

3.6 KYFA 26120 S/N H020405775

Onan Mobile GenSet

Installation Manual

KY



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Safety Precautions

Thoroughly read the **OPERATOR'S MANUAL** before operating the genset. Safe operation and top performance can be obtained only when equipment is operated and maintained properly.

The following symbols in this manual alert you to potential hazards to the operator, service person and equipment.

⚠ DANGER alerts you to an immediate hazard which will result in severe personal injury or death.

⚠ WARNING alerts you to a hazard or unsafe practice which can result in severe personal injury or death.

⚠ CAUTION alerts you to a hazard or unsafe practice which can result in personal injury or equipment damage.

Electricity, fuel, exhaust, moving parts and batteries present hazards which can result in severe personal injury or death.

GENERAL PRECAUTIONS

- Keep ABC fire extinguishers handy.
- Make sure all fasteners are secure and torqued properly.
- Keep the genset and its compartment clean. Excess oil and oily rags can catch fire. Dirt and gear stowed in the compartment can restrict cooling air.
- Before working on the genset, disconnect the negative (–) battery cable at the battery to prevent starting.
- Use caution when making adjustments while the genset is running—hot, moving or electrically live parts can cause severe personal injury or death.
- Used engine oil has been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale, or contact used oil or its vapors.
- Benzene and lead in some gasolines have been identified by some state and federal

agencies as causing cancer or reproductive toxicity. Do not ingest, inhale or contact gasoline or its vapors.

- Do not work on the genset when mentally or physically fatigued or after consuming alcohol or drugs.
- Carefully follow all applicable local, state and federal codes.

GENERATOR VOLTAGE IS DEADLY!

- Generator output connections must be made by a qualified electrician in accordance with applicable codes.
- The genset must not be connected to the public utility or any other source of electrical power. Connection could lead to electrocution of utility workers and damage to equipment. An approved switching device must be used to prevent interconnections.
- Use caution when working on live electrical equipment. Remove jewelry, make sure clothing and shoes are dry and stand on a dry wooden platform.

ENGINE EXHAUST IS DEADLY!

- Learn the symptoms of carbon monoxide poisoning in this manual and never sleep in the vehicle while the genset is running unless the vehicle is equipped with a working carbon monoxide detector.
- The exhaust system must be installed in accordance with the genset Installation Manual. Engine cooling air must not be used for heating the working or living space or compartment.
- Inspect for exhaust leaks at every startup and after every eight hours of running.
- Make sure there is ample fresh air when operating the genset in a confined area.

FUEL IS FLAMMABLE AND EXPLOSIVE

- Do not smoke or turn electrical switches ON or OFF where fuel fumes are present or in areas sharing ventilation with fuel tanks or equipment. Keep flame, sparks, pilot lights, arc-producing equipment and switches and all other sources of ignition well away.

- Fuel lines must be secured, free of leaks and separated or shielded from electrical wiring.
- Leaks can lead to explosive accumulations of gas. Natural gas rises when released and can accumulate under hoods and inside housings and buildings. LPG sinks when released and can accumulate inside housings and basements and other below-grade spaces. Prevent leaks and the accumulation of gas.

BATTERY GAS IS EXPLOSIVE

- Wear safety glasses and do not smoke while servicing batteries.

- When disconnecting or reconnecting battery cables, always disconnect the negative (-) battery cable first and reconnect it last to reduce arcing.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not wear loose clothing or jewelry near moving parts such as PTO shafts, fans, belts and pulleys.
- Keep hands away from moving parts.
- Keep guards in place over fans, belts, pulleys, etc.

Introduction

ABOUT THIS MANUAL

This manual is a guide for the installation of the KY Series of generator sets (gensets). Proper installation is essential for safe, reliable and quiet operation. Read through this manual before starting the installation. Keep this manual and the Operator's Manual with the other vehicle manuals.

This manual addresses the following aspects of the installation:

- Location, Mounting and Enclosure
- Exhaust Connections
- Fuel Connections
- Electrical Connections
- Startup

⚠ WARNING *Improper installation can result in severe personal injury, death and equipment damage. The installer must be qualified to perform the installation of electrical and mechanical equipment.*

⚠ CAUTION *Unauthorized modifications or replacement of fuel, exhaust, air intake or speed control system components that affect engine emissions are prohibited by law in the State of California.*

See the Operator's Manual for operation and maintenance and the Service Manual for service.

Note: Manuals are updated from time-to-time to reflect changes in the equipment and its specifications. For this reason, only the copy of the installation manual supplied with the genset should be used as a guide for the installation.

INSTALLATION CODES AND STANDARDS FOR SAFETY

The builder of the RV or work vehicle bears sole responsibility for the selection of the appropriate genset, for its proper installation and for obtaining approvals from the authorities (if any) having jurisdiction over the installation. These sets meet the basic requirements of the Standard for Safety for Engine Generator Sets for Recreational Vehicles, ANSI/RVIA EGS-1. They are suitable for installation in accordance with:

- NFPA No. 70, Article 551—Recreational Vehicles and RV Parks
- ANSI A119.2 (NFPA No. 501C)—Recreational Vehicles
- CSA Electrical Bulletin 946—Requirements for Internal Combustion Engine-Driven Electric Generators for Use in Recreational Vehicles

Federal, State and local codes, such as the California Administrative Code—Title 25 (RV installation), might also be applicable. Installation codes and recommendations can change from time-to-time and are different in different countries, states and municipalities. Obtain the standards in Table 1 for reference.

TABLE 1. REFERENCE CODES AND STANDARDS

NFPA No. 70 NFPA NO. 501C	National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
ANSI A119.2 ANSI/RVIA-EGS-1 FMVSS 301	Recreational Vehicle Industry Association 14650 Lee Road Chantilly, VA 22021
California Administrative Code—Title 25, Chapter 3	State of California Documents Section P.O. Box 1015 North Highlands, CA 95660
CAN/CSA-Z240 Recreational Vehicles Bulletin 946	Canadian Standards Association Housing and Construction Materials Section 178 Rexdale Blvd. Rexdale, Ontario, Canada M9W 1R3

TYPICAL GENSET

Figure 1 illustrates a typical genset. See OUTLINE DRAWING (Page 21) for installation details: mounting bolt hole locations, connection points (fuel, battery, remote control, AC output and exhaust), sizes and types of fittings, inlet and outlet air openings, weight and overall dimensions, etc. See Pages 22,

23 and 24 for details of the underfloor mounting kits available. See your Onan dealer for large-scale copies of the drawings and for a full-size floor template for floor opening cutouts.

CAUTION Do not tip the genset forward or oil will spill into the breather. Tip the genset backwards to loosen the shipping skid bolts.

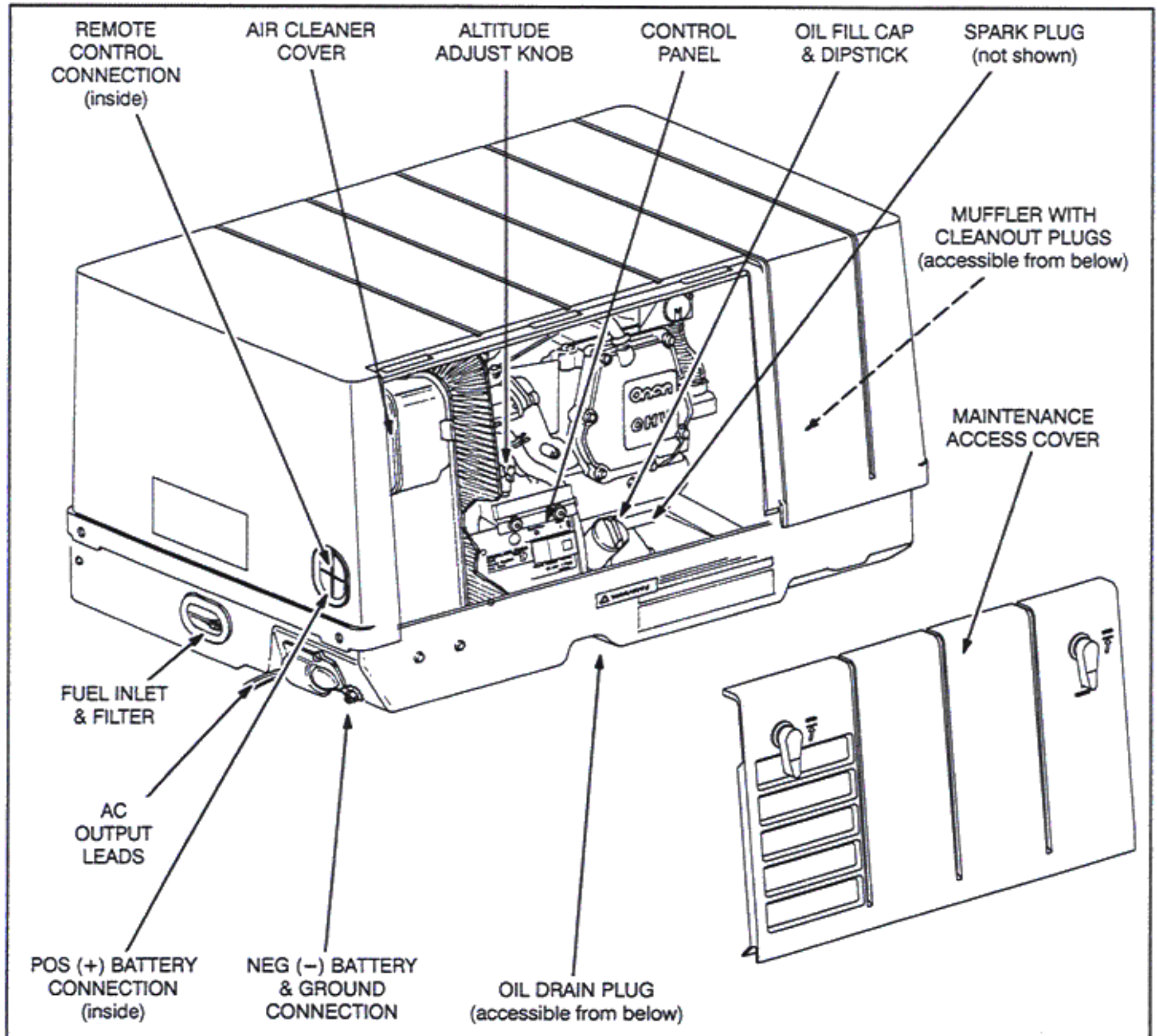


FIGURE 1. TYPICAL GENSET

Location, Mounting and Enclosure

The location, mounting and enclosure of a genset must be such that mounting is secure, engine exhaust and fuel vapors are prevented from entering the vehicle, rain and road debris are prevented from entering the genset, and ready access is afforded for operating the genset and performing periodic maintenance. See Figure 2 for typical genset locations.

1. The genset support structure must be able to resist the dynamic weight of the genset: cyclical vertical forces of ± 561 lbs (± 3 g) and cyclical horizontal forces of ± 187 lbs (± 1 g). **Secure the genset with six 5/16-18 NC bolts.** The bolts must protrude at least 1-1/2 threads beyond the base pan weld nuts but not more than 1/2 inch (13 mm), to avoid interference.

⚠ WARNING *The genset can fall from the vehicle if the supporting structure is weak and cause severe personal injury or death. Design the structure carefully, follow applicable mounting kit instructions and torque mounting bolts properly.*

2. The genset can be mounted on or below the vehicle floor:

- A. **Below-Floor Mounting** – Use one of the mounting kits available from Onan (Page 22, 23 or 24). Follow the instructions in the kit and use Underfloor Template 539-1535 to locate the assembly. A plywood or particle board floor must be reinforced with steel to resist the dynamic weight of the genset (Item 1). Do not mount the genset within the approach or departure angles of the vehicle or below the axle line (Figure 7). If the floor is of combustible material such as wood, install a barrier of 26 gauge galvanized steel or equivalent between the floor and the genset.

⚠ WARNING ***FIRE IS DEADLY!** Install a fire-resistive barrier of approved materials between the floor and the genset.*

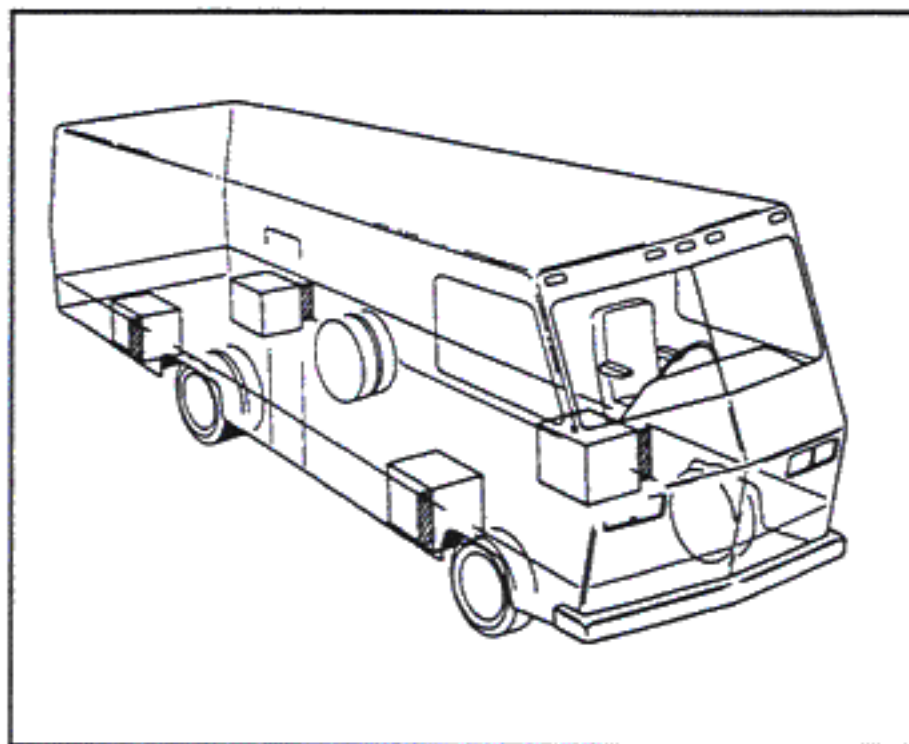


FIGURE 2. TYPICAL GENSET LOCATIONS

B. Above-Floor Compartment Mounting— Construct a vapor-tight, fire-resistive compartment of 26 gauge galvanized steel or equivalent to isolate the genset from the vehicle interior. Do not duct genset cooling air, which can include exhaust gases, into the vehicle for heating.

⚠WARNING EXHAUST GAS AND FIRE ARE DEADLY! — Install a vapor-tight and fire-resistive barrier of approved materials between the genset and the vehicle interior. — Do not duct genset cooling air into the vehicle for heating.

3. Locate or shield the genset cooling air openings (Figure 3) from direct rain, road splash and debris thrown up by the road wheels.
4. Provide ready access for fuel and battery connections and all periodic maintenance procedures (Figure 1). When mounting the genset on a floor, use Compartment Template 539-1546 to locate the cutout for the oil drain. Do not route the exhaust tailpipe underneath the oil drain.

⚠WARNING A hot exhaust tailpipe can ignite oil drain spills causing severe personal injury or death. Do not route the exhaust tailpipe underneath the oil drain.

5. The genset must not share a compartment or ventilation with batteries or fuel tanks. An operating genset can ignite flammable vapors.
6. Genset cooling air (Figure 3) must not be obstructed.
 - A. Generally, the effect of natural convection in ventilating flammable vapors and engine heat after shutdown is better the higher the compartment air inlet. This should be especially noted when fuel vapor lock is an issue.
 - B. A free-air inlet size of at least 40 in² (258 cm²) is required. Grilles, louvers and other kinds of decorative treatments for air openings are restrictive. Contact the manufacturer of the decorative assembly or material to find out how large an opening is required to obtain the minimum free-air inlet size.

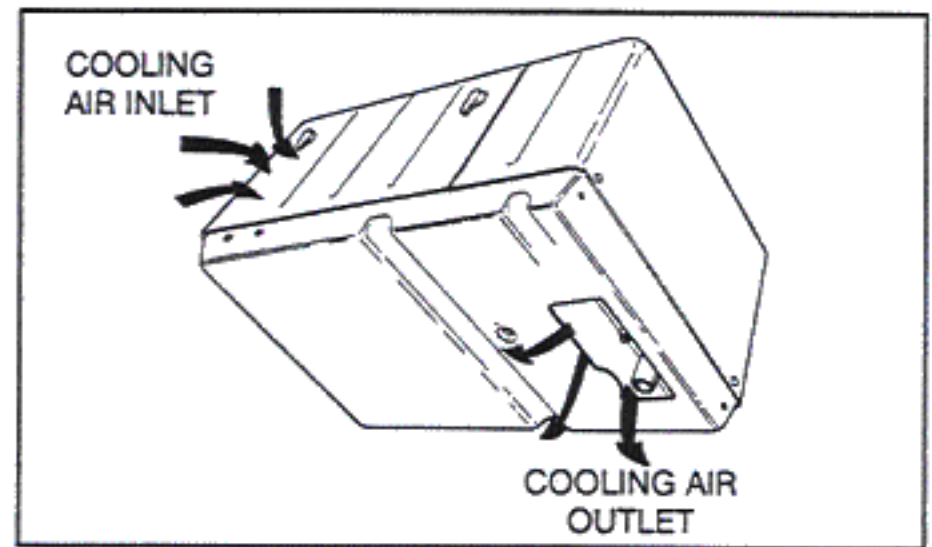


FIGURE 3. GENSET COOLING AIR INLET AND OUTLET OPENINGS

- C. Unless the compartment air inlet lines up directly with the genset air inlet, a clearance of at least 1-1/2 inch (38 mm) is required at the front of the genset for air to get to the genset inlet. (Staggering a compartment side opening or pulling the air up under the skirt of the vehicle will reduce line-of-sight noise but requires the extra clearance in front.)
- D. When mounting the genset on a floor, use Compartment Template 539-1546 to locate the cutout for the cooling air outlet. The floor must not block off any portion of the genset cooling air outlet or cause recirculation of hot air back into the genset air inlet.
- E. Make sure the space below the genset cooling outlet is unobstructed for at least 6 inches (152 mm) and open on at least three sides.
7. See the outline drawing (Page 21) for the minimum inside dimensions of a genset compartment. If the compartment has acoustic insulation (Figure 4), increase the minimum compartment dimensions by the thicknesses of the insulation panels. The following minimum clearances are required between the genset and the compartment or its insulation:
- At least 1 inch (25 mm) clearance is required in the space on the left side for fuel, AC output, battery and remote control connections (Page 5).
 - At least 1/4 inch (6 mm) clearance is required on the sides and 1 inch (25.4 mm) on top.
 - At least 1-1/2 inch (38 mm) clearance is required in front if the compartment air inlet does not line up directly with the genset air inlet (Item 6. C).
8. Acoustic insulation and adhesive (Figure 4) should be Classified as "Self-Extinguishing" at not less than 200°F (90°C). Do not line the bottom of the compartment with insulation—insulation absorbs spilled fuel and oil.

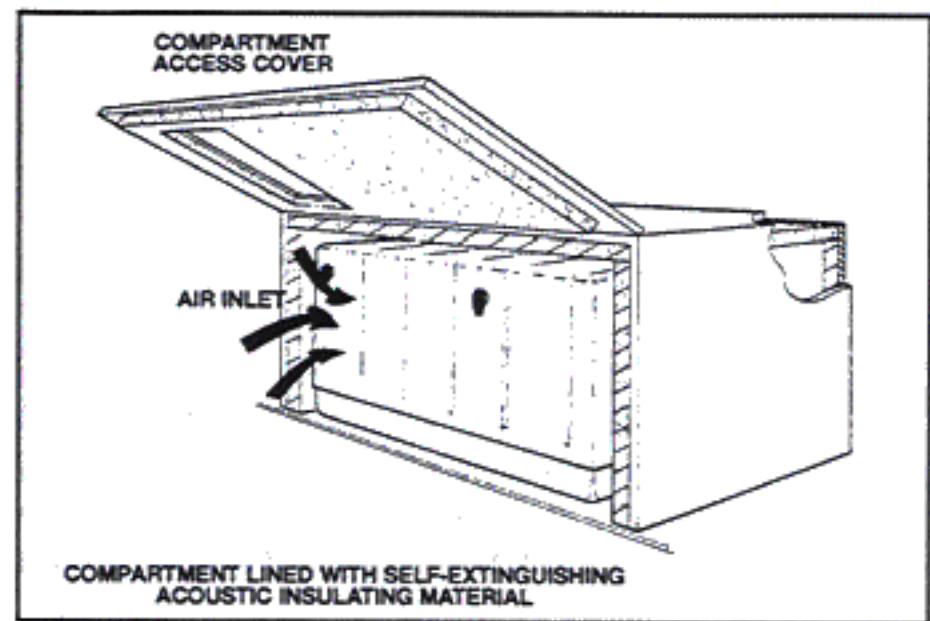


FIGURE 4. COMPARTMENT WITH ACOUSTIC INSULATION

*Henry Products
Benson Highway*

Exhaust Connections

The genset is equipped with a U.S. Forest Service approved spark-arrest muffler. Failure to provide and maintain a spark arrestor can be a violation of the law. Liability for damage, injury and warranty expense due to the modification of the exhaust system or to use of unapproved parts is the responsibility of the person performing the modification or installing the unapproved parts. Contact an Onan dealer for approved exhaust system parts.

⚠ WARNING **EXHAUST GAS IS DEADLY!** *Keep exhaust gases from entering the vehicle. Do not terminate the exhaust tailpipe underneath the vehicle or closer than 6 inches (153 mm) to openings into the vehicle or route it such that it is not protected. Use approved materials only.*

The genset exhaust system must be gas-tight and designed to prevent entry of exhaust gases into the vehicle interior. The muffler is mounted inside the genset and has a collar to which the tailpipe is clamped (Figure 5).

1. Use 18-gauge 1-1/8 inch I. D. aluminized steel tubing or material of equivalent heat and corrosion resistance for the tailpipe. (Straight and elbowed tailpipe kits are available from Onan.) Do not use flexible pipe, which is neither gas tight nor durable. Clamp the tailpipe to the muffler with a U-bolt muffler clamp (available from Onan). Support a tailpipe longer than 1-1/2 feet (457 mm) near its end and at intervals of 3 feet (900 mm) or less. Use automotive-type tailpipe hangers (available from Onan). Do not attach the hangers to combustible material such as wood.
2. See **OUTLINE DRAWING** (Page 21) for the location of a **5/16-18NC threaded hole** in the base of the genset for attaching a tailpipe hanger. The bolt must protrude at least 1-1/2 threads beyond the base pan weld nut but not more than 1/2 inch (13 mm), to avoid interference.
3. Use U-bolt muffler clamps (available from Onan) to connect sections of tailpipe. Overlapping pipe should be slotted (Figure 6).

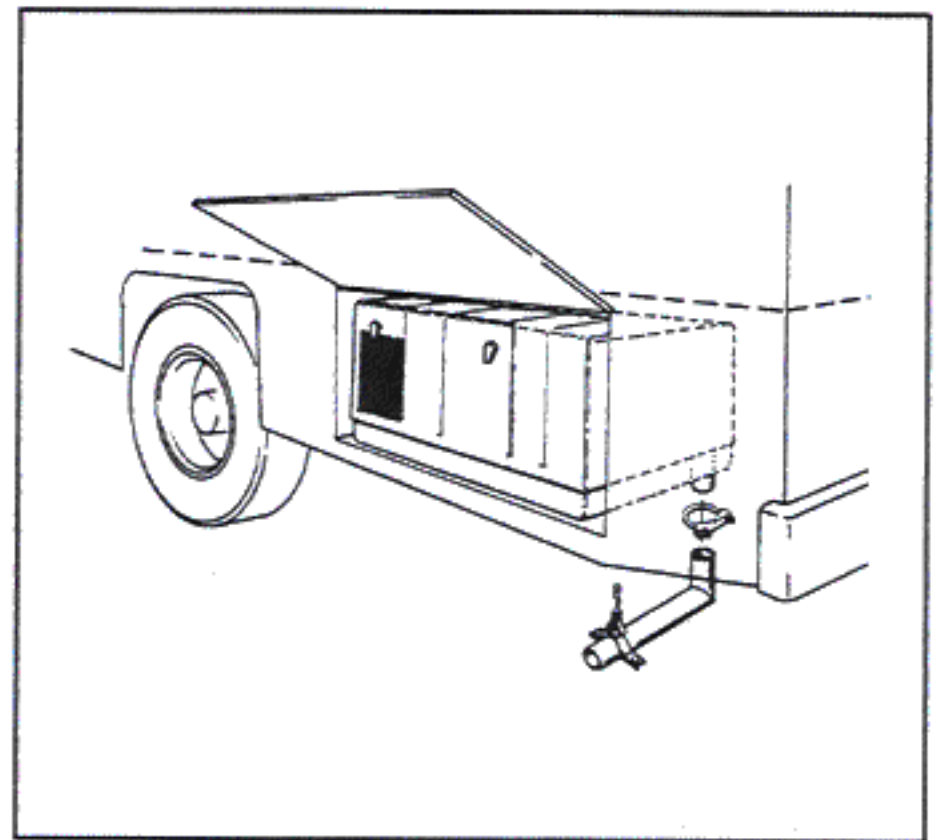


FIGURE 5. TYPICAL TAILPIPE INSTALLATION

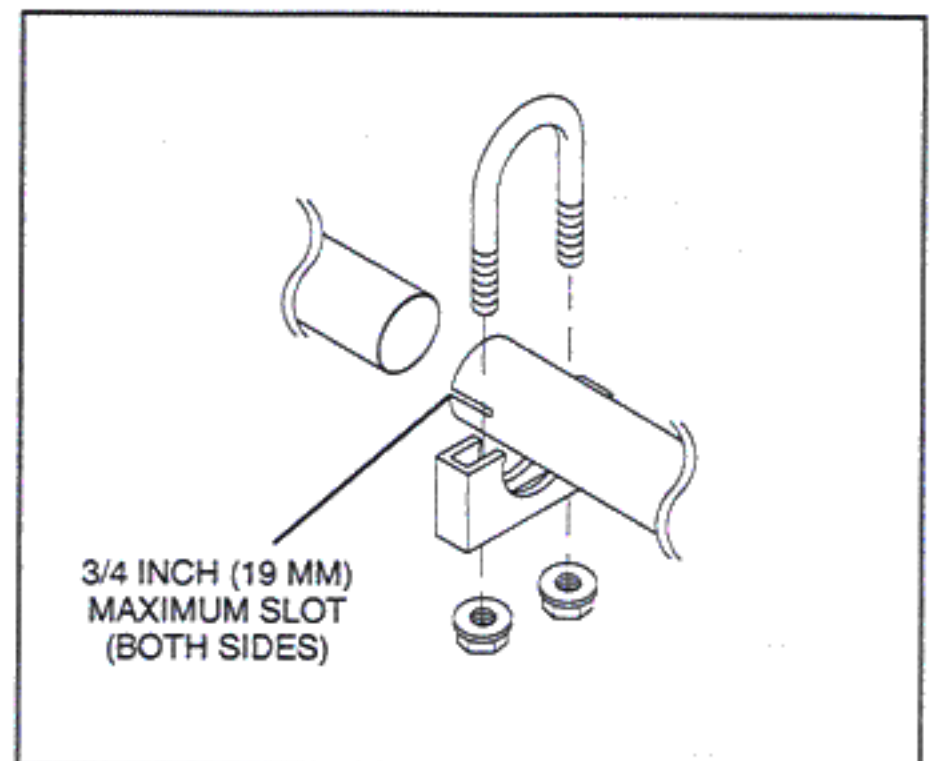


FIGURE 6. EXHAUST TAILPIPE CONNECTIONS

4. Do not route the tail pipe near fuel lines or fuel tanks.
5. Do not route the tailpipe closer than 3 inches (76 mm) to combustible material (wood, felt, cotton, organic fibers, etc.) unless it is insulated or shielded. The temperature rise (above ambient) on adjacent combustible material must not exceed 117°F (65°C).
6. Do not route the exhaust tailpipe underneath the oil drain or such that it will restrict the air outlet.

⚠ WARNING *A hot exhaust tailpipe can ignite oil drain spills causing severe personal injury or death. Do not route the exhaust tailpipe underneath the oil drain.*

7. To keep the tailpipe from being damaged, do not route it such that it protrudes into the approach or departure angles of the vehicle or below the axle clearance line (Figure 7).
8. Do not interconnect genset and vehicle engine exhaust systems.

⚠ CAUTION *Interconnecting engine exhaust systems will lead to migration of exhaust condensate and soot into the idle engine, causing damage.*

9. Do not terminate the tailpipe underneath the vehicle. Extend it a minimum of 1 inch (25 mm) beyond the perimeter of the vehicle (Figure 8). *Support the end of the tailpipe such that it cannot be pushed in and up under the skirt of the vehicle.*
10. Do not terminate the tailpipe such that it is closer than 6 inches (153 mm) to any opening, such as a door, window, vent or unsealed compartment, into the vehicle interior (Figure 9).
11. Make sure a tailpipe deflector will not cause excessive back pressure.

⚠ CAUTION *Excessive back pressure can cause engine damage.*

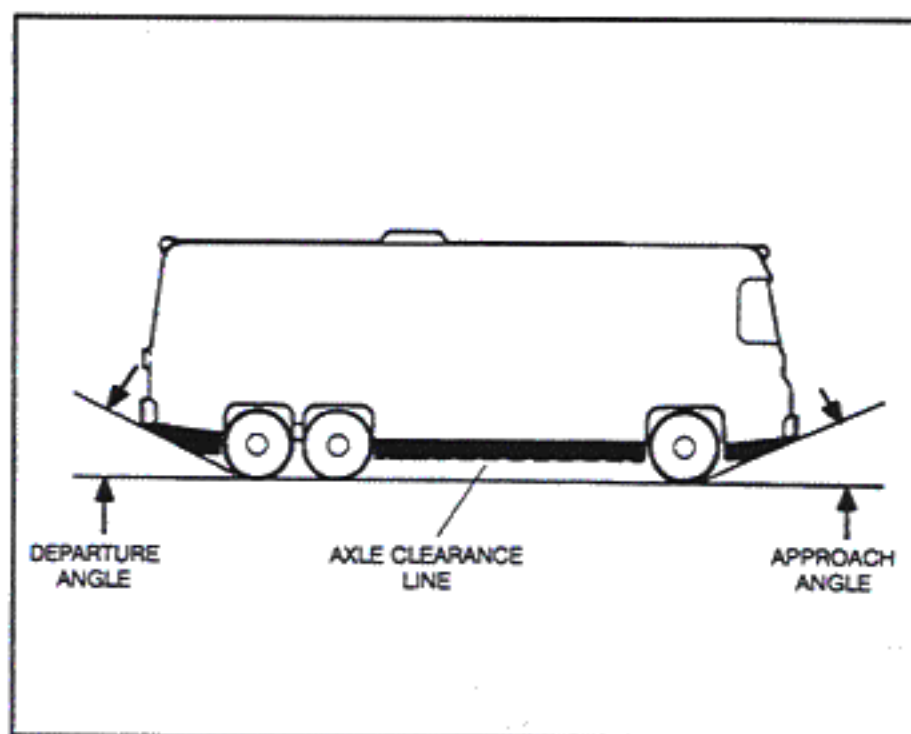


FIGURE 7. VEHICLE CLEARANCES

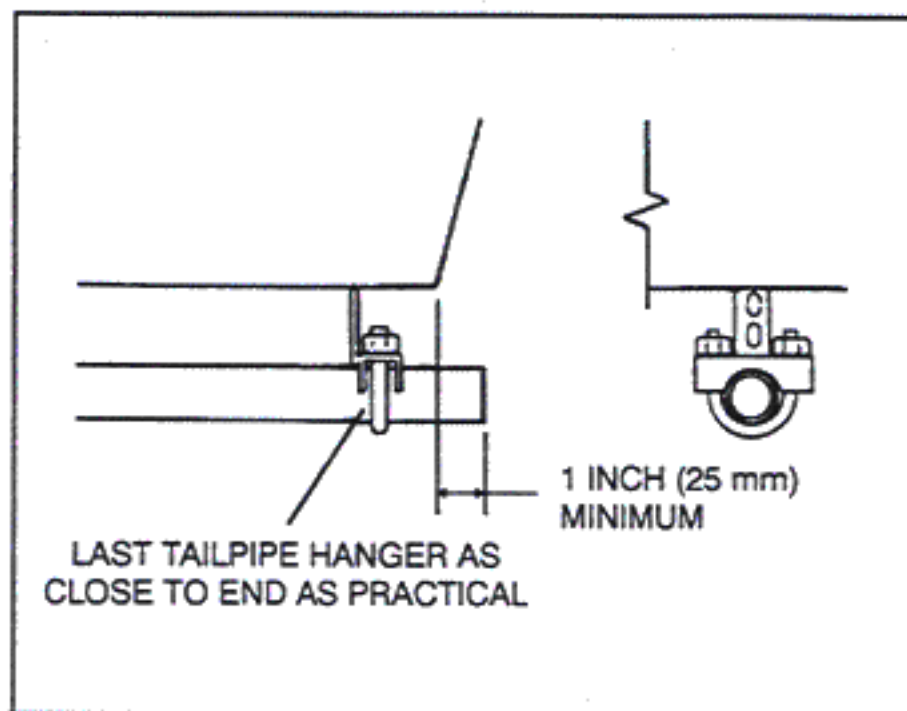


FIGURE 8. TERMINATING THE EXHAUST TAILPIPE

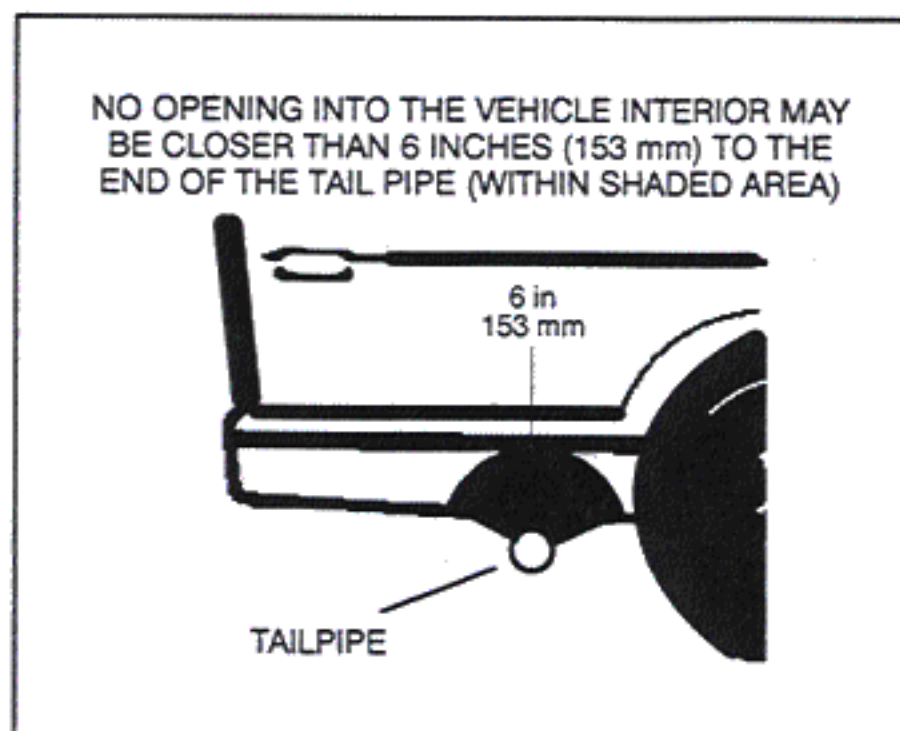


FIGURE 9. MINIMUM DISTANCES TO OPENINGS

Fuel Connections

See the Operator's Manual for recommended fuels and *Specifications* for fuel consumption rates.

⚠WARNING *Gasoline and LPG are flammable and explosive and can cause severe personal injury or death. Do not smoke or allow any flame, spark, pilot light, arc-producing equipment, switches or other ignition sources around fuel or fuel components, or in areas sharing ventilation. Keep an ABC fire extinguisher handy.*

GASOLINE

Onan recommends a separate fuel pickup tube or a separate fuel tank for the genset. The genset must never be connected to the **fuel supply line** of the vehicle engine—either to a high-pressure system (pump in tank), which can overpressurize the genset fuel system, or to a vacuum system (pump on engine), which can cause the genset to starve for fuel. Some vehicle chassis manufacturers allow connections to the **fuel return line** on high pressure fuel systems. Contact the vehicle chassis manufacturer for approval. Fuel line pressure at the point where the genset is connected must not exceed 1-1/2 psi under any condition.

⚠WARNING *Excessive fuel pressure can flood the genset causing a fire. Genset fuel supply line pressure must not exceed 1-1/2 psi under any condition.*

For separate fuel pickup tube installations:

1. Contact the vehicle chassis manufacturer regarding installation of the second fuel pickup. Do not change or remove the fuel fill tube, fill limiter vent, vapor canister, vapor lines, filler cap or any other part of the fuel system without the approval of the vehicle chassis manufacturer. Doing so could affect vehicle engine operation or vehicle emissions regulation compliance.
2. Terminate the genset pickup above the vehicle pickup to prevent the genset from running the vehicle out of fuel.

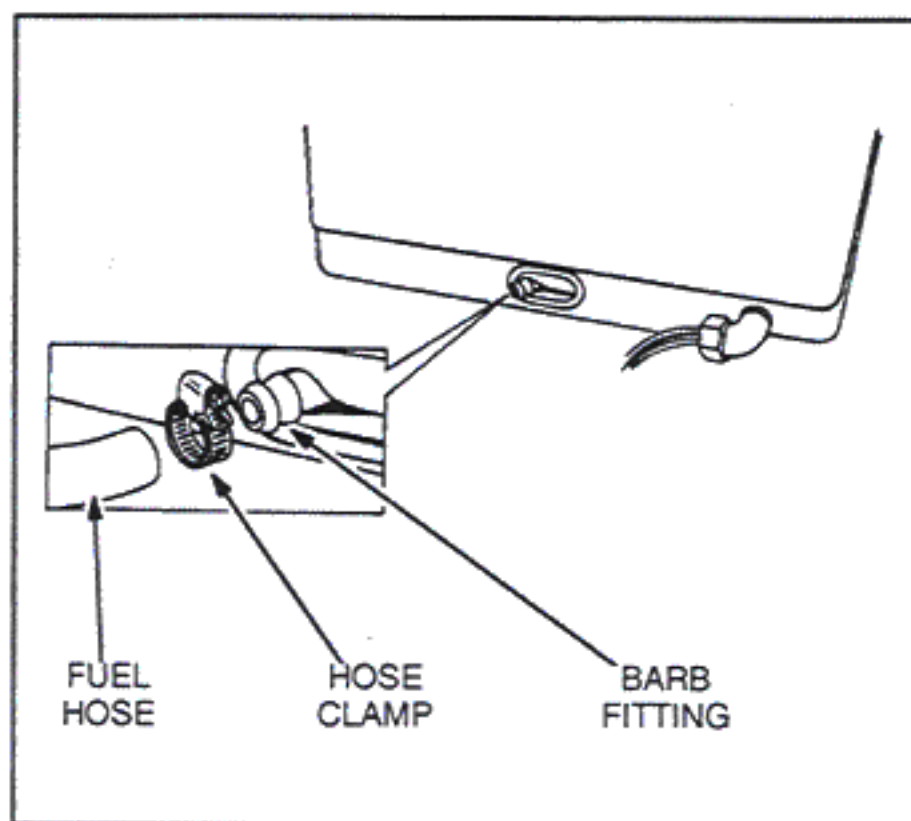


FIGURE 10. GASOLINE FUEL CONNECTION

Note: Federal standards for vehicle fuel tanks may require the installation of an automatic shutoff valve at the genset fuel tank pickup to prevent leakage in the event of a roll-over. Federal standards for vehicle impact, roll-over and emissions may also apply to a separate genset fuel tank. Check with the vehicle chassis manufacture regarding these standards.

For long runs use copper or hot dip coated seamless steel tubing (ASTM A-254) with double-flared fittings. See Figure 10 for the connection at the genset. Use 1/4 inch I. D. fuel hose (SAE 30-R7) and stainless steel hose clamps.

Run the fuel line at or above the top of the fuel tank to reduce the risk of siphoning fuel out of the tank if the line should break. The maximum fuel pump lift is 36 inches (914 mm).

Route gasoline fuel lines away from electrical wiring and hot engine exhaust components. (Heat can cause fuel vapor lock.) Fuel lines should be accessible for inspection and replacement, protected from damage and secured to prevent kinking, contact with sharp edges and chafing due to vibration.

⚠WARNING *Sparks can ignite gasoline, leading to severe personal injury or death. Do not run electrical wiring and fuel lines together. Separate them with conduit or tubing if run through the same opening. Do not tie them together.*

LPG

The Standard for the Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58) should be used as a guide for the installation of the LPG fuel system. Figure 11 illustrates a typical LPG fuel system.

⚠WARNING *LPG is flammable and explosive and can cause asphyxiation. NFPA 58, Section 1.6 requires all persons handling LPG to be trained in proper handling and operating procedures.*

Adjust the gas supply pressure (at the gas inlet of the pressure regulator) to at least 9 inches (229 mm) Water Column (WC). The pressure must not exceed 13 inches (330 mm) WC.

⚠WARNING *High LPG supply pressure can cause gas leaks which can lead to fire and severe personal injury or death. LPG supply pressure must be adjusted to Specifications by qualified personnel.*

Route LPG fuel lines away from electrical wiring and hot engine exhaust components. Fuel lines should be accessible for inspection and replacement, protected from damage and secured to prevent kinking, contact with sharp edges and chafing due to vibration.

⚠WARNING *Sparks can ignite LPG, leading to severe personal injury or death. Do not run electrical wiring and fuel lines together. Separate them with conduit or tubing if run through the same opening. Do not tie them together.*

Route the LPG vent hose (Figure 11) so that it vents to the outside.

⚠WARNING *LPG leaks from the vent hose can lead to explosive accumulations inside the genset compartment. Route the LPG vent hose so that it vents to the outside.*

For a long fuel line run, use seamless steel tubing with flared ends. Make flexible hose connections at the fuel tank and at the genset. Use 3/8-inch I.D. fuel line for runs up to 3 feet (0.9 m) and 1/2-inch I.D. up to 15 feet (4.6 m).

Do not connect the genset fuel supply line to any appliance fuel supply line. The genset can draw fuel away from other appliances and cause a flame out. To prevent the possibility of flameout, the fuel supply system must be designed to deliver sufficient fuel for normal operation of the genset and other appliances at the expected temperature conditions. It may be necessary to use a separate fuel tank for the genset if sufficient fuel cannot be supplied with a single tank system.

WARNING *The flameout of an unvented LPG appliance can lead to explosive accumulations of gas inside the vehicle and the danger of severe personal injury or death. Do not connect the genset fuel supply line to any vehicle appliance supply line.*

Upon completing the installation, fill the LPG tank and test every joint and fitting in the LPG supply system using an approved method, such as soap bubbles.

WARNING *Testing for gas leaks with a flame can cause a fire or explosion that could lead to severe personal injury or death. Use approved methods only.*

Because variations in fuel, altitude and ambient temperature affect performance, it might be necessary to make governor and fuel mixture adjustments once the genset has been installed. See the Service Manual.

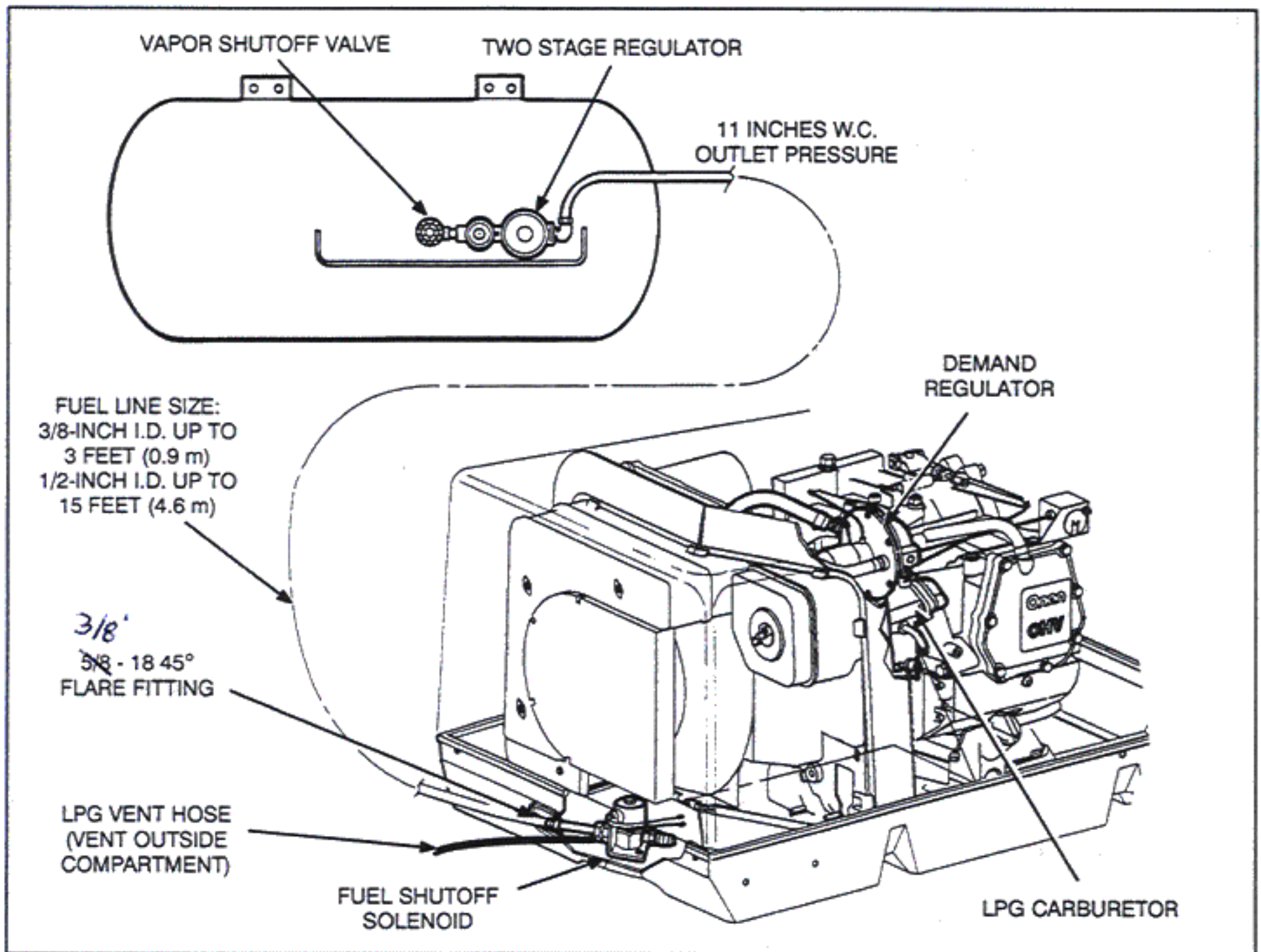


FIGURE 11. TYPICAL LPG VAPOR WITHDRAWAL FUEL SYSTEM

Electrical Connections

Do not connect the battery cables to the battery until *Installation Review and Startup* (Page 20) to prevent accidental starting of the genset during installation.

⚠WARNING *Accidental starting of the genset can cause severe personal injury or death. Do not connect the starting battery until Installation Review and Startup (Page 20).*

GENERATOR CONNECTIONS

The genset is equipped with 126 inch (3.2 m) long AC power output leads which exit through a 1/2 inch trade size conduit connector (Figure 12). See Figure 13 for typical connections. *If these leads must be replaced by longer leads, make sure their ampacity, as determined by the appropriate chart in the National Electrical Code (NEC), is at least 115 percent of the amps marked on the genset circuit breaker. (Unless 125° C rated wiring is available, heavier gauge wiring may be required to obtain the required ampacity.)*

Wiring Methods

Follow the National Electrical Code, especially noting the following:

1. Have a qualified electrician supervise and inspect the installation of all AC wiring.
2. Install vibration-proof switches and controls that won't open and close circuits when the vehicle is in motion.
3. Provide ground fault circuit interrupters (GFCIs) for all convenience power receptacles.
4. Route AC wiring, remote control wiring and fuel lines separately.
5. Seal all conduit openings into the vehicle interior to keep out exhaust gas. Apply silicone rubber or an equivalent type of sealant inside and outside each conduit connector. (Flexible conduit is not vapor-tight and will allow exhaust gas to enter along the wires if not sealed.)

⚠WARNING *EXHAUST GAS IS DEADLY! Seal all wiring openings into the vehicle interior to keep out exhaust gas.*

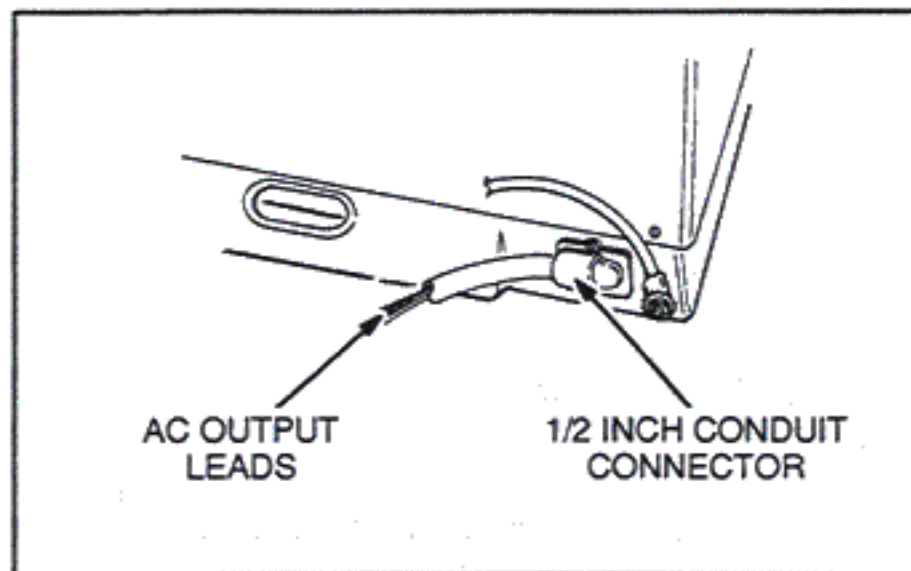


FIGURE 12. AC OUTPUT LEADS AND CONDUIT

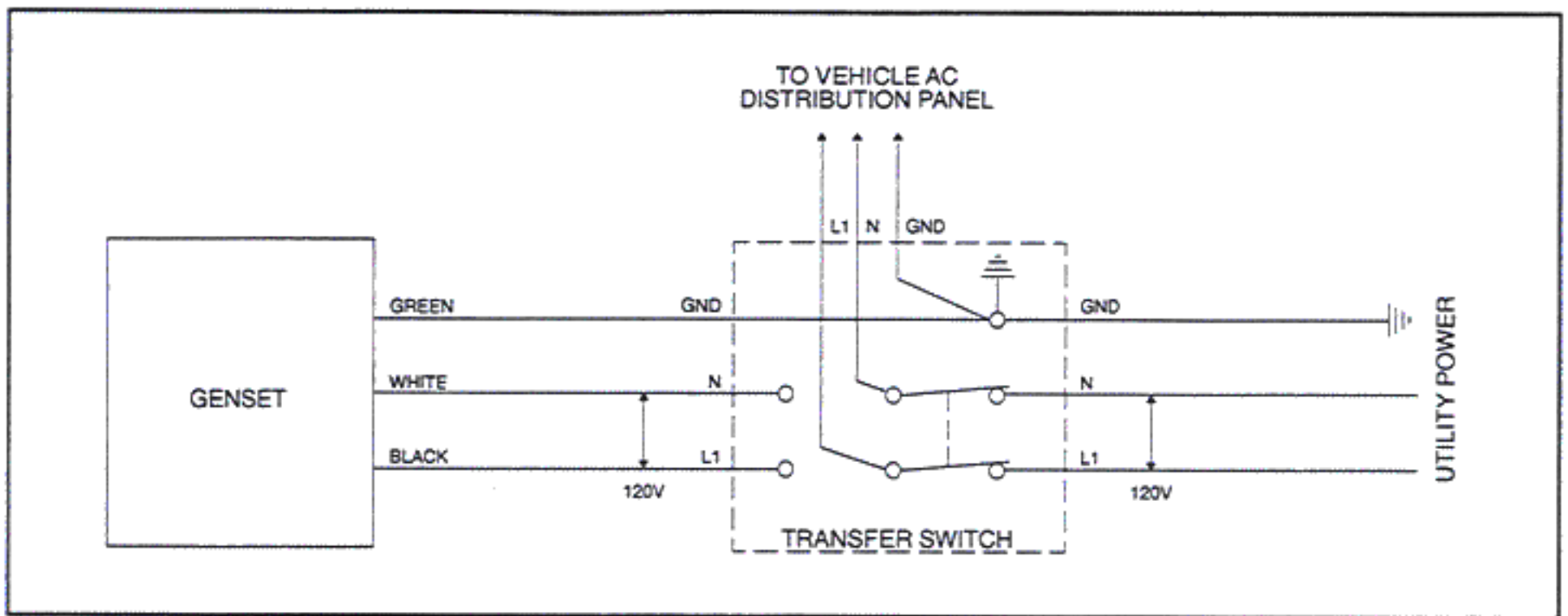


FIGURE 13. TYPICAL CONNECTIONS WITH TRANSFER SWITCH AND UTILITY

6. Bond the genset and all connected AC and DC equipment and controls to a common grounding point in accordance with applicable codes.

⚠WARNING *Faulty grounding can lead to fire and electrocution, resulting in severe personal injury or death. Grounding must be in accordance with applicable codes.*

Connecting the Vehicle to Utility Power

When the vehicle has provision for connecting utility power it must have an approved device to keep the genset and utility from being interconnected. See Figure 13 for typical connections.

⚠WARNING *Interconnecting the genset and the public utility (or any other power source) can lead to the electrocution of personnel working on the utility lines, damage to equipment and fire. An approved switching device must be used to prevent interconnections.*

Genset Reconnections

Some models are reconnectable for the required voltage in accordance with the appropriate reconnection diagram (Page 27). Remove the control panel for access to the generator leads and circuit breaker terminals.

Check voltage after reconnections and adjust no-load voltage as necessary with the adjustment pot on the control panel (Figure 14).

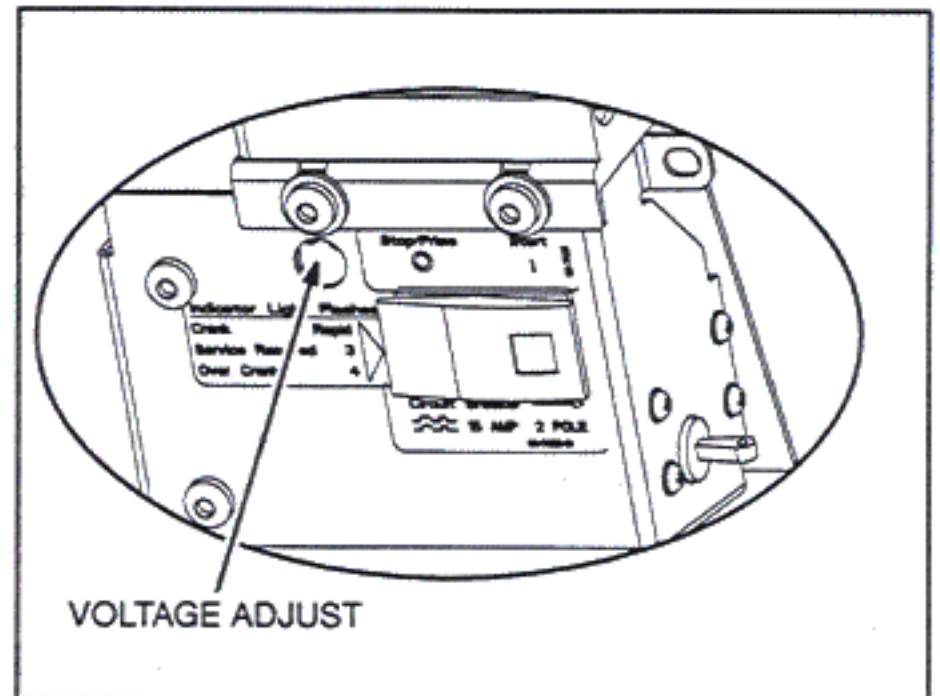


FIGURE 14. AC VOLTAGE ADJUST

REMOTE CONTROL CONNECTIONS

Onan offers three varieties of remote control panel:

- Remote start/stop switch with status indicator light only (Figure 15).
- Remote start/stop switch with status indicator light and hour meter (Figure 16).
- Remote start/stop switch with status indicator light and DC voltmeter (Figure 17).

The genset has an 8-pin connector for remote control connections (Figure 18). Remote control wiring harnesses in several lengths are available separately. To make connections to a remote control panel:

1. Push the remote control wire harness connector through the entrance hole in the side of the genset housing and snap it together with the genset connector. If the wiring harness is made up by others, insulated 18 AWG copper conductors should be used for distances up to 30 feet (9 metres) and heavier gauge conductors for distances that are greater. Use flexible sheathing to protect remote control wiring. Figure 19 is a schematic of typical remote control connections. It identifies the function of each connector pin number. The remote panel end of each lead should be marked to identify the connector pin number.
2. Route control leads separately from AC power leads to reduce the possibility of erratic operation due to false induced signals.
3. Seal the opening where the leads enter the vehicle interior with silicone rubber or an equivalent type of sealant to keep out exhaust gas.

⚠ WARNING EXHAUST GAS IS DEADLY!
Seal all wiring openings into the vehicle interior to keep out exhaust gas.

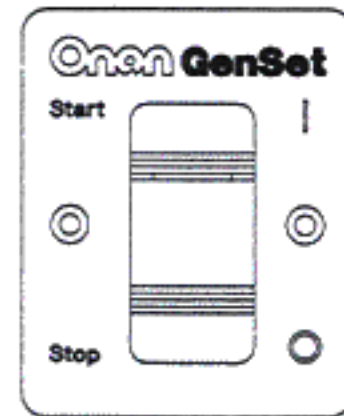


FIGURE 15. REMOTE CONTROL

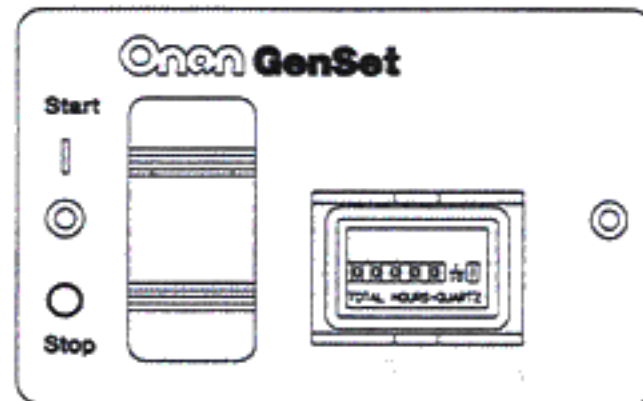


FIGURE 16. REMOTE CONTROL / HOUR METER

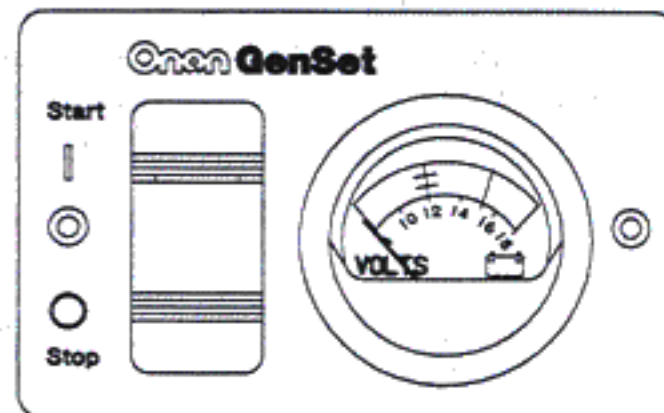


FIGURE 17. REMOTE CONTROL / DC VOLTMETER

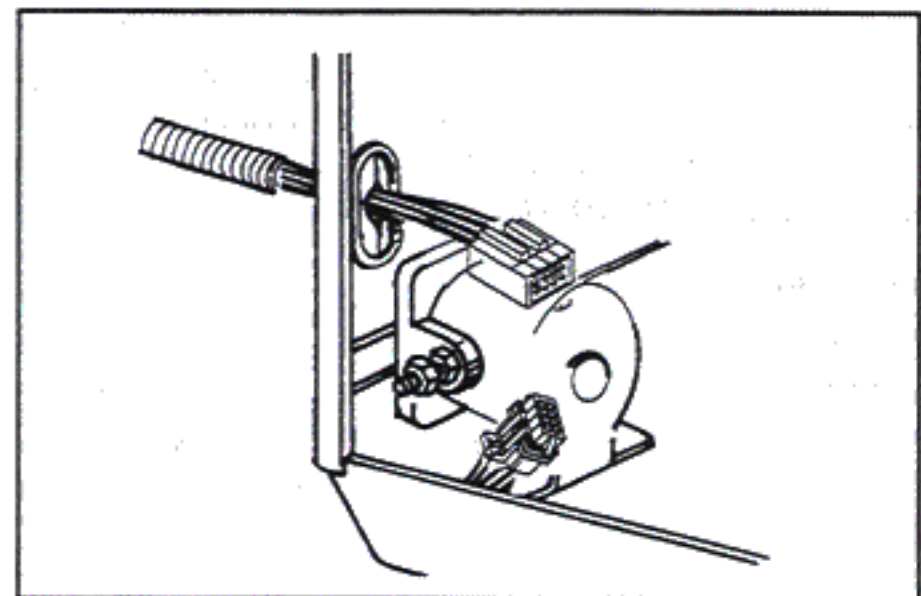


FIGURE 18. REMOTE CONTROL CONNECTOR

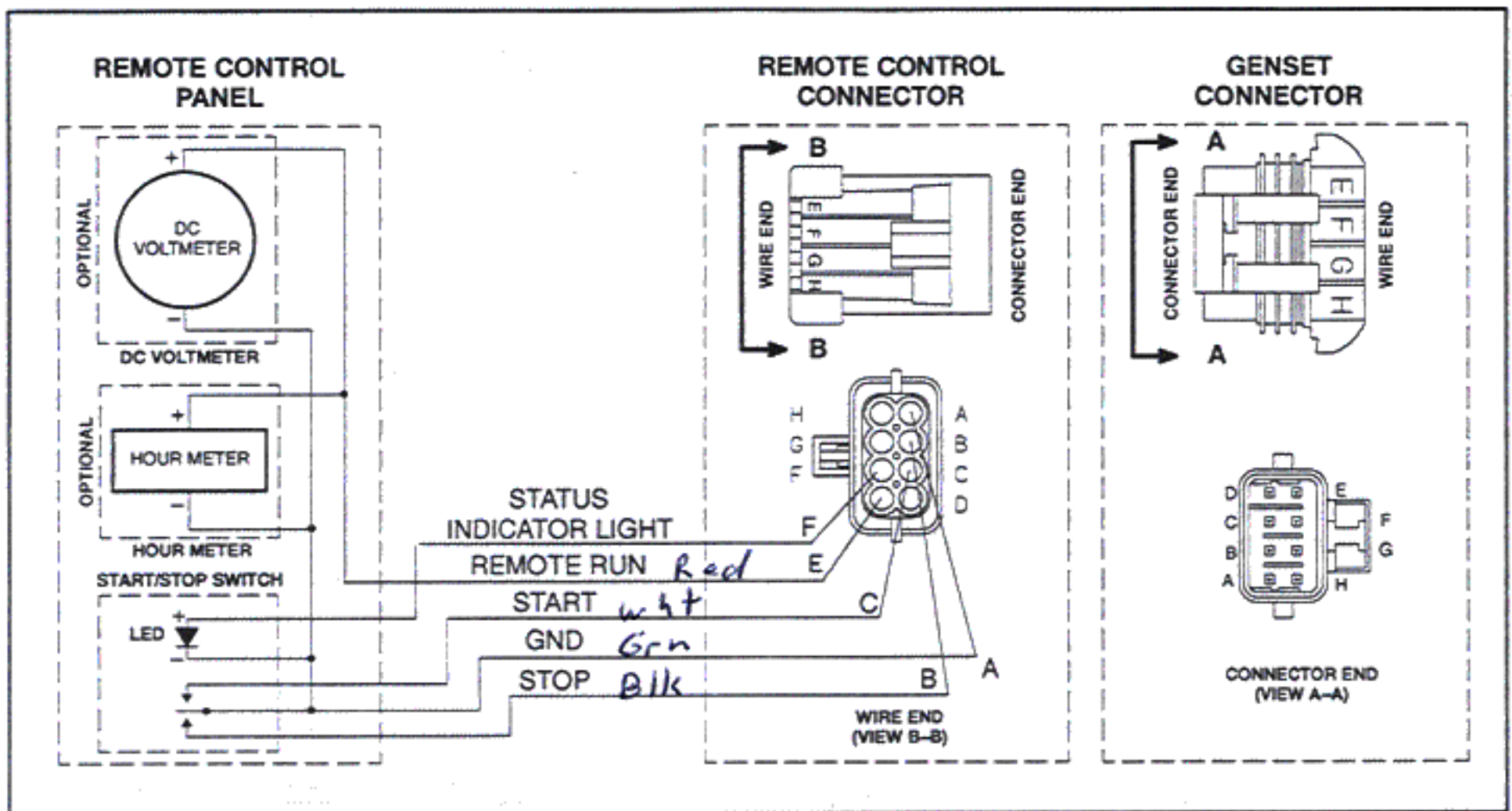


FIGURE 19. SCHEMATIC OF TYPICAL REMOTE CONTROL CONNECTIONS

BATTERY CONNECTIONS

Do not connect the battery cables to the battery until *Installation Review and Startup* (Page 20) to prevent accidental starting of the genset during installation.

⚠ WARNING *Accidental starting of the genset can cause severe personal injury or death. Do not connect the starting battery until Installation Review and Startup (Page 20).*

The genset has a 12 VDC, negative-ground engine control and cranking system. See *Specifications* for the requirements for cranking batteries.

Battery Compartment

Batteries must be mounted in a separate compartment from that of the genset and away from spark-producing equipment. A compartment must have openings of at least 1.7 square inches (11 square centimetres) at the top and bottom for ventilation of battery gasses. It should be mounted such that spills and leaks will not drip acid on fuel lines, wiring and other equipment that could be damaged.

⚠ WARNING *Arcing can ignite the explosive hydrogen gas given off by the battery, causing severe personal injury. The battery compartment must be ventilated and must isolate the battery from spark-producing equipment.*

Battery Cables

Size battery cables according to Table 2. The current path between the genset and the negative (-) battery terminal must also be able to carry full cranking current without causing excessive voltage drop. It is highly recommended that a full-length cable be used to connect the genset to the negative (-) battery terminal (Figure 20). Note also that codes may require bonding conductors from the genset and the battery to the vehicle frame.

If a full-length negative (-) cable is not run from the battery (Figure 21), all vehicle frame members in the path of battery cranking currents must have substantial crosssections. The electrical resistance of riveted or bolted frame joints must also be carefully considered, especially if the joints will be exposed to corrosive conditions. A cable must be used to connect the frame to the designated negative (-) terminal on the genset (Figure 21). The cable must be sized according to Table 2. **The genset mounting bolts are not considered adequate means for bonding the genset to the vehicle frame, either for the purpose of carrying cranking currents or for complying with requirements for genset/system grounding.**

Route battery cables away from fuel lines and hot engine exhaust components. Battery cables should be accessible for inspection and replacement, protected from damage and secured to prevent chafing due to vibration.

⚠ WARNING Routing battery cables with fuel lines can lead to fire and severe personal injury or death. Keep battery cables away from fuel lines.

Terminate the battery cables with appropriately sized eyelet connectors and connect them to the genset as shown in Figure 22.

TABLE 2. BATTERY CABLE SIZES FOR TEMPERATURES DOWN TO -20° F (-29° C)

TOTAL CABLE LENGTH* FEET (METERS)	CABLE SIZE AWG
0 to 10 (0 to 3)	2**
11 to 15 (3 to 4.5)	0
16 to 20 (4.5 to 6)	000

* - Add the negative battery cable lengths with the positive battery cable lengths for the total.
 ** - A total length of up to 20 feet (6 meters) may be used in warmer climates or when battery capacity totals at least 1000 CCA (Cold Cranking Amps).

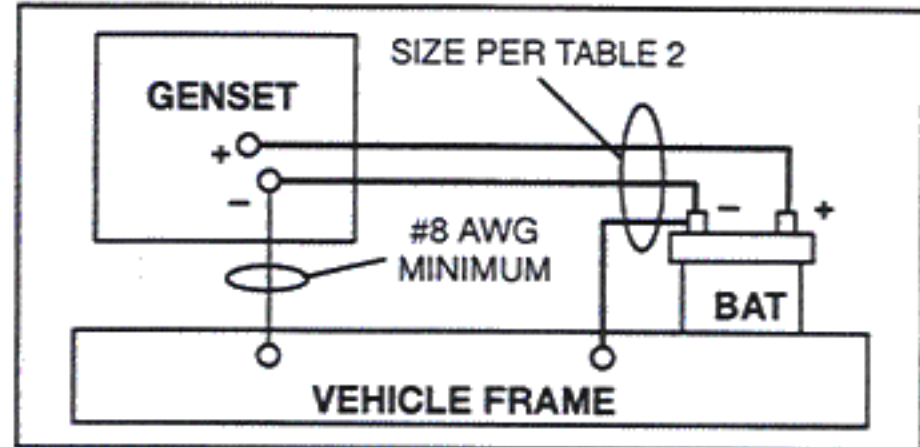


FIGURE 20. FULL-LENGTH CABLE FROM BATTERY NEGATIVE (-) TERMINAL

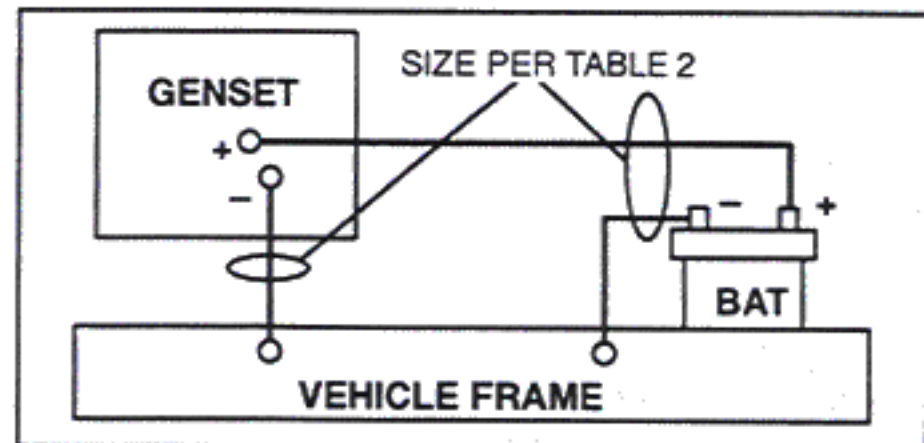


FIGURE 21. VEHICLE FRAME AS PATH FROM BATTERY NEGATIVE (-) TERMINAL

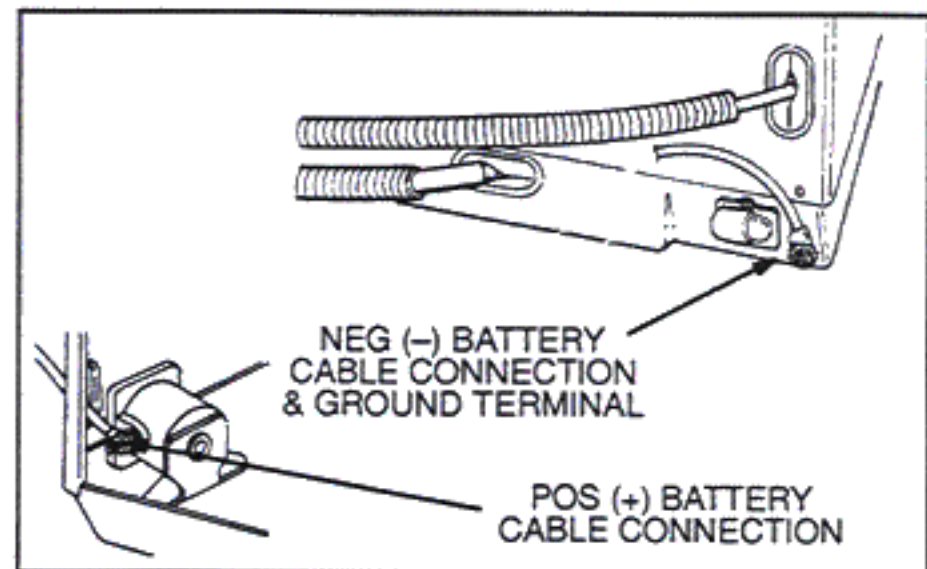


FIGURE 22. BATTERY CABLE CONNECTIONS

Specifications

	GASOLINE MODELS		LPG MODELS	
	4KY	3.6KY	3.6KY	3.3KY
GENERATOR: 2-Pole Revolving Field, Self-Excited, 1-Phase, Microprocessor Regulated				
Power	4000 watts	3600 watts	3600 watts	3300 watts
Frequency	60 Hertz	50 Hertz	60 Hertz	50 Hertz
Voltage	120 volts ¹	230 volts ^{1, 2}	120 volts	230 volts ²
Current	33.3 amperes	15.7 amperes	30 amperes	14.3 amperes
Speed	3600 rpm	3000 rpm	3600 rpm	3000 rpm
FUEL CONSUMPTION:				
No load	0.29 gph (1.1 l/h)	0.21 gph (0.79l/h)	1.5 lbs/h (0.7 kg/h)	1.1 lbs/h (0.5 kg/h)
Half load	0.48 gph (1.8 l/h)	0.37 gph (1.4 l/h)	2.2 lbs/h (1.0 kg/h)	2.0 lbs/h (0.9 kg/h)
Full load	0.71 gph (2.7 l/h)	0.58 gph (2.2 l/h)	3.3 lbs/h (1.5 kg/h)	2.9 lbs/h (1.3 kg/h)
ENGINE: 1-Cylinder, 4-Stroke Cycle, Spark-Ignited, OHV, Air Cooled, Mechanically Governed				
Bore	3.11 inch (79 mm)		3.11 inch (79 mm)	
Stroke	2.44 inch (62 mm)		2.44 inch (62 mm)	
Displacement	18.5 inch ³ (304 cc)		18.5 inch ³ (304 cc)	
Compression Ratio	8.5 : 1		8.5 : 1	
Oil Capacity	1.6 quart (1.5 l)		1.6 quart (1.5 l)	
Intake Valve Lash (Cold)	0.002 inch (0.05 mm)		0.002 inch (0.05 mm)	
Exhaust Valve Lash (Cold)	0.002 inch (0.05 mm)		0.002 inch (0.05 mm)	
Spark Plug Tightening Torque	13 lbs-ft (17 N-m)		13 lbs-ft (17 N-m)	
Ignition Timing (magneto)	25° BTDC, non-adjustable		25° BTDC, non-adjustable	
Magneto Air Gap	0.009-0.015 inch (0.23-0.38 mm)		0.009-0.015 inch (0.23-0.38 mm)	
Spark Plug Gap	0.025 inch (0.64 mm)		0.020 inch (0.51 mm)	
DC SYSTEM:				
Nominal Battery Voltage	12 volts		12 volts	
Min. Battery Rating: Cold Cranking Amps (CCA) @ 0° F (-18° C)	450		450	
Battery Charging Current	-	10 amp (regulated)	-	10 amp (regulated)
INSTALLATION:				
Weight (with engine oil)	174 pounds (79 Kg)	184 pounds (84 Kg)	174 pounds (79 Kg)	184 pounds (84 Kg)
Minimum Compartment Size (H x D x W) ³	14.4 inch x 20 inch x 30.5 inch (366 mm x 508 mm x 775 mm)		14.4 inch x 20 inch x 30.5 inch (366 mm x 508 mm x 775 mm)	
Minimum Free Air Inlet Area	40 inch ² (258 cm ²)		40 inch ² (258 cm ²)	
Muffler Outlet Collar O. D.	1.13 inch		1.13 inch	
Fuel Connection	1/4 inch barb fitting for gasoline hose		5/8-18UNC, SAE 45° Flare Fitting	
LPG Vapor Supply Pressure	-		9-13 inch (228-330 mm) Water Column (WC)	
1. Also available for 100 volts, with grounded or isolated neutral. 2. Reconnectable. See the Installation Manual. 3. See the Installation Manual for additional considerations when sizing the genset compartment.				

Installation Review and Startup

INSTALLATION REVIEW

Before starting the genset inspect the installation and check (✓) each of the following questions if it can be answered "YES". If an item cannot be checked, provision must be made to satisfy the requirement.

- Is the control panel on the genset easily accessible for starting and stopping the genset and resetting the circuit breaker?
- Is there easy access for checking and adding engine oil, replacing the spark plug and changing the air filter?
- Is the genset securely bolted in place?
- Are all specified clearances provided?
- Are the air inlet and outlet openings free of obstructions?
- Is there access for draining engine oil?
- Are all tailpipe connections tight and all hangers and support straps secure?
- Does the tailpipe terminate at least 1 inch (25 mm) beyond the perimeter of the vehicle and at least 6 inches (153 mm) away from any opening into the vehicle?
- Is the genset located outside the vehicle interior or separated by approved vapor-tight and fire-resistant materials?
- Are all openings into the vehicle, such as for AC wiring, sealed to keep out engine exhaust? Are AC conduit connectors sealed inside and outside?
- Have all AC connections been inspected and approved?
- Has a properly sized battery(ies) been installed in a ventilated compartment isolated from the genset?

- Have properly sized battery cables been installed and secured at sufficient intervals to prevent chaffing and contact with sharp edges, fuel lines and hot exhaust parts?
- Are all fuel connections tight?
- Has the fuel line been secured at sufficient intervals to prevent chaffing and contact with sharp edges, electrical wiring and hot exhaust parts?

STARTUP

When all the items on the Installation Review check list have been checked, connect the battery cables to the battery, positive (+) cable first.

⚠ WARNING *Batteries give off explosive gases that can cause severe personal injury. Do not smoke near batteries. Keep flames, sparks, pilot lights, electrical arcs and arc-producing equipment and all other ignition sources well away.*

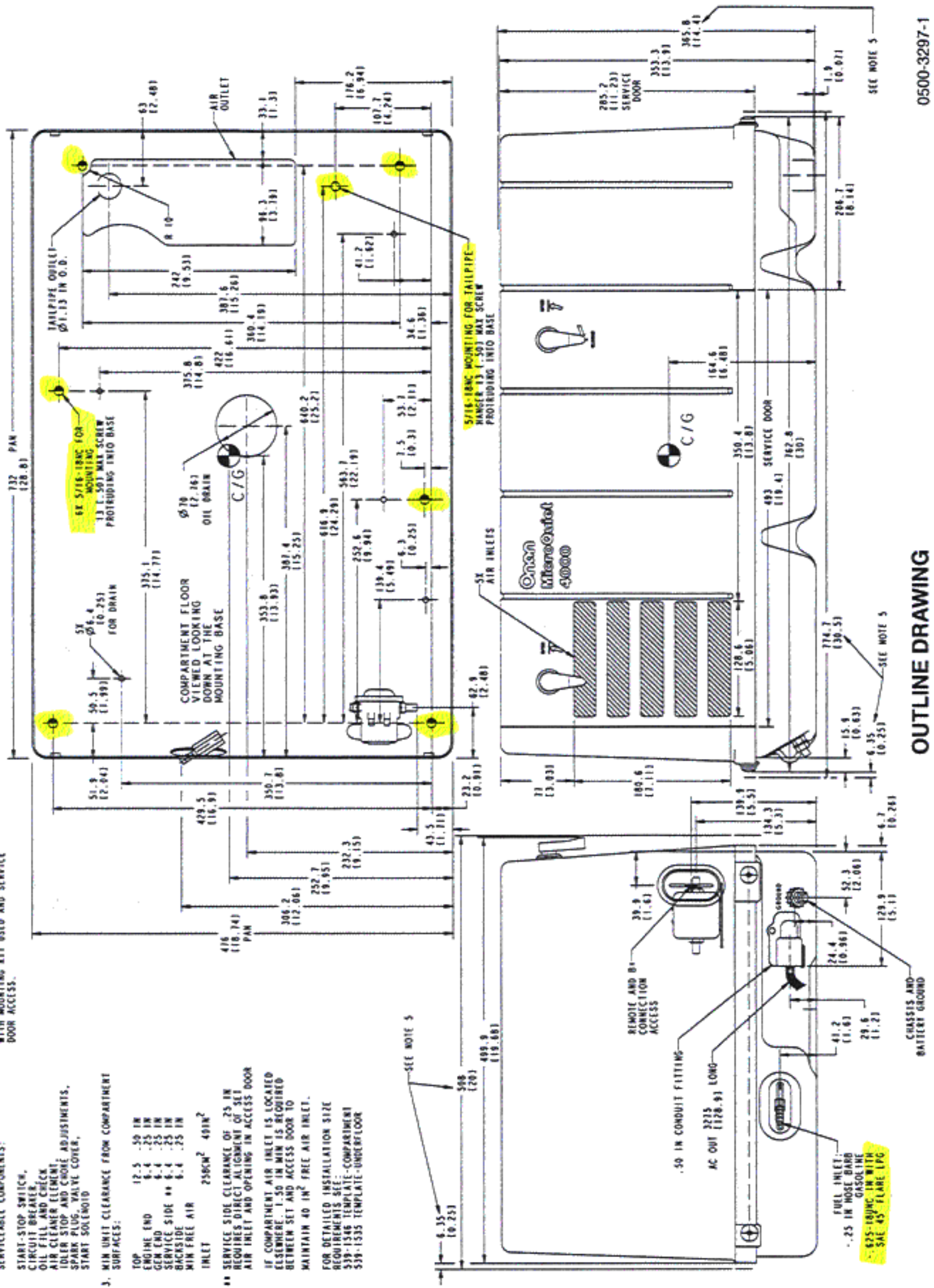
Read the Operator's Manual and perform the maintenance and pre-start checks instructed. **The genset is shipped from the factory with the proper level of engine oil, which should nevertheless be checked before the genset is started.** Start and operate the genset, following all the instructions and safety precautions in the Operator's Manual.

⚠ WARNING *EXHAUST GAS IS DEADLY! Do not operate the genset when the vehicle is indoors or where exhaust can accumulate.*

Check for fuel and exhaust leaks and unusual noises while the genset is running under full and intermediate loads. Do not place the genset in service until all fuel and exhaust leaks have been fixed and operation is satisfactory.

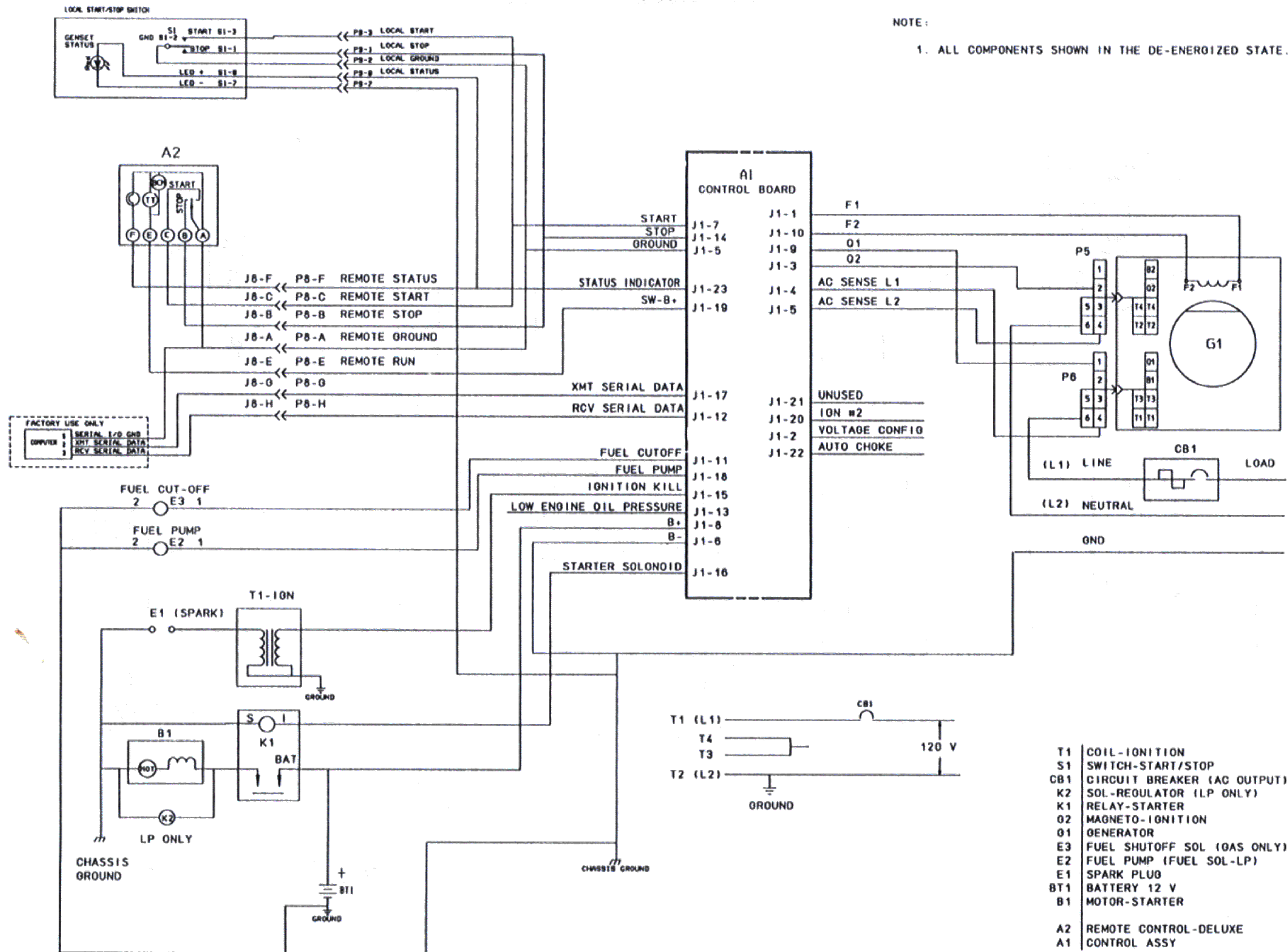
NOTES:

1. PRIMARY DIMENSIONS ARE MILLIMETERS.
60 HZ 79 KG 174 LBS
50 HZ 84 KG 184 LBS
2. COMPARTMENT ACCESS SHALL ALLOW REMOVAL AND REPLACEMENT OF SERVICE DOOR AND ACCESS TO THE FOLLOWING SERVICEABLE COMPONENTS:
START-STOP SWITCH,
CIRCUIT BREAKER,
OIL FILL AND CHECK,
AIR CLEANER ELEMENT,
IDLER STOP AND CHROME ADJUSTMENTS,
SPARK PLUG VALVE COVER,
START SOLENOID
3. MIN UNIT CLEARANCE FROM COMPARTMENT SURFACES:
TOP 12.5 - 50 IN
ENGINE END 6.4 - 25 IN
GEN END 6.4 - 25 IN
SERVICE SIDE ** 6.4 - 25 IN
BACKSIDE 6.4 - 25 IN
MIN FREE AIR INLET 250CM² 49IN²
** SERVICE SIDE CLEARANCE OF .25 IN REQUIRES DIRECT ALIGNMENT OF SET AIR INLET AND OPENING IN ACCESS DOOR
IF COMPARTMENT AIR INLET IS LOCATED ELSEWHERE, 1.50 IN MIN IS REQUIRED BETWEEN SET AND ACCESS DOOR TO MAINTAIN 40 IN² FREE AIR INLET.
FOR DETAILED INSTALLATION SIZE REQUIREMENTS SEE:
538-1545 TEMPLATE-COMPARTMENT
538-1535 TEMPLATE-UNDERFLOOR
4. UNIT WEIGHT WITH OIL:
60 HZ 79 KG 174 LBS
50 HZ 84 KG 184 LBS
5. MINIMUM INSTALLATION SIZE IS 14.4 X 20 X 30.5 INCHES AND VARIES WITH MOUNTING KIT USED AND SERVICE DOOR ACCESS.



OUTLINE DRAWING

0500-3297-1



WIRING DIAGRAM—60 HZ