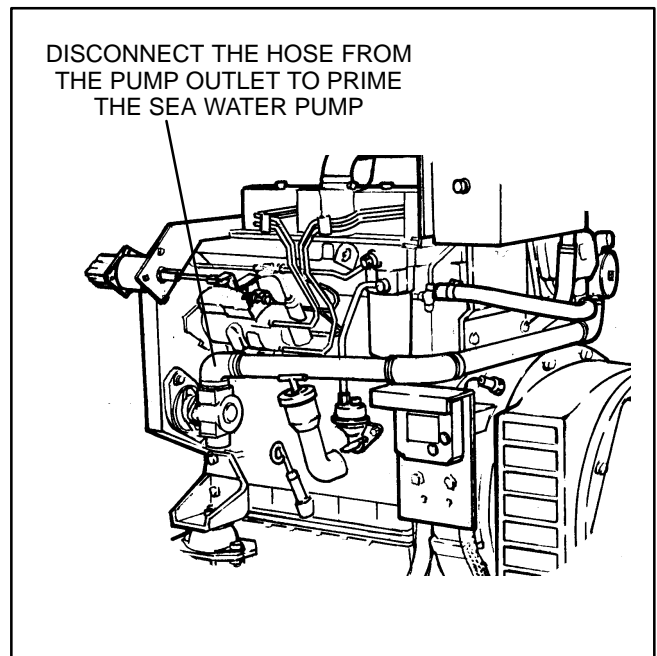


FIGURE 5-4. PRIMING THE SEA WATER PUMP

Heat Exchanger

Heat exchanger cooled engines are equipped with a shell-and-tube heat exchanger that segregates the sea water and coolant (Figure 5-5). Coolant flows inside the shell, around the tubes. Sea water flows through one pass of tubes and returns by the other.

Remove the end cap and drain plug to clean the sea water side of the heat exchanger. Follow the instructions in the engine Operation Manual for clean-

ing the heat exchanger. Take the heat exchanger to a radiator shop if it is badly fouled. Also, if the sea water pump impeller disintegrates (as a result of dry operation), remove the end cap of the heat exchanger to remove impeller debris.

The heat exchanger drain plug contains a zinc anode that provides corrosion protection. Replace the drain plug if the zinc anode is more than half consumed. When new, the zinc anode dimensions are 2 inches long x 5/8 inch wide (25.4L x 15.9D mm) See the Maintenance Schedule in this section.

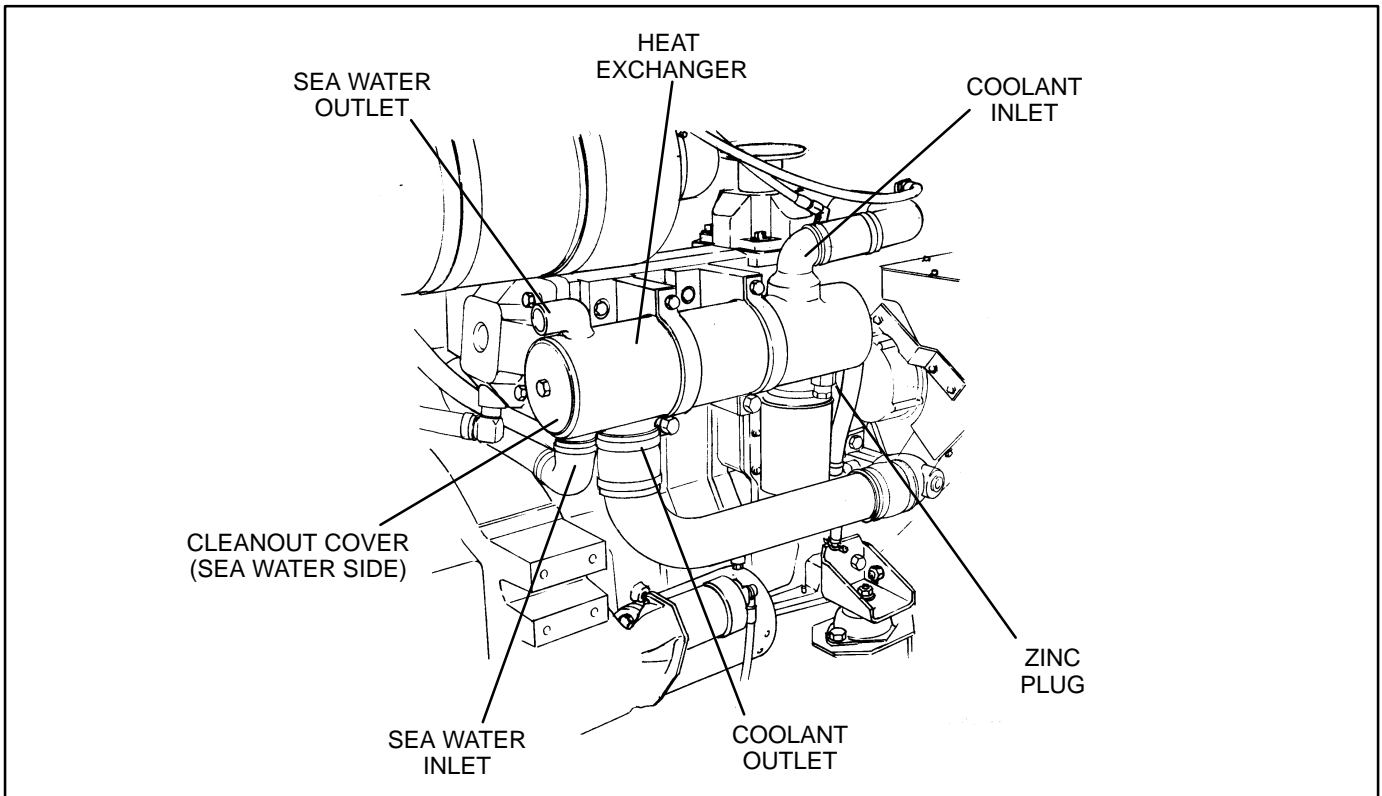


FIGURE 5-5. HEAT EXCHANGER

FUEL

The engine runs on No.2 diesel fuel. See the engine Operation Manual for specifications for other acceptable fuels.

⚠WARNING *Diesel fuel is highly combustible. Do not smoke near fuel tanks and fuel lines. Keep flames and other ignition sources well away from fuel.*

Fuel Filters

Change the fuel filters and drain water in accordance with the Maintenance Schedule in this section. When replacing filters, fill them with fuel and apply a film of fuel to the gasket. Screw the filter on

by hand until the gasket just touches the filter head. Tighten the filter another 3/4 turn. See Figure 5-6.

Bleeding System Air

If it is necessary to bleed the fuel system of air (because of running out of fuel, changing filters, loose connections, etc.) loosen the fuel line fitting at the filter head and pump the priming lever on the fuel lift pump until fuel starts flowing from the fitting and is free of air.

The fuel injection system is self venting and will probably not need to be bled. See the engine Operation Manual if it is necessary to bleed the fuel injection system.

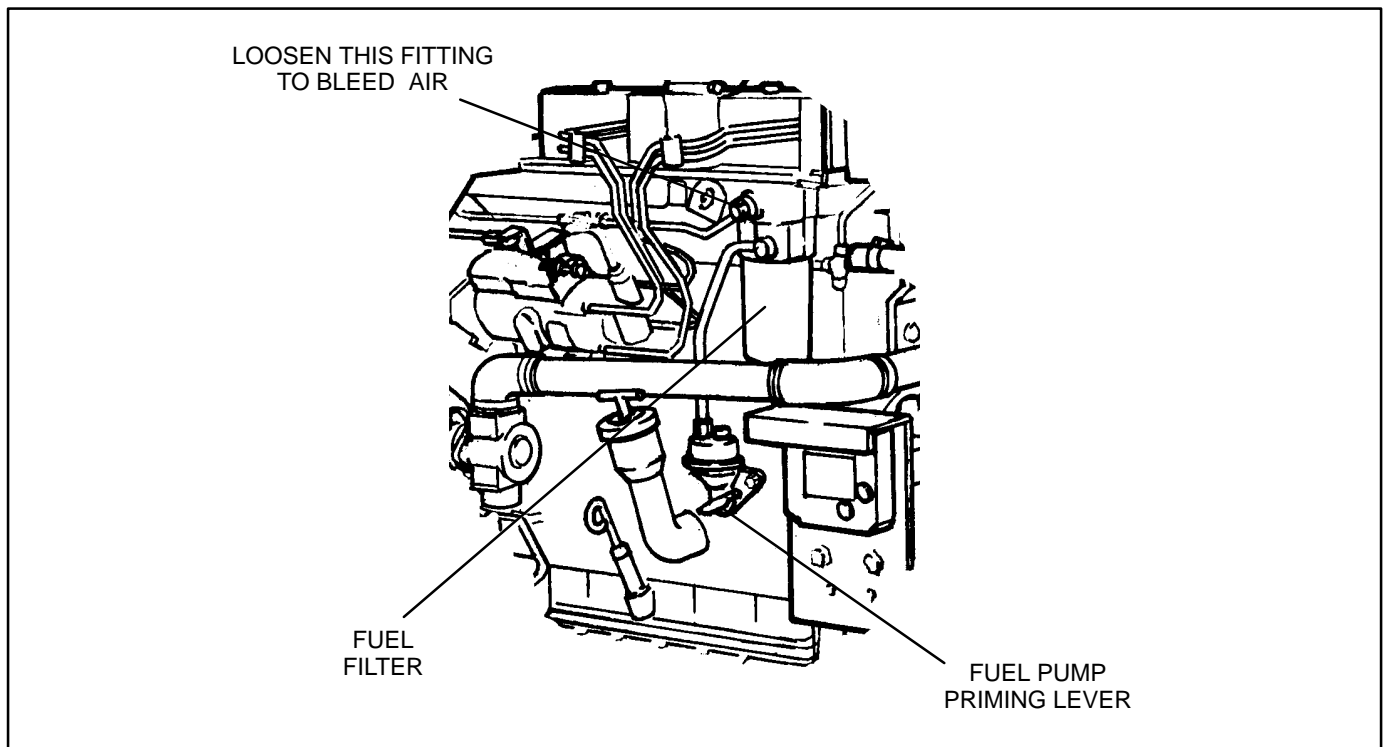


FIGURE 5-6. BLEEDING THE FUEL SUPPLY LINE AND FILTERS

AIR FILTER (ADMIRAL)

Change the disposable air filter element in accordance with the Maintenance Schedule. The filter element is accessible by removing the end cover (Figure 5-7).

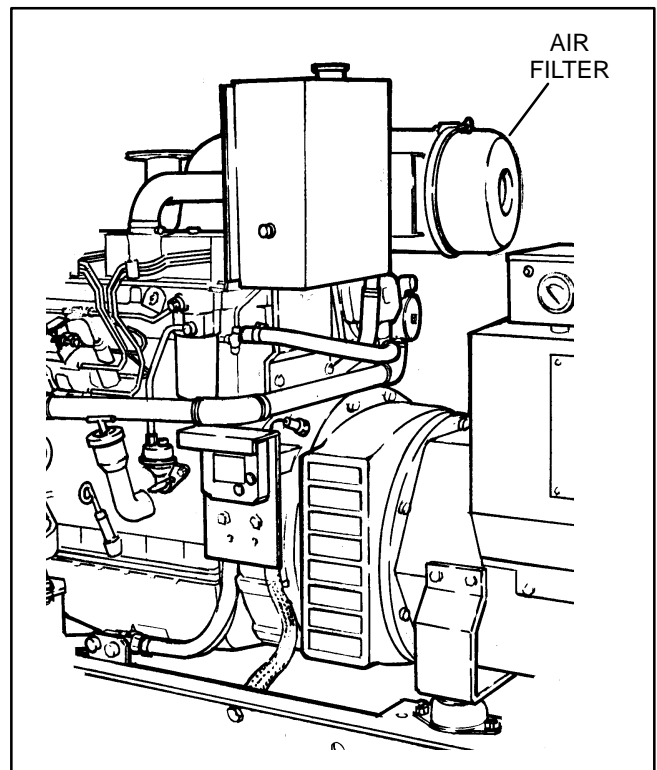


FIGURE 5-7. AIR FILTER (ADMIRAL)

AIR FILTERS (PLATINUM)

Clean both air filters at the interval indicated in the maintenance schedule. Replace the air filters after they have been cleaned three times.

Loosen the hose clamp to remove the smaller filter and the three retaining springs for the larger filter. Cover the inlet openings to prevent the entrance of dirt or debris.

Keep spare filters for use while the other filters are drying. Clean the air filters as follows:

1. Run low pressure water, warm or cold, from inside to outside. (Water should flow opposite the normal airflow direction.) Detergent can be used to clean the filter as long as the filter is thoroughly rinsed with clean water.
2. Always allow the air filter to dry before use. Do not use compressed air to dry a wet filter or damage to the filter could result.

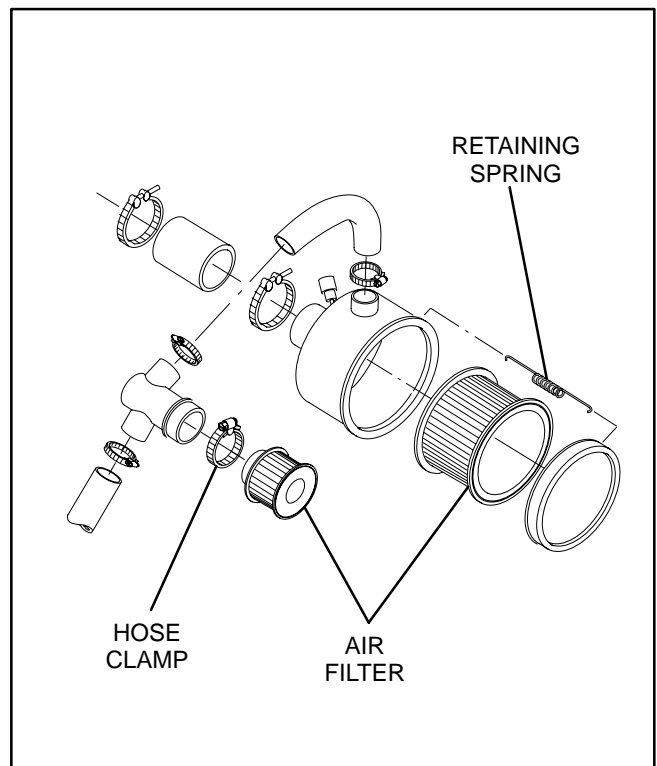


FIGURE 5-8. AIR FILTER (PLATINUM)

BATTERIES

Check the condition of the starting batteries in accordance with the Maintenance Schedule. Add distilled water as necessary and check the specific gravity. Recharge the batteries if the specific gravity is less than 1.260 (Figure 5-8). Clean and tighten the battery terminals and cable connectors and coat with Vaseline to retard corrosion.

⚠WARNING *Battery gases are explosive and can cause severe personal injury if ignited. Do not smoke near batteries. Wear protective goggles, rubber gloves and an apron.*

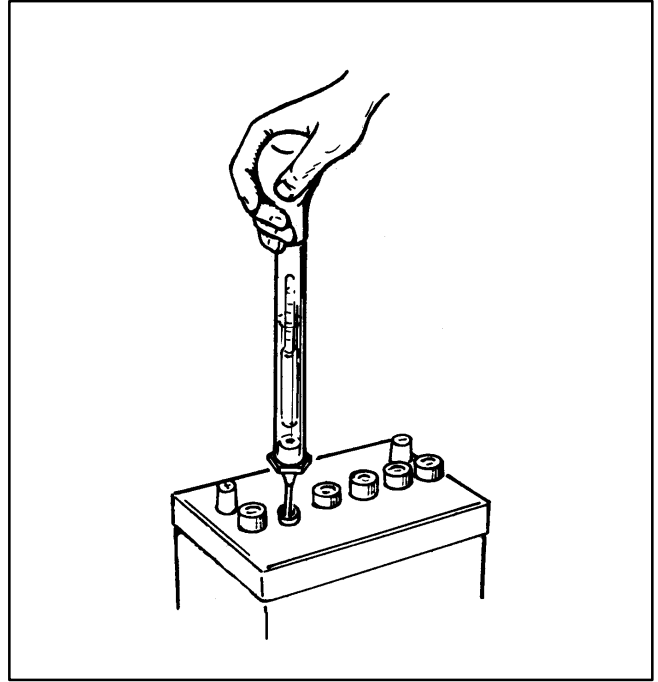


FIGURE 5-8. CHECKING BATTERY SPECIFIC GRAVITY

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6. Adjustments

OUTPUT VOLTAGE ADJUSTMENT

Output voltage can be adjusted plus or minus five percent of nominal voltage by the adjustment screw

on the back of the power supply outlet box (Figure 6-1). Call your distributor if the required voltage cannot be obtained by this adjustment.

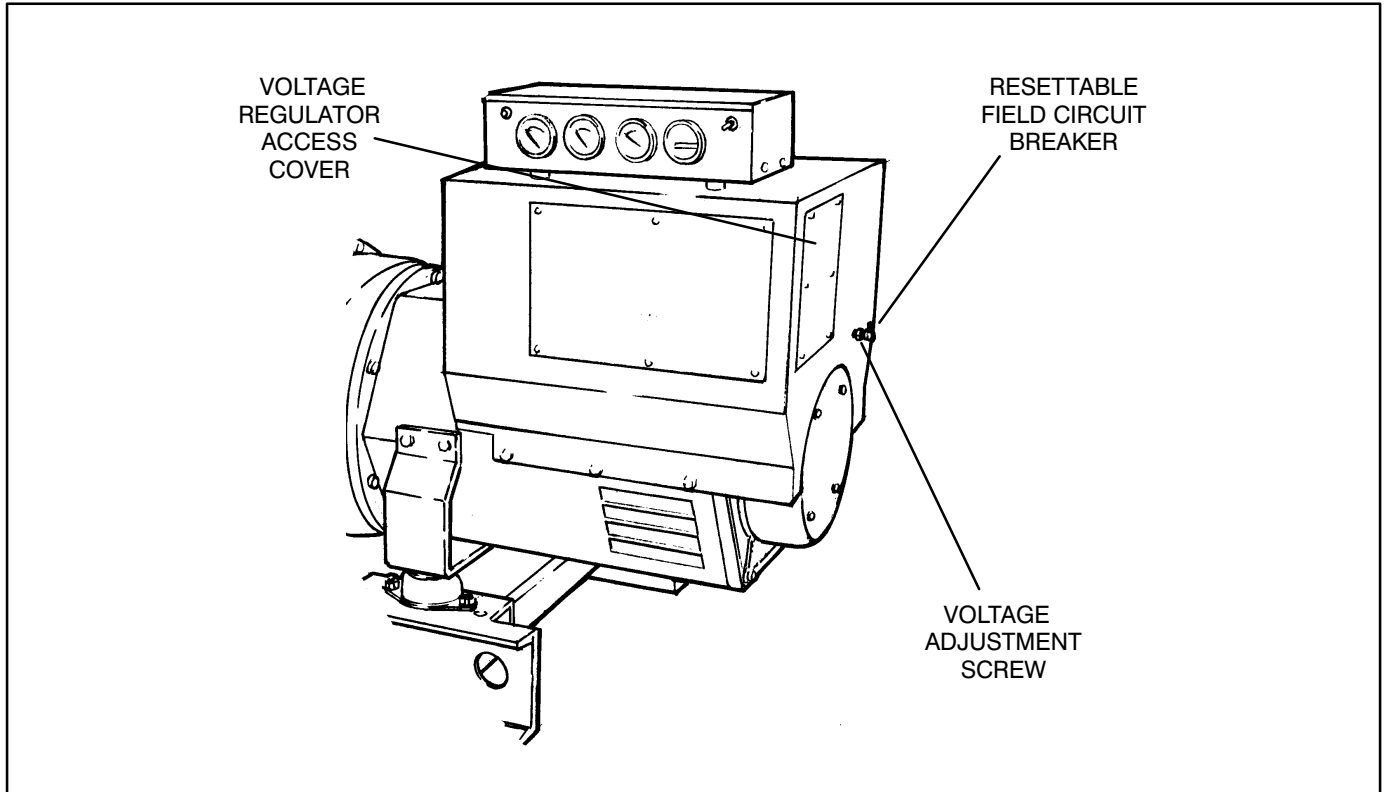


FIGURE 6-1. OUTPUT VOLTAGE ADJUSTMENT

ELECTRONIC GOVERNOR (TYPE 1)

Adjust the governor controller as follows:

1. Push both selector switches (**S1**, **S2**) on the controller to their **OFF** positions.
2. Note that the pots (potentiometers) on the controller are adjustable from zero to 100 percent and are marked off in divisions of ten percent. The speed pot has a 20-turn adjustment range. Set the pots initially as follows:

Gain 20%

I 20%

D 30%

Drop 0%

3. If a remote speed pot is used, set it at its midpoint.
4. Start the set and adjust the **Speed** pot to obtain the required output frequency: 60 Hertz (1800 RPM) or 50 Hertz (1500 RPM). Warm up the set under load until it is up to normal operating temperature.

5. Disconnect the load and turn the **GAIN** pot to 100 percent or until operation becomes unstable. Then turn the pot counterclockwise until operation again becomes stable.
6. Adjust **D** as in Step 5.
7. Adjust **I** as in Step 5.
8. Readjust **Speed** if necessary.
9. Manually push the throttle to the minimum speed position and hold it there until the engine reaches minimum speed. Release the throttle and observe speed overshoot. Two to five Hertz overshoot may be acceptable. If overshoot is unacceptable, turn the **I** pot clockwise (slightly) to reduce overshoot. If the set hunts during steady state operation, turn the **I** pot counterclockwise (slightly) until the set is stable.

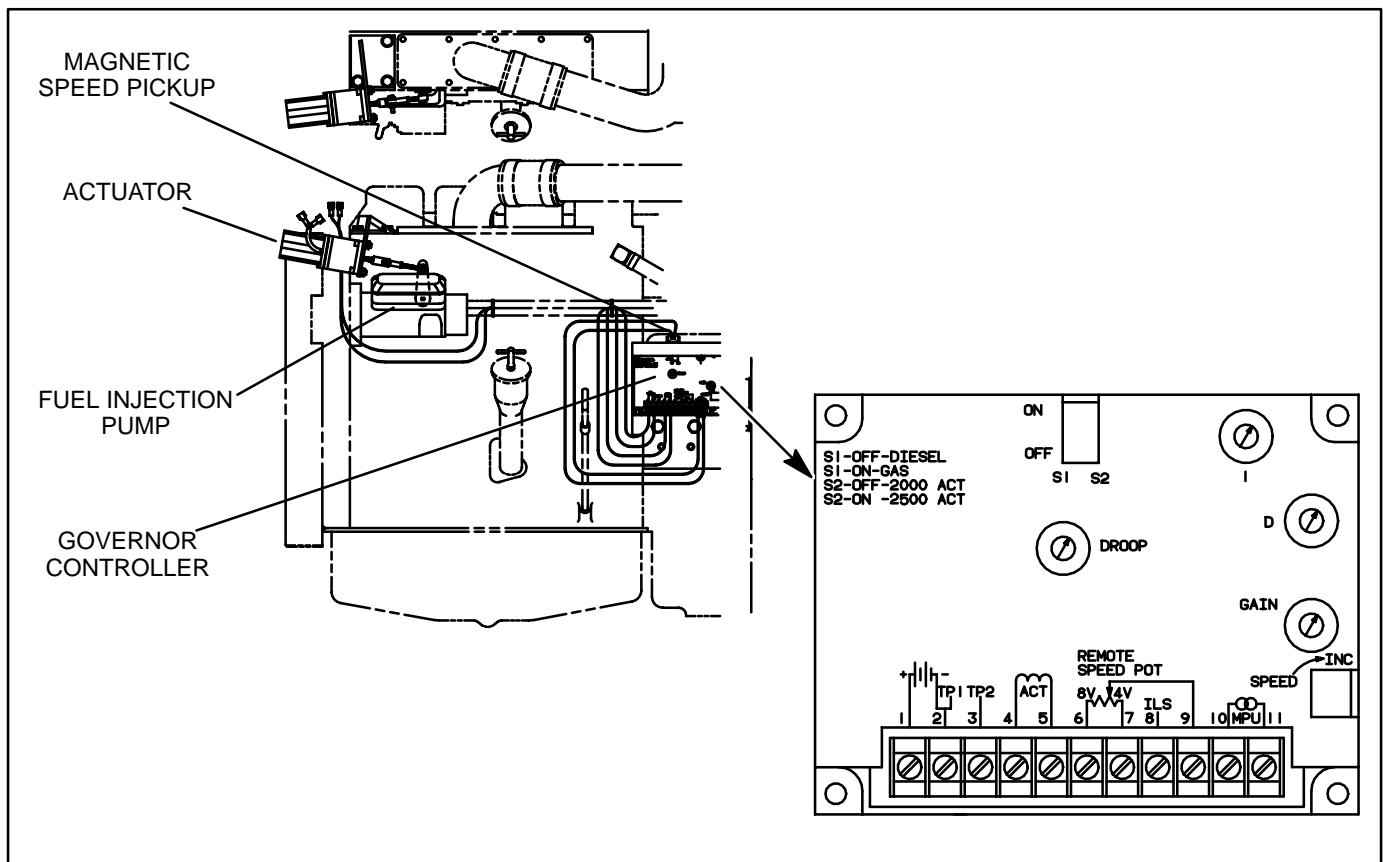


FIGURE 6-3. ELECTRIC GOVERNOR CONTROLLER

ELECTRONIC GOVERNOR (TYPE 2)

Adjust the governor controller as follows:

1. Turn the **Start Fuel Limit** pot fully clockwise. This pot requires no further adjustment and must remain in this position for proper genset operation.
2. Set the pots initially as follows:
 - Gain** mid-position
 - Stability** mid-position
 - Rated Speed** fully counterclockwise
3. If a remote speed pot is used, set to fully counterclockwise position.
4. Start the set and adjust the **Rated Speed** pot to obtain the required output frequency: 60 Hertz (1800 RPM) or 50 Hertz (1500 RPM). Warm up the set under load until it is up to normal operating temperature.
5. Disconnect the load and turn the **Gain** pot fully clockwise or until operation becomes unstable. Then turn the pot counterclockwise until operation again becomes stable.
6. Adjust **Stability** as in Step 5.
7. Readjust **Rated Speed** if necessary.
8. Manually push the throttle to the minimum speed position and hold it there until the engine reaches minimum speed. Release the throttle and observe speed overshoot. Two to five Hertz overshoot may be acceptable. If overshoot is unacceptable, turn the **Gain** pot clockwise (slightly) to reduce overshoot. If the set oscillates during steady state operation, turn the **Stability** pot counterclockwise (slightly) until the set is stable.

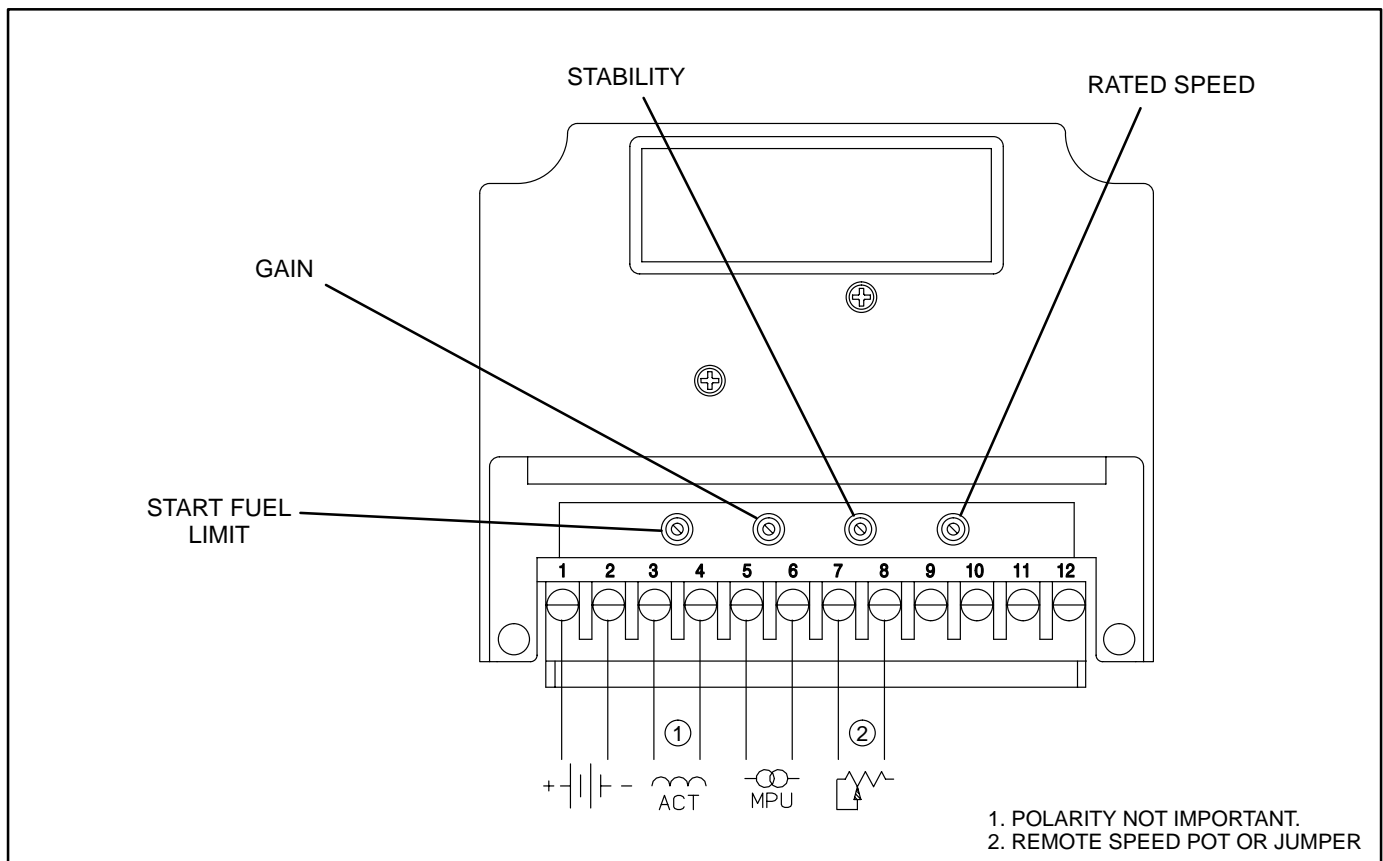


FIGURE 6-4. ELECTRIC GOVERNOR CONTROLLER



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