Onan

Installation Manual

DV

GenSets

982-0601
5-85
Printed in U.S.A.

Safety Precautions

The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

Read your manual and become thoroughly acquainted with it and your equipment before you start your unit. These recommendations and the following safety precautions are for your protection.

Fuels, electrical equipment, batteries, exhaust gases and moving parts present potential hazards that could result in serious, personal injury. Take care in following these recommended procedures.

⚠ DANGER ***This symbol if used 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.***

General

- Keep your electric generating set and the surrounding area clean and free from obstructions. Remove any debris from set and keep the floor clean and dry.
- Provide appropriate fire extinguishers and install them in convenient locations. Consult your local fire department for the correct type of extinguisher to use. Do not use foam on electrical fires. Use extinguisher rated ABC by NFPA.
- Make sure that all fasteners on the generating set are secure. Tighten supports and clamps, keep guards in position over fans, driving belts, etc.
- Do not wear loose clothing in the vicinity of moving parts, or jewelry while working on electrical equipment. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts; cause shock or burning.
- If adjustment *must* be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.
- Do not work on this equipment when mentally or physically fatigued.
- Coolants under pressure have a higher boiling point than water. DO NOT open a radiator or heat exchanger pressure cap while the engine is running. Bleed the system pressure first.

Protect Against Moving Parts

- Keep your hands away from moving parts.
- Before starting work on the generating set, disconnect batteries. This will prevent starting the set accidentally.

Fuel System

- DO NOT fill fuel tanks while engine is running, unless tanks are outside engine compartment. Fuel contact with hot engine or exhaust is a potential fire hazard.
- DO NOT SMOKE OR USE AN OPEN FLAME in the vicinity of the generator set or fuel tank. Internal combustion engine fuels are highly flammable.
- Fuel lines must be adequately secured and free from leaks. Piping at the engine should be approved flexible line. Do not use copper piping on flexible lines as copper will work harden and become brittle.
- Be sure all fuel supplies have a positive shutoff valve.

Guard Against Electric Shock

- Remove electric power before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling electrical equipment.
- Use extreme caution when working on electrical components. High voltages cause injury or death. DON'T tamper with interlocks.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches.
- DO NOT SMOKE while servicing batteries. Lead acid batteries emit a highly explosive hydrogen gas that can be ignited by electrical arcing or by smoking.

Exhaust Gases Are Toxic

- Provide an adequate exhaust system to properly expel discharged gases. Inspect exhaust system daily for leaks per the maintenance schedule. Ensure that exhaust manifolds are secure and not warped. Do not use exhaust gases to heat a compartment.
- Be sure the unit is well ventilated.

Keep the Unit and Surrounding Area Clean

- Make sure that oily rags are not left on or near the engine.
- Remove all oil deposits. Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and subsequent engine damage and may present a potential fire hazard.

Onan

Supplement 982-1000

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Use the following instructions in addition to those found in the installation manual. On Page 2 of the installation manual where mounting the generator set is described, note the following correction.

The Onan DVF and DVG series generator sets do not include vibration isolators as an integral part of the unit. However, for mounting these generators sets, vibration isolators are required between the skid base and mounting surface. Onan has vibration isolators available for these generator sets. Contact your Onan distributor for details.

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⚠WARNING

ONAN RECOMMENDS THAT ALL SERVICE INCLUDING INSTALLATION OF REPLACEMENT PARTS BE DONE ONLY BY PERSONS QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE. FROM THE STANDPOINT OF POSSIBLE INJURY AND/OR EQUIPMENT DAMAGE IT IS IMPERATIVE THAT THE SERVICE PERSON BE QUALIFIED.

Installation

GENERAL

Most generator set installations must be engineered to insure that the generator set will function properly under the expected load conditions. Use these instructions as a general guide only. Follow the instructions of the consulting engineer when locating or installing any components. The complete installation must comply with all local and state building codes, fire ordinances and other regulations that may apply.

Requirements to be considered prior to installation:

- Level mounting surface.
- Adequate cooling air.
- Adequate fresh induction air.
- Discharge of circulated air.
- Discharge of exhaust gases.
- Electrical connections.
- Fuel installation.
- Accessibility for operation and servicing.
- Noise levels.

LOCATION AND MOUNTING

Generator set location is decided mainly by related systems such as ventilation, wiring, fuel, and exhaust. Provide a location away from extreme ambient temperatures and protect the generator set from adverse weather conditions. Locate as near as possible to the main power fuse box. See Figure 1.

Plan for access to the generator set for servicing and provide adequate lighting around the unit. Wood floors should be covered with sheet metal extending 12 inches (305 mm) beyond the extremities of the set.

Mount the generator set on a substantial and level base such as a concrete pad. For convenience in general servicing such as changing the crankcase oil, the surface of the mounting base should be at least 6 inches (152 mm) above the floor.

Generator sets are mounted on a steel skid which provides proper support. The engine-generator assembly is isolated from the skid frame by rubber mounts which provide adequate vibration isolation for normal installations.

Use anchored mounting bolts to secure the generator set skid to the floor to prevent movement. Refer to set outline drawing for proper spacing of mounting bolts and set mounting dimensions.

VENTILATION

Generator sets create considerable heat which must be removed by proper ventilation. Outdoor installations rely on natural air circulation but indoor installations need properly sized and positioned vents for the required airflow.

Vents and Ducts

For indoor installations, locate vents so incoming air passes through the immediate area of the installation before exhausting. Install the air outlet higher than the air inlet to allow for convection air movement. See Figure 1.

Size the vents and ducts so they are large enough to allow the required flow rate of air. "Free area" of louvers, screens and ducts must be as large as the radiator area (when radiator is used). The inlet air vent should be 1-1/2 times the size of the radiator outlet vent.

Cooling air travels from the generator end to the engine end on Onan generator sets.

Wind will restrict free airflow if it blows directly into the air outlet vent. Consider prevailing wind directions when planning vent locations.

Dampers

Dampers can be used in any system to block the airflow through the vents when the generator set is not running. This is sometimes necessary in cold climates to keep the generator enclosure at a normal temperature. Refer to Onan Technical Bulletin T-030 for more detailed information.

Radiator Set Ventilation Requirements

Radiator set cooling air is drawn past the rear of the set by a fan which blows air through the radiator. Locate the air inlet to the rear of set and near the floor. Make the inlet vent opening 1-1/2 times larger than the radiator.

Locate the cooling air outlet directly in front of the radiator and as close as possible. The effective opening area should be 1.3 times as large as the radiator area. Length and shape of the air outlet duct should offer minimum restriction to airflow. Use a duct of canvas or sheet metal between the radiator and the air outlet opening to prevent recirculation of heated air. The radiator has an air discharge duct adapter flange. Remove the radiator core guard prior to installing the duct.

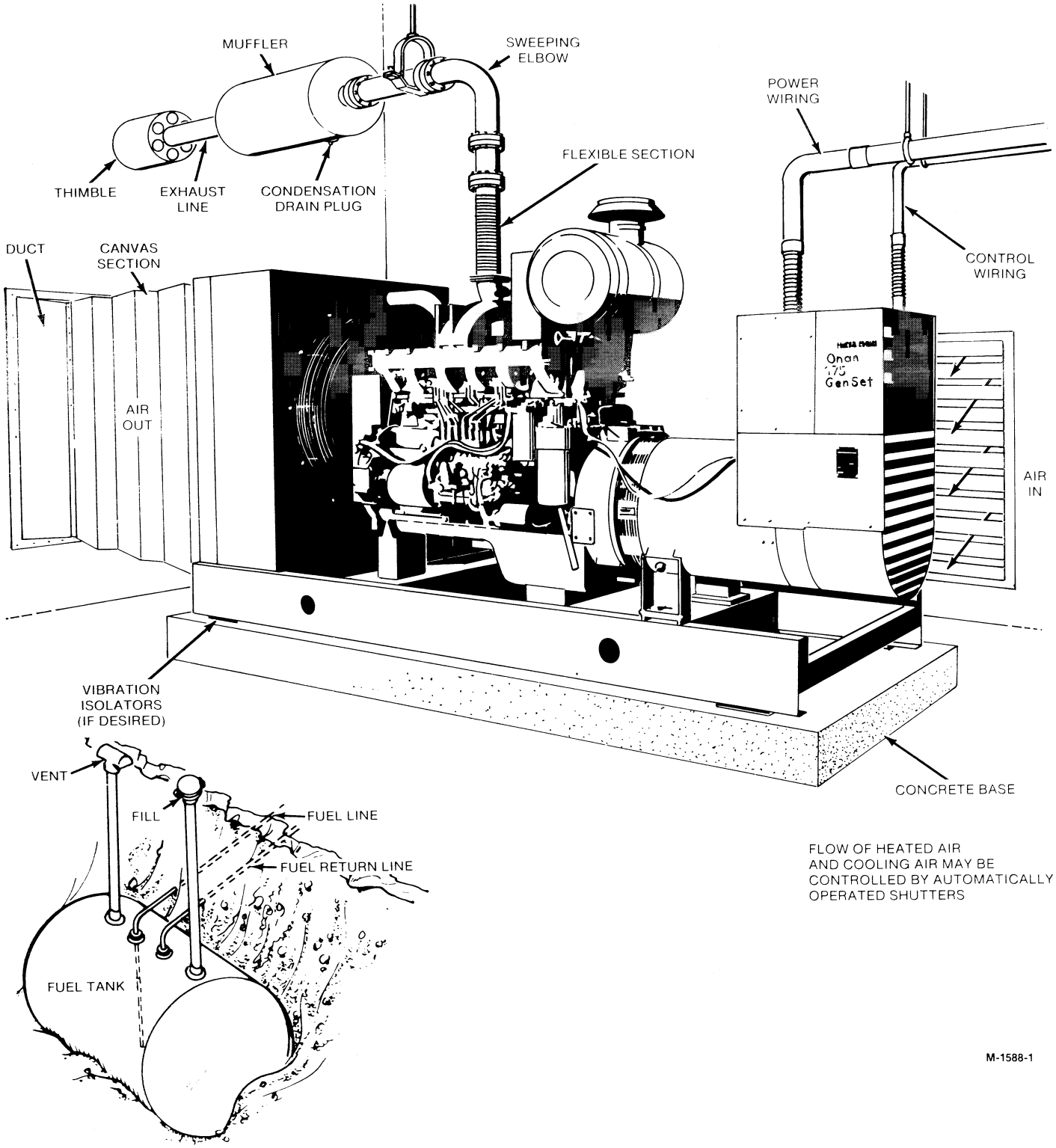


FIGURE 1. TYPICAL DV GENERATOR SET INSTALLATIONS

COOLING SYSTEMS

A set mounted radiator with engine driven fan is standard on the generator set. Optional cooling systems include remote radiator cooling. The following sections briefly cover the installation requirements for each system. Refer to Technical Bulletin T-030 for more detailed information.

Radiator Cooling (Standard)

The standard radiator cooling system (see Figure 1) uses a set mounted radiator with an engine driven pusher type fan to cool the generator set. Air is pulled from the generator end of the set across the engine and then forced through the radiator. An air duct adapter flange surrounds the radiator grill to allow mounting of the air discharge duct. Refer to the section on Ventilation for location and sizing of ducts and vents.

Remote Radiator (Optional)

Remote radiator cooling systems use a remote mounted radiator with electrically driven fans for generator set cooling. Removal of the radiator and fan from the set reduces the set enclosure ventilation requirements to the level of city water cooled sets without making the unit dependent on a continuous water supply. The remote radiator system can also be completely protected against freezing.

The two key design considerations in a remote radiator installation are the vertical distance (X) from the engine centerline to the radiator top and the horizontal distance (Y) from the engine front to the radiator centerline (see Figure 2). These distances determine if any additional equipment is required such as a surge tank, auxiliary pump, or hot well. Because of the many design considerations, all remote radiator installations must be engineered to insure that the system will function properly. Follow the instructions of the consulting engineer when installing a remote radiator system.

Remote radiator plumbing will vary with installation. All systems must comply with the following conditions—

- Make all connections to the set and to the radiator with flexible pipe.
- Install an auxiliary circulating pump if the horizontal distance between the engine and pump exceeds 15 feet (4.65 m).
- Install a hot-well system to relieve excess engine water jacket pressure if the top of the radiator is more than 15 feet (4.65 m) above the centerline of the engine crankshaft.

Coolant Heater (Optional)

A coolant heater option will keep the engine coolant warm while the engine is shut down. It heats and circulates the coolant within the engine which reduces start-up time and engine wear caused by cold starts. It is electrically operated and thermostatically controlled. Hookup is covered in the Electrical Connections section.

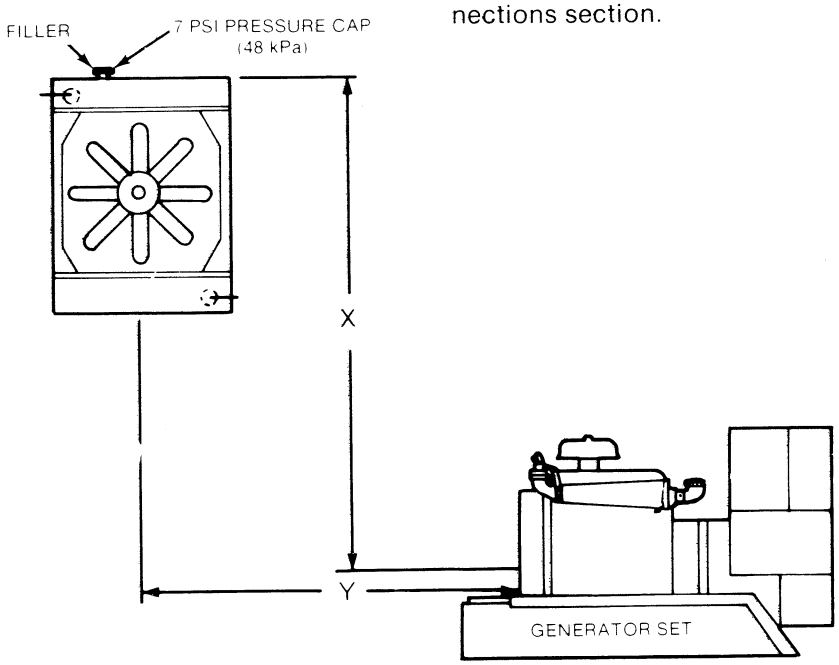


FIGURE 2. REMOTE RADIATOR INSTALLATION

EXHAUST SYSTEMS

Pipe exhaust gases to the outside of any enclosure. Locate the exhaust outlet away from any air inlets to avoid exhaust gases re-entering the enclosure. Exhaust installations are subject to various detrimental conditions such as extreme heat, infrequent operation, light loads, etc.

⚠WARNING ***Inhalation of exhaust gases can cause severe personal injury or death. Use extreme care during installation to ensure a tight exhaust system.***

Use an approved thimble (see Figure 3) where exhaust pipes pass through walls or partitions. Build the thimble according to code requirements (see National Fire Protection Association bulletin, Volume 4, section 211, covering "Standards for Chimneys, Fireplaces, and Vents").

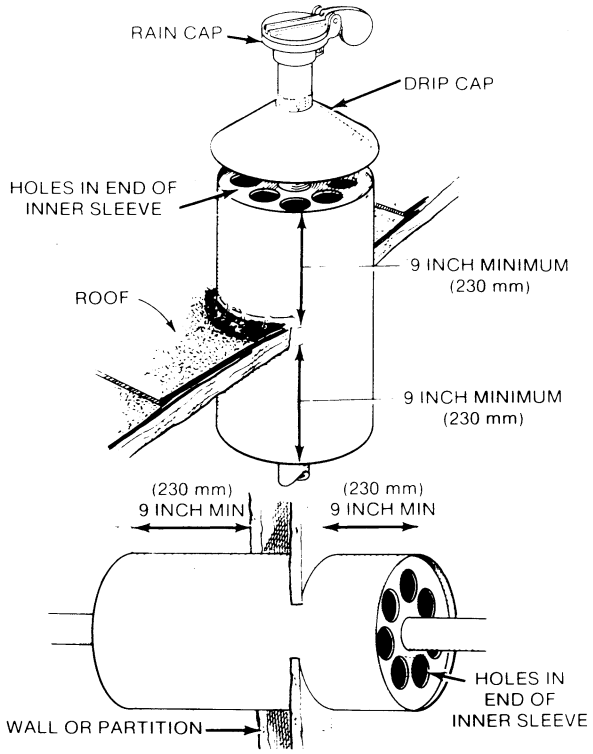
⚠WARNING ***Inhalation of exhaust gases can cause severe personal injury or death. Do not use exhaust heat to warm a room, compartment or storage area.***

Pitch a horizontal run of exhaust pipe downward to allow any moisture condensation to drain away from the engine. If an exhaust pipe must be turned upward, install a condensation trap at the point where the rise begins (see Figure 4).

Use large radius elbows and provide adequate support for mufflers and piping. Use a section of flexible stainless steel tubing between the engine exhaust connection and the exhaust piping system to permit movement and thermal expansion. Shield or insulate exhaust lines if there is danger of personal contact. Allow at least 12 inches (305 mm) of clearance if the pipes pass close to a combustible wall or partition.

⚠CAUTION ***Weight applied to the engine manifold can result in manifold damage. Support the muffler and exhaust piping so that no weight or stress is applied to the engine exhaust manifold.***

The maximum exhaust back pressure is given in the Product Data Sheet. The Onan Distributor can provide assistance to calculate exhaust system parameters.



Diameter of Thimble Must Be 12 Inches (305 mm) Larger Than Diameter of Exhaust Pipe

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FIGURE 3. EXHAUST THIMBLE

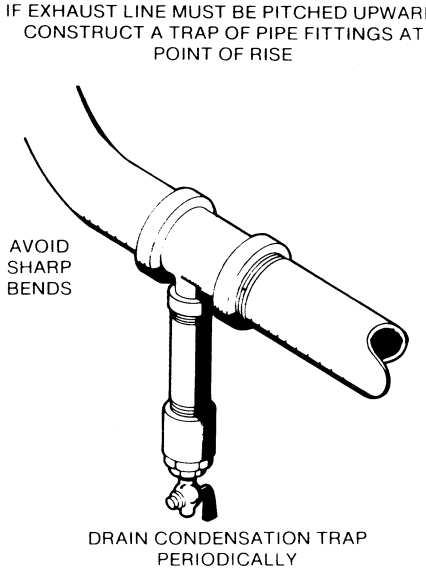

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FIGURE 4. EXHAUST CONDENSATION TRAP

FUEL SUPPLY SYSTEMS

Check local regulations governing installation of fuel tanks before installing the fuel supply system.

General

In all fuel system installations, cleanliness is of the utmost importance. Make every effort to prevent entrance of moisture, dirt or contaminants of any kind. Clean all fuel system components before installing. If water in the fuel is a problem despite all precautions to prevent entrance of moisture, a water separator is recommended.

Use a flexible section of tubing between the engine and the stationary fuel supply line to withstand vibration. Use only compatible metal fuel lines when installing stationary fuel supply lines underground to avoid electrolysis. Onan can supply copper fuel lines with brass fittings if required.

⚠CAUTION ***Never use galvanized fuel lines,fittings or fuel tanks with diesel fuel systems. Condensation in the tank and lines combines with the sulfur in diesel fuel to produce sulfuric acid. The zinc coating on galvanized lines or tanks reacts with the acid and flakes off to contaminate the fuel.***

An electric solenoid shutoff valve in the supply line is recommended for all installations and required for indoor automatic or remote starting installations. Connect the solenoid wires to open the valve during generator set operation.

Supply Tank

Locate the fuel tank as close as possible to the generator set and within the 3.5 feet (1.07 m) lift capacity of the fuel pump if possible. Choose a tank that has sufficient capacity to keep the generator running continuously at full load for at least 36 hours. Onan can supply underground fuel tanks from 55 to 560 gallons (208 to 2120 litres) in capacity.

⚠WARNING ***Fuel presents the hazard of fire or explosion which can result in severe personal injury or death. Always use flexible tubing between the engine and the fuel supply to avoid line failure and leaks due to vibration. The fuel system must meet applicable codes.***

A typical underground fuel system consists of a main fuel tank, vent and fill pipes, fuel supply line, and fuel return line (see Figure 1). If the tank is installed below the lift capabilities of the standard fuel transfer pump, a day tank and auxiliary pump will also be required. If an overhead tank is installed, a day tank and float valve will be required to prevent fuel head pressures from being placed on the fuel system components. Refer to Technical Bulletin T-030 for examples of fuel supply systems that require a day tank.

Day Tank (If Used)

Day tanks are fuel transfer tanks which are used when the standard engine fuel pump does not have the capacity to draw the fuel from the supply tank; or the supply tank is overhead and presents problems of high fuel head pressure for the fuel return. See Figure 5.

⚠WARNING ***Fuel presents the hazard of explosion or fire which can result in severe personal injury or death. An overflow pipe must be installed between the day tank and main fuel tank to prevent fuel spills in the installation area.***

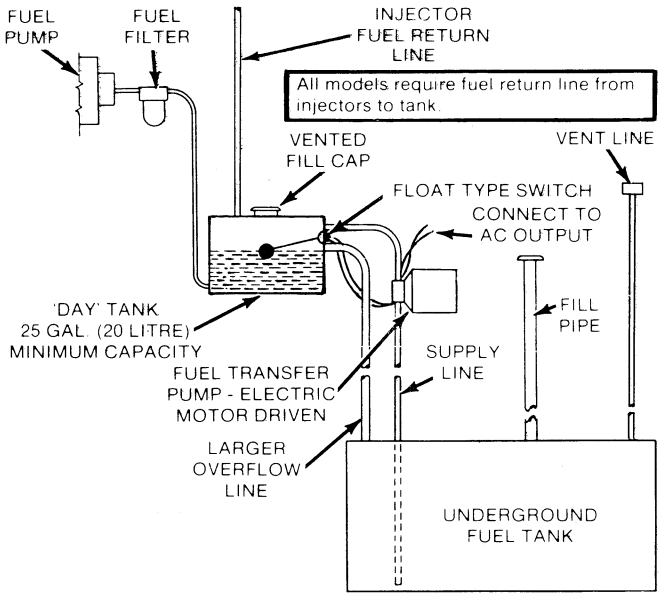


FIGURE 5. DAY TANK (TYPICAL)

Supply Tank Lower Than Engine: With this installation, the day tank is installed near the generator set and within the engine fuel pump lift capability, but below the fuel injection system. Install an auxiliary fuel pump as close as possible to the supply tank to pump fuel from the supply tank to the day tank. A float switch in the day tank controls operation of the auxiliary fuel pump.

The supply tank top must be below the day tank top to prevent siphoning from the fuel supply tank to the day tank.

Provide a day tank overflow line to the supply tank in case the float switch fails to shut off the fuel transfer pump.

Supply Tank Above Engine: Install the day tank near the generator set and within the engine fuel pump lift capability, but below the fuel injection system. Use fuel line at least as large as the fuel pump inlet.

Include a shutoff solenoid in the fuel line between the fuel supply tank and the day tank. It stops fuel flow when the generator set is shut down.

Engine Fuel Connections

Identification tags are attached to the fuel supply line and fuel return line connections by the factory. Flexible lines for connecting between the engine and the stationary fuel line are supplied as standard equipment. Refer to the SPECIFICATIONS section of the Operator's Manual for the fitting sizes.

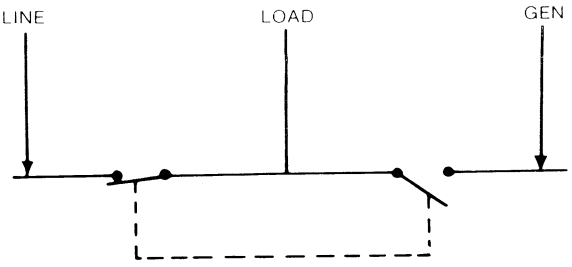
ELECTRICAL CONNECTIONS

General

Installing the generator set electrical system includes connecting the load and switchgear, and installing the remote start control (if used). The batteries should always be connected last to avoid accidental starting of the unit during installation. Battery connections are covered under "Preparing Generator Set for Operation."

Most local regulations require that wiring connections be made by a licensed electrician and that the installation be inspected and approved before operation. All connections, wire sizes, etc., must conform to the requirements of all electrical codes in effect at the installation site. Flexible conduit connections at the generator set for load and control wiring can be made at locations shown in Figure 6.

If the installation is for standby service, a double throw transfer switch must always be used (see Figure 7). Instructions for connecting an automatic load transfer control are included with such equipment.



NOTE: SHOWN WITH LINE CONNECTED TO LOAD

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FIGURE 7. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

Generator Voltage Connections

The generator output voltage and maximum current rating is specified on the generator nameplate. Line-to-neutral voltage is always the lower voltage shown on the nameplate and line-to-line voltage is the higher rating.

Generators can be divided into two groups, reconnectible and non-reconnectible. The reconnectible type generator can be wired to give one of several possible voltages. Non-reconnectible type generators produce only one specific voltage and cannot be wired to give a different voltage without extensive modifications. The following sections explain the connection procedure for each type of generator.

Non-reconnectible Generators (Voltage Code 5D, 6D, 7, or 9X): These generators are wired at the factory for a specific voltage and are not intended for reconnection. The voltage and corresponding current rating (amperes) are shown on the nameplate. For these generators, proceed to *LOAD CONNECTIONS.*

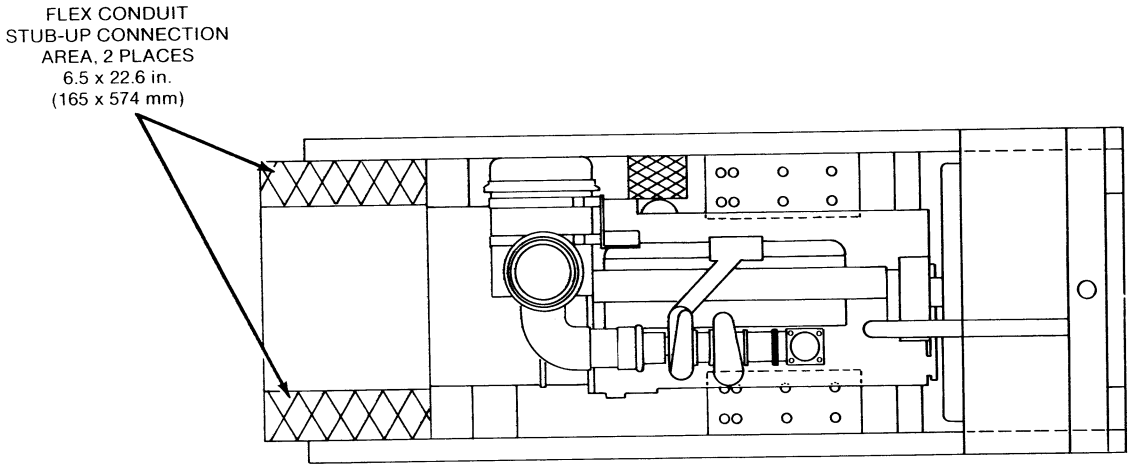

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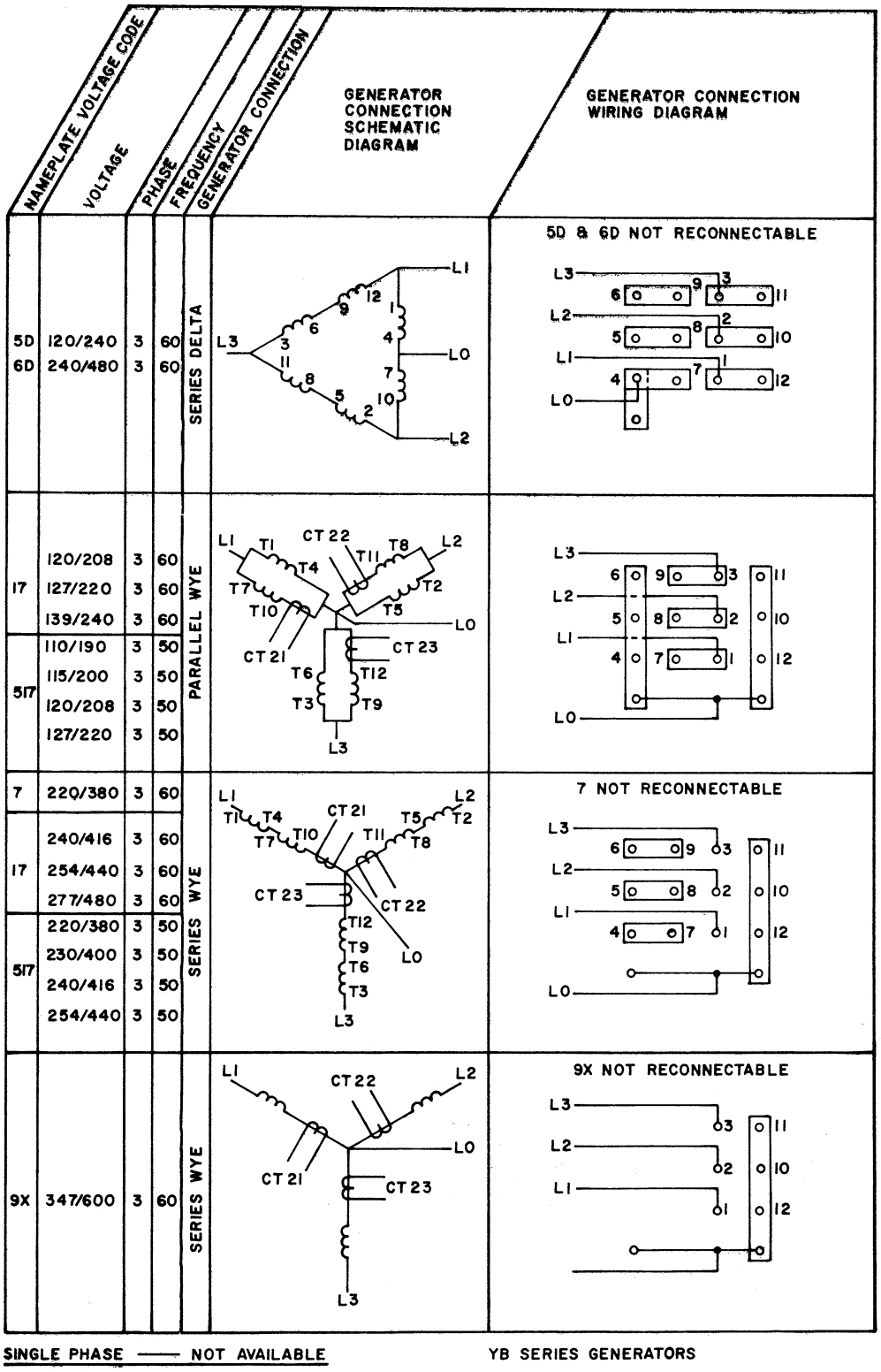
FIGURE 6. TOP VIEW SHOWING LOCATION OF LOAD/CONTROL CONNECTIONS



SINGLE PHASE —— NOT AVAILABLE

YB SERIES GENERATORS

FIGURE 8. VOLTAGE CONNECTIONS

Reconnectible Generators (Voltage Code 17 or 517): Generators with voltage codes 17 (for 60 hertz) and 517 (for 50 hertz) are three phase and can be reconnected for the voltages shown in Figure 8. (If voltage and code are other than 17 or 517, see "Non-reconnectible Generators".) Most of these generators must be reconnected by the installer to give the voltage required for the installation. Before shipping, the factory tests the generator set output by connecting the generator to produce a particular test voltage. The installer must always check the bus bar connections and reconnect to obtain the voltage desired.

Reconnection Bars: Several reconnection bars are provided that can be bolted or unbolted (see Figure 9) to the main bus bars (L0, L1, L2, and L3). Bus bars and reconnection bars are made of tin plated aluminum to resist electrolytic corrosion. Select the voltage required and bolt the reconnection bars to the bus bars as shown in Figure 8. Do not overtighten the bolts.

Load Connections

Load Balancing: When connecting loads to the generator set, balance the loads so that the current flow from each line terminal (L1, L2, and L3) is about the same. This is especially important if both single phase and three phase loads are connected. Any combination of single phase and three phase loading can be used as long as each line current is about the same, within 10 percent of median value, and no line current exceeds the nameplate rating of the generator. Check the current flow from each line after connections (procedure following) by observing the control panel ammeter.

Connecting the Load: All loads are connected to the generator by bolting the load wires to the appropriate bus bars in the control. The bus bars are stamped L0, L1, L2 and L3 to indicate the neutral and line connections (Figure 9).

Generator sets having the circuit breaker option have the incoming load leads connected to the breaker inside the breaker housing (Figure 10). A shunt trip feature of the breaker provides load disconnect should the generator set shut down. It is available for connection to numerous DC and AC shunt trip voltages depending on selected options.

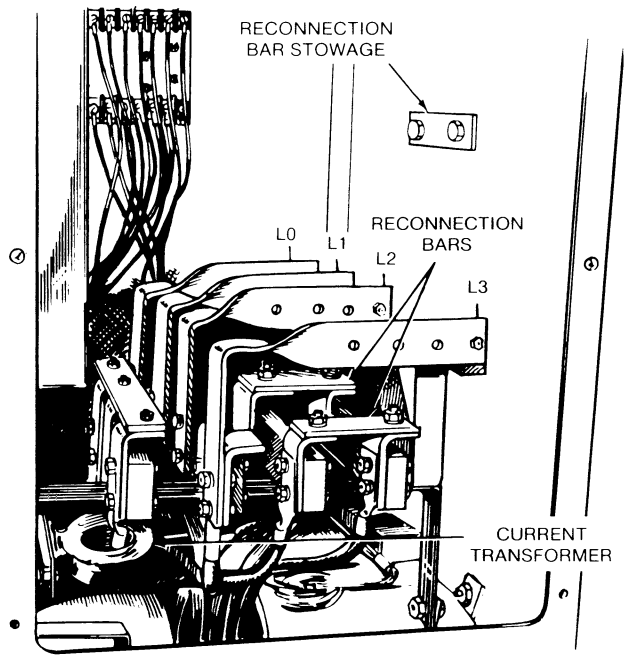


FIGURE 9. RECONNECTION BARS

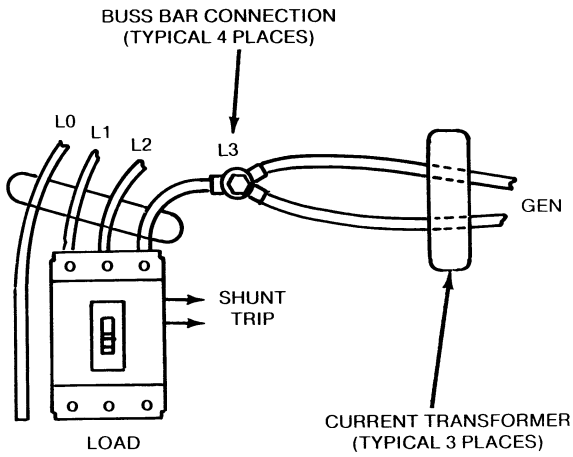


FIGURE 10. CIRCUIT BREAKER CONNECTION

The L0 lead is connected to the load neutral (when used). Use a section of flexible conduit at the control box to permit movement.

⚠CAUTION ***If the generator is reconnected for a different voltage, a different circuit breaker must be installed for proper protection.***

Grounding

Grounding involves making a conducting connection between the metal parts of the generator set or one of its electrical circuits and the earth. The design and installation of a grounding system is affected by many factors such as use of multiple transformers, ground fault protection requirements, and physical location of the generator. Follow the recommendations of the consulting engineer when installing the grounding system.

⚠WARNING ***Contact with electrically "hot" equipment can result in severe personal injury or death. It is extremely important that bonding and equipment grounding be properly done. All metallic parts which could become energized under abnormal conditions must be properly grounded.***

Typical requirements for bonding and grounding are given in the National Electrical Code, NFPA NO. 70, Article 250. All connections, wire sizes, etc. must conform to the requirements of the electrical codes in effect at the installation site.

Remote Control Connections

Provision is made for connecting one or more remote starting switches and a common alarm to the DC control circuit. Connections are made to terminal block TB1 as shown in Figure 11. The common alarm must be limited to 4 amperes maximum. If the distance between the set and remote station is less than 1000 feet (305 m), use No. 18 AWG wire; between 1000 and 2000 feet (305 and 610 m), use No. 16 AWG wire.

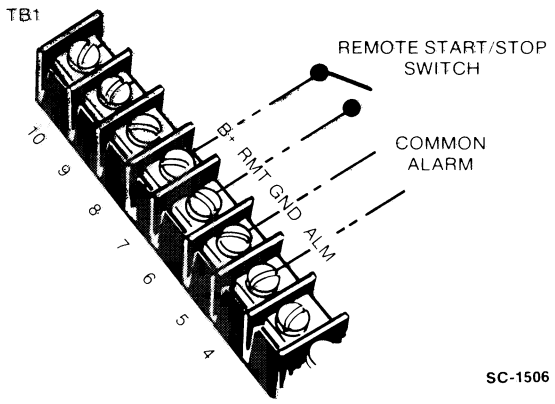


FIGURE 11. REMOTE CONTROL CONNECTIONS

Generator Heater (Optional)

The generator heater option is available in either 120-volt or 240-volt AC and must be plugged into the proper voltage power source. A non-adjustable thermostat closes the heater circuit at about 130° F (54° C) and opens the circuit at about 150° F (66° C).

The heater keeps the air temperature inside the generator (during shutdown) a few degrees higher than ambient and prevents condensation of moisture on components within the generator. This function is especially desirable in corrosive environments such as near salt water seacoasts.

Coolant Heater (Optional)

A coolant heater can be installed to keep engine coolant warm while the engine is shut down. It heats and circulates the coolant within the engine which reduces start-up time and engine wear caused by cold starts. It is electrically operated and thermostatically controlled.

⚠CAUTION ***The heater must not be operated while the cooling system is empty or when the engine is running or damage to the heater will occur.***

Figure 12 shows the heater connections. Connect the heater to a source of power that will be on during the time the engine is not running. Be sure the voltage rating is correct for the heater element rating.

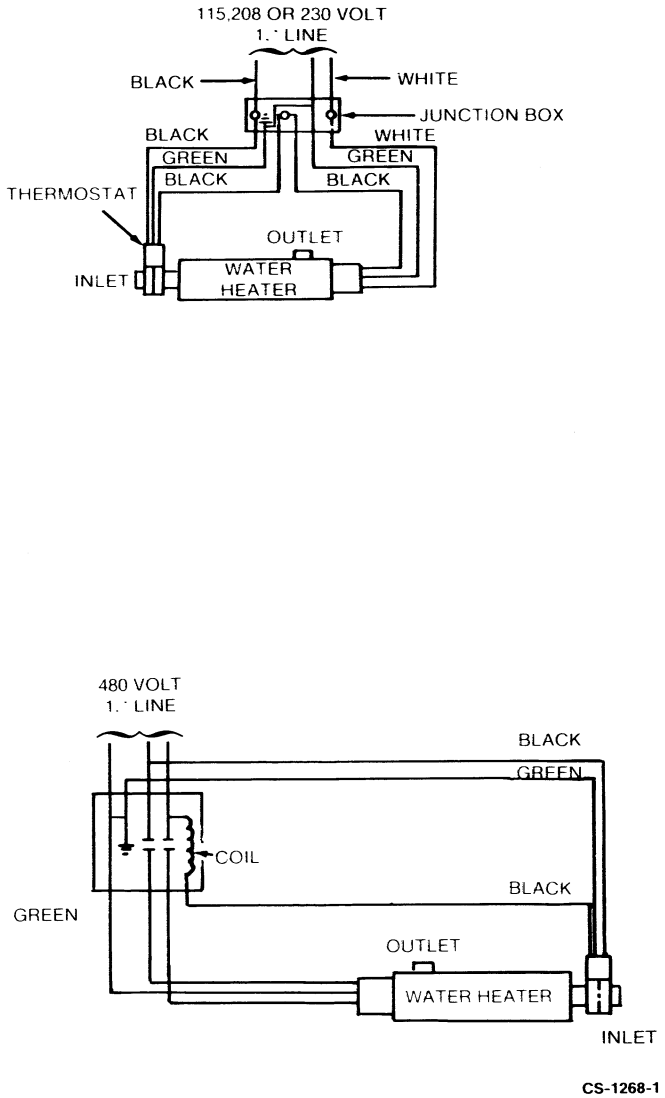


FIGURE 12. COOLANT HEATER WIRING DIAGRAMS

Control Heater (Optional)

The thermostat controlled heater option maintains the control box temperature at 105° ±5°F (41° ±3°C). This is desirable in environments with low ambient temperatures and/or high humidity. The heater power cord must be plugged into a 120-volt AC source.

The thermostat is factory set to open on rising temperature of 105° ±5°F (41° ±3°C) and normally does not require adjustment. The wiring diagram in Figure 13 shows location of the thermostat adjustment screw. A schematic diagram is also shown for reference.

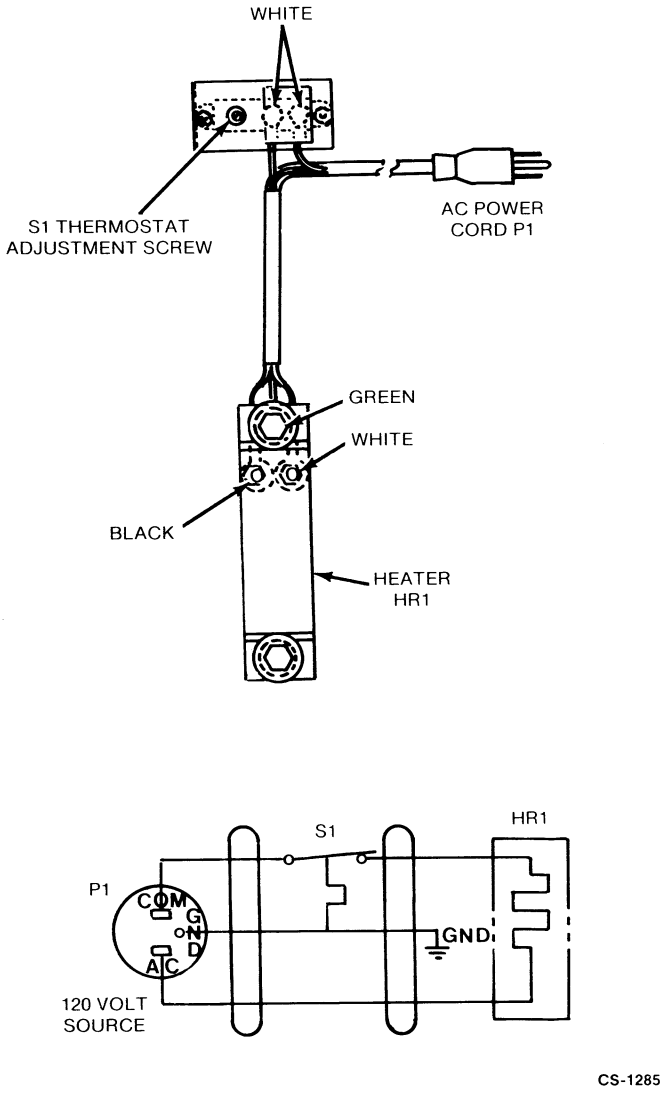


FIGURE 13. CONTROL HEATER WIRING AND SCHEMATIC DIAGRAM

PREPARING GENERATOR SET FOR OPERATION

Before attempting the initial start of the generator set, be sure it is serviced for operation. Refer to the MAINTENANCE section of the operator's manual for the proper procedures and recommendations. Service the following.

Lubrication

Engine oil was drained prior to shipment. Before starting, fill the crankcase with the recommended oil.

Coolant

Engine coolant was drained prior to shipment. Before starting, fill the cooling system with recommended coolant.

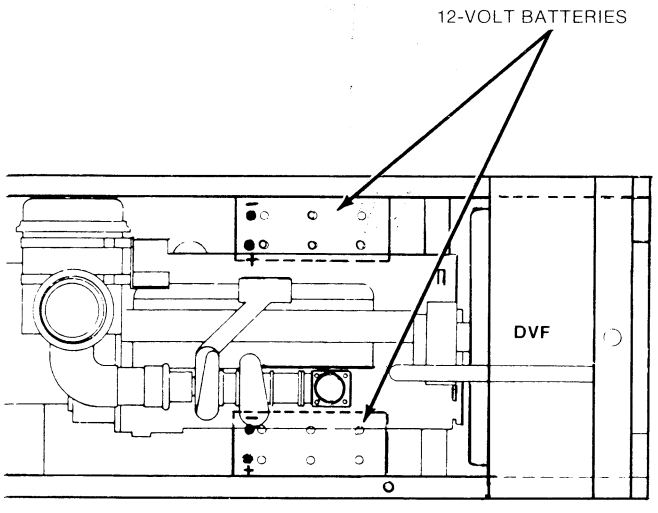
Fuel

Fill the fuel tanks with the recommended fuel and prime the fuel system.

Connect Starting Batteries

Starting the unit requires 24-volt battery current. Use two 12-volt batteries (see *SPECIFICATIONS*) for a normal installation. Connect the batteries in series (negative post of first battery to positive post of second) as in Figure 14. Necessary battery cables are included. Service the batteries as necessary. Infrequent unit use (as in emergency standby service) can allow the batteries to self-discharge to the point where they cannot start the unit. If installing an automatic transfer switch and it has no built-in charge circuit, connect a special float charger to keep the batteries charged at proper level.

⚠WARNING ***Batteries present the hazard of explosion which can result in severe personal injury. Do not smoke or allow any arc-producing devices around the battery area. Do not disconnect battery cables while the generator set is cranking or running. Batteries give off explosive gases.***



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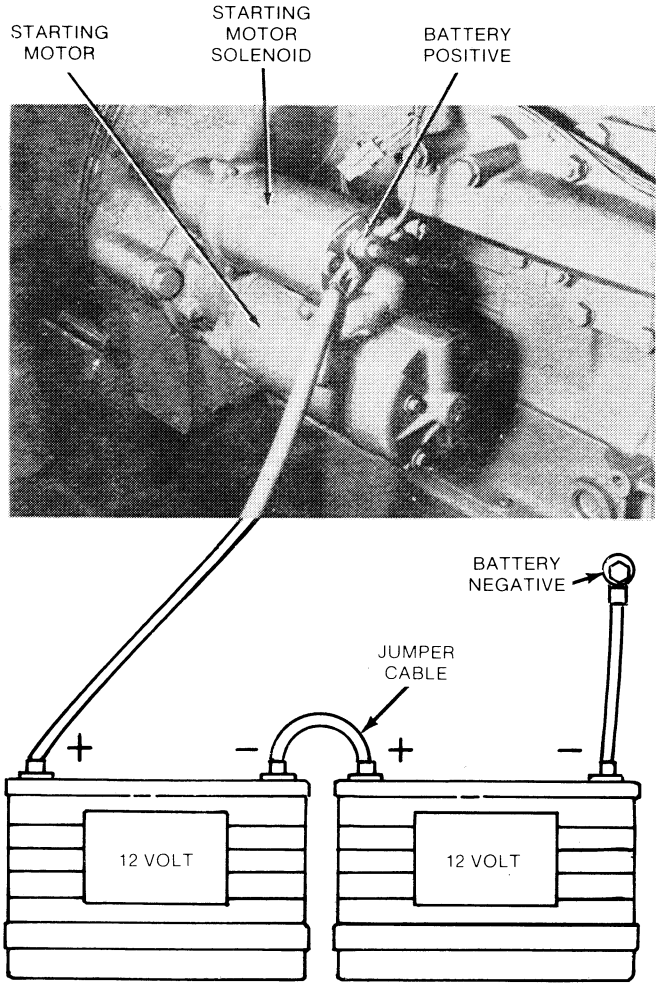
BATTERY ORIENTATION, GENSET TOP VIEW



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BATTERY CONNECTIONS

FIGURE 14. STARTING BATTERY CONNECTIONS

INITIAL STARTING AND CHECKS

Before putting the generator set under load conditions, perform the following to verify the generator set will perform correctly.

1. Start the generator set. Move the Run-Stop-Remote switch on the engine control panel to the RUN position. The starter should crank the engine, and the engine should start within a few seconds.
2. Monitor the engine control panel and note the oil pressure, coolant temperature, and battery charge rate. With the engine at operating temperature, all readings should stay within the normal range.
3. Check the generator set for fuel, oil or coolant leaks. If you find any leaks, move the Run-Stop-Remote switch to STOP. Have the leak repaired before performing the rest of the checks.
4. Check the exhaust system for leaks, visually and audibly. Note the security of the exhaust system supports. If you find any leaks, shut down the generator set immediately by moving the Run-Stop-Remote switch to STOP.

⚠WARNING ***Exhaust gas presents the hazard of severe personal injury or death. For this reason, shut down the generator set immediately if you discover an exhaust leak or component needing replacement. Do not use the generator set until you have the exhaust system repaired.***

5. Note the AC instruments (if equipped) on the control panel. The frequency meter and voltmeter should indicate rated nameplate frequency and voltage. Turn the control panel Voltage Adjust control (if equipped) for nameplate voltage. Use the Phase Selector Switch to read each of the line-to-line voltages.

   If unit does not have control instruments or a Voltage Adjustment control on the front panel, connect an accurate external voltmeter. If necessary, adjust R32 on VRAS-2 Voltage Regulator board for nameplate voltage (Figure 15).

⚠WARNING ***High voltages within the control cabinet can cause severe personal injury or death. Proceed with care!***

6. Stop the generator set by moving the Run-Stop-Remote switch to STOP.

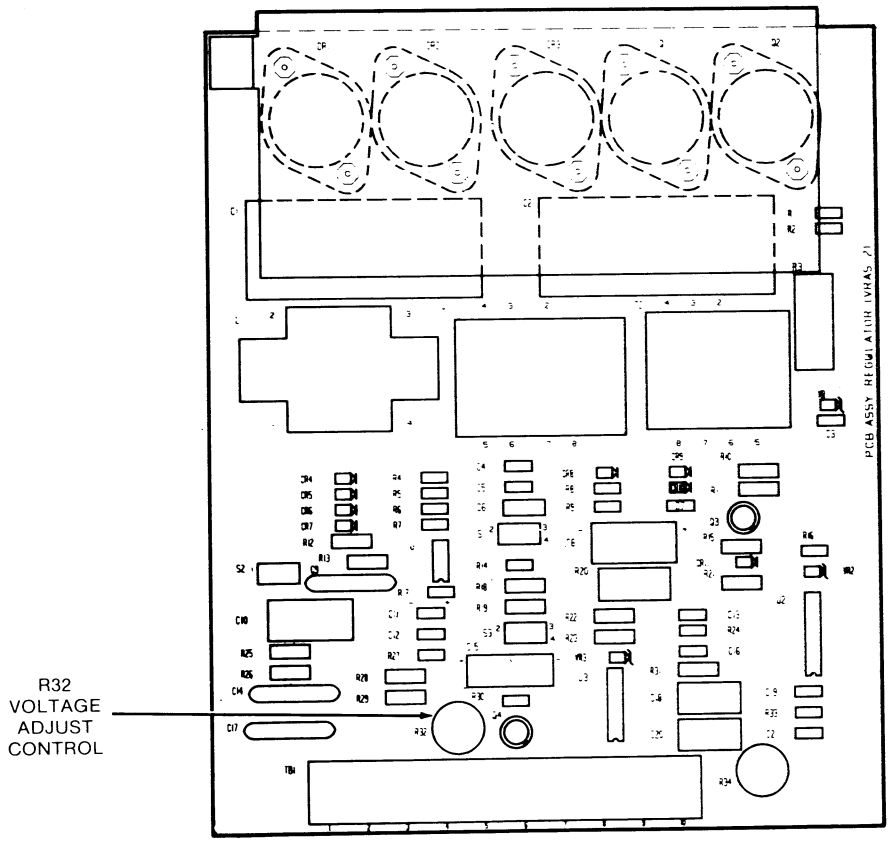

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FIGURE 15. VRAS-2 VOLTAGE REGULATOR ASSEMBLY

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